**** WARNING ** WARNING ** WARNING ** WARNING ****
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Seismic Retrofit Project

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

AND

SPECIAL PROVISIONS

FOR CONSTRUCTION ON STATE HIGHWAY IN

THE CITY AND COUNTY OF SAN FRANCISCO FROM FIFTH STREET

TO SAN FRANCISCO-OAKLAND BAY BRIDGE

DISTRICT 04, ROUTE 80

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

CONTRACT NO. 04-0435V4

INFORMAL BIDS CONTRACT

04-SF-80-4.9/5.9

Bids Open: October 22, 2002
Dated: July 15, 2002

OSD

****

IMPORTANT SPECIAL NOTICES

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

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

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

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

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

  The DVBE information shall include all DVBE partners.

  It is anticipated that this contract will be awarded within **20 days after bid opening**.

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

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

  The contract shall be signed by the successful bidder and shall be received with contract bonds by the Division of Office Engineer within **4 days**, not including Saturdays, Sundays and legal holidays, after the bidder has received notice that the contract has been awarded. (See Section 3 of the special provisions.)

If properly executed by the bidder, it is anticipated the contract will be approved within 24 hours of when the executed contract and contract bonds are received by the Department.

- The Contractor shall begin work within 5 calendar days after receiving notice that the contract has been approved. The contract work shall be completed before the expiration of **1945 WORKING DAYS** beginning at **12:01 a.m. on the DAY AFTER THE DAY OF CONTRACT AWARD.** The definition of a working day has been re-defined for this project. (See Section 4 of the special provisions.)

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

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

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

TABLE OF CONTENTS

NOTICE TO CONTRACTORS 1
COPY OF ENGINEER'S ESTIMATE 3
SPECIAL PROVISIONS 19
SECTION 1. SPECIFICATIONS AND PLANS 19
SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS 19
2-1.01 GENERAL 19
2-1.02 DISABLED VETERAN BUSINESS ENTERPRISE (DVBE) 19
2-1.03 DVBE GOAL FOR THIS PROJECT 20
2-1.04 SUBMISSION OF DVBE INFORMATION 21
2-1.05 SMALL BUSINESS PREFERENCE 21
2-1.06 CALIFORNIA COMPANY PREFERENCE 22
2-1.07 ESCROW OF BID DOCUMENTATION 22
SECTION 3. AWARD AND EXECUTION OF CONTRACT 24
SECTION 4. BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES 25
SECTION 5. GENERAL 26
SECTION 5-1. MISCELLANEOUS 26
5-1.00 PLANS AND WORKING DRAWINGS 26
5-1.002 LABORATORY 26
5-1.003 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK 26
5-1.004 DIFFERING SITE CONDITIONS 26
5-1.005 CONTRACT BONDS 26
5-1.006 EXCAVATION SAFETY PLANS 27
5-1.007 COST REDUCTION INCENTIVE 27
5-1.008 LINES AND GRADES 27
5-1.01 LABOR NONDISCRIMINATION 27
5-1.02 LABOR CODE REQUIREMENTS 28
5-1.03 CONTRACTOR'S LICENSING LAWS 30
5-1.035 INDEMNIFICATION AND INSURANCE 30
5-1.04 ARBITRATION 33
5-1.05 NOTICE OF POTENTIAL CLAIM 33
5-1.06 PARTIAL PAYMENTS 34
5-1.07 PAYMENT OF WITHHELD FUNDS 34
5-1.08 FINAL PAYMENT AND CLAIMS 34
5-1.09 INTEREST ON PAYMENTS 36
5-1.10 PUBLIC SAFETY 36
5-1.11 TESTING 38
5-1.12 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES 38
5-1.13 FINAL PAY QUANTITIES 38
5-1.14 YEAR 2000 COMPLIANCE 38
5-1.15 SUBCONTRACTOR AND DVBE RECORDS 39
5-1.155 PERFORMANCE OF DVBE SUBCONTRACTORS AND SUPPLIERS 39
5-1.16 SUBCONTRACTING 39
5-1.162 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS 40
5-1.165 RECORDS 40
5-1.17 PARTNERING 40
5-1.174 VALUE ANALYSIS 41
5-1.18 DISPUTE REVIEW BOARD 41
5-1.19 FORCE ACCOUNT PAYMENT 53
5-1.20 CONTRACTOR-CONTROLLED INSURANCE PROGRAM (CCIP) 53
5-1.21 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS 55
5-1.22 PAYMENTS 56
5-1.23 PROJECT APPEARANCE 57
5-1.24 HAZARDOUS AND NON-HAZARDOUS MATERIAL, GENERAL 57
APPLICABLE RULES AND REGULATIONS 58

PERMITS AND LICENSES 58
HEALTH, SAFETY AND WORK PLAN 58
SAFETY TRAINING 58
SAMPLING AND ANALYSIS 58
MEASUREMENT AND PAYMENT 59
5-1.25 AREAS FOR CONTRACTOR'S USE 59
5-1.26 UTILITIES 59
5-1.27 SANITARY PROVISIONS 59
5-1.28 ACCESS TO PROJECT SITE 59
5-1.29 DRAWINGS 59
5-1.30 SOUND CONTROL REQUIREMENTS 62
5-1.31 RELATIONS WITH BAY AREA AIR QUALITY MANAGEMENT DISTRICT (ASBESTOS DEMOLITION/RENOVATION) 63
5-1.32 DEFINITIONS AND TERMS 63
Engineer 63
Office of Structure Design 63
5-1.33 PROPOSAL FORMS 63
5-1.34 PROPOSAL REQUIREMENTS AND CONDITIONS 63
Withdrawal of Proposals 64
5-1.35 CONTROL OF WORK 64
5-1.36 LEGAL RELATIONS AND RESPONSIBILITY 64
Hours of Labor 64
5-1.37 MEASUREMENT AND PAYMENT 67
Measurement of Quantities 67
SECTION 6. INCENTIVES AND DISINCENTIVES FOR COMPLETION OF DESIGNATED PORTIONS OF WORK 67
DESIGNATED PORTIONS OF WORK 67
INCENTIVES AND DISINCENTIVES 67
CONSTRUCTION MANAGEMENT PLAN FOR EXTENDED WEEKEND CLOSURE, PREPARATION, APPROVAL AND UPDATES 68
SECTION 7. (BLANK) 69
SECTION 8. MATERIALS 69
SECTION 8-1. MISCELLANEOUS 69
8-1.01 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS 69
CONICAL DELINEATORS, 42" 71
CONCRETE BARRIER DELINEATORS, 16" 72
CONCRETE BARRIER-MOUNTED MINI-DRUM (10" x 14" x 22") 72
8-1.02 STATE-FURNISHED MATERIALS 74
8-1.03 MISCELLANEOUS METAL 74
8-1.04 ENGINEERING FABRICS 76
SECTION 8-2. CONCRETE 76
8-2.01 PORTLAND CEMENT CONCRETE 76
8-2.02 CORROSION CONTROL FOR PORTLAND CEMENT CONCRETE 78
8-2.03 CEMENT AND WATER CONTENT 79
SECTION 8-3. WELDING 79
8-3.01 WELDING 79
General 79
Welding Quality Control 80
Payment 83
SECTION 9. DESCRIPTION OF BRIDGE WORK 83
SECTION 10. CONSTRUCTION DETAILS 85
SECTION 10-1. GENERAL 85
10-1.01 CONSTRUCTION PROJECT INFORMATION SIGNS 85
10-1.02 ORDER OF WORK 86
10-1.03 PHOTO IDENTIFICATION SYSTEM 88
10-1.04 SURVEY OF EXISTING NON-HIGHWAY FACILITIES 90
10-1.05 VIBRATION MONITORING 91
10-1.06 SEWER VIDEO SURVEY 95
SEWER VIDEO SURVEY LOCATIONS 95

SAFETY PROCEDURES 96
PRE-ENTRY AND CONFINED SPACE OPERATIONS 96
ADDITIONAL REQUIREMENTS 96
PAYMENT 97
10-1.07 SOLID WASTE DISPOSAL AND RECYCLING REPORT 97
10-1.08 WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN) 97
STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS 98
COST BREAK-DOWN 100
SWPPP IMPLEMENTATION 102
MAINTENANCE 103
REPORTING REQUIREMENTS 103
PAYMENT 103
10-1.09 NON-STORM WATER DISCHARGES. 105
DEWATERING, GENERAL 105
PILE DEWATERING 105
STOCKPILE DEWATERING 105
EXCAVATION DEWATERING 106
INSPECTION 106
SPILL CONTINGENCY 106
LIQUIDS, RESIDUES AND DEBRIS 106
MEASUREMENT AND PAYMENT 106
10-1.10 TEMPORARY COVER 106
MATERIALS 107
INSTALLATION 107
MEASUREMENT AND PAYMENT 107
10-1.11 TEMPORARY DRAINAGE INLET PROTECTION 107
MATERIALS 107
INSTALLATION AND MAINTENANCE 108
MEASUREMENT AND PAYMENT 109
10-1.12 TEMPORARY ENTRANCE/EXIT 109
MATERIALS 109
CONSTRUCTION 110
MAINTENANCE 110
PAYMENT 110
10-1.13 TEMPORARY CONCRETE WASHOUT FACILITY 110
MATERIALS 110
TEMPORARY CONCRETE WASHOUT FACILITY (TYPE ON GRADE) 111
MAINTENANCE AND REMOVAL 111
MEASUREMENT AND PAYMENT 111
10-1.14 TEMPORARY SILT FENCE 111
MATERIALS 112
INSTALLATION 112
MEASUREMENT AND PAYMENT 112
10-1.15 TEMPORARY SILT FENCE FABRIC ALONG CHAIN LINK FENCE 112
MATERIALS 112
INSTALLATION 113
MEASUREMENT AND PAYMENT 113
10-1.16 TEMPORARY CHAIN LINK FENCE AND CHAIN LINK GATE 113
10-1.17 PRESERVATION OF PROPERTY 114
10-1.18 TEMPORARY ROCK BAG BARRIER 114
MATERIALS 114
INSTALLATION 114
MEASUREMENT AND PAYMENT 115
10-1.19 COOPERATION 115
10-1.20 EMISSIONS REDUCTION INCENTIVE PROGRAM 116
10-1.21 ELECTRONIC MOBILE DAILY DIARY SYSTEM DATA DELIVERY 117
PAYMENT 121
10-1.22 INTERNET DAILY EXTRA WORK REPORT 121

10-1.23 PROGRESS SCHEDULE (CRITICAL PATH) 122
DEFINITIONS 122
PRECONSTRUCTION SCHEDULING CONFERENCE 123
INTERIM BASELINE SCHEDULE 123
BASELINE SCHEDULE 123
PROJECT SCHEDULE REPORTS 125
WEEKLY SCHEDULE MEETINGS 126
MONTHLY UPDATE SCHEDULES 126
SCHEDULE REVISIONS 127
SCHEDULE TIME ADJUSTMENTS 127
FINAL SCHEDULE UPDATE 128
EQUIPMENT AND SOFTWARE 128
PAYMENT 129
10-1.24 OVERHEAD 129
10-1.25 OBSTRUCTIONS 131
10-1.26 MOBILIZATION 132
10-1.27 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES 132
10-1.28 CONSTRUCTION AREA SIGNS 134
10-1.29 MAINTAINING TRAFFIC 135
10-1.30 CLOSURE REQUIREMENTS AND CONDITIONS 174
CLOSURE SCHEDULE 174
CONTINGENCY PLAN 174
LATE REOPENING OF CLOSURES 175
COMPENSATION 175
10-1.31 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE 175
STATIONARY LANE CLOSURE 176
MOVING LANE CLOSURE 176
PAYMENT 176
10-1.32 TEMPORARY PAVEMENT DELINEATION 177
GENERAL 177
TEMPORARY LANELINE AND CENTERLINE DELINEATION 177
TEMPORARY EDGELINE DELINEATION 178
TEMPORARY TRAFFIC STRIPE (PAINT) 178
TEMPORARY PAVEMENT MARKING (PAINT) 179
TEMPORARY PAVEMENT MARKERS 179
10-1.33 BARRICADE 180
10-1.34 PORTABLE CHANGEABLE MESSAGE SIGN 180
10-1.35 TEMPORARY RAILING 180
10-1.36 CHANNELIZER (SURFACE MOUNTED) 180
10-1.37 TEMPORARY TRAFFIC SCREEN 181
10-1.38 TEMPORARY CRASH CUSHION MODULE 181
10-1.39 EXISTING HIGHWAY FACILITIES 182
EXISTING PAINT SYSTEMS 183
ABANDON MANHOLE 186
ABANDON CULVERT 186
ABANDON INLET 187
REMOVE METAL BEAM GUARD RAILING 187
REMOVE SIGN STRUCTURE 187
REMOVE PAVEMENT MARKER 187
REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING 187
REMOVE DRAINAGE FACILITY 189
REMOVE ASPHALT CONCRETE DIKE 189
REMOVE ASPHALT CONCRETE 189
REMOVE ROADSIDE SIGN 189
REMOVE CHAIN LINK FENCE 189
REMOVE GATE 189
RESET ROADSIDE SIGN 189
REMOVE CRASH CUSHION 189
PLANE ASPHALT CONCRETE PAVEMENT 189

EXISTING HIGHWAY IRRIGATION FACILITIES....190
BRIDGE REMOVAL....191
REMOVE CONCRETE....194
REMOVE CONCRETE BARRIER....194
10-1.40 TEMPORARY SUPPORTS....195
TEMPORARY SUPPORT DESIGN AND DRAWINGS....195
TEMPORARY SUPPORT DESIGN CRITERIA....197
MANUFACTURED ASSEMBLIES....197
SPECIAL LOCATIONS....197
TEMPORARY SUPPORT CONSTRUCTION....198
REMOVING TEMPORARY SUPPORTS....198
PAYMENT....198
10-1.41 PROTECTIVE BARRIER....199
10-1.42 PIN COLUMN....200
10-1.43 CLEARING AND GRUBBING....200
10-1.44 EARTHWORK....200
HAZARDOUS AND NON-HAZARDOUS MATERIAL EXCAVATION....201
SOIL ANALYTICAL RESULTS....202
SOLDIER PILE WALL EARTHWORK....220
MEASUREMENT AND PAYMENT (EARTHWORK)....221
10-1.45 EARTH RETAINING STRUCTURES....221
EARTHWORK....222
CONCRETE....224
REINFORCEMENT....225
GALVANIZING....225
INSPECTION WIRE....225
DRAINAGE SYSTEM....225
STATE-DESIGNED EARTH RETAINING STRUCTURES....226
MECHANICALLY STABILIZED EMBANKMENT....226
PROPRIETARY EARTH RETAINING SYSTEMS....226
MEASUREMENT AND PAYMENT....227
10-1.46 CONTROLLED LOW STRENGTH MATERIAL....227
10-1.47 LIGHTWEIGHT EMBANKMENT MATERIAL (CELLULAR CONCRETE)....228
10-1.48 AIR AND WATER SUPPLY LINES....229
WORKING DRAWINGS....229
MATERIALS....229
INSTALLATION....230
TESTING....231
MEASUREMENT AND PAYMENT....231
10-1.49 MOVE-IN/MOVE-OUT (EROSION CONTROL)....231
10-1.50 EROSION CONTROL (TYPE D)....232
MATERIALS....232
APPLICATION....234
MEASUREMENT AND PAYMENT....234
10-1.51 EROSION CONTROL (MULCH)....235
MATERIALS....235
APPLICATION....235
MEASUREMENT AND PAYMENT....235
10-1.52 FIBER ROLLS....235
MATERIALS....235
INSTALLATION....236
MEASUREMENT AND PAYMENT....236
10-1.53 IRRIGATION CROSSOVERS....236
10-1.54 IMPORTED TOPSOIL....237
10-1.55 WATER METERS....237
10-1.56 AGGREGATE SUBBASE....237
10-1.57 AGGREGATE BASE....238
10-1.58 TREATED PERMEABLE BASE....239
10-1.59 ASPHALT CONCRETE....239

10-1.60 PILING 241
CAST-IN-DRILLED-HOLE CONCRETE PILES 246
STEEL PIPE PILING 259
NONDESTRUCTIVE TESTING FOR STEEL PIPE PILING 261
STEEL SOLDIER PILING 263
MEASUREMENT AND PAYMENT (PILING) 263
10-1.61 DRILLED HOLES 265
10-1.62 PRESTRESSING CONCRETE 265
10-1.63 PRESTRESSING 268
10-1.64 TIEDOWN ANCHORS 268
MATERIALS 269
CONSTRUCTION 270
MEASUREMENT AND PAYMENT 273
10-1.65 CATHODIC PROTECTION 273
GENERAL 273
SUBMITTALS 273
PRODUCTS 273
INSTALLATION 273
CATHODIC PROTECTION TESTING 274
10-1.66 SAN FRANCISCO MANHOLE 274
10-1.67 SAN FRANCISCO STORM WATER INLET 275
10-1.68 CLASS B CONCRETE (BACKFILL) 275
10-1.69 CLASS D CONCRETE (BACKFILL) 275
10-1.70 CONCRETE STRUCTURES 275
MASS CONCRETE 276
DECK CRACK TREATMENT 289
10-1.71 ARCHITECTURAL SURFACE (RETAINING WALL) 291
FIRST STREET RETAINING WALL 291
RETAINING WALL No. 2 294
RETAINING WALL No. 3 294
MEASUREMENT AND PAYMENT 294
10-1.72 STRUCTURE APPROACH SLABS (TYPE N) 294
APPROACH SLABS 295
10-1.73 GROUT 297
10-1.74 DRILL AND BOND DOWEL (EPOXY CARTRIDGE) 297
10-1.75 DRILL AND BOND DOWELS 298
10-1.76 SPIN-LOCK CONCRETE ANCHORS 298
10-1.77 ROCK ANCHORS 298
10-1.78 CORE CONCRETE 299
10-1.79 CORE AND PRESSURE GROUT DOWELS 299
10-1.80 CORE AND GROUT PIPES 300
10-1.81 REPLACE BEARING 300
10-1.82 PTFE SPHERICAL BEARING 301
10-1.83 SEALING JOINTS 304
10-1.84 JOINT SEAL ASSEMBLIES (MAXIMUM MOVEMENT RATING, 4 INCHES) 305
10-1.85 JOINT SEAL ASSEMBLIES (MOVEMENT RATING EXCEEDING 4 INCHES) 307
10-1.86 REINFORCEMENT 308
SERVICE BUTT SPLICES 314
ULTIMATE BUTT SPLICES 316
GENERAL REQUIREMENTS 317
ULTIMATE BUTT SPLICE TEST CRITERIA 317
PREJOB TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES 318
PRODUCTION TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES 318
QUALITY ASSURANCE TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES 320
10-1.87 HEADED BAR REINFORCEMENT 320
GENERAL 321
ACCEPTANCE TESTS 322
MEASUREMENT AND PAYMENT 322
10-1.88 SHOTCRETE 322

PRECONSTRUCTION REQUIREMENTS 323
PLACING 324
TESTING AND ACCEPTANCE 324
MEASUREMENT AND PAYMENT 324
10-1.89 WATERPROOFING 324
10-1.90 STEEL STRUCTURES 326
GENERAL 326
FABRICATION 328
Surface Preparation 335
Sealing 335
10-1.91 COLUMN CASINGS 336
GROUTING 339
MEASUREMENT AND PAYMENT 339
10-1.92 ISOLATION CASINGS 339
CLEAN AND PAINT STRUCTURAL STEEL 340
MEASUREMENT AND PAYMENT 341
10-1.93 SIGN STRUCTURES 342
10-1.94 ROADSIDE SIGNS 343
57-2.01 Description 344
57-2.02 Grading Rules and Requirements 344
10-1.95 INSTALL SIGN PANEL ON EXISTING STRUCTURE 344
10-1.96 INSTALL SELF ADHESIVE SIGN PANEL 345
10-1.97 TREATED TIMBER 345
10-1.98 CLEAN AND PAINT STRUCTURAL STEEL 346
10-1.99 ALTERNATIVE PIPE 351
10-1.100 PLASTIC PIPE 351
10-1.101 REINFORCED CONCRETE PIPE 351
10-1.102 CORRUGATED METAL PIPE 352
10-1.103 CORRUGATED STEEL PIPE DOWNDRAIN 353
10-1.104 GRATED LINE DRAIN 353
10-1.105 WELDED STEEL PIPE 354
10-1.106 WELDED STEEL PIPE CLEANOUT 354
10-1.107 VITRIFIED CLAY PIPE 354
10-1.108 MINOR CONCRETE (DITCH LINING) 355
10-1.109 MISCELLANEOUS CONCRETE CONSTRUCTION 355
10-1.110 MISCELLANEOUS IRON AND STEEL 356
10-1.111 MISCELLANEOUS METAL (BRIDGE) 356
10-1.112 BRIDGE DECK DRAINAGE SYSTEM 357
10-1.113 MISCELLANEOUS METAL (RESTRAINER-CABLE TYPE) 358
10-1.114 MISCELLANEOUS METAL (RESTRAINER-PIPE TYPE) 359
10-1.115 CLOCK TOWER SCREEN 359
10-1.116 CHAIN LINK FENCE AND CHAIN LINK GATE 359
10-1.117 DELINEATORS 360
10-1.118 METAL BEAM GUARD RAILING 361
TERMINAL SYSTEM (TYPE ET) 364
TERMINAL SYSTEM (TYPE SRT) 364
10-1.119 CABLE RAILING 365
10-1.120 CONCRETE BARRIER 365
10-1.121 CRASH CUSHION (ADIEM) 367
10-1.122 THERMOPLASTIC TRAFFIC STRIPE AND PAVEMENT MARKING 367
10-1.123 PAINT TRAFFIC STRIPE AND PAVEMENT MARKING 368
10-1.124 PAVEMENT MARKERS 369
SECTION 10-2. (BLANK) 371
SECTION 10-3. LIGHTING AND ELECTRICAL SYSTEMS 371
10-3.01 DESCRIPTION 371
10-3.02 COST BREAK-DOWN 372
10-3.03 ABBREVIATIONS 372
10-3.04 EQUIPMENT LIST AND DRAWINGS 373
10-3.05 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS 373

10-3.06 EXCAVATING AND BACKFILLING....373
10-3.07 FOUNDATIONS....373
10-3.08 STANDARDS, STEEL PEDESTALS AND POSTS....374
10-3.09 CONDUIT....374
10-3.10 PULL BOXES....374
10-3.11 CONDUCTORS AND WIRING....374
CLOSED CIRCUIT TELEVISION CABLES....376
TELEPHONE CABLE....378
15 kV POWER CABLE....378
10-3.12 BONDING AND GROUNDING....380
10-3.13 SERVICE....380
10-3.14 SIGN DISCONNECTS....381
10-3.15 TESTING....381
10-3.16 PAINTING....381
10-3.17 NUMBERING ELECTRICAL EQUIPMENT....381
10-3.18 TELEPHONE DEMARCATION CABINET....381
10-3.19 STATE-FURNISHED CONTROLLER ASSEMBLIES....381
10-3.20 CITY OF SAN FRANCISCO ELECTRICAL SPECIAL PROVISIONS....382
MAINTAINING EXISTING CITY TRAFFIC SIGNAL AND STREET LIGHTING SYSTEMS....382
FOUNDATIONS....382
CONDUIT....382
PULL BOXES....384
CONDUCTORS AND WIRING....384
BONDING AND GROUNDING....386
PAINTING....386
SIGNAL MOUNTING ASSEMBLIES....390
SIGNAL POLES....391
STREET LIGHTING....391
DELIVERY OF SALVAGED EQUIPMENT TO CITY YARDS....391
DAMAGE TO WORK OR PROPERTY....392
CORRECTION OF DEFECTS AFTER ACCEPTANCE....392
PROGRESS SCHEDULE....393
EXTENSIONS OF TIME ALLOWED FOR COMPLETION OF WORK....393
WORK AT UTILITY FACILITIES....393
FLAGMAN....394
CLASSES OF CONCRETE....394
10-3.21 HIGH MAST LIGHTING ASSEMBLY....395
GENERAL....395
SUBMITTALS....395
INSPECTION....395
CONTROL PEDESTAL....395
CORROSION RESISTANCE....396
POLE....396
LUMINAIRE LOWERING DEVICE....397
LUMINAIRES....398
BALLASTS....398
HIGH PRESSURE SODIUM LAMPS....398
10-3.22 LUMINAIRES, LAMPS, TESTING, LIGHTING CONTROL EQUIPMENT (OTHER THAN HIGH MAST LIGHTING LUMINAIRE)....398
10-3.23 HIGH PRESSURE SODIUM LUMINAIRES....400
10-3.24 CITY LUMINAIRE (TYPE A)....400
10-3.25 SIGN LIGHTING FIXTURES-MERCURY....401
10-3.26 PAVEMENT ILLUMINATION....401
10-3.27 JUNCTION BOXES....401
10-3.28 WIRELESS RADIO MODEM ENCLOSURE, POWER SUPPLY AND POWER ADAPTER....401
10-3.29 WIRELESS RADIO MODEM....402
10-3.30 MICROWAVE VEHICLE DETECTION SENSOR (MVDS) SYSTEM- TYPE B....404
10-3.31 MICROWAVE VEHICLE DETECTION SENSOR (MVDS) SYSTEM -TYPE A....406
10-3.32 CAMERA UNIT....408

CAMERA 408
LENS 410
ENVIRONMENTAL HOUSING 410
CAMERA UNIT CABLE ASSEMBLY 411
10-3.33 PAN AND TILT UNIT 412
10-3.34 CAMERA JUNCTION BOX 412
10-3.35 CAMERA POLES 413
10-3.36 CAMERA STATION 413
CABLES AND CONNECTORS 413
INSTALLATION OF CAMERA STATION 413
CAMERA UNIT MOUNTING 413
CAMERA STATION TESTING 414
10-3.37 TRAFFIC OPERATIONS SYSTEM EQUIPMENT TESTING 414
10-3.38 REINSTALLED REMOVED ELECTRICAL EQUIPMENT 415
10-3.39 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT 415
10-3.40 DISPOSING OF ELECTRICAL EQUIPMENT 415
10-3.41 PAYMENT 415
SECTION 11. MODIFIED STANDARD SPECIFICATION SECTIONS 416
SECTION 11-1. (BLANK) 416
SECTION 11-2. PORTLAND CEMENT CONCRETE 416
11-2.01 GENERAL 416
SECTION 90: PORTLAND CEMENT CONCRETE 417
90-1 GENERAL 417
90-1.01 DESCRIPTION 417
90-2 MATERIALS 418
90-2.01 CEMENT 418
90-2.02 AGGREGATES 418
90-2.02A Coarse Aggregate 419
90-2.02B Fine Aggregate 420
90-2.03 WATER 420
90-2.04 ADMIXTURE MATERIALS 421
90-3 AGGREGATE GRADINGS 421
90-3.01 GENERAL 421
90-3.02 COARSE AGGREGATE GRADING 422
90-3.03 FINE AGGREGATE GRADING 422
90-3.04 COMBINED AGGREGATE GRADINGS 422
90-4 ADMIXTURES 423
90-4.01 GENERAL 423
90-4.02 MATERIALS 423
90-4.03 ADMIXTURE APPROVAL 423
90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES AND CALCIUM CHLORIDE 424
90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES 424
90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES 424
90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES 424
90-4.08 REQUIRED USE OF MINERAL ADMIXTURES 424
90-4.09 BLANK 425
90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES 425
90-4.11 STORAGE, PROPORTIONING, AND DISPENSING OF MINERAL ADMIXTURES 425
90-5 PROPORTIONING 426
90-5.01 STORAGE OF AGGREGATES 426
90-5.02 PROPORTIONING DEVICES 426
90-5.03 PROPORTIONING 427
90-5.03A Proportioning for Pavement 427
90-6 MIXING AND TRANSPORTING 428
90-6.01 GENERAL 428
90-6.02 MACHINE MIXING 429
90-6.03 TRANSPORTING MIXED CONCRETE 429
90-6.04 TIME OR AMOUNT OF MIXING 430
90-6.05 HAND-MIXING 430

90-6.06 AMOUNT OF WATER AND PENETRATION 430
90-7 CURING CONCRETE 431
90-7.01 METHODS OF CURING 431
90-7.01A Water Method 431
90-7.01B Curing Compound Method 431
90-7.01C Waterproof Membrane Method 433
90-7.01D Forms-In-Place Method 433
90-7.02 CURING PAVEMENT 433
90-7.03 CURING STRUCTURES 433
90-7.04 CURING PRECAST CONCRETE MEMBERS 434
90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES 434
90-7.06 CURING SLOPE PROTECTION 435
90-7.07 CURING MISCELLANEOUS CONCRETE WORK 435
90-8 PROTECTING CONCRETE 435
90-8.01 GENERAL 435
90-8.02 PROTECTING CONCRETE STRUCTURES 435
90-8.03 PROTECTING CONCRETE PAVEMENT 435
90-9 COMPRESSIVE STRENGTH 436
90-9.01 GENERAL 436
90-10 MINOR CONCRETE 437
90-10.01 GENERAL 437
90-10.02 MATERIALS 438
90-10.02A Cementitious Material 438
90-10.02B Aggregate 438
90-10.02C Water 438
90-10.02D Admixtures 438
90-10.03 PRODUCTION 438
90-10.04 CURING MINOR CONCRETE 439
90-10.05 PROTECTING MINOR CONCRETE 439
90-10.06 MEASUREMENT AND PAYMENT 439
90-11 MEASUREMENT AND PAYMENT 439
90-11.01 MEASUREMENT 439
90-11.02 PAYMENT 439
SECTION 12. (BLANK) 439
SECTION 13. (BLANK) 439

DEPARTMENT OF TRANSPORTATION

NOTICE TO CONTRACTORS

THIS IS AN INFORMAL BIDS CONTRACT

CONTRACT NO. 04-0435V4

04-SF-80-4.9/5.9

Sealed proposals for the work shown on the plans entitled:

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROJECT PLANS FOR CONSTRUCTION ON STATE HIGHWAY IN THE CITY AND COUNTY OF SAN FRANCISCO FROM FIFTH STREET TO SAN FRANCISCO-OAKLAND BAY BRIDGE

will be received at the Department of Transportation, 1120 N Street, Room 0200, MS #26, Sacramento, CA 95814, until 2 o'clock p.m. on October 22, 2002, at which time they will be publicly opened and read in Room 0100 at the same address.

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

STATE OF CALIFORNIA; DEPARTMENT OF TRANSPORTATION; PROPOSAL AND CONTRACT FOR CONSTRUCTION ON STATE HIGHWAY IN THE CITY AND COUNTY OF SAN FRANCISCO FROM FIFTH STREET TO SAN FRANCISCO-OAKLAND BAY BRIDGE

General work description: Freeway to be widened by grading and paving with asphalt concrete and bridges to be constructed, widened, replaced, removed or retrofitted.

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

For all inquiries: Toll Bridge Duty Senior at the District 04 Office, 111 Grand Avenue, Oakland, California 94612, fax number (510) 286-4563, email address duty_senior_tollbridge_district04@dot.ca.gov, telephone number (510) 286-5549.

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

The responses to contractors' inquiries, unless incorporated into a formal addendum to the contract, are not a part of the contract and are provided for the contractor'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 responses may be considered along with all other information furnished to prospective bidders for the purpose of bidding on the project. The availability or use of information provided in the responses to contractors' 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, and any such subsequent response or addenda should be taken into consideration when submitting a bid for the project. Inquiries that are submitted within seventy-two (72) hours of the bid opening date might not be addressed.

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

Bids are required for the entire work described herein.

At the time this contract is awarded, the Contractor shall possess either a Class A license or a combination of Class C licenses which constitutes a majority of the work.

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

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

Preference will be granted to bidders properly certified as a "Small Business" as determined by the Department of General Services, Office of Small Business Certification and Resources at the time of bid opening in conformance with the provisions in Section 2-1.05, "Small Business Preference," of the special provisions, and Section 1896 et seq, Title 2, California Code of Regulations. A form for requesting a "Small Business" preference is included with the bid documents. Applications for status as a "Small Business" must be submitted to the Department of General Services, Office of Small Business Certification and Resources, 1531 "I" Street, Second Floor, Sacramento, CA 95814, Telephone No. (916) 322-5060.

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

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

Cross sections for this project are not available.

References to standard plans in the Standard Specifications and these special provisions shall mean project plans.

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

Pursuant to Section 1773 of the Labor Code, the general prevailing wage rates in the county, or counties, in which the work is to be done have been determined by the Director of the California Department of Industrial Relations. These wages are set forth in the General Prevailing Wage Rates for this project, available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated, and available from the California Department of Industrial Relations' Internet Web Site at: http://www.dir.ca.gov. Future effective general prevailing wage rates which have been predetermined and are on file with the Department of Industrial Relations are referenced but not printed in the general prevailing wage rates.

DEPARTMENT OF TRANSPORTATION

Deputy Director Transportation Engineering

Dated July 15, 2002

EFO

COPY OF ENGINEER'S ESTIMATE

(NOT TO BE USED FOR BIDDING PURPOSES)

04-0435V4

Item	Item Code	Item	Unit of Measure	Estimated Quantity
1	024308	SURVEY OF EXISTING NON-HIGHWAY FACILITIES	LS	LUMP SUM
2	024309	SEWER VIDEO SURVEY	LS	LUMP SUM
3	024310	VIBRATION MONITORING	LS	LUMP SUM
4	024311	ELECTRONIC MOBILE DAILY DIARY SYSTEM DATA DELIVERY	LS	LUMP SUM
5	070010	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM
6	070018	TIME-RELATED OVERHEAD	WDAY	1,945
7	049020	TEMPORARY SUPPORT, LOCATION A	LS	LUMP SUM
8	049021	TEMPORARY SUPPORT, LOCATION B	LS	LUMP SUM
9	024312	LEAD COMPLIANCE PLAN	LS	LUMP SUM
10 (S)	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM
11 (S)	074020	WATER POLLUTION CONTROL	LS	LUMP SUM
12 (S)	074029	TEMPORARY SILT FENCE	LF	1,800
13 (S)	024313	TEMPORARY SILT FENCE FABRIC ALONG CHAIN LINK FENCE	LF	14,600
14 (S)	024314	TEMPORARY ROCK BAG BARRIER	LF	14,600
15 (S)	024315	TEMPORARY COVER	SQYD	2,500
16 (S)	024316	TEMPORARY DRAINAGE INLET PROTECTION	EA	87
17 (S)	024317	TEMPORARY CONCRETE WASHOUT FACILITY	EA	21
18 (S)	024318	TEMPORARY ENTRANCE/EXIT	EA	42
19 (S)	120090	CONSTRUCTION AREA SIGNS	LS	LUMP SUM
20 (S)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
21 (S)	120120	TYPE III BARRICADE	EA	13
22 (S)	120149	TEMPORARY PAVEMENT MARKING (PAINT)	SQFT	3,670
23 (S)	024319	TEMPORARY PAVEMENT MARKER (NON-REFLECTIVE)	EA	4,010
24 (S)	024320	TEMPORARY PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE C)	EA	15
25 (S)	024321	TEMPORARY PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE D)	EA	80
26 (S)	024322	TEMPORARY PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE G)	EA	1,790
27 (S)	024323	TEMPORARY PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE H)	EA	450
28 (S)	120159	TEMPORARY TRAFFIC STRIPE (PAINT)	LF	43,700
29 (S)	120165	CHANNELIZER (SURFACE MOUNTED)	EA	220
30 (S)	024324	TEMPORARY CHAIN LINK FENCE (TYPE CL-6)	LF	4,020
31 (S)	024325	16' TEMPORARY CHAIN LINK GATE (TYPE CL-6)	EA	2
32 (S)	128650	PORTABLE CHANGEABLE MESSAGE SIGN	EA	14
33 (S)	129000	TEMPORARY RAILING (TYPE K)	LF	30,900
34 (S)	129100	TEMPORARY CRASH CUSHION MODULE	EA	620
35 (S)	129150	TEMPORARY TRAFFIC SCREEN	LF	29,200
36	049022	PIN COLUMN	LS	LUMP SUM
37	150206	ABANDON CULVERT	EA	45
38	150221	ABANDON INLET	EA	2
39	150224	ABANDON MANHOLE	EA	3
40	150608	REMOVE CHAIN LINK FENCE	LF	6,940

Item	Item Code	Item	Unit of Measure	Estimated Quantity
41	150620	REMOVE GATE	EA	11
42	150662	REMOVE METAL BEAM GUARD RAILING	LF	350
43 (S)	150685	REMOVE IRRIGATION FACILITY	LS	LUMP SUM
44	150714	REMOVE THERMOPLASTIC TRAFFIC STRIPE	LF	22,400
45	024326	REMOVE THERMOPLASTIC TRAFFIC STRIPE (YELLOW)	LF	6,280
46	150742	REMOVE ROADSIDE SIGN	EA	95
47	150760	REMOVE SIGN STRUCTURE	EA	9
48	150769	REMOVE ASPHALT CONCRETE	CY	210
49	150771	REMOVE ASPHALT CONCRETE DIKE	LF	1,110
50	150805	REMOVE CULVERT	LF	220
51	150820	REMOVE INLET	EA	34
52	024327	REMOVE SAN FRANCISCO MANHOLE	EA	1
53	152320	RESET ROADSIDE SIGN	EA	1
54 (S)	153101	PLANE ASPHALT CONCRETE PAVEMENT	SQYD	27,700
55	153210	REMOVE CONCRETE	CY	940
56	153221	REMOVE CONCRETE BARRIER	LF	6,100
57	153229	REMOVE CONCRETE BARRIER (TYPE K)	LF	760
58	156585	REMOVE CRASH CUSHION	EA	7
59	156590	REMOVE CRASH CUSHION (SAND FILLED)	EA	38
60	157551	BRIDGE REMOVAL, LOCATION A	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
61	157552	BRIDGE REMOVAL, LOCATION B	LS	LUMP SUM
62	157553	BRIDGE REMOVAL, LOCATION C	LS	LUMP SUM
63	157554	BRIDGE REMOVAL, LOCATION D	LS	LUMP SUM
64	157555	BRIDGE REMOVAL, LOCATION E	LS	LUMP SUM
65	157556	BRIDGE REMOVAL, LOCATION F	LS	LUMP SUM
66	157557	BRIDGE REMOVAL, LOCATION G	LS	LUMP SUM
67	157558	BRIDGE REMOVAL, LOCATION H	LS	LUMP SUM
68	157559	BRIDGE REMOVAL, LOCATION I	LS	LUMP SUM
69	049023	BRIDGE REMOVAL, LOCATION J	LS	LUMP SUM
70	049024	BRIDGE REMOVAL, LOCATION M (STAGE 1)	LS	LUMP SUM
71	049025	BRIDGE REMOVAL, LOCATION M (STAGE 2)	LS	LUMP SUM
72	049026	BRIDGE REMOVAL, LOCATION M (STAGE 3)	LS	LUMP SUM
73	049027	BRIDGE REMOVAL, LOCATION M (STAGE 4)	LS	LUMP SUM
74	049028	BRIDGE REMOVAL, LOCATION M (STAGE 5)	LS	LUMP SUM
75	049029	BRIDGE REMOVAL (PORTION), LOCATION N	LS	LUMP SUM
76	049030	BRIDGE REMOVAL (PORTION), LOCATION O	LS	LUMP SUM
77	157571	BRIDGE REMOVAL (PORTION), LOCATION K	LS	LUMP SUM
78	157572	BRIDGE REMOVAL (PORTION), LOCATION L	LS	LUMP SUM
79	160101	CLEARING AND GRUBBING	LS	LUMP SUM
80	024328	ROADWAY EXCAVATION(TYPE NH)	CY	5,770

Item	Item Code	Item	Unit of Measure	Estimated Quantity
81	024329	ROADWAY EXCAVATION (TYPE NRH)	CY	9,030
82	024330	ROADWAY EXCAVATION (TYPE RH)	CY	1,000
83	190138	ROADWAY EXCAVATION (DETOUR REMOVAL)	CY	3,980
84	024331	STRUCTURE EXCAVATION (UTILITY TRENCH)	CY	2,560
85 (F)	049031	STRUCTURE EXCAVATION, TYPE NH	CY	518
86	024332	STRUCTURE EXCAVATION, TYPE NH RETAINING WALL	CY	300
87 (F)	049032	STRUCTURE EXCAVATION, TYPE DNH RETAINING WALL	CY	102
88	024333	STRUCTURE EXCAVATION (RETAINING WALL-TYPE NRH)	CY	430
89 (F)	049033	STRUCTURE EXCAVATION, TYPE NRH	CY	1,335
90 (F)	049034	STRUCTURE EXCAVATION, TYPE DNRH	CY	3,797
91 (F)	049035	STRUCTURE EXCAVATION, TYPE DNH	CY	3,821
92 (F)	049036	STRUCTURE EXCAVATION, TYPE RH	CY	158
93 (F)	049037	STRUCTURE EXCAVATION, TYPE DNRH RETAINING WALL	CY	52
94 (F)	049038	STRUCTURE EXCAVATION (SOLDIER PILE WALL) TYPE DNRH	CY	430
95 (F)	049039	STRUCTURE EXCAVATION (16"-42") PILING TYPE DNH	CY	1,408
96 (F)	049040	STRUCTURE EXCAVATION (60"-84") PILING TYPE DNH	CY	6,746
97 (F)	049041	STRUCTURE EXCAVATION (90"-108") PILING TYPE DNH	CY	11,514
98 (F)	049042	STRUCTURE EXCAVATION (16"-42") PILING TYPE DNRH	CY	164
99 (F)	049043	STRUCTURE EXCAVATION (60"-84") PILING TYPE DNRH	CY	579
100 (F)	049044	STRUCTURE EXCAVATION (90"-108") PILING TYPE DNRH	CY	862

Item	Item Code	Item	Unit of Measure	Estimated Quantity
101 (F)	049045	STRUCTURE EXCAVATION (60"-84") PILING TYPE DRH	CY	4
102 (F)	193003	STRUCTURE BACKFILL (BRIDGE)	CY	5,053
103 (F)	193013	STRUCTURE BACKFILL (RETAINING WALL)	CY	1,045
104	193031	PERVIOUS BACKFILL MATERIAL (RETAINING WALL)	CY	47
105	193114	SAND BACKFILL	CY	55
106 (F)	193119	LEAN CONCRETE BACKFILL	CY	145
107 (F)	049046	CLASS A CONCRETE BACKFILL	CY	50
108	194001	DITCH EXCAVATION	CY	110
109 (F)	197021	EARTH RETAINING STRUCTURE, LOCATION A	SQFT	3,050
110 (F)	197022	EARTH RETAINING STRUCTURE, LOCATION B	SQFT	2,850
111 (F)	197023	EARTH RETAINING STRUCTURE, LOCATION C	SQFT	5,060
112	198001	IMPORTED BORROW	CY	6,200
113	024334	LIGHTWEIGHT EMBANKMENT MATERIAL (CELLULAR CONCRETE)	CY	900
114 (S)	200101	IMPORTED TOPSOIL	CY	16,000
115 (S)	024335	EROSION CONTROL (MULCH)	CY	2,500
116 (S)	203003	STRAW (EROSION CONTROL)	TON	2.5
117 (S)	203014	FIBER (EROSION CONTROL)	LB	350
118 (S)	203021	FIBER ROLLS	LF	4,800
119 (S)	203024	COMPOST (EROSION CONTROL)	LB	1,200
120 (S)	203026	MOVE-IN/MOVE-OUT (EROSION CONTROL)	EA	4

Item	Item Code	Item	Unit of Measure	Estimated Quantity
121 (S)	203045	PURE LIVE SEED (EROSION CONTROL)	LB	150
122 (S)	203061	STABILIZING EMULSION (EROSION CONTROL)	LB	200
123	208029	4" SUPPLY LINE (BRIDGE)	LF	1,200
124	208030	6" SUPPLY LINE (BRIDGE)	LF	1,200
125 (S)	208738	8" CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	LF	570
126 (S)	208739	10" CORRUGATED HIGH DENSITY POLYETHYLENE PIPE CONDUIT	LF	180
127	250401	CLASS 4 AGGREGATE SUBBASE	CY	7,780
128	260301	CLASS 3 AGGREGATE BASE	CY	6,250
129	290211	ASPHALT TREATED PERMEABLE BASE	CY	1,500
130	390102	ASPHALT CONCRETE (TYPE A)	TON	20,400
131	394002	PLACE ASPHALT CONCRETE (MISCELLANEOUS AREA)	SQYD	1,130
132	394040	PLACE ASPHALT CONCRETE DIKE (TYPE A)	LF	430
133	394044	PLACE ASPHALT CONCRETE DIKE (TYPE C)	LF	730
134	394049	PLACE ASPHALT CONCRETE DIKE (TYPE F)	LF	500
135	049047	DRILLED HOLE (24")	LF	930
136 (S)	490601	16" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	599
137 (S)	490602	20" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	304
138 (S)	490603	24" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	1,018
139 (S)	490604	30" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	1,498
140 (S)	490605	36" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	2,883

Item	Item Code	Item	Unit of Measure	Estimated Quantity
141 (S)	490609	60" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	745
142 (S)	490611	72" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	2,561
143 (S)	490616	84" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	3,098
144 (S)	490617	90" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	3,686
145 (S)	490618	96" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	2,887
146 (S)	490620	108" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	410
147 (S)	049048	30" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	90
148 (S)	049049	72" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	443
149 (S)	049050	84" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	84
150 (S)	049051	90" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	277
151 (S)	049052	96" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	1,053
152 (S)	049053	108" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	873
153 (S)	049054	36" CAST-IN-DRILLED-HOLE CONCRETE PILING (ROCK SOCKET)	LF	50
154 (S)	049055	36" PERMANENT STEEL CASING	LF	1,750
155 (S)	049056	42" PERMANENT STEEL CASING	LF	520
156 (S)	049057	90" PERMANENT STEEL CASING	LF	1,264
157 (S)	049058	96" PERMANENT STEEL CASING	LF	1,248
158 (S)	049059	102" PERMANENT STEEL CASING	LF	424
159	490713	FURNISH PILING (CLASS 70)	LF	267
160 (S)	490714	DRIVE PILE (CLASS 70)	EA	8

Item	Item Code	Item	Unit of Measure	Estimated Quantity
161 (F)	049060	STEEL SOLDIER PILE (W18 X 76)	LF	875
162	495133	FURNISH 36" CAST-IN-STEEL SHELL CONCRETE PILING	LF	2,575
163 (S)	495134	DRIVE 36" CAST-IN-STEEL SHELL CONCRETE PILE	EA	35
164 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM
165 (S)	049061	PRESTRESSING (LOCATION A)	LS	LUMP SUM
166 (S)	049062	PRESTRESSING (LOCATION B)	LS	LUMP SUM
167 (S)	049063	PRESTRESSING (LOCATION C)	LS	LUMP SUM
168	049064	PRESTRESSING (LOCATION D)	LS	LUMP SUM
169 (S)	500060	TIEDOWN ANCHOR	EA	61
170	049065	CATHODIC PROTECTION	LS	LUMP SUM
171 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	2,138
172 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	68,951
173 (F)	510060	STRUCTURAL CONCRETE, RETAINING WALL	CY	608
174 (F)	510086	STRUCTURAL CONCRETE, APPROACH SLAB (TYPE N)	CY	291
175	024336	CLASS B CONCRETE (BACKFILL)	CY	340
176	510407	CLASS D CONCRETE (BACKFILL)	CY	64
177 (F)	510502	MINOR CONCRETE (MINOR STRUCTURE)	CY	98.5
178 (S)	024337	SAN FRANCISCO MANHOLE	EA	3
179 (S)	024338	SAN FRANCISCO STORM WATER INLET	EA	2
180	024339	ARCHITECTURAL SURFACE (FIRST STREET RETAINING WALL)	SQFT	2,760

Item	Item Code	Item	Unit of Measure	Estimated Quantity
181	024340	ARCHITECTURAL SURFACE (RETAINING WALL NO. 2)	SQFT	300
182	024341	ARCHITECTURAL SURFACE (RETAINING WALL NO. 3)	SQFT	1,660
183 (F)	511064	FRACTURED RIB TEXTURE	SQFT	3,100
184	511106	DRILL AND BOND DOWEL	LF	11,039
185	511109	DRILL AND BOND DOWEL (EPOXY CARTRIDGE)	EA	959
186	049066	ROCK ANCHOR	EA	56
187 (S)	049067	SPIN-LOCK CONCRETE ANCHORS	LS	LUMP SUM
188 (S)	515062	CORE CONCRETE (3")	LF	110
189 (S)	049068	CORE CONCRETE (6 1/2")	LF	87
190 (S)	049069	CORE CONCRETE (8") AND GROUT STEEL PIPE	LF	32
191 (S)	049070	CORE CONCRETE (3 1/2")	LF	705
192 (S)	515064	CORE CONCRETE (5")	LF	4
193 (S)	049071	CORE CONCRETE (1") AND PRESSURE GROUT DOWEL	LF	120
194 (S)	515160	CORE CONCRETE (1 1/2")	LF	635
195 (S)	049072	CORE CONCRETE (1 1/2") AND PRESSURE GROUT DOWEL	LF	1,582
196 (S)	515161	CORE CONCRETE (1 3/4")	LF	243
197 (S)	049073	CORE CONCRETE (2") AND PRESSURE GROUT DOWEL	LF	2,930
198 (S)	515163	CORE CONCRETE (2 1/2")	LF	114
199	518042	REPLACE BEARING	EA	2
200 (S)	518051	PTFE SPHERICAL BEARING	EA	125

Item	Item Code	Item	Unit of Measure	Estimated Quantity
201	049074	GROUT	CY	52
202	519081	JOINT SEAL (MR 1/2")	LF	328
203 (S)	049075	JOINT SEAL (MR = 1")	LF	248
204 (S)	519086	JOINT SEAL (TYPE B-MR 1 1/2")	LF	51
205 (S)	049076	JOINT SEAL (MR = 2")	LF	60
206 (S)	519092	JOINT SEAL ASSEMBLY (MR 2 1/2")	LF	67
207 (S)	519093	JOINT SEAL ASSEMBLY (MR 3")	LF	219
208 (S)	519094	JOINT SEAL ASSEMBLY (MR 3 1/2")	LF	195
209 (S)	519095	JOINT SEAL ASSEMBLY (MR 4")	LF	96
210 (S)	519096	JOINT SEAL ASSEMBLY (MR 4 1/2")	LF	525
211 (S)	519097	JOINT SEAL ASSEMBLY (MR 5")	LF	191
212 (S)	519098	JOINT SEAL ASSEMBLY (MR 5 1/2")	LF	56
213 (S)	519099	JOINT SEAL ASSEMBLY (MR 6")	LF	182
214	519102	JOINT SEAL (TYPE AL)	LF	361
215 (S)	519105	JOINT SEAL ASSEMBLY (MR 7")	LF	37
216 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	LB	31,228,600
217 (S-F)	520103	BAR REINFORCING STEEL (RETAINING WALL)	LB	42,826
218 (S-F)	520120	HEADED BAR REINFORCEMENT	EA	38,036
219 (F)	530100	SHOTCRETE	CY	55
220 (F)	540101	ASPHALT MEMBRANE WATERPROOFING	SQFT	310

Item	Item Code	Item	Unit of Measure	Estimated Quantity
221 (S-F)	550110	COLUMN CASING	LB	169,700
222 (S-F)	550203	FURNISH STRUCTURAL STEEL (BRIDGE)	LB	1,541,300
223 (S-F)	550204	ERECT STRUCTURAL STEEL (BRIDGE)	LB	1,541,300
224 (S-F)	049077	ISOLATION CASING	LB	385,000
225 (F)	560218	FURNISH SIGN STRUCTURE (TRUSS)	LB	128,590
226 (S-F)	560219	INSTALL SIGN STRUCTURE (TRUSS)	LB	128,590
227 (S)	562004	METAL (RAIL MOUNTED SIGN)	LB	6,820
228 (S)	566011	ROADSIDE SIGN - ONE POST	EA	46
229 (S)	566012	ROADSIDE SIGN - TWO POST	EA	12
230	568001	INSTALL SIGN (STRAP AND SADDLE BRACKET METHOD)	EA	9
231 (S-F)	024342	INSTALL SELF ADHESIVE SIGN PANEL	EA	20
232 (S-F)	568020	INSTALL SIGN PANEL ON EXISTING STRUCTURE	SQFT	585
233 (F)	570120	TREATED LUMBER AND TIMBER	MFBM	12
234 (S)	590115	CLEAN AND PAINT STRUCTURAL STEEL	LS	LUMP SUM
235 (S-F)	590135	SPOT BLAST CLEAN AND PAINT UNDERCOAT	SQFT	144
236	590301	WORK AREA MONITORING	LS	LUMP SUM
237	620060	12" ALTERNATIVE PIPE CULVERT	LF	1,330
238	620100	18" ALTERNATIVE PIPE CULVERT	LF	2,390
239	665037	36" CORRUGATED STEEL PIPE (.109" THICK)	LF	9
240	690118	18" CORRUGATED STEEL PIPE DOWNDRAIN (.109" THICK)	LF	54

Item	Item Code	Item	Unit of Measure	Estimated Quantity
241	703233	GRATED LINE DRAIN	LF	83
242	024343	3" WELDED STEEL PIPE CLEANOUT	EA	2
243	703509	6" WELDED STEEL PIPE (.134" THICK)	LF	170
244 (S)	024344	10" VITRIFIED CLAY PIPE	LF	82
245 (S)	024345	12" VITRIFIED CLAY PIPE	LF	96
246 (S)	024346	18" VITRIFIED CLAY PIPE	LF	260
247	727901	MINOR CONCRETE (DITCH LINING)	CY	64
248	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	CY	700
249 (F)	731517	MINOR CONCRETE (GUTTER)	LF	333
250 (S-F)	750001	MISCELLANEOUS IRON AND STEEL	LB	20,198
251 (S-F)	750496	MISCELLANEOUS METAL (RESTRAINER - PIPE TYPE)	LB	71,900
252 (S-F)	750498	MISCELLANEOUS METAL (RESTRAINER - CABLE TYPE)	LB	32,300
253 (S-F)	750501	MISCELLANEOUS METAL (BRIDGE)	LB	575,376
254 (S-F)	750505	BRIDGE DECK DRAINAGE SYSTEM	LB	83,890
255 (F)	049078	CLOCK TOWER SCREEN	LF	120
256 (S)	800360	CHAIN LINK FENCE (TYPE CL-6)	LF	7,000
257 (S)	802620	16' CHAIN LINK GATE (TYPE CL-6)	EA	1
258 (S)	802660	20' CHAIN LINK GATE (TYPE CL-6)	EA	5
259 (S)	802670	24' CHAIN LINK GATE (TYPE CL-6)	EA	3
260	820107	DELINEATOR (CLASS 1)	EA	160

Item	Item Code	Item	Unit of Measure	Estimated Quantity
261 (S)	832001	METAL BEAM GUARD RAILING	LF	780
262 (F)	833160	CONCRETE BARRIER (TYPE 27)	LF	587
263 (F)	833187	CONCRETE BARRIER (TYPE 27 MODIFIED)	LF	587
264 (F)	839521	CABLE RAILING	LF	333
265 (S)	839559	TERMINAL SYSTEM (TYPE ET)	EA	9
266 (S)	839565	TERMINAL SYSTEM (TYPE SRT)	EA	6
267 (S)	839603	CRASH CUSHION (ADIEM)	EA	12
268	839701	CONCRETE BARRIER (TYPE 60)	LF	4,320
269	839702	CONCRETE BARRIER (TYPE 60A)	LF	1,760
270	839703	CONCRETE BARRIER (TYPE 60C)	LF	1,570
271 (F)	839704	CONCRETE BARRIER (TYPE 60D)	LF	386
272 (F)	839720	CONCRETE BARRIER (TYPE 732)	LF	1,161
273 (F)	049079	CONCRETE BARRIER (TYPE 732 MOD)	LF	25,617
274 (F)	049080	CONCRETE BARRIER (ANCHORAGE RECONSTRUCTION)	LF	45
275 (F)	839721	CONCRETE BARRIER (TYPE 732A)	LF	96
276 (S-F)	839726	CONCRETE BARRIER (TYPE 736A)	LF	221
277 (S)	840504	4" THERMOPLASTIC TRAFFIC STRIPE	LF	38,300
278 (S)	840505	6" THERMOPLASTIC TRAFFIC STRIPE	LF	120
279 (S)	840506	8" THERMOPLASTIC TRAFFIC STRIPE	LF	12,200
280 (S)	840508	8" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 12-3)	LF	2,590

Item	Item Code	Item	Unit of Measure	Estimated Quantity
281 (S)	840515	THERMOPLASTIC PAVEMENT MARKING	SQFT	11,600
282 (S)	840526	4" THERMOPLASTIC TRAFFIC STRIPE (BROKEN 17-7)	LF	10,100
283 (S)	850101	PAVEMENT MARKER (NON-REFLECTIVE)	EA	2,370
284 (S)	850110	PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE C)	EA	120
285 (S)	024347	PAVEMENT MARKER (RETRORFLECTIVE-SPECIAL TYPE D)	EA	200
286 (S)	850112	PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE G)	EA	1,450
287 (S)	850113	PAVEMENT MARKER (RETROREFLECTIVE-SPECIAL TYPE H)	EA	600
288 (S)	860402	LIGHTING (CITY STREET)	LS	LUMP SUM
289 (S)	860407	LIGHTING (PARKING LOT)	LS	LUMP SUM
290 (S)	860460	LIGHTING AND SIGN ILLUMINATION	LS	LUMP SUM
291 (S)	024348	LIGHTING AND SIGN ILLUMINATION (STAGE CONSTRUCTION)	LS	LUMP SUM
292 (S)	860797	ELECTRIC SERVICE (IRRIGATION)	LS	LUMP SUM
293 (S)	024349	TRAFFIC OPERATIONS SYSTEM	LS	LUMP SUM
294 (S)	024350	MICROWAVE VEHICLE DETECTION SENSOR (MVDS) TYPE A	EA	25
295 (S)	024351	MICROWAVE VEHICLE DETECTION SENSOR (MVDS) TYPE B	EA	5
296 (S)	024352	TRAFFIC OPERATIONS SYSTEM (STAGE CONSTRUCTION	LS	LUMP SUM
297 (S)	024353	CAMERA UNIT	EA	1
298 (S)	024354	PAN/TILT UNIT	EA	1
299 (S)	024355	SIGNAL AND LIGHTING (CITY STREET) MODIFY LOCATION 1	LS	LUMP SUM
300 (S)	024356	SIGNAL AND LIGHTING (CITY STREET) MODIFY LOCATION 2	LS	LUMP SUM

Item	Item Code	Item	Unit of Measure	Estimated Quantity
301	999990	MOBILIZATION	LS	LUMP SUM

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISIONS

Annexed to Contract No. 04-0435V4

SECTION 1. SPECIFICATIONS AND PLANS

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

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

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

SECTION 2. PROPOSAL REQUIREMENTS AND CONDITIONS

2-1.01 GENERAL

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

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

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

The 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.

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.

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

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

2-1.02 DISABLED VETERAN BUSINESS ENTERPRISE (DVBE)

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

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

Bidder's attention is directed to the following:

A. "Disabled Veteran Business Enterprise" (DVBE) means a business concern certified as a DVBE by the Office of Small Business Certification and Resources, Department of General Services.
B. A DVBE may participate as a prime contractor, subcontractor, joint venture partner with a prime or subcontractor, or vendor of material or supplies.
C. Credit for DVBE prime contractors will be 100 percent.
D. A DVBE joint venture partner must be responsible for specific contract items of work, or portions thereof. Responsibility means actually performing, managing and supervising the work with its own forces. The DVBE joint venture partner must share in the ownership, control, management responsibilities, risks and profits of the joint venture. The DVBE joint venturer must submit the joint venture agreement with the Caltrans Bidder DVBE Information form required in Section 2-1.04, "Submission of DVBE Information," elsewhere in these special provisions.
E. A DVBE must perform a commercially useful function, i.e., must be responsible for the execution of a distinct element of the work and must carry out its responsibility by actually performing, managing and supervising the work.
F. Credit for DVBE vendors of materials or supplies is limited to 60 percent of the amount to be paid to the vendor for the material unless the vendor manufactures or substantially alters the goods.
G. Credit for trucking by DVBEs will be as follows:

    1. One hundred percent of the amount to be paid when a DVBE trucker will perform the trucking with his/her own trucks, tractors and employees.
    2. Twenty percent of the amount to be paid to DVBE trucking brokers who do not have a "certified roster."
    3. One hundred percent of the amount to be paid to DVBE trucking brokers who have signed agreements that all trucking will be performed by DVBE truckers if credit is toward the DVBE goal, a "certified roster" showing that all trucks are owned by DVBEs, and a signed statement on the "certified roster" that indicates that 100 percent of revenue paid by the broker will be paid to the DVBEs listed on the "certified roster."
    4. Twenty percent of the amount to be paid to trucking brokers who are not a DVBE but who have signed agreements with DVBE truckers assuring that at least 20 percent of the trucking will be performed by DVBE truckers if credit is toward the DVBE goal, a "certified roster" showing that at least 20 percent of the number of trucks are owned by DVBE truckers, and a signed statement on the "certified roster" that indicates that at least 20 percent of the revenue paid by the broker will be paid to the DVBEs listed on the "certified roster."

    The "certified roster" referred to herein shall conform to the requirements in Section 2-1.04, "Submission Of DVBE Information," elsewhere in these special provisions.
H. DVBEs and DVBE joint venture partners must be certified DVBEs as determined by the Department of General Services, Office of Small Business Certification and Resources, 1531 "I" Street, Second Floor, Sacramento, CA 95814, on the date bids for the project are opened before credit may be allowed toward the DVBE goal. It is the Contractor's responsibility to verify that DVBEs are certified.
I. Noncompliance by the Contractor with these requirements constitutes a breach of this contract and may result in termination of the contract or other appropriate remedy for a breach of this contract.

2-1.03 DVBE GOAL FOR THIS PROJECT

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

Disabled Veteran Business Enterprise (DVBE): 3 percent.

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

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

2-1.04 SUBMISSION OF DVBE INFORMATION

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

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

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

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

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

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

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

Bidders are cautioned that even though their submittal indicates they will meet the stated DVBE goal, their submittal should also include the telephone log and rejected DVBE information to protect their eligibility for award of the contract in the event the Department, in its review, finds that the goal has not been met.

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

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

2-1.05 SMALL BUSINESS PREFERENCE

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

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

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

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

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

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

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

2-1.06 CALIFORNIA COMPANY PREFERENCE

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

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

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

A. Has its principal place of business in California.
B. Has its principal place of business in a state in which there is no local contractor preference on construction contracts.
C. Has its principal place of business in a state in which there is a local contractor construction preference and the contractor has paid not less than $5000 in sales or use taxes to California for construction related activity for each of the five years immediately preceding the submission of the bid.

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

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

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

2-1.07 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.

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

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

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

The bid documentation shall include, but not be limited to: quantity takeoffs; rate schedules for the direct costs and the time- and nontime-related indirect costs for labor (by craft), plant and equipment ownership and operation, permanent and expendable materials, insurance and subcontracted work; estimated construction schedules, including sequence and duration and development of production rates; quotations, scoping documents and subcontracts related to subcontractors,

manufacturers and suppliers; estimates of field and home office overhead; contingency and margin for each contract item of work; names of the persons responsible for preparing the bidder's estimate, and other reports, calculations, assumptions and information used by the bidder to arrive at the estimate submitted with the proposal.

The Contractor shall also submit bid documentation for each subcontractor, manufacturer and supplier whose total subcontract or purchase orders exceeds $250,000. Subcontractor, manufacturer and supplier bid documentation shall be enclosed with the Contractor's submittal. If at the time that bid documentation is submitted for escrow, the subcontractor, manufacturer or supplier does not have a executed subcontract or purchase orders, and a subcontract or purchase orders is subsequently executed, then a copy of the executed subcontract or purchase orders 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 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.

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

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

The first, second, and third apparent low bidders shall present the bid documentation for escrow at the District 04 Office, 111 Grand Avenue, Oakland, California, (510) 286-5209, on the first Tuesday at 1:00 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.

Bid documentation submitted by the second and third apparent low bidders will be jointly deposited at agreed commercial businesses. 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. 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. AWARD AND EXECUTION OF CONTRACT

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

The award of 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 DVBE participation or has demonstrated, to the satisfaction of the Department, adequate good faith efforts to do so. Meeting the goal for DVBE 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.

It is anticipated that this contract will be awarded within 20 days after the bid opening.

The contract shall be signed by the successful bidder and shall be received with contract bonds by the Department within **4 days**, not including Saturdays, Sundays and legal holidays, after the bidder has received notice that the contract has been awarded. Failure to do so shall be just cause for forfeiture of the proposal guaranty. The executed contract documents shall be delivered to the following address: Department of Transportation, P.O. Box 942874, Sacramento, CA 94274-0001, Attn: Office Engineer (MS 43) Contracts.

Within 2 days, not including Saturdays, Sundays and legal holidays, of return of the executed contract and bonds, the Department will notify the successful bidder of either approval of the contract by the Attorney General or the attorney appointed and authorized to represent the Department of Transportation, or disapproval of the submittal. Should the Department fail to provide notification within said 2 days, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A "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 20 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.

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

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

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

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

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

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

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

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

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

The second and third paragraphs in Section 8-1.07, "Liquidated Damages," of the Standard Specifications are amended to read:

> It is further agreed that in case the work called for under the contract is not finished and completed in all parts and requirements within the number of working days specified, the Director shall have the right to increase the number of working days or not, as the Director may deem best to serve the interest of the State, and if the Director decides to increase the number of working days, the Director shall further have the right to charge to the Contractor, or the Contractor's heirs, assigns or sureties and to deduct from the final payment for the work all or any part, as the Director may deem proper, of the actual cost of engineering, inspection, superintendence, and other overhead expenses which are directly chargeable to the contract, and which accrue during the period of the extension, except that cost of final surveys and preparation of final estimate shall not be included in the charges.
>
> The Contractor will be granted an extension of time and will not be assessed with liquidated damages or the cost of engineering and inspection for any portion of the delay in completion of the work beyond the time named in the special provisions for the completion of the work caused by acts of God or of the public enemy, fire, floods, tsunamis, earthquakes, epidemics, quarantine restrictions, strikes, labor disputes, shortage of materials and freight embargoes, provided that the Contractor shall notify the Engineer in writing of the causes of delay within 15 days from the beginning of that delay. The Engineer shall ascertain the facts and the extent of the delay, and the Engineer's findings thereon shall be final and conclusive.

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

This work shall be diligently prosecuted to completion before the expiration of **1945 WORKING DAYS** beginning at 12:01 a.m. on the **FIRST WORKING DAY AFTER CONTRACT AWARD.**

The Contractor shall pay to the State of California the sum of $17,500 per day, for each and every calendar day's delay in finishing the work in excess of the number of working days prescribed above.

The 72 hours advance notice before beginning work as referred to in said Section 8-1.03 is changed to 24 hours advance notice for this project.

A working day as defined in said Section 8-1.06 is re-defined for this project. Paragraph 2 through paragraph 5, inclusive, of said Section 8-1.06 shall not apply. Saturdays, Sundays and legal holidays, including days of inclement weather, will be counted as working days.

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

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

SECTION 5. GENERAL

SECTION 5-1. MISCELLANEOUS

5-1.00 PLANS AND WORKING DRAWINGS

When the specifications require working drawings to be submitted to the Engineer, the drawings shall be submitted to: Office of the Resident Engineer, Department of Transporation, 151 Fremont Street, San Francisco, CA 94105.

5-1.002 LABORATORY

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

5-1.003 EXAMINATION OF PLANS, SPECIFICATIONS, CONTRACT, AND SITE OF WORK

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

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

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

5-1.004 DIFFERING SITE CONDITIONS

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

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

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

5-1.005 CONTRACT BONDS

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

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

5-1.006 EXCAVATION SAFETY PLANS

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

5-1.02A Excavation Safety Plans.--The Construction Safety Orders of the Division of Occupational Safety and Health shall apply to all excavations. For all excavations 1.5 m or more in depth, the Contractor shall submit to the Engineer a detailed plan showing the design and details of the protective systems to be provided for worker protection from the hazard of caving ground during excavation. The detailed plan shall include any tabulated data and any design calculations used in the preparation of the plan. Excavation shall not begin until the detailed plan has been reviewed and approved by the Engineer.

Detailed plans of protective systems for which the Construction Safety Orders require design by a registered professional engineer shall be prepared and signed by an engineer who is registered as a Civil Engineer in the State of California, and shall include the soil classification, soil properties, soil design calculations that demonstrate adequate stability of the protective system, and any other design calculations used in the preparation of the plan.

No plan shall allow the use of a protective system less effective than that required by the Construction Safety Orders.

If the detailed plan includes designs of protective systems developed only from the allowable configurations and slopes, or Appendices, contained in the Construction Safety Orders, the plan shall be submitted at least 5 days before the Contractor intends to begin excavation. If the detailed plan includes designs of protective systems developed from tabulated data, or designs for which design by a registered professional engineer is required, the plan shall be submitted at least 3 weeks before the Contractor intends to begin excavation.

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

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

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

5-1.007 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.

5-1.008 LINES AND GRADES

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

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

5-1.01 LABOR NONDISCRIMINATION

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

NOTICE OF REQUIREMENT FOR NONDISCRIMINATION PROGRAM (GOV. CODE, SECTION 12990)

Your attention is called to the "Nondiscrimination Clause", set forth in Section 7-1.01A(4), "Labor Nondiscrimination," of the Standard Specifications, which is applicable to all nonexempt state contracts and subcontracts, and to the "Standard California Nondiscrimination Construction Contract Specifications" set forth therein. The Specifications are applicable to all nonexempt state construction contracts and subcontracts of $5,000 or more.

5-1.02 LABOR CODE REQUIREMENTS

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

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

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

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

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

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

Pursuant to the provisions of Section 1773 of the Labor Code, the Department has obtained the general prevailing rate of wages (which rate includes employer payments for health and welfare, pension, vacation, travel time, and subsistence pay as provided for in Section 1773.8 of the Labor Code, apprenticeship or other training programs authorized by Section 3093 of the Labor Code, and similar purposes) applicable to the work to be done, for straight time, overtime, Saturday, Sunday and holiday work. The holiday wage rate listed shall be applicable to all holidays recognized in the collective bargaining agreement of the particular craft, classification or type of workmen concerned. The general prevailing wage rates and any applicable changes to these wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for the district in which the work is situated. For work situated in District 9, the wage rates are available at the Labor Compliance Office at the offices of the District Director of Transportation for District 6, located at Fresno. General prevailing wage rates are also available from the California Department of Industrial Relations' Internet Web Site at: http://www.dir.ca.gov.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5-1.03 CONTRACTOR'S LICENSING LAWS

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

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

5-1.035 INDEMNIFICATION AND INSURANCE

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

5-1.04 ARBITRATION

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

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

5-1.05 NOTICE OF POTENTIAL CLAIM

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

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

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

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

It is the intention of this Section 9-1.04 that differences between the parties arising under and by virtue of the contract be brought to the attention of the Engineer at the earliest possible time in order that such matters may be settled, if possible, or other appropriate action promptly taken. The Contractor hereby agrees that he shall have no right to

additional compensation for any claim that may be based on any such act, failure to act, event, thing or occurrence for which no written notice of potential claim as herein required was filed.

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

5-1.06 PARTIAL PAYMENTS

The fourth, fifth, and sixth paragraphs in Section 9-1.06, "**Partial Payments**," of the Standard Specifications are 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 kept or retained under the provisions of the contract. No monthly estimate or payment shall be required to be made when, in the judgment of the Engineer, the work is not proceeding in accordance with the provisions of the contract.

No monthly estimate or payment shall be construed to be an acceptance of any defective work or improper materials.

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

5-1.07 PAYMENT OF WITHHELD FUNDS

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

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

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

5-1.08 FINAL PAYMENT AND CLAIMS

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

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

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

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

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

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

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

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

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

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

Dated _____

/s/ _____

Subscribed and sworn before me this _____ day

of _____

_____
Notary Public
My Commission Expires _____

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

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

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

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

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

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

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

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

5-1.09 INTEREST ON PAYMENTS

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

1. Unpaid progress payments, payment after acceptance and final payments shall begin to accrue interest 30 days after the Engineer prepares the payment estimate.
2. Unpaid extra work bills shall begin to accrue interest 30 days after preparation of the first pay estimate following the receipt of a properly submitted and undisputed extra work bill. To be properly submitted, the bill must be submitted within 7 days of the performance of the extra work and in accordance with the requirements of Section 9-1.03C, "Records," and Section 9-1.06, "Partial Payments," of the Standard Specifications. An undisputed extra work bill not submitted within 7 days of performance of the extra work will begin to accrue interest 30 days after the preparation of the second pay estimate following submittal of the bill.
3. The rate of interest payable for unpaid progress payments, payments after acceptance, final payments and extra work payments shall be 10 percent per annum.
4. The rate of interest payable on a claim, protest or dispute ultimately allowed under this contract shall be 6 percent per annum. Interest shall begin to accrue 61 days after the Contractor submits to the Engineer information in sufficient detail to enable the Engineer to ascertain the basis and amount of said claim, protest or dispute.

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

5-1.10 PUBLIC SAFETY

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

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

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

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

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

(2) Temporarily Unprotected Permanent Obstacles.--Whenever the work includes the installation of a fixed obstacle together with a protective system, such as a sign structure together with protective railing, and the Contractor elects to install the obstacle prior to installing the protective system; or whenever the Contractor, for his convenience and with permission of the Engineer, removes a portion of an existing protective railing at an obstacle and does not replace such railing complete in place during the same day.

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

The approach end of temporary railing (Type K), installed in accordance with the requirements in this section "Public Safety" and in Section 7-1.09, "Public Safety," of the Standard Specifications shall be offset a minimum of 15 feet from the edge of the traffic lane open to public traffic. The temporary railing shall be installed on a skew toward the edge of the traffic lane of not more than one foot transversely to 10 feet longitudinally with respect to the edge of the traffic lane. If the 15-foot minimum offset cannot be achieved, the temporary railing shall be installed on the 10 to 1 skew to obtain the maximum available offset between the approach end of the railing and the edge of the traffic lane, and an array of temporary crash cushion modules shall be installed at the approach end of the temporary railing.

Temporary railing (Type K) shall conform to the provisions in Section 12-3.08, "Temporary Railing (Type K)," of the Standard Specifications. Temporary railing (Type K), conforming to the details shown on 1995 Standard Plan T3 or 1997 Standard Plan T3, may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance.

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

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

Amendments to Section 82, "Markers and Delineators," of the Standard Specifications are in "Markers and Delineators" of these special provisions.

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

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

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

Approach speed of public traffic (Posted Limit) (Miles Per Hour)	Work Areas
Over 45	Within 6 feet of a traffic lane but not on a traffic lane.
35 to 45	Within 3 feet of a traffic lane but not on a traffic lane.

The lane closure provisions of this section shall not apply if the work area is protected by permanent or temporary railing or barrier.

When traffic cones or delineators are used to delineate a temporary edge of traffic lane, the line of cones or delineators shall be considered to be the edge of traffic lane, however, the Contractor shall not reduce the width of an existing lane to less than 10 feet without written approval from the Engineer.

When work is not in progress on a trench or other excavation that required closure of an adjacent lane, the traffic cones or portable delineators used for the lane closure shall be placed off of and adjacent to the edge of the traveled way. The spacing of the cones or delineators shall be not more than the spacing used for the lane closure.

Suspended loads or equipment shall not be moved nor positioned over public traffic or pedestrians.

Full compensation for conforming to the requirements in this section "Public Safety," including furnishing and installing temporary railing (Type K) and temporary crash cushion modules, shall be considered as included in the contract prices paid for the various items of work involved and no additional compensation will be allowed therefor.

5-1.11 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.

5-1.12 REMOVAL OF ASBESTOS AND HAZARDOUS SUBSTANCES

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

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

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

5-1.13 FINAL PAY QUANTITIES

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

> **9-1.015 Final Pay Items.—**When an item of work is designated as (F) or (S-F) in the Engineer's Estimate, the estimated quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions, except as otherwise provided for minor structures in Section 51-1.22, "Measurement." If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work.
>
> The estimated quantity for each item of work designated as (F) or (S-F) in the Engineer's Estimate shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the plans, will equal the estimated quantity. No allowance will be made in the event that the quantity based on computations does not equal the estimated quantity.
>
> In case of discrepancy between the quantity shown in the Engineer's Estimate for a final pay item and the quantity or summation of quantities for the same item shown on the plans, payment will be based on the quantity shown in the Engineer's Estimate.

5-1.14 YEAR 2000 COMPLIANCE

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

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

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

5-1.15 SUBCONTRACTOR AND DVBE RECORDS

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

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

5-1.155 PERFORMANCE OF DVBE SUBCONTRACTORS AND SUPPLIERS

The DVBEs listed by the Contractor in response to the provisions in Section 2-1.04, "Submission of DVBE Information," and Section 3, "Award and Execution of Contract," of these special provisions, which are determined by the Department to be certified DVBEs, shall perform the work and supply the materials for which they are listed, unless the Contractor has received prior written authorization to perform the work with other forces or to obtain the materials from other sources.

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

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

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

5-1.16 SUBCONTRACTING

Attention is directed to the provisions in Section 8-1.01, "Subcontracting," of the Standard Specifications, Section 2, "Proposal Requirements and Conditions," Section 2-1.04, "Submission of DVBE Information," and Section 3, "Award and Execution of Contract," of these special provisions and these special provisions.

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

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

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

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

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

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

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

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

1. No substitution of a DVBE subcontractor shall be made at any time without the written consent of the Department, and
2. If a DVBE subcontractor is unable to perform successfully and is to be replaced, the Contractor shall make good faith efforts to replace the original DVBE subcontractor with another DVBE subcontractor.

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

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

5-1.162 PROMPT PROGRESS PAYMENT TO SUBCONTRACTORS

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

5-1.165 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 contact:

1. Direct costs of contract item work.
2. Direct costs of changes in character in conformance with Section 4-1.03C, "Changes in Character of Work," of the Standard Specifications.
3. Direct costs of extra work in conformance with Section 4-1.03D, "Extra Work," of the Standard Specifications.
4. Direct costs of work not required by the contract and performed for others.
5. 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.
6. 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.

5-1.17 PARTNERING

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

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

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

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

The costs involved in providing a "Partnering" facilitator and a workshop site will be borne equally by the State and the Contractor. The Contractor shall pay all compensation for the wages and expenses of the facilitator and of the expenses for obtaining the workshop site. The State's share of such costs will be reimbursed to the Contractor in a change order written by the Engineer.

Markups will not be added to the costs of "Training in Partnering Concepts" or the costs of providing a "Partnering" facilitator and workshop site. All other costs associated with the "Partnering" relationship will be borne separately by the party incurring the costs.

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

5-1.174 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.

5-1.18 DISPUTE REVIEW BOARD

GENERAL

To assist in the resolution of disputes or potential claims arising out of the work of this project, a Dispute Review Board, hereinafter referred to as the "DRB," shall be established by the Engineer and Contractor cooperatively upon approval of the contract. The DRB is intended to assist the contract administrative claims resolution process as specified in the provisions in

Section 9-1.04, "Notice of Potential Claim," and Section 9-1.07B, "Final Payment and Claims," of the Standard Specifications and these special provisions. The DRB shall not serve as a substitute for provisions in the specifications in regard to filing potential claims. The requirements and procedures established in this section shall be a prerequisite to filing a claim, filing for arbitration, or filing for litigation prior or subsequent to project completion.

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

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

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

SELECTION PROCESS, DISCLOSURE AND APPOINTMENTS

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

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

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

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

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

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

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

An impasse shall be considered to have been reached if the parties are unable to approve a third member within 15 days of receipt of the recommendation of the first 2 DRB members, or if the first 2 DRB members are unable to agree upon a recommendation within their 15 day time limit. In the event of an impasse in selection of third DRB member the State and

the Contractor shall each propose 3 candidates for the third DRB member position. The parties shall select the candidates proposed under this paragraph from the current list of arbitrators certified by the Public Works Contract Arbitration Committee created by Article 7.2 (commencing with Section 10245) of the State Contract Act. The first 2 DRB members shall then select one of the 6 proposed candidates in a blind draw.

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

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

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

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

COMPENSATION

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

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 members for the removal of the third member.
D. Upon resignation of a member.

E. The State or Contractor may terminate the service of any member who fails to fully comply with all required employment and financial disclosure conditions of DRB membership

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

OPERATION

The following procedure shall be used for dispute resolution:

A. If the Contractor objects to any decision, act or order of the Engineer, the Contractor shall give written notice of potential claim in conformance with the provisions in Section 9-1.04, "Notice of Potential Claim," of the Standard Specifications and these special provisions, including the provision of applicable cost documentation; or file written protests or notices in conformance with the provisions in the Standard Specifications and these special provisions.
B. The Engineer will respond, in writing, to the Contractor's written protest or notice within 15 days of receipt of the written protest or notice.
C. Within 15 days after receipt of the Engineer's written response, the Contractor shall, if the Contractor still objects, file a written reply with the Engineer, stating clearly and in detail the basis of the objection.
D. Following the Contractor's objection to the Engineer's decision, the Contractor shall refer the dispute to the DRB if the Contractor wishes to further pursue the objection to the Engineer's decision. The Contractor shall make the referral in writing to the DRB, simultaneously copied to the State, within 21 days after receipt of the written reply from the Engineer. The written dispute referral shall describe the disputed matter in individual discrete segments so that it will be clear to both parties and the DRB what discrete elements of the dispute have been resolved, and which remain unresolved, and shall include an estimate of the cost of the affected work and impacts, if any, on project completion.
E. By failing to submit the written notice of referral to the DRB, within 21 days after receipt of the State's written reply, the Contractor waives future claims and arbitration on the matter in contention.
F. The Contractor and the State shall each be afforded an opportunity to be present and to be heard by the DRB, and to offer evidence. Either party furnishing written evidence or documentation to the DRB must furnish copies of such information to the other party a minimum of 15 days prior to the date the DRB is scheduled to convene the meeting for the dispute. Either party shall produce such additional evidence as the DRB may deem necessary to reach an understanding and a determination of the dispute. The party furnishing additional evidence shall furnish copies of such additional evidence to the other party at the same time the evidence is provided to the DRB. The DRB will not consider evidence not furnished in conformance with the terms specified herein.
G. Upon receipt by the DRB of a written referral of a dispute, the DRB shall convene to review and consider the dispute. The dispute meeting shall be held no earlier than 30 days and no later than 60 days after receipt of the written referral unless otherwise agreed to by all parties. The DRB shall determine the time and location of the DRB meeting, with due consideration for the needs and preferences of the parties while recognizing the paramount importance of a speedy resolution of the dispute.
H. There shall be no participation of either party's attorneys at DRB meetings.
I. There shall be no participation of persons who are not directly involved in the contract or who do not have direct knowledge of the dispute, including but not limited to consultants, except for expert testimony allowed at the discretion of the DRB and with approval prior to the dispute meeting by both parties.
J. The DRB shall furnish a report, containing findings and recommendations as described in the Dispute Review Board Agreement, in writing to both the State and the Contractor. The DRB may request clarifying information of either party within 10 days after the DRB dispute meeting. Requested information shall be submitted to the DRB within 10 days of the DRB request. The DRB shall complete its report, including minority opinion, if any, and submit it to the parties within 30 days of the DRB dispute meeting, except that time extensions may be granted at the request of the DRB with the written concurrence of both parties. The report shall include the facts and circumstances related to the matters under consideration, applicable laws and regulations, the pertinent provisions of the contract and the actual costs and time incurred as shown on the Contractor's cost accounting records. The DRB shall make recommendations on the merit of the dispute and, if appropriate, recommend guidelines for determining compensation.

K. Within 30 days after receiving the DRB's report, both the State and the Contractor shall respond to the DRB in writing signifying that the dispute is either resolved or remains unresolved. Failure to provide the written response within the time specified, or a written rejection of the DRB's recommendation or response to a request for reconsideration presented in the report by either party, shall conclusively indicate that the party(s) failing to respond accepts the DRB recommendation. Immediately after responses have been received by both parties, the DRB will provide copies of both responses to the parties simultaneously. Either party may request clarification of elements of the DRB's report from the DRB prior to responding to the report. The DRB will consider any clarification request only if submitted within 10 days of receipt of the DRB's report, and if submitted simultaneously in writing to both the DRB and the other party. Each party may submit only one request for clarification for any individual DRB report. The DRB shall respond, in writing, to requests for clarification within 10 days of receipt of such requests.

L. The DRB's recommendations, stated in the DRB's reports, are not binding on either party. Either party may seek a reconsideration of a recommendation of the DRB. The DRB shall only grant a reconsideration based upon submission of new evidence and if the request is submitted within the 30-day time limit specified for response to the DRB's written report. Each party may submit only one request for reconsideration regarding an individual DRB recommendation.

M. If the State and the Contractor are able to resolve their dispute with the aid of the DRB's report, the State and Contractor shall promptly accept and implement the recommendations of the DRB. If the parties cannot agree on compensation within 60 days of the acceptance by both parties of the DRB's recommendation, either party may request the DRB to make a recommendation regarding compensation.

N. The State or the Contractor shall not call DRB members who served on the DRB for this contract as witnesses in arbitration proceedings which may arise from this contract, and all documents created by the DRB shall be inadmissible as evidence in subsequent arbitration proceedings, except the DRB's final written reports on each issue brought before it.

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

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

DISPUTES INVOLVING SUBCONTRACTOR POTENTIAL CLAIMS

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

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

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

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

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

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

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

RETENTION

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

DISPUTE REVIEW BOARD AGREEMENT

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

Form 6202 Rev (01-05-98)

DISPUTE REVIEW BOARD AGREEMENT

_____
(Contract Identification)

Contract No. _____

THIS DISPUTE REVIEW BOARD AGREEMENT, hereinafter called "AGREEMENT", made and entered into this _____ day of _____, _____, between the State of California, acting through the California Department of Transportation and the Director of Transportation, hereinafter called the "STATE," _____ _____ hereinafter called the "CONTRACTOR," and the Dispute Review Board, hereinafter called the "DRB" consisting of the following members:

_____ ,
(Contractor Appointee)

_____ ,
(State Appointee)

and _____
(Third Person)

WITNESSETH, that

WHEREAS, the STATE and the CONTRACTOR, hereinafter called the "parties," are now engaged in the construction on the State Highway project referenced above; and

WHEREAS, the special provisions for the above referenced contract provides for the establishment and operation of the DRB to assist in resolving disputes; and

WHEREAS, the DRB is composed of three members, one selected by the STATE, one selected by the CONTRACTOR, and the third member selected by the other two members and approved by the parties;

NOW THEREFORE, in consideration of the terms, conditions, covenants, and performance contained herein, or attached and incorporated and made a part hereof, the STATE, the CONTRACTOR, and the DRB members hereto agree as follows:

SECTION I DESCRIPTION OF WORK

To assist in the resolution of disputes between the parties, the contract provides for the establishment and the operation of the DRB. The intent of the DRB is to fairly and impartially consider disputes placed before it and provide written recommendations for resolution of these disputes to both parties. The members of this DRB shall perform the services necessary to participate in the DRB's actions as designated in Section II, Scope of Work.

SECTION II SCOPE OF WORK

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

A. OBJECTIVE

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

B. PROCEDURES

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

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

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

C. CONSTRUCTION SITE VISITS, PROGRESS MEETINGS AND FIELD INSPECTIONS

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

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

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

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

D. DRB CONSIDERATION AND HANDLING OF DISPUTES

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

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

Both parties shall be given the opportunity to present their evidence at these dispute meetings. It is expressly understood that the DRB members are to act impartially and independently in the consideration of the contract provisions, and the facts

and conditions surrounding any dispute presented by either party, and that the recommendations concerning any such dispute are advisory and nonbinding on the parties.

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

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

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

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

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

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

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

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

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

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

E. DRB MEMBER REPLACEMENT

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

SECTION III CONTRACTOR RESPONSIBILITIES

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

SECTION IV STATE RESPONSIBILITIES

The STATE will furnish the following services and items:

A. CONTRACT RELATED DOCUMENTS

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

B. COORDINATION AND SERVICES

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

SECTION V TIME FOR BEGINNING AND COMPLETION

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

SECTION VI PAYMENT

A. ALL INCLUSIVE RATE PAYMENT

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

B. PAYMENTS

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

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

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

C. INSPECTION OF COSTS RECORDS

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

SECTION VII ASSIGNMENT OF TASKS OF WORK

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

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

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

SECTION IX LEGAL RELATIONS

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

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

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

SECTION X CONFIDENTIALITY

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

SECTION XI DISPUTES

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

SECTION XII VENUE, APPLICABLE LAW, AND PERSONAL JURISDICTION

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

SECTION XIII FEDERAL REVIEW AND REQUIREMENTS

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

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

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

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

DRB MEMBER

By: _____

Title: _____

DRB MEMBER

By: _____

Title :_____

DRB MEMBER

By :_____

Title :_____

CONTRACTOR

By: _____

Title: _____

CALIFORNIA STATE DEPARTMENT
OF TRANSPORTATION

By: _____

Title: _____

5-1.19 FORCE ACCOUNT PAYMENT

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

Attention is directed to "Time-Related Overhead" and "Progress Schedule (Critical Path)" 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.

The fourth subparagraph of the first paragraph of Section 9-1.03A(3b), "Equipment not on the Work," in the Standard Specifications shall not apply.

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.

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 and these special provisions, an additional markup of 7 percent will be added to the total cost of that extra work including all markups specified in this section "Force Account Payment". The additional 7 percent markup shall reimburse the Contractor for additional administrative costs, and no other additional payment will be made by reason of performance of the extra work by a subcontractor.

5-1.20 CONTRACTOR-CONTROLLED INSURANCE PROGRAM (CCIP)

Attention is directed to Section 7, "Legal Relations and Responsibility," of the Standard Specifications and these special provisions. Nothing in this section shall be construed to change or waive the requirements of any other provisions of the contract.

To comply with "Indemnification and Insurance" of these special provisions, the Contractor shall implement a contractor-controlled insurance program (CCIP), as herein defined. The indemnification requirements of "Indemnification and Insurance" of these special provisions shall apply only to the State, including its officers, directors, and agents. The indemnification requirements of "Indemnification and Insurance" of these special provisions may apply, at the discretion of the Contractor or Joint Venture, to its subcontractors, suppliers, manufactures, and vendors.

A CCIP is a controlled insurance program by which the prime contractor, or joint venture, arranges and implements a controlled master insurance property/casualty insurance program covering itself and all of its subcontractors, suppliers, manufacturers, and vendors; regardless of tier or level of participation in the performance of this contract. Under the CCIP, the levels of insurance and coverage provided by the prime contractor, or joint venture, for its subcontractors, suppliers, manufacturers and vendors shall comply with the coverage requirements of these special provisions "Indemnification and Insurance."

The CCIP shall provide professional liability insurance and shall cover actual or alleged negligent acts, errors or omissions committed by the Contractor or Joint Venture, subcontractors, suppliers, manufactures, and vendors, their agents or employees, arising out of work performed under this contract. The policy coverage shall extend to include bodily injury and property damage from negligent performance of professional service and personal injury liability coverage for claims arising out of the work. The policy shall be on a claims made basis and have limits of liability of not less than $10,000,000 per occurrence and $10,000,000 in the project aggregate, subject to a $100,000 per occurrence deductible, unless such limits and deductibles are unobtainable at the time of coverage inception or renewal during the term of the contract. Higher limits may be obtained.

The CCIP shall provide pollution liability insurance in the amount not less than $10,000,000 per occurrence and $10,000,000 in the project aggregate with respect to any operation of the Contractor or Joint Venture, subcontractors, suppliers, manufactures, and any vendors required under or incidental to the performance of this contract, including but not limited to handling asbestos contaminated materials, lead paint materials, petroleum, petroleum by-products, and all other environmentally regulated substances and hazardous material. Pollution liability insurance shall be provided unless such limits and deductibles are unobtainable at the time of coverage inception or renewal during the term of the project. Higher limits may be obtained.

The CCIP shall provide builders' risk insurance that insures the interest of the State, Contractor or Joint Venture, subcontractors, suppliers, manufactures, and any vendors of all tiers providing coverage on an "All Risk" basis, including, but not limited to, coverage against fire, floods, lightning, wind damage, hail, tsunamis, earthquakes, and other natural disasters, epidemics, quarantine restrictions, strikes, labor disputes, shortage of materials and freight embargoes, explosion, acts of terrorism, acts of the public enemy, civil commotion, aircraft collision, vehicle collision, collapse, and smoke. Coverage shall include all materials, supplies, and equipment that are intended for specific installation at the insured Project Site, while such materials, supplies, and equipment are located at an insured project site, in transit, and while temporarily located away from an insured project site for the purpose of repair, adjustment, or storage at the risk of one of the insured parties. Project site includes the actual geographic location for this project including limits of the project as shown on the project plans, areas authorized for Contractor use by these special provisions and contract plans, and any location or facility established for the sole or primary purpose of contributing to this specific project. The limit of liability shall be set at the value of this project, with a maximum deductible of $10,000. Builders' risk insurance shall be provided unless such limits and deductibles are unobtainable at the time of coverage inception or renewal during the term of the project. Higher limits may be obtained.

The CCIP shall provide insurance coverage for events related to force majeure, transportation delays, strikes, changes in law, and acts of subcontractors, suppliers, manufacturers and vendors within the limit of liability and deductible amount the Contractor/Joint Venture deems appropriate for this contract.

For subcontractors, suppliers, manufacturers, and vendors, the CCIP is not required to provide automobile liability, automobile umbrella liability, off-site workers' compensation, off-site general liability, and property insurance. If the CCIP does not provide automobile liability, automobile umbrella liability, off-site workers' compensation, off-site general liability, and property insurance, for subcontractors, suppliers, manufacturers, and vendors, then, in accordance with Section 8-1.01 "Subcontracting" of the Standard Specifications all subcontractors, suppliers, manufactures, and vendors, regardless of tier, are required to provide automobile liability, automobile umbrella liability, off-site workers' compensation, off-site general liability, and property insurance for themselves that fully complies with "Indemnification and Insurance" of these special provisions.

The prime contractor, or joint venture, shall arrange for and implement the CCIP and be solely responsible for any and all elements of CCIP administration. A CCIP policy complying with the requirements of this special provision shall remain in effect and provide continuous coverage for the entire project term.

The Contractor, prior to or at the pre-construction conference and the commencement of any work on the project site, shall submit to the Engineer complete details of the CCIP which demonstrates that the CCIP fully complies with the requirements of this special provision including, but not limited to, evidence of coverage, a complete description of program design outlining the claim/risk management program, the complete safety program, loss control program, copies of all applicable policies, a listing of all assumed exposures, insurance types, limits, coverages, pricing, premiums, deductibles, guaranteed rates, estimated administration costs of the CCIP, and the estimated ultimate costs or savings resulting from implementation of the CCIP in lieu of a traditional insurance program. The Contractor shall also submit evidence of coverage for those insurances that are not specifically provided for under the CCIP.

On a semi-annual basis, the Contractor shall submit to the Engineer a financial and narrative evaluation report comparing costs of utilizing a CCIP versus anticipated costs of utilizing a traditional insurance program. The report shall be of sufficient detail and organization for the Engineer to determine the overall financial benefit or liability of CCIP versus traditional insurance program utilization. Such a report must minimally include, but not be limited to, a narrative describing anticipated versus actual performance of CCIP versus traditional insurance program utilization; a financial comparison summary of premium, claim/risk management, safety, and loss control program costs segregated by premium, deductible, and variable administrative costs; a narrative that compares anticipated utilization of traditional insurance versus actual CCIP utilization relative to the Contractor's or Joint Venture's ability to: administrate the contract, utilize small business, utilize disadvantaged business, manage overall project safety, and manage disputes between Contractor or Joint Venture and subcontractors, manufactures, and vendors. The Contractor shall submit an original and four copies of each semi-annual report in order to be entitled to payment in accordance with this Special Provision.

All records of the Contractor related to the CCIP shall be open to inspection by representatives of the Department, during the life of the contract and for a period of not less than 3 years after the date of acceptance thereof, and the Contractor shall retain such records for that period.

The Department acknowledges that the Contractor's cost records related to the CCIP may constitute trade secrets that are eligible for protection from disclosure under the provisions of the California Public Records Act. The Department understands that the Contractor's cost records related to the CCIP may not be known outside the contractor's business, may be known only to a limited extent and only by a limited number of employees of the Contractor, may be safeguarded while in the Contractor's possession, may be extremely valuable to the Contractor, and could be extremely valuable to the Contractor's competitors. The Department agrees that Contractor's cost records that are marked as "Trade Secret" and provided to the Department in compliance with this Special Provision shall be considered confidential and shall not be released or disclosed outside the Department, unless disclosure is mandated pursuant to a request for inspection under the California Public Records Act. If documents marked as "Trade Secret" are the subject of a request for inspection under the California Public Records Act, the Department shall object to such disclosure under all applicable exemptions from disclosure provided by the California Public Records Act, provided, however, in the event of a court proceeding to compel disclosure, the Contractor may intervene in such proceeding and substitute itself in place of the Department. Whether or not the Contractor intervenes, the Contractor shall reimburse the Department for any costs, fees or sanctions imposed on the Department arising out of its assertion that the Contractor's cost records marked "Trade Secret" are exempt from disclosure . In the event of arbitration of Contractor claims pursuant to Public Contract Code section 10240 et seq., documents designated as "Trade Secret" shall be subject to discovery pursuant to the process of the arbitration proceeding.

All costs associated with CCIP development and implementation, as specified herein, shall be considered to be included in the time related overhead item of work and no additional compensation will be provided therefor. The Contractor shall be compensated a lump sum price of $2,500 for each semi-annual report that meets the requirements of this special provision.

5-1.21 COMPENSATION ADJUSTMENTS FOR PRICE INDEX FLUCTUATIONS

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

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

The compensation payable for asphalt concrete and asphalt treated permeable base will be increased or decreased in conformance with the provisions of this section for paving asphalt price fluctuations exceeding 10 percent (Iu/Ib is greater than 1.10 or less than 0.90) which occur during performance of the work.

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

A. Total monthly adjustment = AQ

B. For an increase in paving asphalt price index exceeding 10 percent:

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

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

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

D. Where:

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

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

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

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

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

A. The compensation adjustments provided herein will be shown separately on payment estimates. The Contractor shall be liable to the State for decreased compensation adjustments and the Department may deduct the amount thereof from any moneys due or that may become due the Contractor.
B. Compensation adjustments made under this section will be taken into account in making adjustments in conformance with the provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.
C. In the event of an overrun of contract time, adjustment in compensation for paving asphalt included in estimates during the overrun period will be determined using the California Statewide Paving Asphalt Price Index in effect on the first business day of the month within the pay period in which the overrun began.

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

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

5-1.22 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	$ 25,000
B.	Electronic Mobile Daily Diary System Data Delivery	$ 85,000
C.	Prepare Storm Water Pollution Prevention Plan	$ 5,500
D.	Lead Compliance Plan	$ 10,000
E.	Progress Schedule (Critical Path)	$300,000

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

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

A. Steel Piling
B. Precast Members of Earth Retaining Structures
C. Prestressing Steel in Sealed Containers
D. Prestressing Anchorages and Ducts
E. Tiedown Anchors
F. Spherical PTFE Bearings
G. Type B Joint Seal
H. Joint Seal Assemblies
I. Bar Reinforcing Steel
J. Structural Steel
K. Column Casing
L. Isolation Casing
M. Treated Lumber and Timber
N. Miscellaneous Metal
O. Bridge Deck Drainage System
P. Luminaires
Q. Lighting Fixtures

R. Signal and Lighting Standards
S. Signal Heads and Mounting Brackets
T. Alternate Pipe Culvert
U. Welded Steel Pipe
V. Miscellaneous Iron and Steel
W. Chain Link Fence and Gates
X. Crash Cushions
Y. Terminal Systems.

5-1.23 PROJECT APPEARANCE

The Contractor shall maintain a neat appearance to the work.

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

A. When practicable, broken concrete and debris developed during clearing and grubbing shall be disposed of concurrently with its removal. If stockpiling is necessary, the material shall be removed or disposed of weekly.
B. Trash bins shall be furnished for debris from structure construction. Debris shall be placed in trash bins daily. Forms or falsework that are to be re-used shall be stacked neatly concurrently with their removal. Forms and falsework that are not to be re-used shall be disposed of concurrently with their removal.

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

5-1.24 HAZARDOUS AND NON-HAZARDOUS MATERIAL, GENERAL

Attention is directed to "Earthwork" of these special provisions regarding the stockpile, removal and disposal of hazardous and non-hazardous material.

Contaminants have been discovered through testing within the project limits. Testing consisted of collecting and analyzing in situ samples within the project limits. A description of the sampling plan and summary tables of test results are included in the reports described herein. The reports entitled "Site Investigation Report - West Approach Project, Transbay Terminal Loop, San Francisco, California, June 1999" and "Addendum Site Investigation Report - West Approach Project, Westbound and 4th Street On-Ramp, San Francisco/Oakland Bay Bridge, San Francisco, California, August 1999" are available for inspection at the Office of the Toll Bridge Duty Senior at the District 4 Office, 111 Grand Avenue, Oakland, CA 94612, email; duty_senior_tollbridge_district04@dot.ca.gov, telephone number (510) 286-5549, fax number; (510) 286-4563. Requests to review the reports must be made with the duty senior at least 24 hours in advance. These test results have been used for disposal characterization of material within the excavation limits and shall not be construed as identifying all locations within the project limits that contain contaminants.

Wherever the following terms are used in the contract documents, the meaning and intent shall be interpreted as provided below:

A. Resource Conservation Recovery Act (RCRA) Hazardous Material - Material that contains contaminants at concentrations equal to or greater than the threshold limit concentrations listed in Section 66261.24 (a) (1) of Title 22 of the California Code of Regulations.
B. Non-RCRA Hazardous Material - Material that contains contaminants at concentrations equal to or greater than the threshold limit concentrations listed in Section 66261.24 of Title 22 of the California Code of Regulations, excluding Section 66261.24 (a) (1).
C. Non-Hazardous Material - Material that does not contain contaminants at concentrations equal to or greater than the threshold limit concentrations listed in Section 66261.24 of Title 22 of the California Code of Regulations.

Characterization and disposal of additional material resulting from excavations performed outside of the pay limits shown on the plans, specified in the Standard Specifications, or specified or directed by the Engineer, for the Contractor's convenience, shall be at the Contractor's expense. This resultant material shall be presumed to be either hazardous material or non-hazardous material if the test results for the location indicate that the material being excavated is hazardous material or non-hazardous material. Unless backfilling with the material is approved in writing by the Engineer, the Contractor shall dispose of the resultant material outside highway right of way in conformance with the provisions in "Earthwork" of these special provisions. When the material must be removed from highway right of way the Contractor shall furnish replacement material suitable for the purpose intended in conformance with the provisions in Section 19, "Earthwork," of the Standard Specifications.

Operations shall be conducted in a manner that prevents increases in the quantities of RCRA and non-RCRA hazardous material resulting from mixing with material containing lower contaminant concentrations. No additional compensation will be made for material requiring reclassification due to failure to segregate the material after excavation.

APPLICABLE RULES AND REGULATIONS

Excavation, transport and disposal of RCRA and non-RCRA hazardous material, and non-hazardous material shall be in accordance with the rules and regulations of the following agencies:

1. United States Department of Transportation (USDOT)
2. United States Environmental Protection Agency (USEPA)
3. California Environmental Protection Agency (CAL-EPA)
4. Department of Toxic Substance Control (DTSC)
5. Integrated Waste Management Board
6. Regional Water Quality Control Board, Region 2 (RWQCB)
7. State Air Resources Board
8. Bay Area Air Quality Management District (BAAQMD)
9. California Division of Occupational Safety and Health Administration (CAL-OSHA)

PERMITS AND LICENSES

The Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the hazardous material, in conformance with the provisions in Section 7-1.04, "Permits and Licenses," of the Standard Specifications.

The Engineer will obtain the Environmental Protection Agency Generator Identification No. and Board of Equalization Identification Number and sign all manifests as the Generator.

HEALTH, SAFETY AND WORK PLAN

The Contractor shall prepare a detailed Site Health, Safety and Work Plan for all site personnel including State personnel, that identifies potential health and safety hazards associated with each operation and specifies work practices that will be used to protect workers from those hazards in accordance with the DTSC and CAL-OSHA regulations. At a minimum, the Site Health, Safety and Work Plan shall identify the following items: key site safety personnel, risks associated with the work, training requirements, appropriate personal protective equipment, any site-specific medical surveillance requirements, any periodic air monitoring requirements, appropriate site work zones, and any decontamination requirements. The Site Health, Safety and Work Plan shall be submitted at least 15 working days prior to beginning any excavation work for review and acceptance by the Engineer. Prior to submittal, the Contractor shall have the Site Health, Safety and Work Plan approved by an Industrial Hygienist certified by the American Board of Industrial Hygiene. Subcontractors shall use the Site Health, Safety and Work Plan prepared by the Contractor or prepare and submit a separate Site Health, Safety and Work Plan in conformance with the provisions in this section.

SAFETY TRAINING

Prior to performing any work, all personnel, including State personnel, shall complete a safety training program that communicates the potential health and safety hazards associated with work on the site and instructs the personnel in procedures for doing the work safely. The level of training provided shall be consistent with the personnel's job function and conform to CAL-OSHA regulations. The training, including subsequent training required until completion of the project, shall be provided by the Contractor. The Contractor shall provide a certification of completion of the Safety Training Program to all personnel. Personal protective equipment required by State personnel to inspect the work shall be provided by the Contractor. The number of State personnel requiring the above mentioned safety training program will be 30.

SAMPLING AND ANALYSIS

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

The Contractor may perform additional tests on the material to be excavated at his option and expense for confirmation of the classification as RCRA and non-RCRA hazardous material, or non-hazardous material. Sampling and analysis shall be based on guidelines in USEPA, SW 846, "Test Methods for Evaluating Solid Waste, Volume II: Field Manual Physical/Chemical Methods."

The Contractor shall submit, for approval by the Engineer, a Sampling and Analysis Plan that describes the scope of the investigation, along with the name, address, and certification number of the testing laboratory, 15 working days prior to beginning any sampling or analysis for additional disposal facility requirements, reclassification of material, or characterization of material outside of the excavation pay limits. The Sampling and Analysis Plan shall be prepared under the guidance of a registered professional experienced in site characterization. The Engineer will make the final decision on reclassification of material after review of the test data. Five working days shall be allowed for review of test data and if accepted, the reclassified material will be paid for under the appropriate various items of work, in accordance with Section 4-1.03, "Changes," of the Standard Specifications.

MEASUREMENT AND PAYMENT

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

5-1.25 AREAS FOR CONTRACTOR'S USE

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's activities in these areas shall be planned with consideration to the needs and prior demands of State forces and to other contract requirements and, at the direction of the Engineer, shall allow access to State forces in these areas.

Attention is directed to "Order of Work" and "Maintaining Traffic" of these special provisions regarding availability requirements. The Contractor shall notify the Engineer of Contractor's intent to enter and occupy a State-owned lot, in writing, at least 60 days but not more than 75 days prior to occupying the lot, and shall occupy the lot only upon the written approval of the Engineer. The Engineer reserves the right to notify the Contractor to vacate a State-owned lot at any time during the contract, if, at the judgment of the Engineer, the lot is not being actively used in pursuing the contract work.

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

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

5-1.26 UTILITIES

Utilities shall be subject to the provisions in "Cooperation," "Order of Work," and "Obstructions" of these special provisions.

The Contractor shall make arrangements to obtain electrical power, water, or compressed air or other utilities required for the Contractor's operations and shall make and maintain the necessary service connections at the Contractor's own expense. The Contractor shall not use any existing State utility outlets within the contract limits, unless approved in writing by the Engineer.

5-1.27 SANITARY PROVISIONS

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

5-1.28 ACCESS TO PROJECT SITE

Prospective bidders may make arrangements to visit the project site by contacting the Toll Bridge Program Duty Senior, telephone number (510) 286-5549, email address: Duty_Senior_ Tollbridge_ District 04@dot.ca.gov, and fax number (510) 286-4563.

5-1.29 DRAWINGS

The first paragraph in Section 55-1.02, "Drawings," of the Standard Specifications is amended to read:

- The Contractor shall submit working drawings for structural steel to the Office of Resident Engineer, 151 Fremont Street, San Francisco, CA 94105 for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings". For initial review, 6 sets of the drawings shall be submitted for highway bridges and 10 sets shall be submitted for railroad bridges. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to Office of Structure Design for final approval and for use during construction.

The seventh and eighth paragraphs in Section 55-1.02, "Drawings," of the Standard Specifications are amended to read:

- At the completion of each structure on the contract, one set of reduced prints on 20 pound (minimum) bond paper, 11 by 17 inches in size, of the corrected original tracings of all working drawings for each structure shall be furnished to the Engineer. Reduced prints that are common to more than one structure shall be submitted for each structure. An index prepared specifically for the drawings for each structure containing sheet numbers and titles shall be included on the first reduced print in the set for each structure. Reduced prints for each structure shall be arranged in the order of drawing numbers shown in the index.
- The edge of the corrected original tracing image shall be clearly visible and visually parallel with the edges of the page. A clear, legible symbol shall be provided on the upper left side of each page to show the amount of reduction and a horizontal and vertical scale shall be provided on each reduced print to facilitate enlargement to original scale.

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

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

A. Working drawings shall be submitted to the Engineer at Office of the Resident Engineer, Department of Transportation, 151 Fremont Street, San Francisco, CA 94105.
B. Working drawings shall not exceed 22" x 34" in size.
C. Microfilms are required of all approved shop drawings and shall be only a 24x reduction.
D. All working drawing submittals, including re-submittals, shall include electronic versions of the working drawings in Microstation 95 or a more current design file format. All other information accompanying the working drawings shall be submitted in Adobe Acrobat Version 3.0 or later file format. This information shall be submitted on a compact disk media compatible with the Microsoft Windows Operating System. The diskette shall include both as a file and cover jacket a list of the files on the disk and for what they are being submitted.

Attention is directed to the Engineer's review time of working drawings, as specified elsewhere in these special provisions. The time to be provided for the Engineer's review of Structural Steel working drawings shall be 10 weeks. The time to be provided for the Engineer's review of all other working drawings shall be 4 weeks unless otherwise specified in the Standard Specifications or these special provisions.

Said Engineer's review time is for the initial working drawing submittal. The Contractor shall allow additional time as specified herein for the Engineer's review of working drawing re-submittal and simultaneous submittals.

The Contractor shall allow the review time specified herein, after complete working drawings and all supporting data are submitted to the Engineer. Working drawings shall show complete details of the method and materials the Contractor proposes to use in the work. Attention is directed to the section entitled "Existing Highway Facilities," elsewhere in these special provisions for the Contractor's certification, which shall indicate that field dimensions have been verified for a working drawing submittal. Working drawings not including the Contractor's certification will be returned by the Engineer as incomplete.

The review time for a set of working drawings will be considered as starting when the Engineer has received the complete set of working drawings and all supporting data.

If at any time during the review process the working drawings are determined to be incomplete or if the working drawings are stamped "Return for Corrections", then the drawings will be rejected and returned to the Contractor for correction. The review time on a set of returned drawings will be considered stopped on the date the drawings are date stamped by the Engineer for return. The Contractor shall submit a notice of re-submittal to the Engineer within 7 days after receipt of the rejected set. The notice shall contain the submittal number, revision number, and date the revised set will be returned for review. The revised set shall contain the same work as was originally submitted.

After a revised set of drawings has been received by the Engineer, the new review time for that set of revised drawings will be the same as the original review time.

The review time for a set of working drawings will be considered as completed on the date the working drawings have been reviewed, approved, and mailed to the Contractor with a date stamp by the Engineer.

After review and approval of the working drawings, between 6 and 12 sets, or otherwise specified elsewhere in these special provisions, as requested by the Engineer, and in addition to the number of sets required by the Contractor, shall be submitted to the Engineer for final approval. These sets will be the only sets stamped "Approved" and will be distributed for use during construction.

Working drawings will be required for, but shall not be limited to the following items:

Bridge removal plans
Protection shields plans
Debris containment and collection program
Temporary bracing system
Temporary supports
Temporary structures
Falsework
Shoring systems and cofferdam systems
Temporary trestles
Test borings
Cast-in-drilled hole concrete pile placing plan
Pile handling plan
Column reinforcing bracing system
Prestressing and anchorage assemblies
Prestressing cast-in-place concrete
Joint seal assemblies
Steel casings
Structural steel
Miscellaneous metal
Paint residue containment and collection program

Working drawings shall be submitted in sets according to the Scope Breakdown Structure Level 1, Level 2, Level 3, and Level 4 codes given at the end of this specification. Each set of working drawings shall be coded with the applicable set of Scope Breakdown Structure codes, and each set of working drawings shall be limited to and represent no more work than what is defined by one set of Scope Breakdown Structure codes as determined by the Engineer. In addition, each set of working drawings shall be identified with a unique and sequential number.

In the event that several sets of working drawings corresponding to one set of Scope Breakdown Structure codes are submitted simultaneously or additional sets of drawings corresponding to one set of Scope Breakdown Structure codes are submitted for review before the review of the previously submitted sets of drawings has been completed, the Contractor shall designate the sequence in which all of the sets of drawings corresponding to the particular set of Scope Breakdown Structure codes are to be reviewed. In such event, the time to be provided for the review of any set of working drawings in the sequence shall be not less than the review time specified for that set of working drawings plus one half of each of the original review times for each set of working drawings of higher priority that are still under review. The Contractor shall incorporate the designated review sequence into the CPM Schedule by designating predecessor and successor relationships between sequential submittal sets and ensuring that submittals have the correct construction activity successor relationship. The Contractor shall submit a detailed predecessor/successor report of submittal and submittal review activities generated from said schedule including activity start and finish dates and activity total float. The Contractor may change the sequence of review for any item by submitting a written notification outlining their proposal for reprioritization of working drawing submittal review in conformance with the following requirements:

A. All sets of working drawings corresponding to a particular set of Scope Breakdown Structure codes under review shall be reprioritized by the Contractor.
B. The proposed reprioritization, including review time for each submittal, shall be agreed upon by the Engineer and the Contractor before it is approved and implemented. The reprioritization shall be included in the CPM Schedule. The Engineer and the Contractor shall agree upon the impact to the CPM Schedule before the reprioritization is approved and implemented.
C. The review time for the new top priority set will restart and will not exceed the original review time starting from the time that the Contractor's reprioritization proposal has been approved, unless the set is returned for revisions.
D. The review time for each submittal will be adjusted based on the Contractor's reprioritization and the total number of working drawings under review at the time of the written notification.

Should the Engineer fail to review the complete working drawing submittal within the time specified and the delay can not be mitigated within the procurement/fabrication, and/or the construction time, and if, in the opinion of the Engineer, the completion of the Contractor's successor construction activity is delayed and a delay in completion of the contract ensues, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Approval by the Engineer of the working drawings or field inspection performed by the Engineer will in no way relieve the Contractor of full responsibility for verifying field dimensions.

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

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

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

The Contractor shall submit to the Engineer 3 copies of manufacturer's catalog sheets, maintenance and operation booklets or instructions for joint seal assemblies, seismic isolation bearings, viscous damping devices, anti-washout admixtures, concrete coatings, and T-headed reinforcement. In addition, the Contractor shall submit 2 copies of steel lists and shop drawings for bar reinforcing steel in conformance with Section 52-1.03, "Steel Lists," of the Standard Specifications.

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

5-1.30 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.

Attention is directed to "Order of Work" and "Maintaining Traffic" of these special provisions.

Except as otherwise specified in this Section, between the hours 8:00 p.m. to 8:00 a.m. the noise level from any of the contractor's operations shall not exceed 86 dbA, L(max), when measured at a distance of 50 feet from the noise source.

Should the Contractor elect to schedule work between 8:00 p.m. and 8:00 a.m., a written Sound Control Plan (SCP) shall be submitted to the Engineer for review and approval. The SCP shall be submitted at least three weeks in advance of anticipated nighttime work operations. The Contractor shall allow the Engineer two weeks to review and approve the SCP. The Contractor shall allow an additional week for review and approval of any SCP re-submittals or revisions. The SCP shall include work to be performed, equipment to be used, planned work duration, mitigating measures, noise monitoring procedures and contingency plan if mitigating measures are not effective. Mitigation shall be made at the noise source. Work shall not begin on any nighttime noise operations until the Engineer has approved in writing the SCP.

Should the noise level from any work operation performed between the hours of 8:00 p.m. and 8:00 a.m. exceed the allowable limit of 86 dbA, L(max), the operation shall cease immediately. Prior to resuming this work, the Contractor shall submit a revised SCP plan detailing new, revised or additional measures to mitigate the noise. The Contractor shall not resume work until the Engineer has approved, in writing, the revised plan.

Should the noise level adjacent to pedestrian traffic in the area exceed 115 dbA, L(max) at any time, the operation shall cease immediately**.** Prior to resuming this work, the Contractor shall submit a revised SCP detailing new, revised or additional measures to mitigate the noise. The Contractor shall not resume work until the Engineer has approved, in writing, the revised plan.

Exceptions to the above requirements are as follows:

1. Noise level from any of the Contractor's operations associated with bridge removal, erection of falsework, and removal of falsework over city streets shall not exceed 86 dbA, L(max), when measured at a distance of 50 feet from the noise source, between the hours of 10:00 p.m. and 7:00 a.m..

2. Noise level from any of the Contractor's operations associated with bridge removal, erection of falsework, and removal of falsework from the Anchorage to existing Bent 43 shall not exceed 86 dbA, L(max), when measured at a distance of 50 feet from the noise source, between the hours of 12:01 a.m. and 7:00 a.m.

These noise level requirements shall apply to all of the Contractor's operations and all equipment on the job or related to the job, including but not limited to trucks, transit mixers or transient equipment which 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.

Monitoring shall be performed using a Type 1 Sound Level Meter, as specified by the latest ANSI standards, measuring a dynamic range of 40-120 dB. Noise levels shall be A-weighted with a minimum sampling rate of 64 samples per second (Fast). Root Mean Square (RMS) sound pressure levels (SPLs) shall be expressed by the descriptors L(max) and Leq(h). Microphones shall be equipped with windscreens and shall be positioned as designated by the Engineer. Monitoring shall be performed for a duration of at least 60 minutes during each work operation. Additional spot readings shall be taken as directed by the Engineer to assure the noise level during work operations are within the allowable limits. Noise monitoring equipment shall be calibrated before each work shift. The noise monitor shall print data to a serial printer, providing

immediate on-site results. The Contractor shall keep a copy of all documentation and submit one copy to the Engineer on a daily basis.

Full compensation for conforming to the requirements of this section including monitoring, generating, submitting, and maintaining all reports and documentation 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.

5-1.31 RELATIONS WITH BAY AREA AIR QUALITY MANAGEMENT DISTRICT (ASBESTOS DEMOLITION/RENOVATION)

Portions of the work being performed under this contract are subject to the provisions of Regulation 11, Rule 2, "Asbestos Demolition, Renovation, and Manufacturing," of the Bay Area Air Quality Management District (BAAQMD). The Contractor shall be fully informed of the provisions of Rule 2 and shall conduct the work accordingly.

The Contractor shall submit the required notification of intent to demolish or renovate to the BAAQMD at least 10 working days, as defined in Rule 2, prior to beginning any demolition, even where no regulated asbestos-containing material (RACM) is present; any renovation operation where the amount of RACM is at least 101 linear feet, 101.2 square feet, or 35.3 cubic feet; and for all dry removals. The Contractor shall pay all fees for conducting the asbestos operations.

An asbestos survey titled "Asbestos Survey Report: San Francisco-Oakland Bay Bridge West Approach & Transbay Terminal Loop, October 1999" has been completed covering the work areas of this contract. Copies of the report are available for inspection at the office of the Toll Bridge Duty Senior at 111 Grand Avenue, Oakland, CA 94612, telephone no. (510) 286-5549; e-mail: Duty_Senior_Tollbridge_District 04@dot.ca.gov. Notify the Duty Senior at least 24 hours in advance to reserve a copy for review.

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

Attention is directed to "Labor Code Requirements," of these special provisions regarding amendments to Sections 7-1.01A(1), "Hours of Labor," 7-1.01A(2), "Prevailing Wage," 7-1.01A(2)(a), "Travel and Subsistence Payment," and 7-1.01A(3), "Payroll Records".

Attention is directed "Public Safety," of these special provisions regarding amendments to Section 7-1.09, "Public Safety," of the Standard Specifications.

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

5-1.32 DEFINITIONS AND TERMS

Section 1-1.18, "Engineer," of the Standard Specifications is amended to read:

Engineer

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

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

Office of Structure Design

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

5-1.33 PROPOSAL FORMS

The fourth paragraph of Section 2-1.05, "Proposal Forms," of the Standard Specifications is amended to read:

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

5-1.34 PROPOSAL REQUIREMENTS AND CONDITIONS

Section 2-1.08, "Withdrawal of Proposals," of the Standard Specifications is amended to read:

Withdrawal of Proposals

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

5-1.35 CONTROL OF WORK

Delete the first 2 paragraphs of Section 5-1.04, "Coordination and Interpretation of Plans, Standard Specifications, and Special Provisions," of the Standard Specifications.

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

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

5-1.36 LEGAL RELATIONS AND RESPONSIBILITY

Delete Section 7-1.01A(1), "Hours of Labor," of the Standard Specifications.

Hours of Labor

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

Delete Section 7-1.01A(2), "Prevailing Wage," of the Standard Specifications.

Prevailing Wage

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

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

4. Prior to making final payment to the subcontractor for work performed on the public works project, the contractor shall obtain an affidavit signed under penalty of perjury from the subcontractor that the subcontractor had paid the specified general prevailing rate of per diem wages to the subcontractor's employees on the public works project and any amounts due pursuant to Section 1813 of the Labor Code.

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

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

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

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

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

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

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

Delete Section 7-1.01A(2)(a), "Travel and Subsistence Payments," of the Standard Specifications

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

Delete the first and second paragraphs of Section 7-1.01A(3), "Payroll Records," of the Standard Specifications.

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

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

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

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

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

"(c) The certified payroll records shall be on forms provided by the Division of Labor Standards Enforcement or shall contain the same information as the forms provided by the division.
"(d) A contractor or subcontractor shall file a certified copy of the records enumerated in subdivision (a) with the entity that requested the records within 10 days after receipt of a written request.
"(e) Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by the awarding body, the Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement shall be marked or obliterated in a manner so as to prevent disclosure of an individual's name, address and social security number. The name and address of the contractor awarded the contract or the subcontractor performing the contract shall not be marked or obliterated.
"(f) The contractor shall inform the body awarding the contract of the location of the records enumerated under subdivision (a), including the street address, city and county, and shall, within five working days, provide a notice of a change of location and address.
"(g) The contractor or subcontractor shall have 10 days in which to comply subsequent to receipt of a written notice requesting the records enumerated in subdivision (a). In the event that the contractor or subcontractor fails to comply within the 10-day period, he or she shall, as a penalty to the state or political subdivision on whose behalf the contract is made or awarded, forfeit twenty-five dollars ($25) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Division of Apprenticeship Standards or the Division of Labor Standards Enforcement, these penalties shall be withheld from progress payments then due. A contractor is not subject to a penalty assessment pursuant to this section due to the failure of a subcontractor to comply with this section."

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

Delete Section 7-1.01A(5), "Apprentices," of the Standard Specifications.

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

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

The title of Section 7-1.02, "Weight Limitations," of the Standard Specifications is amended to, "Load Limitations."

Delete the first paragraph of Section 7-1.02, "Weight Limitations."

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

Delete the second paragraph of Section 7-1.09, "Public Safety," of the Standard Specifications.

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

Delete the first paragraph of Section 7-1.11, "Preservation of Property," of the Standard Specifications.

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

The title of Section 7-1.165, is changed to read "Damage by Storm, Flood, Tsunami, or Earthquake." Any references to tidal wave or tidal waves in the Standard Specifications shall be understood to refer to tsunami or tsunamis, respectively.

5-1.37 MEASUREMENT AND PAYMENT

Measurement of Quantities

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

SECTION 6. INCENTIVES AND DISINCENTIVES FOR COMPLETION OF DESIGNATED PORTIONS OF WORK

Attention is directed to the details shown on the plans and to the provisions in "Order of Work" and "Maintaining Traffic" of these special provisions. Incentives and disincentives are applicable to the designated portions of work. Damages specified in "Closure Requirements And Conditions" of these special provisions will be assessed for failure to open all lanes to traffic as specified herein.

Attention is directed to the provisions in "Beginning Of Work, Time Of Completion And Liquidated Damages" of these special provisions.

An "extended weekend closure" is defined as a closure of extended duration that is specifically for the purpose of completing the designated portion of work. An extended duration is a period of time that is greater than 14 hours and up to 55 hours starting at any time after 10:00 p.m. of Friday and ending at any time before 5:00 a.m. of the following Monday.

DESIGNATED PORTIONS OF WORK

The designated portions of work are defined as follows:

A. Extended Weekend Closure for bridge removal and erecting falsework for the Northern Portion of Frame 8U, Br. No. 34-0126L.
B. Extended Weekend Closure for bridge removal and erecting falsework for the Southern Portion of Frame 8U, Br. No. 34-0126L.
C. Frame 8U, Br. No. 34-0126L.

INCENTIVES AND DISINCENTIVES

Incentive payments and disincentive deductions shall apply to the designated portions of work in conformance with the following:

A. Extended Weekend Closure for bridge removal and erecting falsework for the Northern Portion of Frame 8U, Br. No. 34-0126L.

1. For this designated portion of work, an extended weekend closure is comprised of simultaneously closing the First Street, Essex Street, and Bus On-ramps as shown in Chart No. 28 in “Maintaining Traffic” of these special provisions.
2. Nine extended weekend closures will be the basis for the determination of incentive payments and disincentive deductions to complete the designated portion of work. For each and every extended weekend closure in excess of nine extended weekends, a disincentive deduction of $200,000 will be deducted from any monies due to the Contractor under this contract. For each and every extended weekend closure less than nine extended weekends, to complete the designated portion of work, the Contractor will receive an incentive payment of $200,000. The total incentive payment or disincentive deduction will not exceed $600,000. No credit will be issued to offset the

damages specified in "Closure Requirements And Conditions" of these special provisions. The work shall be diligently prosecuted to completion before the expiration of nine extended weekend closures.

3. Inspection, testing, and review duties performed by the Engineer shall be considered as included in the number of extended weekend closures for completion of the designated portion of work and no extensions of time will be allowed for such actions in determining incentive payments or disincentive deductions.

B. Extended Weekend Closure for bridge removal and erecting falsework for the Southern Portion of Frame 8U, Br. No. 34-0126L.

1. For this designated portion of work, an extended weekend closure is comprised of simultaneously closing the First Street On-ramp, Essex Street On-ramp, Sterling Street On-ramp, and one lane of Eastbound I-80 as shown in Chart No. 27 in “Maintaining Traffic” of these special provisions .
2. Nine extended weekend closures will be the basis for the determination of incentive payments and disincentive deductions to complete the designated portion of work. For each and every extended weekend closure in excess of nine extended weekends, a disincentive deduction of $500,000 will be deducted from any monies due to the Contractor under this contract. For each and every extended weekend closure less than nine extended weekends, to complete the designated portion of work, the Contractor will receive an incentive payment of $500,000. The total incentive payment or disincentive deduction will not exceed $1,500,000. No credit will be issued to offset the damages specified in "Closure Requirements And Conditions" of these special provisions. The work shall be diligently prosecuted to completion before the expiration of nine extended weekend closures.
3. Inspection, testing, and review duties performed by the Engineer shall be considered as included in the number of extended weekend closures for completion of the designated portion of work and no extensions of time will be allowed for such actions in determining incentive payments or disincentive deductions.

C. Frame 8U, Br. No. 34-0126L.

1. The beginning of this designated portion of work shall be defined as the commencement of the bridge demolition of portion B shown on the following plan sheets: “Stage Construction 3, Details No. 3, Demolition Layout Plan No. 9, and Demolition Details Double Deck No. 1” sheet and shall be considered complete when the last Frame 8U Bent Cap has been successfully prestressed. The Contractor shall not begin work on this segment of the project until all working plan submittals related to this portion of the work have been submitted and approved by the Engineer. These submittals include, but are not limited to: Demolition plans, Interim support shop drawings, falsework plans, construction management plan, working drawings for prestressing, design drawings for temporary supports, and sound control plan.
2. Four hundred and fifty (450) working days will be the basis for determining incentive payments and disincentive deductions to complete the designated portion of work. For each and every working day in excess of 450 working days, a disincentive deduction of $20,000 per working day needed to finish this designated portion of work will be deducted from any monies due to the Contractor under this contract. For each and every working day less than 450 working days, the Contractor will receive an incentive payment of $20,000. The total incentive payment or disincentive deduction will not exceed $3,000,000. No credit will be issued to offset the damages specified in "Closure Requirements And Conditions" of these special provisions. The work shall be diligently prosecuted to completion before the expiration of 450 working days.
3. Inspection, testing, and review duties performed by the Engineer shall be considered as included in the number of working days for completion of the designated portion of work and no extensions of time will be allowed for such actions in determining incentive payments or disincentive deductions.

CONSTRUCTION MANAGEMENT PLAN FOR EXTENDED WEEKEND CLOSURE, PREPARATION, APPROVAL AND UPDATES

The Contractor shall submit a written request to the Engineer 60 days prior to start of any extended weekend closure.

As part of the request, a Construction Management Plan is required for every extended weekend closure. The Construction Management Plan shall include a general time-scaled logic diagram displaying the major activities and sequence of planned operations that comply with the requirements of these special provisions and a contingency plan at each stage of the operations to prevent late opening of the extended weekend closure. "Early finish" and "late finish" milestones shall be clearly identified for every major activity. The contingency plan shall include detailed operations to be undertaken by the Contractor should any major activity pass the "late finish" milestone. Anytime the Contractor fails to open all lanes to public traffic on time for extended weekend closure, the approvals for the Construction Management Plans of the remaining extended weekend closures will be considered invalid.

The Engineer will have 15 days to review the Construction Management Plan. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the Construction Management Plan within 15 days of receipt of the Engineer's comments. The Engineer will have 7 days to review the revisions. The Contractor shall not proceed with the extended weekend closure unless a written approval of final Construction Management Plan is issued by the Engineer 7 days before the planned extended weekend closure.

For consecutive extended weekend closures, revision of the Construction Management Plan for the immediate subsequent extended weekend closure solely based on the progress of the immediate preceding extended weekend closure shall be submitted to Engineer by Tuesday of the subsequent week. The Contractor shall not proceed with the subsequent extended weekend closure unless a written approval of said revision is issued by the Engineer at least one day before the subsequent extended weekend closure.

Full compensation for preparing, updating, and obtaining written approval of the Construction Management Plans for extended weekend closures shall be considered as included in the lump sum price paid for progress schedule (critical path) and no additional compensation will be allowed therefor.

SECTION 7. (BLANK)

SECTION 8. MATERIALS

SECTION 8-1. MISCELLANEOUS

8-1.01 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS

The Department maintains the following list of Prequalified and Tested Signing and Delineation Materials. The Engineer shall not be precluded from sampling and testing products on the list of Prequalified and Tested Signing and Delineation Materials.

The manufacturer of products on the list of Prequalified and Tested Signing and Delineation Materials shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for each type of traffic product supplied.

For those categories of materials included in the list of Prequalified and Tested Signing and Delineation Materials, only those products shown within the listing may be used in the work. Other categories of products, not included in the list of Prequalified and Tested Signing and Delineation Materials, may be used in the work provided they conform to the requirements of the Standard Specifications.

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

PAVEMENT MARKERS, PERMANENT TYPE

Retroreflective With Abrasion Resistant Surface (ARS)

A. Apex, Model 921AR (4" x 4")
B. Ray-O-Lite, Model "AA" ARS (4" x 4")
C. Stimsonite, Models 911 (4" x 4") and 953 (2.75" x 4")
D. 3M Series 290 (3.5" x 4")

Retroreflective With Abrasion Resistant Surface (ARS)

(Used for recessed applications)

A. Stimsonite, Model 948 (2.3" x 4.7")
B. Ray-O-Lite, Model 2002 (2.3" x 4.6")
C. Stimsonite, Model 944SB (2.0" x 4")*
D. Ray-O-Lite, Model 2004 ARS (2.0" x 4")*

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

Non-Reflective For Use With Epoxy Adhesive, 4" Round

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

Non-Reflective For Use With Bitumen Adhesive, 4" Round

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

PAVEMENT MARKERS, TEMPORARY TYPE

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

A. Apex Universal, Model 924 (4" x 4")
B. Elgin Molded Plastics, "Empco-Lite" Model 901 (4" x 4")
C. Road Creations, Model R41C (4" x 4")
D. Vega Molded Products "Temporary Road Marker" (3" x 4")

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

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

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

STRIPING AND PAVEMENT MARKING MATERIAL

Permanent Traffic Striping and Pavement Marking Tape

A. Advanced Traffic Marking, Series 300 and 400
B. Brite-Line, Series 1000
C. Brite-Line "DeltaLine XRP"
D. Swarco Industries, "Director 35" (For transverse application only)
E. Swarco Industries, "Director 60"
F. 3M, "Stamark" Series 380 and 5730
G. 3M, "Stamark" Series 420 (For transverse application only)

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

A. Advanced Traffic Marking, Series 200
B. Brite-Line, Series 100
C. P.B. Laminations, Aztec, Grade 102
D. Swarco Industries, "Director-2"
E. Trelleborg Industri, R140 Series
F. 3M, Series 620 and Series A750
G. 3M, Series A145, Removable Black Line Mask
(Black Tape: for use only on Asphalt Concrete Surfaces)
H. Advanced Traffic Marking Black "Hide-A-Line"
(Black Tape: for use only on Asphalt Concrete Surfaces)
I. Brite-Line "BTR" Black Removable Tape
(Black Tape: for use only on Asphalt Concrete Surfaces)
J. Trelleborg Industri, RB-140
(Black Tape: for use only on Asphalt Concrete Surfaces)

Preformed Thermoplastic (Heated in place)

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

Removable Traffic Paint

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

Ceramic Surfacing Laminate, 6" x 6"

A. Safeline Industries/Highway Ceramics, Inc.

CLASS 1 DELINEATORS

One Piece Driveable Flexible Type, 66"

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

Special Use Flexible Type, 66"

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

Surface Mount Flexible Type, 48"

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

CHANNELIZERS

Surface Mount Type, 36"

A. Bent Manufacturing Company, Masterflex Models MF-360-36 (Round) and MF-180-36 (Flat)
B. Carsonite, "Super Duck" (Flat SDF-436, Round SDR-336)
C. Carsonite, "Super Duck II" Model SDCF203601MB "The Channelizer"
D. Bunzl (Formerly Davidson Plastics), Flex-Guide Models FG300LD and FG300UR
E. FlexStake, Surface Mount, Models 703 and 753 TM
F. GreenLine, Model SMD-36
G. Hi-Way Safety, Inc. "Channel Guide Channelizer" Model CGC36
H. The Line Connection, "Dura-Post" Model DP36-3 (Permanent)
I. The Line Connection, "Dura-Post" Model DP36-3C (Temporary)
J. Repo, Models 300 and 400
K. Safe-Hit, Guide Post, Model SH236SMA

CONICAL DELINEATORS, 42"

(For 28 inches Traffic Cones, see Standard Specifications)

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

OBJECT MARKERS

Type "K", 18"

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

Type "K-4" / "Q" Object Markers, 24"

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

TEMPORARY RAILING (TYPE K) REFLECTORS AND CONCRETE BARRIER MARKERS

Impactable Type

A. ARTUK, "FB"
B. Bunzl (Formerly Davidson Plastics), Model PCBM-12
C. Duraflex Corp., "Flexx 2020" and "Electriflexx"
D. Hi-Way Safety, Inc., Model GMKRM100

Non-Impactable Type

A. ARTUK, JD Series
B. Stimsonite, Model 967 (with 3.25" Acrylic cube corner reflector)
C. Stimsonite, Model 967LS
D. Vega Molded Products, Models GBM and JD

THRIE BEAM BARRIER MARKERS

(For use to the left of traffic)

A. Duraflex Corp., "Railrider"
B. Bunzl (Formerly Davidson Plastics), "Mini" (3" x 10")

CONCRETE BARRIER DELINEATORS, 16"

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

A. Bunzl (Formerly Davidson Plastics), Model PCBM T-16
B. Safe-Hit, Model SH216RBM
C. Sun-Lab Technology, "Safety Guide Light, Model TM," 5" x 5" x 3"

CONCRETE BARRIER-MOUNTED MINI-DRUM (10" x 14" x 22")

A. Stinson Equipment Company "SaddleMarker"

SOUND WALL DELINEATOR

(Applied vertically. Place top of 3" x 12" reflective element at 48" above roadway)

A. Bunzl (Formerly Davidson Plastics), PCBM S-36
B. Sun-Lab Technology, "Safety Guide Light, Model SM12," 5" x 5" x 3"

GUARD RAILING DELINEATOR

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

Wood Post Type, 27"

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

Steel Post Type

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

RETROREFLECTIVE SHEETING

Channelizers, Barrier Markers, and Delineators

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

Traffic Cones, 13" Sleeves

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

Traffic Cones, 4" and 6" Sleeves

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

Barrels and Drums

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

Barricades: Type I, Engineer Grade

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

Barricades: Type II, Super Engineer Grade

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

Signs: Type II, Super Engineer Grade

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

Signs: Type III, High-Intensity Grade

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

Signs: Type IV, High-Intensity Prismatic Grade

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

Signs: Type VII, High-Intensity Prismatic Grade

A. 3M Series 3900

Signs: Type VI, Roll-Up Signs

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

SPECIALTY SIGN (All Plastic)

A. All Sign Products, STOP Sign, 30"

SIGN SUBSTRATE FOR CONSTRUCTION AREA SIGNS

Aluminum

Fiberglass Reinforced Plastic (FRP)

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

8-1.02 STATE-FURNISHED MATERIALS

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

The following materials will be furnished to the Contractor:

A. Sign panels for roadside signs and overhead sign structures, self-adhesive sign panels and primer.
B. Sign overlay panels for roadside signs and overhead sign structures.
C. Padlocks for backflow preventer assembly enclosures, walk gates, and irrigation controller enclosure cabinets.
D. Marker panels, including reflectors, for Type N, Type P, and Type R object markers.
E. Lamps for vehicular traffic signal units, Type A pedestrian signals, flashing beacon units, and sign lighting fixtures.
F. Model 170 controller assemblies, including controller unit, completely wired controller cabinet, and inductive loop detector sensor units.
G. Reclaimed water warning signs.

Completely wired controller cabinets, with auxiliary equipment but without controller unit, will be furnished to the Contractor at the Caltrans Maintenance Station, 30 Rickard Street, San Francisco, CA 94134.

The Contractor shall notify the Engineer not less than 48 hours before State-furnished material is to be picked up by the Contractor. A full description of the material and the time the material will be picked up shall be provided.

The Contractor shall submit written request to the Engineer for the delivery of State-furnished material at least 60 days prior to its intended use.

8-1.03 MISCELLANEOUS METAL

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

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

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

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

Stud Diameter (inch)	Ultimate Tensile Load (pounds)
1 1/4	25,200
1 1/8	19,800
1	16,000
7/8	11,600
3/4	7,200
5/8	6,600
1/2	4,200

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

Installation Torque Values, (foot pounds)

Stud Diameter (inches)	Shell Type Mechanical Expansion Anchors	Integral Stud Type Mechanical Expansion Anchors	Resin Capsule Anchors and Cast-in-Place Inserts
1 1/4	—	—	400
1	—	—	230
7/8	—	—	175
3/4	80	175	150
5/8	35	90	75
1/2	22	50	30
3/8	11	25	18
1/4	4	7	—

8-1.04 ENGINEERING FABRICS

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

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

SECTION 8-2. CONCRETE

8-2.01 PORTLAND CEMENT CONCRETE

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

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

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

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

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

testing the Department may elect to perform. Approval will expire 3 years from the date the most recent registered and evaluated sample was collected from the aggregate source.

Qualified testing laboratories shall conform to the following requirements:

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

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

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

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

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

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

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

Unless otherwise specified, mineral admixture will not be required in portland cement concrete used for precast concrete girders.

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

8-2.02 CORROSION CONTROL FOR PORTLAND CEMENT CONCRETE

Portland cement concrete at Bents 1U to 8U and Bents 1L to 8L of SFOBB SAN FRANCISCO APPROACH – MAINLINE (Bridge No. 34-0126R/L), at BAYSHORE VIADUCT- 4TH STREET (RETROFIT) (Bridge No. 34-0088), at SFOBB SAN FRANCISCO APPROACH - 5TH STREET ON-RAMP (Bridge No. 34-0138C), and at SFOBB SAN FRANCISCO APPROACH - 5TH STREET OFF-RAMP (Bridge No. 34-0129C) is considered to be in a corrosive environment and shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

Cementitious material to be used in portland cement concrete of Bents 1U to 8U and Bents 1L to 8L of SFOBB SAN FRANCISCO APPROACH – MAINLINE (Bridge No. 34-0126R/L), of BAYSHORE VIADUCT- 4TH STREET (RETROFIT) (Bridge No. 34-0088), of SFOBB SAN FRANCISCO APPROACH - 5TH STREET ON-RAMP (Bridge No. 34-0138C), and of SFOBB SAN FRANCISCO APPROACH - 5TH STREET OFF-RAMP (Bridge No. 34-0129C) shall conform to the provisions for cement and mineral admixtures in Section 90-2, "Materials," of the Standard Specifications, and shall be a combination of "Type II Modified" portland cement and mineral admixture.

Concrete in a corrosive environment shall contain not less than 658 pounds of cementitious material per cubic yard.

No reduction in the cementitious material content specified or ordered, in conformance with the provisions in Section 90-4.05, "Optional Use of Chemical Admixtures," of the Standard Specifications, will be allowed for concrete in a corrosive environment.

Unless otherwise specified, for concrete in a corrosive environment, the amount of cement shall be 75 percent by mass, and the amount of mineral admixture to be combined with cement shall be 25 percent by mass, of the total amount of cementitious material to be used in the concrete mix. The calcium oxide content of mineral admixtures shall not exceed 10 percent.

For concrete below ground of Bents 1U to 8U and Bents 1L to 8L of SFOBB SAN FRANCISCO APPROACH – MAINLINE (Bridge No. 34-0126R/L), of BAYSHORE VIADUCT- 4TH STREET (RETROFIT) (Bridge No. 34-0088), of SFOBB SAN FRANCISCO APPROACH - 5TH STREET ON-RAMP (Bridge No. 34-0138C), and of SFOBB SAN FRANCISCO APPROACH - 5TH STREET OFF-RAMP (Bridge No. 34-0129C), the mineral admixture for concrete in a corrosive environment shall conform to ASTM Designation: C618 Class F or N.

For concrete below ground of Bents 1U to 8U and Bents 1L to 8L of SFOBB SAN FRANCISCO APPROACH – MAINLINE (Bridge No. 34-0126R/L), of BAYSHORE VIADUCT- 4TH STREET (RETROFIT) (Bridge No. 34-0088), of SFOBB SAN FRANCISCO APPROACH - 5TH STREET ON-RAMP (Bridge No. 34-0138C), and of SFOBB SAN FRANCISCO APPROACH - 5TH STREET OFF-RAMP (Bridge No. 34-0129C) , the cementitious material shall be comprised of either:

- 20 percent by weight of mineral admixture conforming to ASTM Designation: C618 Class F or N, 5 percent by weight of mineral admixture conforming to ASTM Designation: C1240, and 75 percent by weight of cement.
- 10 percent by weight of mineral admixture conforming to ASTM Designation: C1240, and 90 percent by weight of cement.
- 10 percent by weight of metakaolin conforming to ASTM Designation: C618 Class N, and 90 percent by weight of cement. Metakaolin shall also conform to the following chemical and physical requirements:

Chemical Requirements	Percent
Silicon Dioxide (SiO_2) + Aluminum Oxide (Al_2O_3)	92.0 min.
Calcium Oxide (CaO)	1.0 max
Sulfur Trioxide (SO_3)	1.0 max.
Loss on ignition	1.2 max.
Available Alkalies (as Na_2O) equivalent	1.0 max.

Physical Requirements	Percent
Retained 45-µm (No. 325) sieve	2.0 max
Strength Activity Index with portland cement 7 days 28 days	 100 (minimum % of control) 100 (minimum % of control)

The amount of free water used in concrete in a corrosive environment shall not exceed 270 pounds per cubic yard , plus 40 pounds for each 100 pounds of cementitious material in excess of 658 pounds per cubic yard.

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

8-2.03 CEMENT AND WATER CONTENT

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

SECTION 8-3. WELDING

8-3.01 WELDING

General

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Welding Quality Control

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

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

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

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

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

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

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

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

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

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

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

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

As a minimum, each WQCP shall include the following:

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

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

F. A system for the identification and tracking of all welds, NDT, and any required repairs, and a procedure for the reinspection of repaired welds. The system shall have provisions for 1) permanently identifying each weld and the person who performed the weld, 2) placing all identification and tracking information on each radiograph, 3) a method of reporting nonconforming welds to the Engineer, and 4) a method of documentation of repairs and reinspection of nonconforming welds;
G. Standard procedures for performing noncritical repair welds. Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, rollover or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size;
H. The WPS, including documentation of all supporting Procedure Qualification Record (PQR) tests performed, and the name of the testing laboratory who performed the tests, to verify the acceptability of the WPS. The submitted WPS shall be within the allowable period of effectiveness;

I. Documentation of all certifications for welders for each weld process and position that will be used. Certifications shall list the electrodes used, test position, base metal and thickness, tests performed, and the witnessing authority. All certifications shall be within the allowable period of effectiveness;
J. One copy each of all AWS welding codes and the FCP which are applicable to the welding to be performed. These codes and the FCP shall become the permanent property of the Department; and
K. Forms to be used for Certificates of Compliance, daily production logs, and daily reports.

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

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

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

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

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

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

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

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

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

The Engineer will review the Welding Report to determine if the Contractor is in conformance with the WQCP. Unless otherwise specified, the Engineer shall be allowed 7 working days to review the report and respond in writing after a complete Welding Report has been received. Prior to receiving notification from the Engineer of the Contractor's conformance with the WQCP, the Contractor may encase in concrete or cover welds for which a Welding Report has been submitted. However, should the Contractor elect to encase or cover those welds prior to receiving notification from the

Engineer, it is expressly understood that the Contractor shall not be relieved of the responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase or cover welds pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

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

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

Payment

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

SECTION 9. DESCRIPTION OF BRIDGE WORK

The bridge work to be done consists, in general, of replacing and retrofitting bridges and constructing and removing interim bridges as shown on the plans and briefly described as follows:

FREMONT STREET OFF-RAMP
(Bridge No. 34-0127S)

A multi span steel girder and concrete composite slab, founded on cast-in-drilled hole piling.

MSE WALL (FOLSOM LEG)
(Bridge No. 34-0142M)

A mechanically stabilized embankment wall.

MSE WALL (FREMONT LEG)
(Bridge No. 34-0141M)

A mechanically stabilized embankment wall.

HARRISON STREET OFF RAMP
(Bridge No. 34-0128K)

A multi span reinforced concrete box girder bridge, founded on cast-in-drilled hole piling.

MSE WALL (BRYANT LEG)
(Bridge No. 34-0130M)

A mechanically stabilized embankment wall.

INTERIM GTR OFF-RAMP
(Bridge No. 34-0145)

A multi span cast-in-place prestressed concrete box girder bridge including a steel girder span and a hollow section approach slab, founded on cast-in-drilled hole piling.

INTERIM TBT ON-RAMP
(Bridge No. 34-0143)

A multi span cast-in-place prestressed concrete box girder bridge, founded on cast-in-drilled hole piling.

INTERIM TBT OFF-RAMP
(Bridge No. 34-0146)

A multi span cast-in-place reinforced concrete slab and structural steel I girder bridge, founded on spread footings.

INTERIM EASTBOUND DETOUR
(Bridge No. 34-0151)

A multi span cast-in-place prestressed concrete voided slab bridge, founded on cast-in-drilled hole piling.

INTERIM ESSEX STREET ON-RAMP
(Bridge No. 34-0149)

A multi span cast-in-place reinforced concrete voided slab bridge, founded on cast-in-drilled hole piling.

INTERIM FIRST STREET ON-RAMP
(Bridge No. 34-0150)

A multi span cast-in-place reinforced concrete voided slab bridge, founded on cast-in-drilled hole piling.

INTERIM FREEMONT STREET OFF-RAMP
(Bridge No. 34-0148)

A multi span steel girder and reinforced concrete slab bridge, founded on cast-in-drilled hole piling.

INTERIM FIFTH STREET ON-RAMP
(Bridge No. 34-0152)

A multi span cast-in-place reinforced concrete voided slab bridge, founded on cast-in-drilled hole piling.

FIRST STREET RETAINING WALL
(Bridge No. RW-101)

A reinforced concrete faced soldier pile retaining wall.

TRANSBAY TERMINAL RAMPS (RETROFIT)
(Bridge No. 34-0119Y)

A footing and column strengthening retrofit of an existing multi span reinforced concrete bridge.

BAYSHORE VIADUCT- 4TH STREET (RETROFIT)
(Bridge No. 34-0088)

A footing column and bent cap strengthening retrofit of an existing multi span concrete and structural steel bridge.

SFOBB SAN FRANCISCO APPROACH – MAINLINE
(Bridge No. 34-0126R/L)

A multi-span, double deck, cast-in-place box girder viaduct founded on cast-in-drilled-hole piling.

SFOBB SAN FRANCISCO APPROACH – LOWER DECK WIDEN AND RETROFIT
(Bridge No. 34-0118R)

A widening with a reinforced concrete box girder and retrofit which includes infill walls and bearing replacements.

SFOBB SAN FRANCISCO APPROACH - 5TH STREET ON-RAMP
(Bridge No. 34-0138C)

A multi-span reinforced concrete slab bridge founded on cast-in-steel-shell concrete piling.

SFOBB SAN FRANCISCO APPROACH - 5TH STREET OFF-RAMP
(Bridge No. 34-0129C)

A multi-span cast-in-place box girder bridge founded on cast-in-steel shell concrete piling.

SFOBB – WEST ANCHORAGE
(BRIDGE NO. 34-0003)

Reconstruction of anchorage housing.

4TH STREET OVERCROSSING INTERIM STRUCTURE
(BRIDGE NO. 34-0153T)

A single-span cast-in-place reinforced concrete T-beam widening founded on existing columns.

TBT EAST LOOP
(Bridge No. 34-0119Y)

A multi span cast-in-place prestressed concrete box girder bridge, founded on cast-in-drilled hole piling.

SECTION 10. CONSTRUCTION DETAILS

SECTION 10-1. GENERAL

10-1.01 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 4 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:

TOLL BRIDGE SEISMIC RETROFIT ACCOUNT 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.

10-1.02 ORDER OF WORK

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

Attention is directed to "Shotcrete" of these special provisions. The Contractor shall furnish the shotcrete preconstruction test panel to the Engineer four weeks prior to beginning any shotcrete work.

Temporary railing (Type K) and temporary crash cushions shall be secured in place prior to commencing work for which the temporary railing and crash cushions are required.

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

Traffic signal controllers shall be first placed in operation on a Tuesday, Wednesday or Thursday between 9:00 a.m. and 4:00 p.m. provided such days do not precede a holiday. At newly signalized locations, the intersection shall be placed on flashing operation 48 hours in advance of the scheduled day to operate in the normal cycling mode.

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

No above ground electrical work shall be performed on any system within the project site until all Contractor-furnished electrical materials for that individual system have been tested and delivered to the Contractor.

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

Attention is directed to "Beginning of Work, Time of Completion and Liquidated Damages," "Health, Safety and Work Plan," "Areas for Contractor's Use," "Utilities," "Water Pollution Control," "Cooperation," "Obstructions," "Lighting and Electrical Systems," and "Mechanical" of these special provisions regarding additional requirements for procedures of constructing, testing, documenting, and reporting that are specific to the elements of work that are referenced in those sections.

Attention is directed to "Progress Schedule (Critical Path)" of these special provisions regarding the submittal of a general time-scaled logic diagram within 60 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 and phases of construction as described in this section and as shown on the plans. Nonconflicting work in subsequent stages or phases may proceed concurrently with work in preceding stages or phases upon written request to and approval by the Engineer, provided satisfactory progress is maintained in the preceding stages or phases of construction.

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

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

Before removing any chain link fence that is to be replaced on the same alignment and location, as determined by the Engineer, the existing fence shall be referenced by the Contractor, with a sufficient number of control points to reestablish the alignment and location of the new chain link fence. Full compensation for referencing chain link fence shall be considered as included in the contract prices paid for chain link fence and no additional compensation will be allowed therefor.

The Contractor shall complete construction of the First Street Retaining Wall and all substructure work for the Interim First Street On-ramp (FIRT-Line), Interim Essex Street On-ramp (EST-Line), Interim Fremont Street Off-ramp (UFT-Line), Bent 20U(L), Bent 21U(L), Interim Bent 21(U), Bent 22U(L), Interim Bent 22U, and Interim Bent 23(U) prior to excavating for the utility duct and junction boxes that are adjacent to the aforementioned substructures.

The Contractor shall complete the utility duct for the Sterling Substation prior to abandoning the existing facilities and commencing with substructure work for Frame 6U.

The Contractor shall complete and make accessible four parking spaces as shown on the plans prior to occupying Area 8 and commencing with demolition of the westbound I-80 overhang adjacent to Area 8.

At 4th Street Retrofit, Bridge No. 34-0088, the retrofit of one footing shall be completed, including backfilling, prior to beginning excavation on any adjacent footing.

The Contractor shall complete the Fremont Street Off-ramp (UFR-Line) prior to closing the bus ramp at Second Street.

The Contractor shall complete construction of the foundations for HAR-Line Bent 22, HAR-Line Bent 23, Bent 18U(R), Bent 19U(R), Bent 20U(R), Bent 21U(R), Bent 22U(R), and Bent 23U(R) prior to completing construction of the Sterling Street On-ramp (STR-Line).

The Contractor shall install, but not tension, the prestressing rods for interim supports at existing Bent 1 to Bent 6 adjacent to the Anchorage prior to commencing with bridge removal.

The Contractor shall perform all bridge removal and falsework erection operations for the construction of Frame 8U (SFOBBUP Line) during consecutive weekends, defined herein as the closure hours allowed for Friday evenings to Monday mornings per the lane closure charts in the section entitled "Maintaining Traffic" in these special provisions. The Contractor shall not perform bridge removal or falsework erection operations during the following weekends:

- The weekend encompassing the Bay to Breakers Event.
- The weekend encompassing the San Francisco Gay Pride Parade.
- The weekend encompassing Carneval.

The Contractor shall not perform bridge removal or falsework erection operations during all of the weekends inclusive in the period between Thanksgiving Day and New Year's Day. The Contractor shall not begin bridge removal or falsework erection operations for the construction of Frame 8U (SFOBBUP Line) after August 1, and the Contractor shall complete any portions of bridge removal or falsework erection operations that he begins prior to August 1 by the following Thanksgiving Day.

The Contractor shall complete construction of the parking lot at the southeast corner of Harrison and Second Streets as shown in the contract plans and make the parking lot accessible prior to occupying Areas 8 and 9.

The Contractor shall complete construction of the 27 parking stalls as shown in plans and make the 27 parking stalls accessible prior to beginning demolition of the I-80 structure that is within Area 9.

At the end of each working day if a difference in excess of 6 inches exists between the elevation of the existing pavement and the elevation of excavations within 8 feet of the traveled way, material shall be placed and compacted against the vertical cuts adjacent to the traveled way. During excavation operations, native material may be used for this purpose; however, once placing of the structural section commences, structural material shall be used. The material shall be placed to the level of the elevation of the top of existing pavement and tapered at a slope of 1:4 (vertical:horizontal) or flatter to the bottom of the excavation. Treated base shall not be used for the taper. Full compensation for placing the material on a 1:4 slope, regardless of the number of times the material is required, and subsequent removing or reshaping of the material to the lines and grades shown on the plans shall be considered as included in the contract price paid for the materials involved and no additional compensation will be allowed therefor. No payment will be made for material placed in excess of that required for the structural section.

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

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

Attention is directed to "Move-In/Move-Out (Erosion Control)" of these special provisions regarding application of erosion control (Type D) requiring the possibility of several move-in/move outs of erosion control equipment.

Attention is directed to "Fiber Rolls" of these special provisions, regarding restrictions for other erosion control operations.

Attention is directed to "Imported Topsoil" of these special provisions regarding the time restraints specified for topsoil.

Attention is directed to "Erosion Control (Mulch)" of these special provisions regarding the placement of imported topsoil, prior to the start of erosion control (mulch) work.

Water meters to be installed shall be placed in conformance with the provisions under "Water Meters," of these special provisions and shall be installed as a last item of work.

10-1.03 PHOTO IDENTIFICATION SYSTEM

Photo identification system shall consist of photo identification (ID) cards, production equipment and database. The contractor shall submit a database record of every person contemplated to work on the project, including the employees of the subcontractors, vendor and suppliers.

All employees, including subcontractor, vendors and suppliers, shall have photo ID cards when reporting to work at the jobsite. Photo ID cards shall consist of a visible badge which can be worn plainly at all times and a wallet-size card which shall be available for inspection as required. The front side of the badge shall contain a visible, identifiable photograph with a minimum size of 1 inch x 1 inch, the person's last name, first name, employee ID number, issue date, expiration date and employer logo. Wallet-size cards shall contain the last name, first name, middle initial, issue date, expiration date and issuer signature. Any lost badges or cards shall be immediately reported to the Engineer prior to being replaced. Individuals who do not possess the required photo ID cards shall be removed from the work site immediately at the Engineer's request.

Production equipment shall consist of system software, camera and duplex card printer. Equipment shall have the following standard features or equivalent, as determined by the Engineer:

A. **System Software.--**ID works production software will have the following standard features:

1. Microsoft Windows-compatible operation;
2. Full user audit log;
3. Administrator and user security;
4. .BMP, .JPG, .PCX, .PNG, and .PSD image import formats;
5. .BMP, .JPG, .PCX, .TGA, .TIF, .WMF image export formats;
6. Full character recognition search (alphabets, numbers) in all fields;
7. Automatic update of database after badge production;
8. Simultaneous batch print of multiple card formats;
9. Software license key;
10. Online Help and reference library; and
11. Documentation, installation, training and Help Desk support.

B. **Camera.--**The camera used for producing employee ID badges shall be USB digital with the following specifications:

1. Compatible with Windows 98, ME, 2000 Professional;
2. External AC power supply (auto-switch);
3. Operating Environment for humidity of 30%-90% and for temperature of 32-104° F (0-40° C);
4. Resolutions of 1600 x 1200, 1024 X 768, or 640 x 480 pixels;
5. Lens of 7.1 to 21.3 mm, F/1.8 to F/2.6 (equivalent to 40-120 mm lens on 35mm camera);
6. Flash range appropriate for a subject 20 feet to 6 feet from camera;
7. 8 MB SmartMedia memory card; and
8. CE Mark, FCC Class B and UL approved.

In addition, the camera shall have the following features and components:

1. Datacard Integrated USB Digital Camera Software with controlled Auto-Crop or Manual Crop;
2. USB cable connection to PC;
3. High, Medium and Low resolution (customer selectable);
4. Built-in flash;
5. Automatic focus and exposure;
6. 3x Optical Zoom;
7. 2.11 Megapixel RGB CCD;
8. Country Specific Power Cords;
9. Power adapter (auto switches for the appropriate voltage);
10. Tripod, backdrop, frame and stand;
11. Installation instruction and manuals; and
12. Optional 10 Foot USB Cable.

C. **Duplex Card Printer.--**The duplex card printer shall have the following features and specifications:

1. Windows 95, NT, 98, 2000 printer drivers;
2. CD ROM Tutorial;
3. Operator-replaceable printhead;
4. Audio and visual error prompts;
5. Operator messages displayed on PC screen;
6. Automatic card feed;
7. "True" exception card system;
8. Full-color or monochrome imaging;
9. One-step ribbon cartridge replacement;
10. Hands-free card cleaning system;
11. In-line topcoat application;
12. Portable, desktop design;
13. Input hopper holds 100 - .030 in. (.76mm) cards;
14. Output hopper holds 25 - .030 in. (.76mm) cards;
15. One-year depot warranty for printer;
16. One-year printhead warranty - no prorating, no card counting;
17. Continuous-tone, full-color, with alphanumeric text and logos print capability;
18. Background patterns with 300 dots per inch print resolution, In-line ribbon application of single topcoat capability, and dual voltage-auto sensing electrical requirements;
19. 100/120V, 50/60 Hz and 220/240V, 50/60 Hz;
20. Parallel ECP mode or Compatible mode communications;
21. CR80-30 Plastic cards accepted:
22. PVC, with glossy overlaminate laminate surface ID cards, 3.4 inch x 2.1 inch in size and 0.030 inch in thickness;
23. Resident memory of 2MB; and
24. UL, CSA, FCC Class A (for U.S. and Canada) approved.

A database record shall be furnished to the Engineer at least three days prior to beginning of work. It will be updated for new employees, subcontractors or suppliers at least three days prior to the individual reporting to work on the project. This database shall contain the following information:

A. Caltrans contract number;
B. Contractor/Subcontractor/Vendor/Supplier ID number;
C. Employee ID number;
D. Last name;
E. First name;
F. Middle name;
G. Labor classification;
H. Date of hire/employment date;
I. Length of employment;
J. Issue date; and
K. Expiration date.

All data shall be delivered to the Engineer electronically, on Microsoft Windows compatible 3 1/2" floppy disks or CD ROM.s. The Contractor shall provide an updated personnel information whenever there is a change or at least five working days after requested by the Engineer. The file format for all files delivered to the Engineer shall be standard comma delimited (CSV), plain text files. Characteristics of this type of file are:

A. All data is in the form of plain ASCII characters;
B. Each row of data is delimited by a carriage return character: and
C. Within row, each column (field) of data is delimited by a comma character.

Full compensation for providing photo identification system shall be considered as included in the various contract items of work and no additional compensation will be allowed therefor.

In addition to photo identification system, access control measures shall be placed as directed by the Engineer. Access control measures will be paid for as extra work as provided for in Section 4-1.03D of the Standard Specifications, and will not be considered a special service as specified in Section 9-1.03D of the Standard Specifications.

10-1.04 SURVEY OF EXISTING NON-HIGHWAY FACILITIES

This work shall consist of performing a photo survey, elevation survey and crack monitoring of existing facilities, buildings, sub sidewalk basements and other improvements which might be damaged by the operations of the Contractor. The Contractor shall perform and prepare the elevation survey and the photo survey prior to and after performing any bridge removal, demolition activity, pile activity, Cast-in-Drilled-Hole pile construction, shoring installation, de-watering operations, or other significant impact work that has a potential to cause damage to existing facilities, and as directed by the Engineer. The photo and elevation survey and crack monitoring shall be conducted in conformance with the requirements in these special provisions.

The scope of the examination for photo survey shall include both internal and external cracks in structures, settlement, leakage, distress, and the like. The photo survey shall consist of photographic and video recording of the conditions of the facilities specified herein, prior to and after performing significant impact work adjacent to said facilities. The photo survey shall document the condition of the foundation, walls, ceiling, roof, improvements and other building elements on the interiors and exteriors of the said facilities.

The photo survey, elevation survey and crack monitoring shall be conducted at those facilities shown in the table entitled "VIBRATION MONITORING LOCATIONS" elsewhere in these special provisions or as directed by the Engineer. The pre-construction photo survey, elevation survey, and crack monitoring shall be performed at least 10 days prior to beginning any bridge removal, demolition activity, pile activity, shoring installation, or other significant impact work that has a potential to cause damage to existing facilities that occurs within 200 feet of the listed facilities. A post-construction photo survey shall be performed on the same facilities within 5 days after the completion of bridge removal, demolition activity, pile activity, shoring installation, or other significant impact work that has a potential to cause damage to existing facilities.

The Contractor shall submit to the Engineer for approval a complete description of the work to be completed for each of the surveyed locations and existing facilities. The work to be completed shall consist of records of observations, video tapes, and photographs.

The Contractor shall notify the Engineer 48 hours prior to beginning the photo and elevation survey and crack monitoring work.

The photograph prints shall be in color, and have a printed image size of at least be 5" x 7." All prints shall be on glossy photographic paper. Digital photos, proof sheets, thumbnail prints, or contact prints are not acceptable. All negative shall be provided in protective sleeves. The negatives shall be indexed to facilitate expeditious reproduction. All photos shall be identified by date, location, orientation, and labeled with a detailed description. All photos shall be submitted in a 3-ring binder and shall include the following: protective photo sleeves, building layout (including layout of each floor as necessary), and a summary sheet indexing all photos.

The Contractor shall videotape the foundation, floors, walls, ceilings, roof, improvements and all building elements inside and outside the specified facilities as part of the photo survey. The video survey shall show the condition of the facility, including, but not limited to, any and all deficiencies in the facility such as cracks, settlement, leakage, distress and the like. The video tape recording shall be narrated contemporaneously by the camera operator, documenting the location, orientation, time and date of the scene. The narration may be supplemented by on-screen text either generated by the camera or by other methods approved by the Engineer. The video survey shall be conducted using premium grade VHS color tape and shall be recorded in the Standard Play (SP) mode. All video tape recording shall be made to the highest quality and standards. No more than one facility shall be recorded on a single videotape. The Contractor shall submit the original, unedited video recording to the Engineer. Copies of the video shall be professionally made and shall not incur signal degradation during copying.

A written report of the record of observations shall also be submitted with the video tape. The written report shall include the date and time of the recording and the location of the facility in question. The report shall also include a table listing the anomalies with a detailed description, and orientation. The table shall also list the beginning and the ending times of the videocassette counter for each anomaly recorded on the videotape.

Crack monitoring shall be made on all existing cracks in each of the facilities included in this survey and shall be performed concurrent with the photo survey. The gage installation shall be done concurrent with the pre-construction photo survey. Crack monitoring shall be performed using a calibrated crack monitoring device approved by the Engineer. The crack gage shall be capable of measuring cracks to the nearest 0.05 inch. The location of the crack gauges shall be identified in the pre-construction survey report.

Cracks shall be monitored weekly during the pre-construction photo survey and daily throughout the duration of any work that has a potential to cause damage to the existing facilities. The crack gauge measurements shall be recorded at the same time each day in an effort to eliminate deviations in crack magnitude due to heat fluctuations. A report detailing such readings shall be provided to the Engineer on a weekly basis.

The elevation survey shall be conducted to obtain vertical elevations of existing buildings, foundations and other improvements. A minimum of three points shall be monitored at each facility. Elevation measuring equipment shall be of a type approved by the Engineer. Such equipment shall be capable of measuring changes in elevations to the nearest 0.05 inch.

The elevation survey shall be performed by a Professional Land Surveyor registered in the State of California or by a competent person designated by such a professional surveyor.

Three calendar days prior to beginning any impact work, the Contractor shall document the elevations of the required points per facility and shall continue to document each point on a daily basis until the significant impact work begins. During the impact work, the Contractor shall document the elevations of the points three times per shift. After the impact work is complete for the specified location, the Contractor shall document the elevations on a daily basis for two days. If there is variation in elevation of a 0.125 inch or more, the impact work shall be halted, and the Engineer shall be immediately notified. If the work is halted due to fluctuations in elevation the Contractor shall modify their operations to eliminate future fluctuations in elevations, at no cost to the State.

Within 10 working days after the completion of any impact work, the Contractor shall submit to the Engineer a report documenting the results of the survey. Each facility shall have a separate report. The report shall be signed by a Professional Land Surveyor in the State of California who performed the survey or in whose authority the survey was made. The report shall include the location of the monitoring points, including the address of the facility surveyed and the building layout. A general layout plan shall be include in the report showing the elevations, dimensions and distances of the monitoring locations.

The photographs, videotapes, and reports of all observations shall be prepared in triplicate by the Contractor and the authorized representatives of the State and of the Contractor shall sign every document.

The pre-construction survey records and the documentation specified above shall be submitted to the Engineer prior to commencement of any significant impact work as defined above. The Engineer shall have five working days to review the submittal for adequacy. No work shall take place unless the Engineer approves the pre-construction survey records.

The package of the pre-construction survey documents shall be submitted within 10 working days after the impact work has been completed adjacent to each of the specified facilities.

The photo survey package may be submitted in portions based on Stage Construction, if in the opinion of the Engineer deleterious actions can be avoided in the subsequent stages. The submittal package shall include all records, documents, photos, videotapes, and observations. The Engineer shall have five working days to review the submittal for adequacy.

Records in triplicate of all observations shall be prepared by the Contractor and every document shall be signed by the authorized representatives of the State and of the Contractor. Video tapes and photographs, as deemed advisable by the Engineer will be made by the Contractor and signed in the manner specified above. One signed copy of every document and photograph will be kept on file by the Engineer.

The above referenced records, video tapes, and photographs are intended for use as indisputable evidence in ascertaining the extent of any damage which may occur as a result of the Contractor's operations. The above-referenced records, video tapes, and photographs are for the protection of the adjacent property owners, the Contractor, and the State. These records will be used to determine any damage from the Contractor's operations during the work.

The Contractor shall obtain written permission from each property owner prior to entering the property for the purpose of performing the work specified in this section. The Contractor shall provide to the Engineer a copy of all such permissions or refusals by property owners.

Attention is directed to "Indeminification and Insurance" of these special provisions. The Contractor will immediately inform the Engineer in writing, of any damage to these and other facilities.

The contract lump sum price paid for survey of existing non-highway facilities shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in photo survey and elevation survey of existing facilities and crack monitoring, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The Engineer may order photo surveys, elevation surveys and crack monitoring of existing facilities other than those facilities listed under "Photo and Elevation Survey and Crack Monitoring," Photo surveys, elevation surveys and crack monitoring of existing facilities other than those facilities listed under "Photo and Elevation Survey and Crack Monitoring," will be paid for as extra work as provided in Section 4-l.03D of the Standard Specifications.

10-1.05 VIBRATION MONITORING

This work shall consist of vibration monitoring as a means of protecting the following properties from excess vibration during seismic retrofit construction activities:

VIBRATION MONITORING LOCATIONS

Address	Description
231 1st St.	Thomson Machine Work
234 1st St.	Phillips Building
246 1st St.	Commercial
425 1st St.	Bank of America Building
303 2nd St.	Marathon Plaza
400 2nd St.	Commercial
425 2nd St.	Commercial
461 2nd St.	Clock Tower Condos.
480 2nd St.	Commercial
428 3rd St.	Complete Auto Service
470 3rd St.	Commercial
471 3rd St.	Liquor Store (ground)
401-425 4th St.	St. Vincent De Paul Society
420 4th St.	Commercial
475 4th St.	Speedway Printing
19 Tehama St.	Residential
528 Folsom St.	The Magazine
530 Folsom St.	Critical Path
88 Perry St.	Yerba Buena Commons
120 Perry St.	Pat's Garage Auto Repair
130 Perry St.	Commercial
140 Perry St.	Ken's Wheel Service
148 Perry St.	Commercial
511-515 Harrison St.	Golden Gate Garage
525 Harrison St.	Sound Factory
575 Harrison St.	Residential
645 Harrison St. (monitor Perry St. side only)	Commercial
653 Harrison St. (monitor Perry St. side only)	Commercial
657 Harrison St. (monitor Perry St. side only)	Commercial
715 Harrison St. (monitor Perry St. side only)	North Beach Pizza
735 Harrison St. (monitor Perry St. side only)	Commercial
743 Harrison St. (monitor Perry St. side only)	Commercial
759 Harrison St. (monitor Perry St. side only)	City Glass
765 Harrison St. (monitor Perry St. side only)	Val's Auto Upholstery
859 Harrison St.	Office Depot
15-17 Stillman St.	Residential
21 Stillman St.	Residential
25 Stillman St.	Residential
31 Stillman St.	Residential
35 Stillman St.	Commercial

39 Stillman St.	Commercial
51-53 Stillman St.	Commercial
55 Stillman St.	Commercial
57 Stillman St.	Commercial
87-91 Stillman St.	Residential
93-99 Stillman St.	Residential
113 Stillman St.	Commercial
125 Stillman St.	Commercial
131-135 Stillman St.	Commercial
141 Stillman St.	Commercial
145-147 Stillman St.	Residential
149 Stillman St.	Commercial
169-171 Stillman St.	Commercial
177 Stillman St.	Commercial
301 Bryant St.	Commercial
329 Bryant St.	Commercial
333 Bryant St.	Commercial
340 Bryant St.	Commercial
355 Bryant St.	Commercial
440 Bryant St.	Lewis & Taylor
448-450 Bryant St.	Commercial
460-462 Bryant St. (monitor Stillman St. side only)	Arion Press
474 Bryant St. (monitor Stillman St. side only)	Commercial
546 Bryant St .	Image Printing
550 Bryant St.	Commercial
558 Bryant St.	Commercial
400 Beale St.	Commercial
North of Anchorage on Beale St.	Under Construction
West of Fremont St. b/t Howard & TTT Loop	Under Construction
East of Fremont St. b/t Howard & TTT Loop	Under Construction

At the above listed locations, vibration monitoring and recording shall be performed within 200 feet of the said locations during the course of all seismic retrofit activity, and for other significant impact work as determined by the Engineer. As a minimum, all bridge removal, shoring installation, demolition work, Cast-in-Drilled-Hole pile construction, pile driving and pile driving related activities shall be considered as significant impact work and shall be monitored as provided herein.

The first vibration monitoring prior to start of seismic retrofit activities shall establish the baseline for all subsequent recordings. The baseline recordings shall consist of uninterrupted recordings for a period of not less than 24 hours at the above listed locations. The Contractor shall have the equipment in place and functioning properly prior to any seismic retrofit activity within 200 feet of the affected property. No seismic retrofit activity occurring within this zone shall occur unless monitoring equipment is functioning properly. The equipment shall be set up in a manner such that an immediate warning is given when the resultant peak particle velocity equal to or exceeding 0.5 inches per second is produced. Monitoring equipment shall be stationed within 3 feet of the exterior of designated buildings on the side facing the Contractor's work site. For buildings whose frontage exceeds 200 feet, at least 2 monitors shall be utilized at that location.

Prior to performing any vibration monitoring, including the baseline vibration monitoring and during significant impact work, the Contractor shall submit to the Engineer a written plan detailing the procedures for vibration monitoring. Such details shall include:

- The name of the firm providing the vibration monitoring services.
- Description of the instrumentation and equipment to be used.
- Methods for mounting the instrumentation to the ground.
- Data collection analysis procedure.
- Number of vibration monitors to be utilized at each of the facilities specified herein.
- Means and methods of providing warning when particle velocity equals to or exceeds specified limits.
- Name of the responsible person designated by the Contractor.
- A contingency plan for alternative construction methods when particle velocity equals to or exceeds specified limits.

The details shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and these special provisions. The review period shall be the same as those set forth in section 51-1.06A, "Falsework Design and Drawings".

Once the vibration monitoring plan is approved by the Engineer, the vibration monitoring equipment shall be furnished and installed by the Contractor at the facilities designated herein when significant work occurs within 200 feet of the said facilities. The 200 feet shall be measured from the source of vibration such as the column nearest to the actual demolition work, the location of the equipment, the pile location or from the point of probable impact of any fallen structural elements, materials, equipment, bridge elements, shoring or debris.

The vibration monitoring equipment shall be capable of continuous operation with instant monitoring results and shall conform to the following requirements:

- ♦ The velocity sensing transducers shall be capable of measuring velocities on the three perpendicular axis (ie.V_x, V_y and V_z) simultaneously.
- ♦ Frequency response of the velocity transducers and data acquisition equipment shall cover the range from less than 5Hz to more than 100Hz. Sensitivity of the velocity transducers shall range below 0.001 inch per second to more than 2.000 inch per second.
- ♦ Velocity transducers shall be field calibrated prior to use.
- ♦ The data acquisition equipment shall be capable of simultaneously recording individual velocity transducers, in digital format, time-domain data (i.e. time vs. particle velocity) for each of the transducers.

The vibration shall be monitored continuously by the responsible person designated by the Contractor while significant impact work is in progress. The vibration monitoring equipment at each location shall operate continuously.

The vibration monitoring data shall be recorded contemporaneously and plotted continuously in ink on graph by the data acquisition equipment. The graph shall conform to the following:

- Each graph shall show time-domain wave traces (particle velocity versus time) for each transducer.
- The graph shall have the same vertical and horizontal axis scale.
- The resultant particle velocity shall be plotted on the graph instantaneously.

The equipment shall be set up in a manner such that an immediate warning is given when the resultant peak particle velocity is equal to or greater than 0.5 inches per second. The peak particle velocity shall be derived from the component particle velocity V_x, V_y , and V_z and shall be equal to the square root of the sum of $V_x^2+V_y^2+V_z^2$.

The warning emitted by the vibration monitoring equipment shall be instantaneously transmitted to the responsible person designated by the Contractor by means of warning lights, audible sounds or electronic transmission. The responsible person shall have the authority to stop the work causing the vibration.

When the peak particle velocity reading on monitoring equipment equals to or exceeds 0.5 inches per second, work shall immediately cease and the Contractor shall implement the approved contingency plan to reduce and maintain the monitoring equipment reading below 0.5 inches per second before resuming work. The Contractor shall immediately notify the Engineer every time the vibration equals to or exceeds 0.5 inches per second. After the completion of the baseline vibration monitoring and vibration monitoring during significant impact work at each of the facilities designated herein, the Contractor shall submit to the Engineer a daily report documenting the results of the vibration monitoring. Each building or facility shall have a separate report. The reports shall be signed by an engineer who is registered as a Civil Engineer in the State of California, who is experienced in and who has expertise in the field of vibration monitoring. The report shall include the following:

- Project identification, District, County, Route, Post Mile, Project Name and Bridge number as shown on the project plans.
- Location of Monitoring equipment, including address of monitored building or facility.
- Location of vibration source (i.e., pile driving equipment).

The Department will retain an amount equal to 25 percent of the estimated value of the work performed during the estimate period in which the Contractor fails to submit the vibration monitoring reports conforming to the requirements of this section, as determined by the Engineer.

The persons, firm or entities providing vibration monitoring, recording, documentation and the production of the reports shall not be employed or compensated by subcontractors, or by persons or entities hired by the subcontractors, who will provide other service's or material for the project.

Compliance with this section does not relieve the Contractor of full responsibility for damage caused by Contractor's operations as per "Indemnification and Insurance" of these special provisions.

The Contractor shall obtain written permission from each property owner prior to entering the property for the purpose of performing the work specified in this section. The Contractor shall provide to the Engineer a copy of all such permissions or refusals by property owners.

The contract lump sum price paid for vibration monitoring shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all work involving vibration monitoring, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Additional areas to receive vibration monitoring will be paid for as extra work as provided in Section 4-l.03D "Extra Work," of the Standard Specifications.

10-1.06 SEWER VIDEO SURVEY

This work shall consist of investigating, sewer cleaning as necessary to facilitate the survey, documenting, and reporting on the structural condition of the existing sewer lines both before and after seismic retrofit construction from manhole to manhole at the following locations:

SEWER VIDEO SURVEY LOCATIONS

No.	Location	Sewer Pipe Size
1	4th St between Bryant St and Harrison St	8" VCP, 3' X 5' Brick, 30" Force Main, 12"VCP
2	3rd St between Bryant St and Harrison St	3' X 5' Brick
3	2nd St between Bryant St and Harrison St	3' X 5' Brick
4	Perry St between 4th and 3rd St	3' X 5' Brick
5	Perry St between 3rd and 2nd St	12" VCP
6	Stillman St between 4th and 3rd st	3' X 5' Brick, 12" VCP, 15" VCP
7	Stillman St. between 3rd and 2nd St.	2.5' x4' Brick, 16" VCP
8	Bryant St. between Sterling and Rincon St.	3' X 5' Brick, 8" VCP
9	Rincon St. between Bryant and HWY 80	12" VCP
10	Sterling St. between Bryant and HWY 80	12" VCP
11	Harrison St. 200' from Essex St toward to 2nd St.	12" VCP
12	Essex St. between Folsom and Harrison (belong to Caltrans)	12" VCP
13	Folsom St. 200' from Essex toward to 2nd St.	3' X 5' Brick
14	Folsom St. and Fremont St. intersection	3' X 5' Brick
15	1st St. 150' from Clementina St. toward to Tehama St.	3' X5' Brick
16	Clementina St. 600' from the 1st St. toward to 2nd St.	3' X5' brick
17	Fremont about 400' from Folsom St. toward to Howard St.	3' X5' Brick
18	Beale St. between 250' from Folsom & 400' from Folsom toward to Howard St.	15" VCP
19	Howard St. between 80' from Beale and 180' from Beale St. toward to Main St.	3' X5' Brick
20	Beale St. between 160' from Howard & 360' from Howard St. toward to Mission St.	12" VCP

The Contractor shall videotape with narration the condition of the sewer to show any and all structural deficiencies including cracks, holes, exposed aggregates and reinforcing bars, honey combed areas, damaged construction joints, deteriorated concrete surfaces, infiltrations, root intrusions and missing pieces. The locations of all deficiencies shall be shown by stationing with reference points agreed upon by the Contractor and the Engineer. The Contractor shall provide the dimensions of all major structural deficiencies and provide supplemental photographs of such deficiencies when requested by the City and County of San Francisco, Bureau of Engineering.

For all the sewer locations as listed above and for all other sewer locations subjected to live loads exceeding AASHTO Standard HS-20, the Contractor shall investigate, document and report the sewer conditions before commencement and after final completion of the project.

At least 10 working days prior to investigation, the Contractor shall submit for acceptance 5 copies of the proposed operations and safety procedure to the Engineer.

The Engineer will either accept or reject such procedures within 5 working days of receipt. Approval of the procedures will be contingent on them being satisfactory to the City and County of San Francisco. Such procedures must comply with the Safety Procedures Section of this special provision.

The Contractor shall call the general foreman of the City and County of San Francisco Bureau of Street and Sewer Repair two days in advance at (415) 695-2095 for coordination and to gain access to the sewer.

The Contractor shall cooperate with local authorities relative to handling traffic through the area and shall make his own arrangements relative to keeping the working area clear of parked vehicles.

The Contractor shall prepare for the Engineer's approval, a written report documenting the results of its investigation. Approval of the report will be contingent on it being satisfactory to the City and County of San Francisco. In this report, the Contractor shall place its emphasis on; first, the deficiencies discovered during the investigation; secondly; the proposed measures to remedy such deficiencies and; thirdly, the serviceability of the present sewer.

The Contractor shall: (a) after the pre-construction sewer investigation, deliver 2 copies of the report and 2 copies of the videotape 5 working days before actual start of construction and; (b) after post-construction sewer investigation, deliver 5 copies of the final report and 2 copies of the post-construction videotape, all to the Manager of the Hydraulics Section, Bureau of Engineering, City and County of San Francisco.

SAFETY PROCEDURES

Except to the extent that more explicit or more stringent requirements are stated herein, the Contractor shall comply with all applicable federal, State and local safety and health requirements and standards.

PRE-ENTRY AND CONFINED SPACE OPERATIONS

Pre-entry and confined space operations shall be performed in accordance with the provisions of Article 108 of the General Industry Safety Orders and Section 1532 of the Construction Safety Orders of Title 8 of the California Code of Regulations. These provisions shall govern:

A. Blocking of laterals.
B. Testing for the existence of dangerous water and air contamination.
C. Ventilation requirements.
D. Entry rate work within confined spaces.
E. Precautions for emergencies involving work in the sewer.
F. Other related work.

Testing shall take place for the following suspected conditions prior to entering the sewer, and at times during inspection:

1. Oxygen deficiencies.
2. Carbon dioxide.
3. Combustible gases.
4. Contaminated and infectious waste.

ADDITIONAL REQUIREMENTS

The Contractor shall provide safeguards, including traffic barriers, warning signs, barricades, temporary fences and other similar safeguards that are required for the protection of all personnel during the performance of this contract.

The Contractor shall provide to all workers and inspectors, protective, disposable clothing for sewage conditions consisting of fullbody coveralls, gloves, boot type covers on reusable footwear, eye protection, hardhats and safety tools as required by job conditions and CAL-OSHA safety rules and regulations.

The Contractor shall provide air ventilation and respiratory protection to workers and inspectors in accordance with an operation and safety procedures plan required by CAL-OSHA and accepted by the City and County of San Francisco.

The Contractor shall provide a plan for rescue of workers and investigators for review by the Engineer and for approval by the City and County of San Francisco.

PAYMENT

The contract lump sum price paid for sewer video survey shall include full compensation for furnishing all labor, materials, tools, equipment, sewer cleaning as necessary to facilitate the survey, and incidentals, and for doing all the work involved in conducting the sewer video survey, including providing plans, reports and video tape, safety devices and precautions, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.07 SOLID WASTE DISPOSAL AND RECYCLING REPORT

A report of recyclables and solid resources generated by construction and demolition operations shall be submitted monthly. The report shall be submitted on the "Solid Waste Disposal and Recycling Report" form provided by the Engineer. The report shall include manifests, weigh tickets, receipts, and invoices specifically identifying the Project and materials that were sent to:

- Source Separated Recycling Facilities
- Mixed Debris Recycling Facilities
- Class 3 Landfills
- Other

Manifests, weigh tickets, receipts, and invoices shall be from recyclers or disposal site operators that can legally accept the materials for the purpose of re-use, recycling, or disposal.

With each submittal of an application for progress payment, Contractor shall submit to the Resident Engineer the "Solid Waste Disposal and Recycling Report" form containing the following information:

- Quantity of all materials generated in the Work, disposed in Class 3 Landfills, or diverted from disposal through recycling. Indicate zero (0) if there is no quantity to report for a type of material.
- Report disposal or recycling either in tons or in cubic yards: if scales are available at disposal or recycling facility, report in tons; otherwise, report in cubic yards. For salvage items, list the quantity of each item and approximate weight.
- Indicate locations to which materials are delivered for disposal, recycling, accepted as daily cover, or taken for inert backfill.
- Indicate the Project title, Contract number, progress payment number, name of the company completing the Summary Form and compiling backup documentation; the printed name, signature, and daytime phone number of the person completing the form, the beginning and ending dates of the period covered on this Report Form; and the date that this Report Form is completed.

Failure to submit the form and its supporting documentation may render the application for progress payment incomplete and delay payments issued by the Department.

After acceptance of the contract and prior to final payment, a final report summarizing the information contained from all previous monthly reports shall be submitted. Final Payment shall not be made until the final report is deemed acceptable by the Engineer.

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.

10-1.08 WATER POLLUTION CONTROL (STORM WATER POLLUTION PREVENTION PLAN)

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

This project lies within the boundaries of the San Francisco Bay Regional Water Quality Control Board and shall conform to the requirements of the National Pollutant Discharge Elimination System (NPDES) Permit for General Construction Activities No. CAS000002, Order No, 99-08-DWQ, including State Water Resources Control Board (SWRCB) Resolution No. 2001-046, and the NPDES Permit for the State of California Department of Transportation Properties, Facilities, and Activities, No. CAS000003, Order No, 99-06-DWQ issued by the SWRCB. These permits, hereafter referred to as the "Permits," regulate storm water discharges associated with construction activities.

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

In addition, a Conceptual Storm Water Pollution Prevention Plan (CSWPPP) has been prepared for this project by the Department and is available for review at the office of the Duty Senior at the District 4 Office, 111 Grand Avenue, Oakland, CA 94612, email: duty_senior_district04@dot.ca.gov, telephone number: (510) 286-5209, fax number: (510) 286-4563.. This document may be used by the Contractor for developing the actual contract Storm Water Pollution Prevention Plan (SWPPP).

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

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

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

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

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

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

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

Attention is directed to "Labor Code Requirements," "Contractor's Licensing Laws," "Public Safety," and "Indemnification and Insurance" of these special provisions regarding amendments to Section 7, "Legal Relations and Responsibilities," of the Standard Specifications.

Section 7-1.02, "**Weight Limitations**," of the Standard Specifications is renamed as "**Load Limitations**."

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

STORM WATER POLLUTION PREVENTION PLAN PREPARATION, APPROVAL AND AMENDMENTS

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

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

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

Within 30 days after the approval of the contract, the Contractor shall submit 3 copies of the draft SWPPP to the Engineer. The Engineer will have 15 days to review the SWPPP. If revisions are required, as determined by the Engineer, the Contractor shall revise and resubmit the SWPPP within 10 days of receipt of the Engineer's comments. The Engineer will have 10 days to review the revisions. Upon the Engineer's approval of the SWPPP, 4 approved copies of the SWPPP, incorporating the required changes, shall be submitted to the Engineer. In order to allow construction activities to proceed, the Engineer may conditionally approve the SWPPP while minor revisions are being completed. If the Engineer does not review or approve the SWPPP within the time specified, compensation will be made in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

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

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

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

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

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

Special Requirement(s)

Category	BMP, location and quantity
Tracking Control Practices	TC-1 Stabilized Construction Roadway, various unpaved work areas with moderate traffic, lump sum
Non Storm Water Control	NS-2 Dewatering Operations, various locations, lump sum NS-3 Paving and Grading Operations, Various, Lump Sum
Waste Management & Materials Pollution Control	WM-6 Hazardous Waste management, Various, Lump Sum

The following contract items of work, shall be incorporated into the SWPPP as "Temporary Water Pollution Control Practices": Temporary Silt Fence, Temporary Silt Fence Fabric along Chain Link Fence, Temporary Rock Bag Barrier, Temporary Entrance/Exit, Temporary Drainage Inlet Protection, Temporary Cover, and Temporary Concrete Washout

Facility. The Contractor's attention is directed to these special provisions provided for each temporary water pollution control practice.

The following contract items of work, as shown on the project plans or as specified elsewhere in these special provisions, shall be identified in the SWPPP as permanent water pollution control practices: Erosion Control (Type D). These permanent water pollution control practices shall be constructed and utilized during the construction period. The Contractor shall maintain and protect the permanent water pollution control practices throughout the duration of the project and shall restore these controls to the lines, grades and condition shown on the plans prior to acceptance of the contract.

The SWPPP shall include, but not be limited to, the items described in the Manuals, Permits, and related information contained in the contract documents. In addition, the SWPPP shall include a copy of the following: San Francisco Batch Wastewater Permit.

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

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

COST BREAK-DOWN

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

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

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

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

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

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

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

If requested by the Contractor and approved by the Engineer, changes to the water pollution control practices listed in the approved cost break-down, including the addition of new water pollution control practices, will be allowed. The changes shall be included in an approved amendment to the SWPPP. If the changes to the water pollution control practices requested

by the Contractor would result in a net cost increase to the lump sum price for water pollution control, an adjustment in compensation will be made without change to the item of water pollution control. The net cost increase to the item of water pollution control resulting from changes requested by the Contractor will be paid for as extra work as provided in Section 4-1.03D, "Extra Work," of the Standard Specifications.

WATER POLLUTION CONTROL COST BREAK-DOWN

Contract No. 04-0435V4

UNIT DESCRIPTION	UNIT	APPROXIMATE QUANTITY	VALUE	AMOUNT
MINIMUM REQUIREMENTS				
SS-1 Scheduling	LS			
SS-2 Preservation Of Existing Vegetation	SF			
SS-3 Hydraulic Mulch	SF			
SS-4 Hydroseeding	SF			
SS-5 Soil Binders	SF			
SS-6 Straw Mulch	SF			
SS-7 Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	SF			
WE-1 Wind Erosion Control	LS			
NS-6 Illicit Connection/Illegal Discharge Detection and Reporting	LS			
NS-8 Vehicle and Equipment Cleaning	LS			
NS-9 Vehicle and Equipment Fueling	LS			
NS-10 Vehicle and Equipment Maintenance	LS			
WM-1 Material Delivery and Storage	LS			
WM-2 Material Use	LS			
WM-4 Spill Prevention and Control	LS			
WM-5 Solid Waste Management	LS			
WM-9 Sanitary/Septic Waste Management	LS			
SPECIAL REQUIREMENTS				
TC-2 Stabilized Construction Roadway	LS	LUMP SUM		
NS-2 Dewatering Operations	LS	LUMP SUM		
NS-3 Paving and Grinding Operations	LS	LUMP SUM		
WM-6 Hazardous Waste Management	LS	LUMP SUM		

TOTAL _____

SWPPP IMPLEMENTATION

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

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

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

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

Year-Round Implementation Requirements

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

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

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

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

Rainy Season Requirements

Soil stabilization and sediment control practices conforming to the requirements in the Special Requirements and applicable Preparation Manual Minimum Requirements, shall be provided throughout the rainy season, defined as between October 15 and April 15.

An implementation schedule of required soil stabilization and sediment control practices for disturbed soil areas shall be completed not later than 20 days prior to the beginning of each rainy season. The implementation schedule shall identify the soil stabilization and sediment control practices to be implemented and the dates on which the implementation will be 25 percent, 50 percent, and 100 percent complete, respectively. Construction activities beginning during the rainy season shall implement applicable soil stabilization and sediment control practices. The Contractor shall implement soil stabilization and sediment control practices a minimum of 10 days prior to the start of the rainy season.

Throughout the defined rainy season, the active disturbed soil area of the project site shall be not more than 2 hectares. The Engineer may approve, on a case-by-case basis, expansions of the active disturbed soil area limit. Soil stabilization and sediment control materials shall be maintained on site sufficient to protect the unprotected disturbed soil area. A detailed plan for the mobilization of sufficient labor and equipment shall be maintained to deploy the water pollution control practices required to protect the project site prior to the onset of precipitation events.

Non-Rainy Season Requirements

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

MAINTENANCE

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

A. Prior to a forecast storm;
B. After a precipitation event which causes site runoff;
C. At 24 hour intervals during extended precipitation events;
D. Routinely, a minimum of once every 2 weeks outside of the defined rainy season;
E. Routinely, a minimum of once every week during the defined rainy season.

The Contractor shall use the Storm Water Quality Construction Site Inspection Checklist provided in the CSWPPP or an alternative inspection checklist provided by the Engineer. One copy of each site inspection record shall be submitted to the Engineer within 24 hours of completing the inspection.

REPORTING REQUIREMENTS

Report of Discharges, Notices or Orders

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

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

Report of First-Time Non-Storm Water Discharge

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

Annual Certifications

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

PAYMENT

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

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

Payments for prepare storm water pollution prevention plan will be made as follows:

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

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

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

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

Soil Stabilization

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

Sediment Control

All temporary water pollution control practices.

Tracking Control

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

Wind Erosion Control

All temporary water pollution control practices.

Non-Storm Water Control

No sharing of maintenance costs will be allowed.

Waste Management & Material Control

No sharing of maintenance costs will be allowed.

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

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

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

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

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

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

10-1.09 NON-STORM WATER DISCHARGES.

Non-storm water discharges shall conform to the requirements in Section 7-1.01G, "Water Pollution" of the Standard Specifications and these special provisions. Attention is directed to "Water Pollution Control (Storm Water Pollution Prevention Plan)" of these special provisions.

Conformance with the requirements of this section shall in no way relieve the Contractor from the Contractor's responsibilities, as provided in Section 7-1.11, "Preservation of Property," of the Standard Specifications and "Indemnificaton and Insurance" of these special provisions.

Groundwater has been encountered during the collection of in situ samples within the project limits. Samples of the groundwater have been collected and analyzed. A description of the sampling plan and summary tables of test results are included in the reports entitled "Site Investigation Report - West Approach Project, Transbay Terminal Loop, San Francisco, California, June 1999" and "Addendum Site Investigation Report - West Approach Project, Westbound and 4th Street On-Ramp, San Francisco/Oakland Bay Bridge, San Francisco, California, August 1999" are available for inspection at the office of the Toll Bridge Duty Senior at the District 4 Office, 111 Grand Avenue, Oakland, CA 94612, email; duty_senior_tollbridge_district04@dot.ca.gov, telephone number (510) 286-5549, fax number; (510) 286-4563. Requests to review the reports must be made with the duty senior at least 24 hours in advance. These test results have been used for characterization of groundwater discharges within the excavation limits and shall not be construed as identifying all locations within the project limits that contain contaminants.

DEWATERING, GENERAL

Suspended solids shall be removed to the extent that visible, floating products are not apparent within the discharge during the dewatering operation for piles, stockpiles, and excavations as specified in these special provisions.

The water to be discharged shall meet the City and County of San Francisco Department of Public Work (SFDPW) Requirements for Batch Wastewater Discharges. Copies of the SFDPW Requirements will be available for inspection at the office of the Toll Bridge Duty Senior at the District 4 Office, 111 Grand Avenue, Oakland, CA 94612, email; duty_senior_tollbridge_district04@dot.ca.gov, telephone number (510) 286-5549, fax number; (510) 286-4563. Requests to review the SFDPW Requirements must be made with the duty senior at least 24 hours in advance.

The Contractor is responsible for obtaining the San Francisco Batch Wastewater Permit from the City and County of San Francisco, for performing all work and for preparing all records and reports. The Contractor shall supply a copy of the San Francisco Batch Wastewater Permit, all analytical data and dewatering volume records to the Engineer. The Engineer shall have up to 7 calendar days for review and approval of discharge. The Contractor shall notify the Engineer prior to discharge. Water that does not meet discharge requirements shall not be discharged on the site or to the SFDPW storm or sanitary sewer systems. The Contractor is responsible for either treating the water to meet the requirements for discharge or hauling the water off site to an appropriately licensed liquid disposal facility. Penalties assessed against the State for non-compliance by the Contractor will be deducted from the monthly progress payment.

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

PILE DEWATERING

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

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

STOCKPILE DEWATERING

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

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

EXCAVATION DEWATERING

The Contractor shall graphically depict the dewatering process within the Storm Water Pollution Prevention Plan (SWPPP), as specified in "Water Pollution Control (Storm Water Pollution Prevention Plan)" of these special provisions. The graphic shall show in details the methods and measures that will be used to seal the sides and bottom of excavations to minimize the flow of water into excavations. The graphic shall show both a sectional and plan view that details the removal techniques for groundwater contaminants including suspended solids. The graphic shall define the flow path and placement of pipes, hoses, pumps, and other equipment used to convey the discharge. In addition, the Contractor shall provide a drawing that depicts the general position of the dewatering measures relative to the excavations undergoing dewatering and the point of effluent discharge. The written descriptions of the dewatering operation shall include, but are not limited to, an estimate of the discharge volume, flow rate, and frequency; location of discharge; performance capabilities of treatment measures; and the inspection and monitoring procedures related to the discharge.

INSPECTION

The Contractor shall conduct a daily inspection of the dewatering equipment, when in use, to ensure that all components are functional and routinely maintained to prevent leakage prior to removal of groundwater contaminants including suspended solids. Observations indicating that the dewatering equipment is not functioning properly shall be immediately reported to the Engineer. The discharge activity shall immediately cease, and corrective actions shall be undertaken to repair, modify, or replace the equipment. The commencement of discharge activities shall be allowed upon approval by the Engineer.

SPILL CONTINGENCY

The Contractor shall prepare and submit to the Engineer a contingency plan for the management of spills or leaks of any materials or wastes that may impact the water quality of the drainage systems and/or other water bodies.

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

The contingency plan shall include instructions and procedures for reporting spills, and a list of spill containment and collection materials and equipment to be maintained onsite. The contingency plan shall be reviewed and updated at least every 180 calendar days.

LIQUIDS, RESIDUES AND DEBRIS

The control and disposal of liquids, residues, and debris associated with all construction activities shall be described within the SWPPP, as specified in "Water Pollution Control (Storm Water Pollution Prevention Plan)" of these special provisions. The SWPPP shall, at a minimum, depict and describe the procedural and structural methods of detaining, collecting, and disposing of all slurries, liquids, residues, and debris associated with the operations. Sufficient redundancy shall be incorporated into the procedural and structural methods such that the liquids, residues, and debris are not conveyed into or become present in drainage systems and/or other water bodies.

MEASUREMENT AND PAYMENT

Full compensation for all pile, excavation, and stockpile dewatering operations including, but not limited to, sampling; providing power to operate pumping equipment; monitoring and inspection of treatment systems, discharges, and receiving water body; providing all necessary maintenance, labor, vehicles, equipment, and other incidentals; and removal and disposal of materials, groundwater, and treated effluent shall be considered as included in the contract lump sum price paid for water pollution control and no additional compensation will be allowed therefor.

Full compensation for preparing and implementing spill contingency shall be considered as included in the contract lump sum price paid for water pollution control and no additional compensation will be allowed therefor.

Full compensation for controlling and disposing of liquids, residues, and debris shall be considered as included in the prices paid for the items of work involved and no additional compensation will be allowed therefor.

10-1.10 TEMPORARY COVER

Temporary cover shall conform to the details shown on the plans. The minimum quantity of temporary cover required for this project shall be 2,500 square yards.

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

MATERIALS

Materials shall conform to the following for either plastic or fabric sheeting:

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

Properties

Grab tensile strength	191- 213.5 pound force
Elongation at break (minimum)	15%

If plastic sheeting is used, the sheeting shall be polyethylene, new and a minimum of 6 mil-thickness.

INSTALLATION

Fabric or plastic sheeting shall be placed and anchored as shown on the plans. Abutting edges shall overlap a minimum of a 2 feet. A weight such as rock bags shall be placed on the overlap area at a maximum spacing of 8 feet. Anchoring temporary cover by using staples or wooden lath and anchors may be allowed in lieu of rock bags as determined by the Engineer. The Contractor shall submit details for any alternative anchoring system to the Engineer for approval prior to installation. Non-abutting edges shall be embedded a minimum of 6 inches in native soil.

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

MEASUREMENT AND PAYMENT

The contract price paid per square yard for temporary cover shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing, maintaining and removing temporary cover, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer. If the Contractor removes the temporary cover in order to facilitate any other work, the temporary cover shall be replaced and secured by the contractor at no additional cost to the State.

10-1.11 TEMPORARY DRAINAGE INLET PROTECTION

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

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

Temporary drainage inlet protection that impedes public traffic or creates an unsafe condition shall not be used for existing and new drainage inlets adjacent to traffic. The Engineer shall review the need for drainage inlet protection commensurate to each location. Any proposed drainage inlet protection in such cases shall be approved by the Engineer for safety related concerns.

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

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

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

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications, amendments for Section 20-2, "Materials," under "Erosion Control (Type D)" of these special provisions, and these special provisions.

A. **SILT FENCE.—**Sedimentation control fabric for temporary silt fence shall be a prefabricated silt fence with a minimum woven polypropylene fabric width of 36 inches and a minimum tensile strength of 100 pounds-force, conforming to ASTM Designation: D 4632.

B. **ROCK BAG.—** Rock bag fabric shall be woven polypropylene, with a minimum unit weight of 7.5 oz/yd^2. The fabric shall have a mullen burst strength of at least 363 PSI, per ASTM Designation: D 3786 and an ultraviolet (UV) stability exceeding 70 percent at 500 hours.

Rock bags shall have a length of 24 inches to 32 inches, width of 16 inches to 20 inches, thickness of 6 inches to 8 inches, and capable of containing a weighted mass of 30 pounds to 50 pounds.

Rock bag fill material shall be non-cohesive gravel, free from deleterious material. Rock bags shall be filled and the opening secured such that rock shall not escape from the bag.

C. **TEMPORARY FLEXIBLE DIKE.—**Temporary flexible dike fabric cover and skirt shall be a woven polypropylene fabric with a minimum tensile strength of 100 pounds-force, conforming to ASTM Designation: D 4632. The prefabricated fabric shall be high visibility orange in color that is integral to the fabric; painting shall not be allowed. The fabric shall have an ultraviolet (UV) stability exceeding 70 percent.

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

Adhesive for temporary flexible dike shall be a solvent free rubber modified asphalt emulsion. The color of the emulsion shall be brown when wet and shall have a drying period of not more than 3 hours.

Anchoring nails or spikes for temporary flexible dike shall be a minimum of 1 inch in length and capable of penetrating concrete and asphalt surfaces.

D. **EROSION CONTROL BLANKET.—**Erosion control blanket shall consist of straw and coconut or wood excelsior blanket secured in place with wire staples and shall conform to one of the following:

Excelsior Blanket.—Excelsior blanket material shall consist of machine produced mats of curled wood excelsior with 80 percent of the fiber 6 inches or longer. The erosion control blanket shall be of consistent thickness and the wood fiber shall be evenly distributed over the entire area of the blanket. The top surface of the blanket shall be covered with an extruded plastic mesh. The blanket shall be smolder resistant without the use of chemical additives and shall be non-toxic and non-injurious to plant and animal life. Erosion control blanket shall be furnished in rolled strips, 4 feet to 8 feet in width, and shall have an average mass of 12 oz/yd^2, ± 10 percent, at the time of manufacture.

Straw And Coconut Blanket.—Straw and coconut blanket shall be machine produced mats of straw and coconut with a light weight netting on top. The straw and coconut shall be adhered to the netting with biodegradable thread or glue strip. The straw and coconut erosion control blanket shall be of consistent thickness with the straw and coconut evenly distributed over the entire area of the blanket. Straw and coconut erosion control blanket shall be furnished in rolled strips with a minimum width of 6 feet, minimum length of 66 feet (± 3 feet) and a minimum weight of 8 oz/yd^2.

E. **STAPLES.—**Staples for erosion control blankets shall be made of 11-gage minimum steel wire and shall conform to the dimensions shown on the plans.

F. **SEDIMENT BAG.—**Sedimentation control fabric for sediment bags shall be a prefabricated sedimentation control fabric envelop with a woven polypropylene fabric and sewn with a double stitched seam using nylon thread. The fabric shall have a grab tensile strength of at least 265 lbs and grab elongation of 20 percent, per ASTM Designation: D4632. The fabric shall have a mullen burst strength of at least 420 PSI, per ASTM Designation: D3786 and an ultraviolet (UV) stability exceeding 90 percent. The sedimentation control fabric shall be capable of a flow rate of 16 gal/minute/yd^2, per ASTM Designation: D4491.

The sediment bag shall be sized to fit the catch basin or drop inlet and be complete with lifting loops and dump straps attached at the bottom to facilitate emptying of the sediment bag. The sediment bags shall have a restraint cord approximately halfway up the bag to keep the sides away from the catch basin walls.

INSTALLATION AND MAINTENANCE

Temporary flexible dike consists of individual sections of dike installed in conjunction with one another adjacent to existing drainage inlets as shown on the plans. The spacing and angle of placement shall be in accordance with the table

shown on the plans. Temporary flexible dike shall be installed flush against the sides of concrete or asphalt curbs, dikes and pavement with the inner material and fabric cover cut smoothly and evenly to provide a tight flush joint.

Temporary flexible dike installed as part of temporary drainage inlet protection shall be maintained to provide for adequate sediment holding capacity. Sediment deposits shall be removed when the deposit reaches one-half of the temporary flexible dike height. Removed sediment shall be deposited within the project in such a way that it is not subject to erosion by wind or water, or as directed by the Engineer.

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

Temporary drainage inlet protection damaged due to storms, deficient maintenance or as a result of the Contractors operations shall be replaced by the Contractor at his expense.

Sediment bags shall be installed by removing the drainage inlet grate, placing the sediment bag in the opening, and replacing the grate to secure the sediment bag in place. Removal of the bag shall be facilitated by the use of 1 inch steel reinforcing bars placed through the lifting loops.

Sediment bags installed as part of temporary drainage inlet protection shall be emptied when the restraint cords are no longer visible. Emptying of the bag shall be facilitated by the use of 1 inch steel reinforcing bars placed through the dump loops. The sediment bag shall be emptied of material with a shovel and rinsed before replacement in the catch basin or drop inlet.

MEASUREMENT AND PAYMENT

The quantity of temporary drainage inlet protection to be paid for will be determined from each drainage inlet protected conforming to the details shown on the plans. The protection is measured one time only and no additional measurement is recognized, and no additional compensation made, if it changes during the course of construction.

The contract price paid per temporary drainage inlet protection shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing temporary drainage inlet protection, complete in place, including excavation and backfill, all modifications occurring during the course of construction, and maintenance and removal of temporary drainage inlet protection, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Temporary drainage inlet protection for protection at drainage inlets other than as shown on the project plans or directed by the Engineer, in accordance with the Contractor's Storm Water Pollution Prevention Plan (SWPPP), will not be measured as temporary drainage inlet protection. Payment for drainage inlet protection that is required as part of the SWPPP, but is not shown on the project plans, will be paid for as specified in "Water Pollution Control (Storm Water Pollution Prevention Plan)" elsewhere in these special provisions.

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

10-1.12 TEMPORARY ENTRANCE/EXIT

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

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

MATERIALS

Materials shall conform to the following:

Steel Ribbed Panels

Manufactured steel ribbed panels with raised bars shall be provided in individual sections. Steel plate shall be a minimum 0.5 inch thick. Bars shall be a minimum of 1.5 inches in height, approximately 1.5 inches thick at the base and tapered to 0.25 inch thick at the top of the bar, and shall be uniformly distributed 7.5 inches apart longitudinally throughout the full section of each panel. Raised bars shall be welded to the bottom plate. Each panel shall have a nominal dimension of 10 feet x 8 feet with an approximate weight of 3205 pounds for each panel. Each end of the panel shall have a slot or hooked section to facilitate coupling at the ends.

CONSTRUCTION

Temporary entrance/exit shall be installed as shown on the plans:

The areas shall be cleared of all trash and debris. Vegetation shall be removed to the ground level. Cleared trash, debris, and removed vegetation shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

MAINTENANCE

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

Temporary entrance/exit shall be maintained to minimize tracking of soil and sediment onto paved roads. If the efficiency of a temporary entrance/exit to minimize tracking of soil and sediment is compromised by the buildup of soil and sediment, or by other means, as determined by the Engineer, the Contractor shall remove and dispose of the soil and sediment in conformance with Section 19, "Earthwork," of the Standard Specifications and these special provisions. Installation of additional steel ribbed panels will be determined by the Engineer.

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

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

Once the temporary entrance/exit is no longer needed, steel ribbed panels shall be removed. All soil and sediments remaining shall be removed and disposed of as provided in Section 19, "Earthwork," of the Standard Specifications and these special provisions. Following removal of the temporary entrance/exit, unpaved areas shall be graded smooth and compacted to conform to adjacent areas.

PAYMENT

The quantity of the temporary entrance/exit shall be paid by each unit installed. The contract unit price paid for temporary entrance/exit shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing, maintaining and removing temporary entrance/exit complete in place, including transporting and disposing of soil and sediments removed from temporary entrance/exit and any incidental grading required to grade and compact areas as specified in these special provisions, and as directed by the Engineer.

10-1.13 TEMPORARY CONCRETE WASHOUT FACILITY

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

Temporary concrete washout facilities shall be installed prior to beginning any placement of concrete and located a minimum of 50 ft from storm drain inlets, open drainage facilities, and watercourses, unless determined infeasible by the Engineer. Each facility shall be located away from construction traffic or access areas to prevent disturbance or tracking.

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

Temporary concrete washout facilities shall be constructed on grade. These facilities shall be constructed to contain all liquid and concrete waste without seepage, spillage or overflow.

MATERIALS

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

A. **PLASTIC SHEETING.—**Plastic sheeting shall be new and a minimum of 12 mil thick polyethylene sheeting and shall be free of holes, tears or other defects that compromise the impermeability of the material. Plastic sheeting shall not have seams or overlapping joints.

B. **ROCK BAG.—**Rock bag fabric shall be non-woven polypropylene, with a minimum unit weight of 7.5 oz/yd^2. The fabric shall have a mullen burst strength of at least 363 psi, per ASTM Designation: D3786 and an ultraviolet (UV) stability exceeding 70 percent at 500 hours. Rock bags shall have a length of 24 inches to 32 inches, width of 16 inches to 20 inches, thickness of 6 inches to 8 inches, and shall be filled to a weighted mass ranging from 30 pounds to 50 pounds. Rock bag fill material shall be non-cohesive, gravel, free from deleterious material. After filling, the opening shall be secured such that rock shall not escape from the bag.

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

Each straw bale shall be a minimum of 14 inches wide, 18 inches in height, 36 inches in length and shall have a minimum mass of 50 pounds. The straw bale shall be composed entirely of vegetative matter, except for binding material.

Bales shall be bound by either wire, nylon or polypropylene string. Jute and cotton binding shall not be used. Wire shall be a minimum of (16-gage) baling wire. Nylon or polypropylene string shall be approximately 0.125-inch in diameter with 80 pound-force of breaking strength.

D. **STAKES.—**Stakes shall be 2 inches x 2 inches wood posts. Each stake shall have a minimum length of 3.5 feet. Metal stakes may be used as an alternative. The Contractor shall submit a sample of the metal stake to the Engineer for approval prior to installation. The tops of the metal stakes shall be bent over at a 90-degree angle. No additional compensation will be allowed for the use of a metal stake.

E. **STAPLES.—**Staples shall be made of 11-gage minimum steel wire and shall be U-shaped with 8 inch legs and 2 inch crown.

TEMPORARY CONCRETE WASHOUT FACILITY (TYPE ON GRADE)

Temporary concrete washout facility (type on grade) shall be constructed as shown on the plans with a minimum length of 10 feet and a minimum width of 10 feet. The length and width of a facility may be increased, at the Contractor's expense, upon approval of the Engineer.

MAINTENANCE AND REMOVAL

Temporary concrete washout facilities shall be maintained to provide adequate holding capacity with a minimum freeboard of 4 inches. Maintaining temporary concrete washout facilities shall include removing and disposing of hardened concrete and returning the facilities to a functional condition. Hardened concrete materials shall be removed and disposed of in conformance with the provisions in Section 15-3.02, "Removal Methods," of the Standard Specifications. Minor holes and tears in the plastic sheeting may be taped as long as the repair does not compromise the impermeability of the material.

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

Attention is directed to "Existing Highway Facilities" of this special provisions regarding amendments to Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT AND PAYMENT

The quantity of temporary concrete washout facility to be paid for shall be determined by each unit installed. If the Contractor removes the temporary concrete washout facility in order to facilitate any other work, the temporary concrete washout facility shall be replaced by the Contractor at no additional cost to the State.

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 temporary concrete washout facility, complete in place, including maintaining, removing and disposing of temporary concrete washout, as specified in Section 15-3.02, "Removal Methods," of the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.14 TEMPORARY SILT FENCE

Temporary silt fence shall conform to the details shown on the plans and these special provisions.

Temporary silt fence shall be furnished, installed, maintained, and removed as designated by the Engineer.

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

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

MATERIALS

Materials for temporary silt fence shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and one of the following:

Temporary silt fence shall be a prefabricated silt fence with a minimum woven polypropylene fabric width of 36 inches and a minimum tensile strength of 100 pounds –force, conforming to the requirements of ASTM Designation: D 4632.

Temporary silt fence shall be a prefabricated silt fence with a minimum woven polypropylene fabric width of 36 inches and a minimum tensile strength of 100 pounds –force, conforming to the requirements of ASTM Designation: D 4632 and having an integral reinforcement layer. The reinforcement layer shall be a polypropylene or equivalent net provided by the manufacturer.

INSTALLATION

Temporary silt fence shall be installed as shown on the plans.

When joints are necessary, the temporary silt fence shall overlap a minimum of 6 inches with both posts tied together.

Temporary silt fences shall be maintained to provide for adequate sediment holding capacity. Sediment deposits shall be removed when the sediment deposit reaches approximately one-third of the fence height. Removed sediment shall be deposited within the project in such a way that the sediment is not subject to erosion by wind or water, or as directed by the Engineer.

When no longer required for the intended purpose, as determined by the Engineer, temporary silt fence shall be removed from the site of the work.

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

Attention is directed to "Existing Highway Facilities" of this special provisions regarding amendments to Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT AND PAYMENT

The quantity of temporary silt fence will be measured by the foot as determined from actual measurements, the measurements to be made parallel with the ground slope along the line of the completed temporary silt fence, deducting the widths of openings.

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

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

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

10-1.15 TEMPORARY SILT FENCE FABRIC ALONG CHAIN LINK FENCE

Temporary silt fence fabric installed along chain link fencing shall conform to the details shown on the plans and these special provisions.

Temporary silt fence fabric shall be furnished, installed, maintained, and removed at the locations shown on the plans.

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

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

MATERIALS

Materials for temporary silt fence fabric installed along chain link fencing shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and one of the following:

Temporary silt fence fabric shall be a prefabricated silt fence fabric with a minimum woven polypropylene fabric width of 36 inches and a minimum tensile strength of 99 Pounds Force, conforming to the requirements of ASTM Designation: D 4632 and having an integral reinforcement layer. The reinforcement layer shall be a polypropylene or equivalent net provided by the manufacturer.

INSTALLATION

Temporary silt fence fabric installed along chain link fencing shall be installed as shown on the plans.

When joints are necessary, the temporary silt fence fabric shall overlap a minimum of 6 inches.

Temporary silt fence fabric installed along chain link fencing shall be maintained to provide for adequate sediment holding capacity. Sediment deposits shall be removed when the sediment deposit reaches approximately one-third of the silt fence fabric height. Removed sediment shall be deposited within the project in such a way that the sediment is not subject to erosion by wind or water, or as directed by the Engineer.

Temporary silt fences fabric shall be tied to existing or temporary chain link fence surrounding excavation sites as shown on the plans. A single sheet of fabric or two overlapping layers of fabric shall be tied to the fence so that a minimum of 5 feet measured from the ground up is attached to the interior of the fence (side nearest excavation sites) and a minimum of 1 foot is secured to the ground surface along base of fence.

Silt fence fabric will be secured to ground surface using a single layer rock bag barrier. At the option of the Contractor, alternative methods for securing silt fence fabric to ground surface may be used if approved in writing by the Engineer. Additional expenses for using other methods shall be at the Contractor's expense.

When no longer required for the intended purpose, as determined by the Engineer, temporary silt fence fabric shall be removed from the site of the work.

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MEASUREMENT AND PAYMENT

The quantity of temporary silt fence along chain link fence will be measured by the foot as determined from actual measurements, the measurements to be made parallel with the ground slope along the line of the completed temporary silt fence, deducting the widths of openings.

The contract price paid per linear foot for temporary silt fence along chain link fence shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing temporary silt fence, complete in place, including securing with ties and a rock bag barrier, and maintenance and removal of temporary silt fence, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Temporary silt fence along chain link fence placed at location other than as shown on the project plans or directed by the Engineer, in conformance with the Contractor's Storm Water Pollution Prevention Plan, will not be measured and will be paid for as specified in "Water Pollution Control" of these special provisions.

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

10-1.16 TEMPORARY CHAIN LINK FENCE AND CHAIN LINK GATE

Temporary chain link fence (Type CL-6) and chain link gate (Type CL-6) shall be furnished, constructed, maintained, and later removed as shown on the plans, as specified in these special provisions and as directed by the Engineer.

Except as otherwise specified in this section, temporary fence and gate shall conform to the plan details and the specifications for permanent fence and gate of similar character as provided in Section 80, "Fences," of the Standard Specifications. Amendments to Section 80 "Fences," of the Standard Specifications are in "Chain Link Fence and Chain Link Gate" of these special provisions.

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

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

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

Galvanizing and painting of steel items will not be required.

Treating wood with a wood preservative will not be required.

Concrete footings for metal posts will not be required.

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

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

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

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

Attention is directed to "Existing Highway Facilities" of this special provisions regarding amendments to Section 15-1.02, "Preservation of Property," of the Standard Specifications.

The various types and kinds of temporary fence and gate will be measured and paid for in the same manner specified for permanent fence and gate of similar character as provided in Section 80, "Fences," of the Standard Specifications.

Full compensation for maintaining, removing, and disposing of temporary fence shall be considered as included in the contract price paid per meter for temporary chain link fence (Type CL-6) and no additional compensation will be allowed therefor.

Full compensation for maintaining, removing, and disposing of temporary gate shall be considered as included in the contract unit price paid for 16 foot temporary chain link gate (Type CL-6) and no additional compensation will be allowed therefor.

10-1.17 PRESERVATION OF PROPERTY

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

The Contractor shall protect from damage utility and other non-highway facilities that are to remain in place, be installed, relocated or otherwise rearranged.

Due care shall be exercised to avoid injury to existing highway improvements or facilities, utility facilities, adjacent property, and roadside trees shrubs and other plants that are not to be removed.

Existing trees, shrubs and other plants, that are not to be removed as shown on the plans or specified in these special provisions, and are injured or damaged by reason of the Contractor's operations, shall be replaced by the Contractor. The minimum size of tree replacement shall be 24 inch box. Replacement planting shall conform to the requirements in Section 20-4.07, "Replacement," of the Standard Specifications. The Contractor shall water replacement plants in conformance with the provisions in Section 20-4.06, "Watering," of the Standard Specifications.

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

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

10-1.18 TEMPORARY ROCK BAG BARRIER

Temporary rock bag barriers shall conform to the details shown on the plans and these special provisions.

Temporary rock bag barriers shall be furnished, installed, maintained and removed at the locations shown on the plans.

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

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

MATERIALS

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

Rock bag fabric shall be woven polypropylene, with a minimum unit weight of 7.5 oz/yd^2. The fabric shall have a mullen burst strength of at least 363 PSI, conforming to the requirements in ASTM Designation: D 3786 and an ultraviolet (UV) stability exceeding 70 percent at 500 hours.

Rock bag shall have a length of 24 inches to 32 inches , width of 16 inches to 18 inches, thickness of 6 inches to 8 inches, and capable of containing a weight of 30 lbs to 50 lbs.

Rock bag fill material shall be non-cohesive ravel, free from deleterious material. Rock bags shall be filled and the opening secured such that the contents shall not escape from the bag.

INSTALLATION

Temporary rock bag barriers consisting of rock bag placed in a single layer shall be installed along edge of temporary silt fence fabric along chain link fence adjacent to construction sites as shown on the plans. Temporary rock bag barriers shall be installed tightly against the base of the chain link fencing adjacent to construction sites as shown on the plans. Rock bags will be placed on the one foot flap of silt fence fabric. Rock bags shall be placed end to end so that no portion of the flap is left uncovered.

Temporary rock bag barriers shall be maintained to provide for adequate sediment holding capacity. Sediment deposits shall be removed when the deposit reaches one-third of the temporary rock bag barrier height. Removed sediment shall be deposited within the project in such a way that the sediment is not subject to erosion by wind or water, or as directed by the Engineer.

When no longer required for the intended purpose, as determined by the Engineer, temporary rock bag barriers shall be removed from the site of the work.

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

Attention is directed to "Existing Highway Facilities" of this special provisions regarding amendments to Section 15-1.02, "Preservation of Property," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Temporary rock bag barrier will be measured by the linear foot as determined from actual measurements, the measurements to be made parallel with the ground slope along the line at the base of the chain link fence, deducting the widths of openings.

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

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

10-1.19 COOPERATION

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

It is anticipated that work by other contractors may be in progress adjacent to or within the limits of this project during progress of the work on this contract as listed below.

A. 04-133024: Bayshore 1 project - seismic retrofit.
B. 04-440004: Bayshore 2 project - seismic retrofit.
C. 04-133474: Bayshore 3 project - seismic retrofit.
D. 04-0435U4: Project 18 - Seismic retrofit work on the SFOBB 0.2 miles west of San Francisco Anchorage to east end of Yerba Buena Tunnel.
E. 04-012064: Self-anchored suspension span of the SFOBB.
F. 04-012024: Skyway portion of the new span of SFOBB.
G. 04-012044: Oakland touchdown of the new span of SFOBB.
H. 04-012094: Demolition of the east span of SFOBB.
I. 04-248024: Widening of the 4th St. off-ramp.
J. 04-0435C4: Archeology for the SFOBB West Approach Seismic Retrofit Project.
K. City and County of San Francisco (CCSF) Project: Transbay Transit Terminal Replacement Project.
L. 04-0438U4: San Rafael/Richmond Bridge Seismic Retrofit project.
M. 04-045014: San Mateo Bridge Trestle Widening.
N. Golden Gate Bridge South Approach Structures Seismic Retrofit, Contract No. 99-B-5
O. Golden Gate Bridge Public Safety Railing, Contract No. 2000-B-10
P. Golden Gate Bridge Main Cable Renovation Project
Q. Golden Gate Bridge Main Span Seismic Retrofit Project
R. CCSF 3rd Street Light Rail Project.
S. CCSF Department of Public Works (DPW) - 4th Street bridge retrofit.
T. CCSF DPW - Sewer Replacement between Howard and Folsom Streets, and between Harrison and Bryant Streets, Contract No. CW-287.

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

The Contractor shall attend joint weekly meetings, to be organized by the Engineer with other contractors on adjacent projects, in order to minimize potential conflicts. The Contractor shall coordinate with and accommodate other bridge contractors when preparing operations and work schedules.

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

10-1.20 EMISSIONS REDUCTION INCENTIVE PROGRAM

The Contractor shall participate in a program for the purpose of reducing emissions of nitrogen oxides (NOx) during the construction phase of this contract. Work performed under this program shall conform to these special provisions. Participating in this program shall not relieve the Contractor from the responsibility of conforming to the plans and specifications for this contract.

This program shall apply only to off-road, heavy-duty equipment powered by diesel engines with a rating between 37.3 and 559.3 kilowatts. The Contractor shall receive an incentive payment for achieving a reduction in emissions as specified herein.

The Contractor shall provide for a reduction in NOx emissions to receive an incentive payment, by one of the following methods:

1. More than 20 percent of the off-road, heavy-duty diesel equipment used during construction of the project shall be controlled equipment, based on fuel consumption.
2. NOx emissions produced by off-road, heavy-duty diesel equipment during construction of the project shall be reduced to a NOx emission level less than that of a fleet utilizing 20 percent controlled equipment.

Off-road, heavy-duty diesel equipment is defined as any self-propelled vehicle used for construction purposes, using diesel fuel, having a manufacturer's maximum gross vehicle weight rating of 6000 pounds or more, with a power rating between 37.3 and 559.3 kilowatts, and moves only occasionally over highways, or which because of length, height, width, or weight, may not move over the public highways unladen without a permit conforming to the requirements of the California Vehicle Code.

Controlled equipment is defined as equipment powered by a California Air Resources Board certified off-road diesel engine. Certification shall be considered to mean the engine has a label attached in conformance to the requirements of the California Code of Regulations, Title 13.

At least 10 days prior to starting work, the Contractor shall submit a Construction Equipment Emission Plan (CEEP) to the Engineer. The plan will indicate the method used to achieve the emission reduction. If method 2 as specified above, is selected, the Contractor shall describe in the plan how the emissions reduction will be determined. The Engineer will review and approve, or return the plan to the Contractor for additional information within 10 days of receiving the plan. The Contractor shall re-submit the plan within 7 days after receiving the Engineer's request for additional information. With the Engineer's written approval, the Contractor may start work during the re-submittal period. Data sheets shall be maintained and submitted as specified herein if work begins before the CEEP has been approved.

The CEEP shall include data sheets that will be submitted to the Engineer biweekly, signed by an authorized representative of the Contractor. The data sheets shall be maintained on a daily basis and include the following information for all off-road, heavy-duty diesel equipment used:

1. Equipment identifying number conforming to the provisions in Section 5-1.10, "Equipment and Plants," of the Standard Specifications
2. Equipment make and model
3. Engine type and year
4. Engine power rating
5. Engine modifications
6. Hours of operation
7. Fuel usage
8. A signed statement containing the following language:

   The undersigned,

   _____

   Name Date

   _____

   Title

   hereby certifies that the information provided herein is true and correct.

The Engineer will review the CEEP and make an initial determination whether the Contractor will meet or exceed the 20 percent controlled equipment utilization. If the Engineer's initial determination concludes the Contractor will meet or exceed the 20 percent controlled equipment utilization or equivalent, the Engineer will release 50 percent of the maximum possible incentive calculated for the contract with the first progress payment after approval of the CEEP, conforming to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications and these special provisions.

The total amount of payment due the Contractor under this incentive program will be based on the percent of emissions reduction attained, and will be determined as a percentage of the total contract value based on the following equation:

$$X=(A-0.2)B/40$$

where:

X = incentive payment due the Contractor

A = percent emission reduction or percent controlled vehicles used, based on time of use and amount of fuel used for off-road, heavy-duty diesel equipment (expressed as a decimal)

B = total contract value including extra work, not including incentive payment for emissions reduction.

If $A < 0.20$, then $X = 0$.

The total payment for emission reduction incentive program shall not exceed $250,000.

At completion of the contract, the information collected in the data sheets submitted by the Contractor will be evaluated and used to make a final determination whether the Contractor has met or exceeded the 20 percent emissions reduction. Based on this evaluation, adjustments to the calculated incentive payment will be made. The final incentive amount, less the initial payment made upon approval of the CEEP, will be paid upon completion of this final determination.

Based on the final determination of percent emission reduction, any excess payment previously made for emission reduction incentive program to the Contractor will be deducted from moneys due or to become due the Contractor.

10-1.21 ELECTRONIC MOBILE DAILY DIARY SYSTEM DATA DELIVERY

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

Attention is directed to Section 5-1.02, "Labor Code Requirements," of these special provisions regarding amendments to Section 7-1.01A(3), "Payroll Records".

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

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

The Contractor shall provide the personnel and equipment information not later than 20 days after the contract award for its own personnel and equipment, and not later than 5 days before start of work by any subcontractor for the labor and equipment data of that subcontractor.

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

Data Content Requirements.--

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

Caltrans contract ID	Alphanumeric; up to 15 characters.
Company name.	Alphanumeric; up to 30 characters.
Federal tax ID	Alphanumeric; up to 10 characters.
State contractor license	Alphanumeric; up to 20 characters.
Company type (prime or sub)	Alphanumeric; up to 10 characters.
Address (line 1).	Alphanumeric; up to 30 characters.
Address (line 2).	Alphanumeric; up to 30 characters.
Address (city).	Alphanumeric; up to 30 chars.
Address (2-letter state code).	Alphanumeric; up to 2 characters.
Address (zip code)	Alphanumeric; up to 14 characters.
Contact First Nname.	Alphanumeric; up to 15 characters
Contact Last Name	Alphanumeric; up to 20 characters
Telephone number (with area code).	Alphanumeric; up to 20 characters.
Company code: short company name.	Alphanumeric; up to 10 characters.
Type of work (Department-supplied codes)	Alphanumeric; up to 30 characters
DBE status (Department-supplied codes)	Alphanumeric; up to 20 characters.
Ethnicity for DBE status (Department-supplied codes).	Alphanumeric; up to 20 characters.
List of laborers to be used on this contract (detail specified below).	
List of equipment to be used on this contract (detail specified below).	

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

04-072359
XYZ CONSTRUCTION, INC.
94-2991040
AL1649T
SUB
1240 9TH STREET
SUITE 600
OAKLAND
CA
94612
JOHN SMITH
(510) 834-9999
XYZ
PAVING
MBE
BLACK

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

Caltrans contract ID	Alphanumeric; up to 15 characters.
Company code (as defined above).	Alphanumeric; up to 10 characters.
Employee ID	Alphanumeric; up to 10 characters.
Last name.	Alphanumeric; up to 20 characters.
First name.	Alphanumeric; up to 15 characters.
Middle name.	Alphanumeric; up to 15 characters.
Suffix	Alphanumeric; up to 15 characters
Labor trade (Department-provided codes).	Alphanumeric; up to 10 characters.
Labor classification (Department-provided codes).	Alphanumeric; up to 10 characters.
Regular hourly rate.	Alphanumeric; up to (6,2)
Overtime hourly rate.	Alphanumeric; up to (6,2)
Doubletime hourly rate	Alphanumeric; up to (6,2)
Standby hourly rate.	Alphanumeric; up to (6,2)
Ethnicity (Department-provided codes).	Alphanumeric; up to 20 characters.
Gender.	Alphanumeric; up to 1 characters.

For example, one such set of information might be:

04-072359
XYZ
1249
GONZALEZ
HECTOR
VINCENT
JR.
OPR
JNY
22.75
30.25
37.75
0.00
HISPANIC
M

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

Caltrans contract ID	Alphanumeric; up to 15 characters.
Company code (as defined above).	Alphanumeric; up to 10 characters.
Company's equipment ID number.	Alphanumeric; up to 10 characters.
Company's equipment description.	Alphanumeric; up to 60 characters.
Equipment type (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment make (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment model (from Department ratebook).	Alphanumeric; up to 60 characters.
Equipment rate code (from Department ratebook).	Alphanumeric; up to 10 characters
Regular hourly rate.	Alphanumeric; up to (6,2)
Overtime hourly rate.	Alphanumeric; up to (6,2)
Standby hourly rate	Alphanumeric; up to (6,2)
Idle hourly rate.	Alphanumeric; up to (6,2)
Rental flag.	Alphanumeric; up to 1 character.

For example, one such set of information might be:

04-072359
XYZ
B043
CAT TRACTOR D-6C
TRACC
CAT
D-6C
3645
28.08
25.27
14.04
0.00
N

Data Delivery Requirements.--

A. All data described in "Data Requirements" of this section shall be delivered to the Department electronically, on 3 1/2" floppy disks compatible with the Microsoft Windows operating system or via email. The Contractor shall provide a weekly disk and hard copy of the required correct updated personnel and equipment information for the Contractor and all the subcontractors and verified correct by the Engineer.

B. Data of each type described in the previous section (contractor, labor, and equipment information) will be delivered separately, each type in one or more files on floppy disk. Any given file may contain information from one contractor or from multiple contractors, but only one type of data (contractor, labor, or equipment information).

C. The file format for all files delivered to Caltrans shall be standard comma-delimited, plain text files. This type of file (often called "CSV") is the most standard type for interchange of formatted data; it can be created and read by all desktop spreadsheet and desktop database applications. Characteristics of this type of file are:

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

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

1. Contractor info: 16 columns (fields) as specified in "Data Requirements #1", above.
2. Labor info: 15 columns (fields) as specified in "Data Requirements #2", above.
3 Equipment info: 13 columns (fields) as specified in "Data Requirements #3", above.

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

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

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

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

PAYMENT

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

The Contractor will receive not more than 1.56 percent per month of the total bid price for electronic mobile daily diary computer system data delivery .

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

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

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

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

10-1.22 INTERNET DAILY EXTRA WORK REPORT

Daily extra work reports shall be submitted 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." 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 representative(s), 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 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 FAX or as an electronic-mail attachment.

The Contractor shall maintain the Contractor's interface with the Department's Internet extra work billing system. Extra Work Reports submitted by the file transfer process shall conform to the Department's specified file transfer format and process.

Full compensation for furnishing daily extra work reports using the Department's Internet extra work billing system shall be included in the various contract items involved, and no separate payment or additional compensation will be made or allowed therefore.

10-1.23 PROGRESS SCHEDULE (CRITICAL PATH)

Progress schedules will be required for this contract. Progress schedules shall utilize the Critical Path Method (CPM). Attention is directed to "COOPERATION," and "OBSTRUCTIONS" of these special provisions. Nothing in theses special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7, "Legal Relations and Responsibility," of the Standard Specifications.

Attention is directed to "Labor Code Requirements," "Contractor's Licensing Laws," "Public Safety," "Indemnification and Insurance," and "Preservation of Property" of these special provisions for amendments to Section 7, "Legal Relations and Responsibilities," of the Standard Specifications.

Section 7-1.02, "**Weight Limitations**," of the Standard Specifications is renamed as "**Load Limitations**."

DEFINITIONS

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

A. Activity: Any task, or portion of a project, which takes time to complete.
B. Baseline Schedule: The initial CPM schedule representing the Contractor's original work plan, as accepted by the Engineer.
C. Controlling Operation: The activity considered at the time by the Engineer, within that series of activities defined as the critical path, which if delayed or prolonged, will delay the time of completion of the contract.
D. Critical Path: The series of activities, which determines the earliest completion of the contract (Forecast Completion Date). This is the longest path of activities having the least amount of float.
E. Critical Path Method: A mathematical calculation to determine the earliest completion of the contract represented by a graphic representation of the sequence of activities that shows the interrelationships and interdependencies of the elements composing a project.
F. Current Contract Completion Date: The extended date for completion of the contract shown on the weekly statement of working days furnished by the Engineer in accordance with Section 8-1.06, "Time of Completion," of the Standard Specifications.
G. Early Completion Time: The difference in time between the current contract completion date and the Contractor's scheduled early forecast completion date as shown on the accepted baseline schedule, or schedule updates and revisions.
H. Float: The amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any activity or group of activities in the network.
I. Forecast Completion Date: The completion date of the last scheduled work activity identified on the critical path.
J. Fragnet: A section or fragment of the network diagram comprised of a group of activities.
K. Free Float: The amount of time an activity can be delayed before affecting a subsequent activity.
L. Hammock Activity: An activity added to the network to span an existing group of activities for summarizing purposes.

M. Milestone: A marker in a network, which is typically used to mark a point in time or denote the beginning or end of a sequence of activities. A milestone has zero duration, but will otherwise function in the network as if it were an activity.
N. Revision: A change in the future portion of the schedule that modifies logic, adds or deletes activities, or alters activities, sequences, or durations.
O. Tabular Listing: A report showing schedule activities, their relationships, durations, scheduled and actual dates, and float.
P. Total Float: The amount of time that an activity may be delayed without affecting the total project duration of the critical path.
Q. Update: The modification of the CPM progress schedule through a regular review to incorporate actual progress to date by activity, approved time adjustments, and projected completion dates.
R. Time Scaled Logic Diagram: A schematic display of the logical relationships of project activities, drawn from left to right to reflect project chronology with the positioning and length of the activity representing its duration.
S. Bar Chart (Gantt Chart): A graphic display of scheduled-related information, activities or other project elements are listed down the left side of the chart, dates are shown across the top, and activity durations are shown as date-placed horizontal bars.
T. State Owned Float Activity: The activity documenting time saved on the critical path by actions of the Engineer.
U. Near Critical Path: A path having 30 working days or less of total float.

PRECONSTRUCTION SCHEDULING CONFERENCE

The Engineer shall schedule and conduct a Preconstruction Scheduling Conference with the Contractor's Project Manager and Construction Scheduler within seven days after the bidder has received the contract for execution. At this meeting, the requirements of this section of the special provisions will be reviewed with the Contractor. The Contractor shall be prepared to discuss its schedule methodology, proposed sequence of operations, the activity identification system for labeling all work activities, the schedule file numbering system, and any deviations it proposes to make from the Stage Construction Plans. Periodically the Engineer may request the Contractor to utilize additional filters or layouts to be able to further group or summarize work activities.

Also, the Engineer and the Contractor shall review the requirements for all submittals applicable to the contract and discuss their respective preparation and review durations. All submittals and reviews are to be reflected on the Interim Baseline Schedule and the Baseline Schedule.

INTERIM BASELINE SCHEDULE

Within 15 days after approval of the contract, the Contractor shall submit to the Engineer an Interim Baseline Project Schedule which will serve as the progress schedule for the first 120 days of the project, or until the Baseline Schedule is accepted, whichever is sooner. The Interim Baseline Schedule shall utilize the critical path method. The Interim Baseline Schedule shall depict how the Contractor plans to perform the work for the first 120 days of the contract. Additionally, the Interim Baseline Schedule shall show all submittals required early in the project, and shall provide for all permits, and other non-work activities necessary to begin the work. The Interim Baseline Schedule submittal shall include a 3 l/2 inch floppy diskette which contains the data files used to generate the schedule.

The Engineer shall be allowed 10 days to review the schedule and to provide comments, including the Contractor's application of the supplied scope breakdown structure. The Interim Baseline Schedule does not require Caltrans acceptance but all comments are to be implemented into the Baseline Schedule. Re-submittal of the Interim Baseline Schedule is not required. Late review of the Interim Baseline Schedule shall not restrain the submittal of the Baseline Schedule.

BASELINE SCHEDULE

Within 60 days, after approval of the contract, the Contractor shall submit to the Engineer a Baseline Project Schedule including the incorporation of all comments provided to the Interim Baseline Schedule. The Baseline Schedule shall have a data date of the day prior to the first working day of the contract. The schedule shall not include any actual start dates, actual finish dates, or constraint dates (except for Contract Milestone dates). The Baseline Schedule shall meet interim milestone dates, contract milestone dates, stage construction requirements, internal time constraints, show logical sequence of activities, and must not extend beyond the number of days originally provided for in the contract.

All task activities shall be assigned to a project calendar. Each calendar shall identify a workweek, and holidays. Use different calendars for work activities that occur on different work schedules. Activities for the preparation and the review of submittals plus fabrication are to be assigned to the same calendar.

The Contractor shall not add job inefficiencies or weather days to a project calendar without prior approval by the Engineer.

The Contractor shall not assign negative lags to any activities.

The Baseline CPM Schedule submitted by the Contractor shall have a sufficient number of activities to assure adequate planning of the project and to permit monitoring and evaluation of progress and the analysis of time impacts. The Baseline Schedule shall depict how the Contractor plans to complete the whole work involved, and shall show all activities that define the critical path. Each activity shall have durations of not more than 20 working days, and not less than one working day unless permitted otherwise by the Engineer. All activities in the schedule, with the exception of the first and last activities, shall have a minimum of one predecessor and a minimum of one successor. Multiple critical paths and near-critical paths shall be kept to a minimum, as determined by the Engineer. A total of not more than 50 percent of the baseline schedule activities shall be critical or near-critical, unless otherwise approved by the Engineer.

The Baseline Schedule shall not attribute negative float to any activity. 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 conduct a time impact analysis, when directed by the Engineer, to determine the effect of the action as described 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 schedule update. The Contractor shall include a log of the action on the State owned float activity and include a discussion of the actions in the narrative report. The Engineer may use State owned float to mitigate past or future State delays by offsetting potential time extensions for contract change work orders.

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

The Baseline Schedule shall be supplemented with resource allocations for every task activity to a level of detail that facilitates report generation based on labor craft and equipment class for the Contractor and subcontractors. The Contractor shall use average composite crews to display the labor loading of on-site construction activities. On the P3 resource dictionary, each resource should have the normal and maximum limits for the specified period of time. Based on the resource limits, 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. Along with the baseline progress schedule, the Contractor shall also submit to the Engineer time-scaled resource histograms of the labor crafts and equipment classes to be utilized on the contract.

The Contractor shall not create hammock activities for the purpose of resources loading.

The Contractor shall require each subcontractor to submit in writing a statement certifying that the subcontractor has concurred with the Contractor's CPM, including major updates, and that the subcontractor's related schedule has been incorporated accurately, including the duration of activities, labor and equipment loading. Should the Baseline Schedule or schedule update, submitted for acceptance, show variances from the requirements of the contract, the Contractor shall make specific mention of the variations in the letter of transmittal, in order that, if accepted, proper adjustments to the project schedule can be made. The Contractor will not be relieved of the responsibility for executing the work in strict accordance with the requirements of the contract documents. In the event of a conflict between the requirements of the contract documents and the information provided or shown on an accepted schedule, the requirements of the contract documents shall take precedence.

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

A. Physical breakdown of the project;
B. Contract milestones and completion dates, substantial completion dates, constraints, restraints, sequences of work shown in the contract, the planned substantial completion date, and the final completion date;
C. Type of work to be performed, the sequences, and the major subcontractors involved;
D. All purchases, submittals, submittal reviews, manufacture, fabrication, tests, delivery, and installation activities for all major materials and equipment, including submittal of requests for audits of manufacturers and fabricators in conformance with "Manufacturing and Fabrication Qualification Audit for Materials" of these special provisions;
E. Preparation, submittal and approval of shop and working drawings and material samples, showing time, as specified elsewhere, for the Engineer's review. The same time frame shall be allowed for at least one resubmittal on all major submittals so identified in the contract documents;
F. Identification of interfaces and dependencies with preceding, concurrent and follow-on contractors, railroads, and utilities as shown on the plans or specified in the specifications;
G. Identification of each and every utility relocation and interface as a separate activity, including activity description and responsibility coding that identifies the type of utility and the name of the utility company involved;

H. Actual tests, submission of test reports, and approval of test results;
I. All start-up, testing, training, and assistance required under the Contract;
J. Punchlist and final clean-up;
K. Identification of any manpower, material, or equipment restrictions, as well as any activity requiring unusual shift work, such as double shifts, 6-day weeks, specified overtime, or work at times other than regular days or hours;
L. Identification of each and every ramp closing and opening event as a separate one-day activity, including designation by activity coding and description that it is a north-bound, south-bound, east-bound, west-bound, and entry or exit ramp activity;
M. Separate resources graphs for the Contract's labor, equipment and critical path labor, with an accompanying analysis of each and explanation for any variances (i.e., example front-end resource loading of schedules); and
N. Equipment and labor shall be differentiated by a cost account code within the resource dictionary.
O. State owned float as the last activity in the schedule, at the end of which is the Scheduled Completion Date.

The Baseline Schedule submittal shall include a 3 l/2 inch floppy diskette which contains the data files used to generate the schedule, a schedule narrative describing the critical path, narratives providing additional schedule detail as requested by the Engineer and all schedule reports.

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

PROJECT SCHEDULE REPORTS

Schedules submitted to the Engineer including Interim Baseline, Baseline, and update schedules shall include time scaled network diagrams in a layout format requested by the Engineer. The network diagrams submitted to the Engineer shall also be accompanied by four computer-generated mathematical analysis tabular reports for each activity included in the project schedule. The reports (8 1/2" x 11" size) shall include a network diagram report showing the activity columns only, a predecessor and successor report, a resource report (Interim Baseline and Baseline Schedules), and a scheduling and leveling calculation report. The network diagram report~~s~~ shall include, at a minimum, the following for each activity:

A. Activity number and description;
B. Activity codes;
C. Original, actual and remaining durations;
D. Early start date (by calendar date);
E. Early finish date (by calendar date);
F. Actual start date (by calendar date);
G. Actual finish date (by calendar date);
H. Late start date (by calendar date);
I. Late finish date (by calendar date);
J. Identify activity calendar ID;
K. Total Float and Free Float, in work days; and
L. Percentage complete.

Network diagrams shall be sorted and grouped in a format requested by the Engineer reflecting the project breakdown per the Caltrans scope breakdown structure codes. They shall show a continuous flow of information from left to right per the project sorting and grouping codes. E.g., project milestones, submittals sub-grouped by description, and the construction activities sub-grouped by the scope breakdown structure. The primary paths of criticality shall be clearly and graphically identified on the networks. The network diagram shall be prepared on E-size sheets (36" x 48"), shall have a title block in the lower right-hand corner, and a timeline on each page. Exceptions to the size of the network sheets and the use of computer graphics to generate the networks shall be subject to the approval of the Engineer.

Schedule network diagrams the tabular reports shall be submitted to the Engineer for acceptance in the following quantities:

A. 2 sets of the Network Diagrams;
B. 2 copies of the tabular reports (8 1/2" x 11" size); and
C. 3 computer diskettes.

WEEKLY SCHEDULE MEETINGS

The Engineer and the Contractor shall hold weekly scheduling meetings to discuss the near term schedule activities, to address any long-term schedule issues, and to discuss any relevant technical issues. The Contractor shall develop a rolling 4-weeks schedule identifying the previous week worked and a 3-week look ahead. It shall provide sufficient detail to include the actual and planned activities of the Contractor and all the subcontractors for offsite and construction activities, addressing all activities to be performed and to identify issues requiring engineering action or input.

Each activity in the 4 week rolling schedule should be identified by an associated CPM schedule activity ID numbering system. This schedule should not be hand written. To create the 4 weeks rolling schedules, the Contractor should utilize the use of EXCEL spreadsheet, or Primavera scheduling software, as acceptable by the Engineer. The Engineer will provide the format of the schedule. This schedule should be electronically submitted to the Engineer one day prior to the scheduled meeting date.

MONTHLY UPDATE SCHEDULES

The Contractor shall submit a Monthly Update Schedule to the Engineer once in each month within 5 days of the data date. The proposed update schedule prepared by the Contractor shall include all information available as of the 20th calendar day of the month, or other data date as established by the Engineer. A detailed list of all proposed schedule changes such as logic, duration, lead/lag, forecast completion date, additions and deletions shall be submitted with the update.

The monthly update of the schedule shall focus on the period from the last update to the current cut-off data date. Changes to activities or logic beyond the data date are classified as revisions and need to be addressed per the schedule revision section of this specification. Activities that have either started or finished shall be reported as they actually occurred and designated as complete, if actually completed. For activities in progress that are forecasted to complete longer than planned, the remaining durations shall be revised, not the original durations. All out of sequence activities are to be reviewed and their relationships either verified or changed.

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

Contractor's Schedule Narrative Report Outline:

A. Contractor's Transmittal Letter;
B. Work completed during the period;
C. Description of the current critical path;
D. Description of current problem areas;
E. Current and anticipated delays;
    1. Cause of the delay;
    2. Corrective action and schedule adjustments to correct the delay; and
    3. Impact of the delay on other activities, milestones, and completion dates;
F. Changes in construction sequences;
G. Pending items and status thereof;
    1. Permits;
    2. Change Orders;
    3. Time Extensions; and
    4. Non-Compliance Notices;
H. Contract completion date(s) status;
    1. Ahead of schedule and number of days; and
    2. Behind schedule and number of days; and
I. Include updated Network Diagram and Reports.

The Contractor shall provide to the Engineer a 3 1/2" electronic disk of the schedule, together with printed copies of the network diagrams and tabular reports described under "Project Schedule Reports", and the Schedule Narrative Report.

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

On a date determined by the Engineer, the Contractor shall meet with the Engineer to review the monthly schedule update. At the monthly progress meeting, the Contractor and the Engineer shall review the updated schedule and shall discuss the content of the Narrative Report. The Engineer shall be allowed 10 days after the meeting to review and accept or

reject the update schedule submitted. Rejected schedules shall be resubmitted to the Engineer within 5 days, at which time a new 5 day review period by the Engineer will begin. All efforts shall be made between the Engineer and the Contractor to complete the review and the acceptance process prior to the next update schedule data date. To expedite the process a second meeting between the Engineer and the Contractor shall be held.

SCHEDULE REVISIONS

If the Contractor desires to make a change to the accepted schedule, the Contractor shall request permission from the Engineer in writing, stating the reasons for the change, and proposed revisions to activities, logic and duration. The Contractor shall submit for acceptance an analysis showing the effect of the revisions on the entire project. The analysis shall include:

A. An updated schedule not including the revisions. The schedule shall have a data date just prior to implementing the proposed revisions and includes a project completion date;
B. A revised schedule that includes the proposed revisions. The schedule will have the same data date as the updated schedule and include a project completion date;
C. The Contractor should add resources for all new activities, also adjust resources for those activities that their remaining duration were changed;
D. A narrative explanation of the revisions and their impact to the schedule; and
E. Computer files of the updated schedule and the revised schedule sequentially numbered or renamed for archive (record) purposes.

The Engineer will provide a response within 10 days to Contractor proposed schedule revisions.

Within 15 calendar days, the Contractor shall submit a revised CPM network for approval when requested by the Engineer, or when any of the following occurs:

A. there is a significant change in the Contractor's operations that will affect the critical path;
B. the current updated schedule indicates that the contract progress is 4 weeks or more behind the planned schedule, as determined by the Engineer; or
C. the Engineer determines that an approved or anticipated change will impact the critical path, milestone or completion dates, contract progress, or work by other contractors.

The Engineer shall be allowed 10 days to review and accept or reject a schedule revision. Rejected schedule revisions shall be revised and resubmitted to the Engineer within 10 days, at which time a new 10 day review period by the Engineer will begin. Only upon approval of a change by the Engineer shall it be reflected in the next schedule update submitted by the Contractor. The revised schedule shall also include a narrative explanation of the revisions and their impact to the schedule.

SCHEDULE TIME ADJUSTMENTS

When the Contractor requests a time adjustments due to contract change orders or delays, or if the Contractor or the Engineer considers that an approved or anticipated change will impact the critical path or contract progress, the Contractor shall submit to the Engineer a written Time Impact Analysis illustrating the impact of each change or delay on the current scheduled completion date or milestone completion date, utilizing the current accepted schedule. Each Time Impact Analysis shall include a schedule update and schedule revision, both with the same data dates, demonstrating how the Contractor proposes to incorporate the Change Order or delay into the current schedule. The schedule revision shall include the sequence of activities and any revisions to the existing activities to demonstrate the impact of the delay, or change into the schedule.

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

Time extensions will be granted only to the extent that equitable time adjustments for the activity or activities affected exceed the total or remaining float along the critical path of activities at the time of actual delay, or at the time the contract change order work is performed. Time extensions will not be granted nor will delay damages be paid unless:

A. the delay is beyond the control and without the fault or negligence of the Contractor and its subcontractors or suppliers, at any tier; and
B. the delay extends the actual performance of the work beyond the applicable scheduled contract completion date and the most recent date predicted for completion of the project on the accepted schedule update current as of the time of the delay or as of the time of issuance of the contract change order.

Time Impact Analyses shall be submitted in triplicate within 15 days after the delay occurs or after issuance of the contract change order. A schedule file diskette is also to be submitted.

Acceptance or rejection of each Time Impact Analysis by the Engineer will be made within 15 days after receipt of the Time Impact Analysis, unless subsequent meetings and negotiations delay the review. A copy of the Time Impact Analysis accepted by the Engineer shall be returned to the Contractor and the accepted schedule revisions illustrating the impact of the contract change orders or delays shall be incorporated into the project schedule during the first update after acceptance. Until such time that the Contractor provides the analysis, the Engineer may, at his option, construct and utilize the project as-built schedule or other recognized method to determine adjustments in contract time.

FINAL SCHEDULE UPDATE

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

EQUIPMENT AND SOFTWARE

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

A. Complete computer system, including keyboard, mouse, 19 inch color flat panel monitor (1024x768 pixels), Intel Pentium 2 GHz microprocessor chip, or equivalent;
B. Computer operating system software, compatible with the selected processing unit, for Windows XP or later or equivalent;
C. Minimum one-hundred-and-twenty-eight (512) megabytes of random access memory (RAM);
D. A 80 gigabytes minimum hard disk drive, a 1.44 megabyte 3 1/2 inch floppy disk drive, 32x speed minimum read/write CD-ROM drive, Ethernet card and 56k modem;
E. A color-ink-jet plotter with a minimum 36 megabyte RAM, capable of 300 dots per inch color, 600 dots per inch monochrome, or equivalent, capable of printing fully legible, timescaled charts, and network diagrams, in four colors, with a minimum size of 36 inches by 48 inches (E size) and is compatible with the selected system, an HP Design Jet 1055 CM or equivalent, plotter stand, roll paper assembly and automatic paper cutter, and provide plotter paper and ink cartridges throughout the contract;
F. CPM software shall be Primavera Project Planner, the latest version for Windows 98, or later;
G. Scheduler Analyzer Pro or equivalent (a suite of programs to assist in schedule analysis) in the latest version for Windows XP, Windows NT or later; and
H. Microsoft Office professional edition Software, the latest version for Windows XP, Windows NT or later and McAfee Virus scan 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 software.

The Contractor shall furnish, install, set up, maintain and repair the computer hardware and software ready for use at a location determined by the Engineer. The hardware and software shall be installed and ready for use by the first submission of the baseline schedule. The Contractor shall provide 24 hours of formal training for the Engineer, 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 and cost allocations. An authorized vendor of Project Primavera shall perform the training.

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

PAYMENT

The contract lump sum price paid for progress schedule (critical path) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in preparing, furnishing, updating and revising CPM progress schedules, including maintaining and repairing the computer hardware and training the Engineer in the use of the computer hardware and software, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Payments for progress schedule (critical path) will be made as follows:

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

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

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications, shall not apply to the item of progress schedule (critical path). Adjustments in compensation for the project schedule will not be made for any increased or decreased work ordered by the Engineer in furnishing project schedules.

10-1.24 OVERHEAD

Overhead shall conform to these special provisions. The Contractor will be compensated for time-related overhead in conformance with these special provisions.

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

The provisions in Section 9-1.08, "Adjustment of Overhead Costs," of the Standard Specifications shall not apply.

Time-related overhead shall consist of those overhead costs, including field and home office overhead, that are in proportion to the time required to complete the work. Time-related overhead shall not include costs that are not related to time, including but not limited to, mobilization, licenses, permits, and any other charges incurred only once during the contract.

Field office overhead expenses include time-related costs associated with the normal and recurring operations of the construction project, and shall not include costs directly attributable to any of the work of the contract. Such time-related costs include, but are not limited to, the salaries and benefits of project managers, general superintendents, field office managers and other field office staff assigned to the project, and rent, utilities, maintenance, security, supplies and equipment costs of the project field office.

Home office overhead or general and administrative expenses refer to the fixed costs of operating the Contractor's business. These costs include, but are not limited to, general administration, insurance, personnel and subcontract administration, purchasing, accounting, and project engineering and estimating. The rate of home office overhead shall exclude expenses specifically related to other contracts or other businesses of the Contractor, equipment coordination, material deliveries, and consultant and legal fees.

The quantity of time-related overhead to be paid will be measured by the working day, as specified in the Engineer's Estimate as WDAY. The estimated amount will be based on the number of working days, excluding any days for plant establishment, as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. In the event an early completion progress schedule, as defined in "Progress Schedule (Critical Path)" of these special provisions, is submitted by the Contractor and approved by the Engineer, the quantity of time-related overhead eligible for payment will be based on the total number of working days as specified in "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions, rather than the Contractor's early completion progress schedule. The quantity of time-related overhead, as measured above, will be adjusted only as a result of suspensions and adjustments of time which revise the current contract completion date and which are also any of the following:

A. Suspensions of work ordered in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications, except:

1. Suspensions ordered due to weather conditions being unfavorable for the suitable prosecution of the controlling operation or operations; or
2. Suspensions ordered due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the contract; or
3. Any other suspensions mutually agreed upon between the Engineer and the Contractor.

B. Extensions of time granted by the State in conformance with the provisions in the fifth paragraph in Section 8-1.07, "Liquidated Damages," of the Standard Specifications and these special provisions; or

C. Reductions in contract time set forth in approved contract change orders, in conformance with the provisions in Section 4-1.03, "Changes," of the Standard Specifications.

In the event a cost reduction proposal is submitted by the Contractor, and is subsequently approved by the Engineer, which provides for a reduction in contract time, the contract amount of time-related overhead associated with the reduction in contract time shall be considered as a net savings in the total cost of time-related overhead. The Contractor will be paid 50 percent of the estimated net savings of the time-related overhead, in conformance with the provisions in Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications.

If the quantity of time-related overhead, measured as specified in this special provision, exceeds 149 percent of the number of working days specified in the Engineer's Estimate, the Contractor shall, within 60 days of the Engineer's written request, submit to the Engineer an audit examination and report performed by an independent Certified Public Accountant of the Contractor's actual overhead costs. The independent Certified Public Accountant's audit examination shall be performed in conformance with the requirements of the American Institute of Certified Public Accountants Attestation Standards. The audit examination and report shall depict the Contractor's project and company-wide financial records and shall specify the actual overall average daily rates for both field and home office overhead for the entire duration of the project, and whether the costs have been properly allocated. The rates of field and home office overhead shall exclude all unallowable costs as determined in the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31. The audit examination shall determine if the rates of field and home office overhead:

A. are allowable in conformance with the requirements of the Federal Acquisition Regulations, 48 CFR, Chapter 1, Part 31;
B. are adequately supported by reliable documentation; and
C. related solely to the project under examination.

Upon the Engineer's written request, the Contractor shall make its financial records available for audit by the State for the purpose of verifying the actual rate of time-related overhead specified in the audit submitted by the Contractor. The actual rate of time-related overhead specified in the audit, submitted by the Contractor, will be subject to approval by the Engineer.

If the Engineer elects, or if requested in writing by the Contractor, contract item payments for time-related overhead, in excess of 149 percent of the number of working days designated in the Engineer's Estimate, will be adjusted to reflect the actual rate.

The cost of performing an audit examination and submitting the report, requested by the Engineer, will be borne equally by the State and the Contractor. The division of the cost will be made by determining the cost of providing an audit examination in conformance with the provisions of Section 9-1.03B, "Work performed by Special Forces or Other Special Services" of the Standard Specifications, and paying to the Contractor one-half of that cost.

The contract price paid per working day for time-related overhead shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in time-related overhead, complete in place, including all field and home office overhead costs incurred by the Contractor and by any joint venture partner, subcontractor, supplier or other party associated with the Contractor, and the Contractor's share of costs of audits of overhead costs requested by the Engineer, as specified in these special provisions, and as directed by the Engineer. The provisions in Sections 4-1.03B, "Increased or Decreased Quantities," 4-1.03C, "Changes in Character of the Work," of the Standard Specifications shall not apply to time-related overhead.

Full compensation for additional overhead costs involved in the performance of extra work at force account shall be considered as included in the markups specified in "Force Account Payment," of these special provisions.

Full compensation for additional overhead cost involved in performing additional contract item work that is not a controlling operation and for all overhead, other than the time-related overhead measured and paid for as specified in this section "Overhead", shall be considered as included in the various items of work involved, and no additional compensation will be allowed therefor.

For the purpose of making partial payments pursuant to the provisions in Section 9-1.06, "Partial Payments," of the Standard Specifications, the number of working days to be paid for time-related overhead in each monthly partial payment will be the number of working days, specified above to be measured for payment, that occurred during that monthly estimate period. The amount earned per working day for time-related overhead shall be either the contract item price, or 20 percent of the original total contract amount divided by the number of working days specified in "Beginning of Work, Time of Completion and Liquidated Damages," of these special provisions, whichever is the lesser.

After acceptance of the contract in conformance with the provisions in Section 7-1.17, "Acceptance of Contract," of the Standard Specifications, the amount of the total contract item price for time-related overhead not yet paid, will be included for payment in the first estimate made after acceptance of the contract in conformance with the provisions in Section 9-1.07, "Payment After Acceptance," of the Standard Specifications.

10-1.25 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 6 inches in diameter or pipelines operating at pressures greater than 60 psi (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.

For the purpose of protecting the high pressure PG&E gas line on Perry Street at 4th Street prior to excavating for the left footing at Bent L-6, the Contractor shall hand dig, expose, and protect the 2 inch high pressure gas line which is encased in a 3 inch pipe.

The Contractor shall notify the Engineer, in writing, of the need to relocate or remove existing street lighting standards, fire hydrants, and other surface mounted utilities, as shown on the plans to be relocated or removed by others, at least 30 days in advance of any operation that would require the relocation or removal of those surface mounted facilities.

The Contractor shall be familiar with all existing permanent City signs, traffic control devices, parking meter posts, and other facilities on sidewalks within the project limit. For signs, the Contractor shall survey the site thoroughly to get all pertinent information including, but not limited to, sign type, condition, location, orientation, number of faces (double sided or single sided), and reflectivity, and shall provide the Engineer with a copy of the survey..

The Contractor shall protect in place all utility poles and boxes within the project limit.

The Contractor shall reconstruct or protect in place all City signs, traffic control devices, parking meter posts, and other facilities on sidewalks. The above mentioned facilities shall be reinstalled in their original locations within one week of the completion of the construction activity that required the temporary removal.

The Contractor shall protect the foundations, anchor bolts, and other features of all surface mounted facilities that are subject to reconstruction and would have to be reinstalled after the completion of construction in the affected vicinity.

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

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

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

Utility Facility	Street Name	Limits (From - To)
3" Low Pressure Gas Line	Perry	3rd - 4th

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

If these facilities are not located on the plans in both alignment and elevation, no work shall be performed in the vicinity of the facilities until the owner, or the owner's representative, has located the facility by potholing, probing or other means that will locate and identify the facility. If, in the opinion of the Engineer, the Contractor's operations are delayed or interfered with by reason of the utility facilities not being located by the owner or the owner's representative, the State will compensate the Contractor for the delays to the extent provided in Section 8-1.09, "Right of Way Delays," of the Standard Specifications, and not otherwise, except as provided in Section 8-1.10, "Utility and Non-Highway Facilities," of the Standard Specifications, and "Preservation of Property" of these special provisions.

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10-1.26 MOBILIZATION

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

10-1.27 CONSTRUCTION AREA TRAFFIC CONTROL DEVICES

Flagging, signs, and all other traffic control devices furnished, installed, maintained, and removed when no longer required shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

The second paragraph in Section 12-2.02, "Flagging Costs," of the Standard Specifications is amended to read:

The provisions in this Section 12-2.02 shall in nowise relieve the Contractor from the responsibility of providing for the safety of the public as provided in Section 7-1.09 nor relieve the Contractor from the responsibility for damage as provided in Section 7, "Legal Relations and Responsibility."

Section 12-3.01, "General," of the Standard Specifications is amended by adding the following paragraph:

Retroreflective sheeting shall conform to the requirements in ASTM Designation: D 4956-95 and to the special provisions.

The third paragraph in Section 12-3.02, "Barricades," of the Standard Specifications is amended to read:

Markings for barricade rails shall be alternate orange and white stripes. The entire area of orange and white stripes shall be Type I, engineering grade, or Type II, super engineering grade, retroreflective sheeting. The color of the orange retroreflective sheeting shall conform to PR No. 6, Highway Orange, of the Federal Highway Administration's Color Tolerance Chart. Retroreflective sheeting shall be placed on rail surfaces in such a manner that no air bubbles or voids are present between the rail surface and retroreflective sheeting. The predominate color for barricade components other than rails shall be white, except that unpainted galvanized metal or aluminum may be used.

Section 12-3.06A, "Stationary Mounted Signs," of the Standard Specifications is amended to read:

Stationary mounted signs shall be installed on wood posts in the same manner shown on the plans for installation of roadside signs, except as follows:

1. Back braces and blocks for sign panels will not be required.
2. The height to the bottom of the sign panel above the edge of traveled way shall be at least 7 feet.
3. Construction area sign posts may be installed on above ground temporary platform sign supports as approved by the Engineer, or the signs may be installed on existing lighting standards or other supports as approved by the Engineer. When construction area signs are installed on existing lighting standards, holes shall not be made in the standards to support the sign.
4. The post embedment shall be 2.5 feet if post holes are backfilled around the posts with portland cement concrete produced from commercial quality aggregates and cement with not less than 295 pounds of cement per cubic yard.

Post size and number of posts shall be as shown on the plans, except that when stationary mounted signs are installed and the type of sign installation is not shown on the plans, post size and the number of posts will be determined by the Engineer. Posts shall be good sound wood posts, suitable for the purpose intended.

Sign panels for stationary mounted signs shall consist of Type II, Type III or Type IV retroreflective sheeting applied to an aluminum substrate conforming to the requirements in the Department's "Specifications for Reflective Sheeting Aluminum Signs." The type of retroreflective sheeting, Type II, Type III or Type IV, shall be at the Contractor's option and sign substrates fabricated from materials other than aluminum may be used when specified in the special provisions.

Legend and border may be applied by a screening process or by use of pressure sensitive cut-out sheeting. Size and spacing of letters and symbols shall be as depicted on the sign specification sheets published by the Department.

Rectangular signs over 55 inches measured along the horizontal axis, and diamond-shaped signs 60 inches and larger shall be framed unless otherwise specified. Frames shall be constructed in conformance with the requirements in the Department's "Framing Details for Sheet Aluminum Signs," Sheets 1 through 4 and Table 1 on Sheet 5.

Copies of the Department's "Specifications for Reflective Sheeting Aluminum Signs," "Framing Details for Sheet Aluminum Signs," and sign specification sheets may be obtained from the Department's Office of Business Management, Materiel Operations Branch, 1900 Royal Oaks Drive, Sacramento, CA 95815.

Sign panel fastening hardware shall be commercial quality.

The second paragraph in Section 12-3.06B, "Portable Signs," of the Standard Specifications is amended to read:

Sign panels for portable signs shall conform to the provisions for sign panels for stationary mounted signs in Section 12-3.06A, "Stationary Mounted Signs," or shall be Type VI retroreflective sheeting, or shall be cotton drill fabric, flexible industrial nylon fabric or other approved fabric. Fabric signs shall not be used during the hours of darkness. Size, color and legend requirements for portable signs shall be as described for stationary mounted sign panels in Section 12-3.06A. The height to the bottom of the sign panel above the edge of traveled way shall be at least 1 foot.

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

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

Section 12-3.10, "Traffic Cones," of the Standard Specifications is amended to read:

Traffic cones shall be fluorescent and of good commercial quality, flexible material suitable for the purpose intended. The outer section of the portion above the base of the cone shall be translucent and be of a highly pigmented fluorescent orange polyvinyl compound. The overall height of the cone shall be at least 28 inches and the bottom inside diameter shall be not less than 10.5 inches. The base shall be of sufficient weight and size or shall be anchored in a manner that the traffic cone will remain in an upright position.

During the hours of darkness traffic cones shall be affixed with retroreflective cone sleeves. The retroreflective sheeting of sleeves on the traffic cones shall be visible at 1000 feet at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Retroreflective cone sleeves shall conform to one of the following:

1. Removable flexible retroreflective cone sleeves shall be fabricated from the retroreflective sheeting specified in the special provisions, have a minimum height of 13 inches and shall be placed a maximum of 3 inches from the top of the cone. The sleeves shall not be in place during daylight hours;
2. Permanently affixed semitransparent retroreflective cone sleeves shall be fabricated from the semitransparent retroreflective sheeting specified in the special provisions, have a minimum height of 13 inches, and shall be placed a maximum of 3 inches from the top of the cone. Traffic cones with semitransparent retroreflective cone sleeves may be used during daylight hours; or
3. Permanently affixed double band retroreflective cone sleeves shall have 2 white retroreflective bands. The top band shall be 6 inches in height, placed a maximum of 4 inches from the top of the cone. The lower band shall be 4 inches in height, placed 2 inches below the bottom of the top band. Traffic cones with double band retroreflective cone sleeves may be used during daylight hours.

The type of retroreflective cone sleeve used shall be at the option of the Contractor. Only one type of retroreflective cone sleeve shall be used on the project.

The fourth paragraph in Section 12-4.01, "Measurement and Payment," of the Standard Specifications is amended to read:

When the Engineer's Estimate includes a contract item for temporary railing (Type K), the temporary railing (Type K) will be measured by the linear foot along the top of the railing, at each location shown on the plans, specified, or ordered by the Engineer. If the Engineer orders a lateral move of the temporary railing (Type K), and the repositioning is not shown on the plans, moving the temporary railing will be paid for as extra work as provided in Section 4-1.03D and the temporary railing will not be measured in the new position. Temporary railing (Type K) placed in excess of the length shown, specified, or ordered will not be paid for. The contract price paid per linear foot for temporary railing (Type K) shall include full compensation for furnishing all labor, materials (including reinforcement, Type P marker panels and reflectors), tools, equipment and incidentals, and for doing all the work involved in furnishing, placing, maintaining, repairing, replacing, and removing the temporary railing, including excavation and backfill, drilling holes and bonding threaded rods or dowels when required, removing threaded rods or dowels and filling the drilled holes with mortar and moving and replacing removable panels as required, complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

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

Category 1 traffic control devices are defined as those devices that are small and lightweight (less than 100 pounds), and have been in common use for many years. The devices shall be known to be crashworthy by crash testing, crash testing of similar devices, or years of demonstrable safe performance. Category 1 traffic control devices include traffic cones, plastic drums, portable delineators, and channelizers.

If requested by the Engineer, the Contractor shall provide written self-certification for crashworthiness of Category 1 traffic control devices. Self-certification shall be provided by the manufacturer or Contractor and shall include the following: date, Federal Aid number (if applicable), expenditure authorization, district, county, route and post mile of project limits; company name of certifying vendor, street address, city, state and zip code; printed name, signature and title of certifying person; and an indication of which Category 1 traffic control devices will be used on the project. The Contractor may obtain a standard form for self-certification from the Engineer.

Category 2 traffic control devices are defined as those items that are small and lightweight (less than 100 pounds), that are not expected to produce significant vehicular velocity change, but may otherwise be potentially hazardous. Category 2 traffic control devices include: barricades and portable sign supports.

Category 2 devices purchased on or after October 1, 2000 shall be on the Federal Highway Administration (FHWA) Acceptable Crashworthy Category 2 Hardware for Work Zones list. This list is maintained by FHWA and can be located at the following internet address: http://safety.fhwa.dot.gov/fourthlevel/hardware/listing.cfm?code=workzone. The Department maintains a secondary list at the following internet address: http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdffiles.htm.

Category 2 devices that have not received FHWA acceptance, and were purchased before October 1, 2000, may continue to be used until they complete their useful service life or until January 1, 2003, whichever comes first. Category 2 devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer by the start of the project. The label shall be readable. After January 1, 2003, all Category 2 devices without a label shall not be used on the project.

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

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

10-1.28 CONSTRUCTION AREA SIGNS

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

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

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

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

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

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

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

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

The term "construction area signs" shall include temporary object markers required for the direction of public traffic through or around the work during construction. Object markers listed or designated on the plans as construction area signs shall be considered to be signs and shall be furnished, erected, maintained, and removed by the Contractor in the same manner specified for construction area signs.

Object markers shall be stationary mounted on wood or metal posts in conformance with the details shown on the plans and the provisions in Section 82, "Markers and Delineators," of the Standard Specifications. Amendments to Section 82, "Markers and Delineators" are in "Markers and Delineators" of these special provisions.

Marker panels for Type N, Type P and Type R object markers shall conform to the provisions for sign panels for stationary mounted signs.

Target plates for Type K and Type L object markers and posts, reflectors and hardware shall conform to the provisions in Section 82, but need not be new.

10-1.29 MAINTAINING TRAFFIC

Attention is directed to Sections 7-1.08, "Public Convenience," 7-1.09, "Public Safety," and 12, "Construction Area Traffic Control Devices," of the Standard Specifications and to the provisions in "Public Safety" of these special provisions and these special provisions. Nothing in these special provisions shall be construed as relieving the Contractor from the responsibilities specified in Section 7-1.09.

Attention is directed to "Public Safety," "Indemnification and Insurance," and "Construction Area Traffic Control Devices" of these special provisions.

Lane closures shall conform to the provisions in section "Traffic Control System for Lane Closure" of these special provisions.

Attention is directed to "Sound Control Requirements" and "Order of Work" of these special provisions. Contractor shall comply with the sound control requirements for all seismic retrofit activities during the allowed lane closure hours.

Attention is directed to "Cooperation" of these special provisions regarding requirement for the Contractor to coordinate with and accommodate other bridge contractors when preparing lane closure schedules.

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.

Interim TBT Bus Ramp Bridge No.34-0147 Stage 1 over Beale Street			
	Number	Width	Height
Vehicle Openings	1	32	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Freemont Street Off Ramp (UFR and UFF lines) Bridge No. 34-0127S Stage 1 over 1st Street			
	Number	Width	Height
Vehicle Openings	1	42	13.50
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5			

Interim TBT Off Ramp Bridge No. 34-0146 Stage 1 over 1st Street			
	Number	Width	Height
Vehicle Openings	1	42	13.61
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5			

Westbound Mainline Bridge No. 34-0126 L Stage 2 over 2nd Street			
	Number	Width	Height
Vehicle Openings	2	22 and 31	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Interim Eastbound (Detour) Bridge No. 34-0151 Stage 3 over 2nd Street			
	Number	Width	Height
Vehicle Openings	2	22 and 31	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Eastbound Mainline Bridge No. 34-0126 R Stage 5 over 2nd Street			
	Number	Width	Height
Vehicle Openings	2	22 and 30	13.72
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Westbound Mainline Bridge No. 34-0126 L Stage 1 over 3rd Street			
	Number	Width	Height
Vehicle Openings	1	52	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5 with C staggered 1/2 space			

Westbound Mainline Bridge No. 34-0126 L Stage 2 over 3rd Street			
	Number	Width	Height
Vehicle Openings	1	52	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5 with C staggered 1/2 space			

Interim Eastbound (Detour) Bridge No. 34-0151 Stage 3 over 3rd Street			
	Number	Width	Height
Vehicle Openings	1	52	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5 with C staggered 1/2 space			

Eastbound Mainline Bridge No. 34-0126 R Stage 5 over 3rd Street			
	Number	Width	Height
Vehicle Openings	1	52	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5 with C staggered 1/2 space			

Eastbound Mainline Bridge No. 34-0126 R Stage 6 over 3rd Street			
	Number	Width	Height
Vehicle Openings	1	52	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5 with C staggered 1/2 space			

5th Street Off Ramp Bridge No. 34-0138C Stage 2 over 4th Street			
	Number	Width	Height
Vehicle Openings	2	21	14.00
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

5th Street On Ramp Bridge No. 34-0138C Stage 3 over 4th Street			
	Number	Width	Height
Vehicle Openings	2	21	14.87
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Harrison Street Off-Ramp Bridge No. 34-0128K Stage 5 over Rincon Street			
	Number	Width	Height
Vehicle Openings	1	20	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Fremont Street Off Ramp Bridge No. 34-0127S Stage 1 over Harrison Street			
	Number	Width	Height
Vehicle Openings	2	31 and 21	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Fremont Street Off Ramp Bridge No. 34-0127S Stage 1 over Folsom Street			
	Number	Width	Height
Vehicle Openings	1	42	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5			

Fremont Street Off Ramp Bridge No. 34-0127S Stage 1 over Clementina Street			
	Number	Width	Height
Vehicle Openings	1	12	15
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Eastbound Mainline Bridge No. 34-0126 R Stage 5 over Stillman Street			
	Number	Width	Height
Vehicle Openings	1	14	14.73
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Eastbound Mainline Bridge No. 34-0126 R Stage 5 over Clock Tower Lot			
	Number	Width	Height
Vehicle Openings	1	16	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Harrison Street Off Ramp Bridge No. 34-0128K Stage 5 over Bryant Street Building			
	Number	Width	Height
Vehicle Openings	2	20	15
Pedestrian Openings	2	5	8
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Mainline Frame 8U Bridge No. 34-0126 L Stage 3 over Eastbound Mainline			
	Number	Width	Height
Vehicle Openings	2	21 and 31	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Mainline Frame 8U Bridge No. 34-0126 L Stage 4 over Eastbound Mainline			
	Number	Width	Height
Vehicle Openings	2	21 and 31	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Mainline Frame 7U Bridge No. 34-0126 L Stage 5 over Interim Eastbound Mainline			
	Number	Width	Height
Vehicle Openings	1	32	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R and L 30 staggered 1/2 space			

Fremont Street (UFR Line)/ Mainline Frame 7U Bridge Nos. 34-0127S/34-0126 L Stage 1 over 1st Street On Ramp			
	Number	Width	Height
Vehicle Openings	1	11	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Mainline Frame 7U Bridge No. 34-0126 L Stage 2 over 1st Street On Ramp			
	Number	Width	Height
Vehicle Openings	1	11	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Fremont Street (UFR Line)/ Mainline Frame 7U Bridge Nos. 34-0127S/34-0126 R/L Stage 1 over Essex On Ramp			
	Number	Width	Height
Vehicle Openings	1	12	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Mainline Frame 7U Bridge No. 34-0126 L Stage 2 over Essex On Ramp			
	Number	Width	Height
Vehicle Openings	1	11	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Interim GTR Off Ramp Bridge No. 34-0145 Stage 1 over Bus On Ramp			
	Number	Width	Height
Vehicle Openings	1	11	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

Harrison Street Off Ramp Bridge No. 34-0128K Stage 5 over Sterling On Ramp			
	Number	Width	Height
Vehicle Openings	1	34	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5			

Westbound Mainline Bridge No. 34-0126 L Stage 1 over 2nd Street Bus Ramp			
	Number	Width	Height
Vehicle Openings	1	20	15
Pedestrian Openings	N/A	N/A	N/A
Location and Spacing of Falsework Pavement Lighting			
R 22.5			

TBT East Loop Bridge No. 34-0119Y Stage 1 over 1st Street			
	Number	Width	Height
Vehicle Openings	1	42	15.00
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5			

TBT East Loop Bridge No. 34-119Y Stage 1 over Freemont Street			
	Number	Width	Height
Vehicle Openings	1	42	15.00
Pedestrian Openings	2	5	8.00
Location and Spacing of Falsework Pavement Lighting			
R and L 22.5			

(Width and Height in feet.)
(R=right side of traffic. L=left side of traffic)
(C=Centered overhead.)

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

Personal vehicles of the Contractor's employees shall not be parked on the traveled way or shoulders including any section closed to public traffic.

The Contractor may prohibit stopping in parking lanes where and when necessary to gain access to the work or to provide the required lanes, unless specified otherwise in this section.

The Contractor shall obtain the approval for the required prohibition of stopping from the Department of Parking and Traffic (DPT) at (415) 554-2300, at least 72 hours in advance of the effective date and time. The Contractor shall post the signs at least 72 hours in advance of the effective date and time.

The Contractor shall furnish and place, spaced every 100 feet, where approved by the San Francisco Police Department and the Engineer, metal "Tow-Away - No Stopping" signs on wood posts at least seven feet above the sidewalk in accordance with the plans. A sign shall be placed and attached to the post so that the face is visible to through traffic.

If "Tow-Away -No Stopping" signs are to remain in place for less than 30 days, such signs may be attached to Type II barricades, placed at 25 feet centers. The Contractor shall post the signs only in the area where work will actually be occurring. Parking shall not be prohibited in the area where there is no construction activity. The name and contact telephone number of the Contractor shall be shown on the signs.

The Contractor shall maintain the signs on a continual basis and shall replace damaged or missing signs daily, and shall remove the signs immediately after they are no longer needed.

When a vehicle is removed from a street at the request of the Contractor and a post-storage hearing determines that, as a result of the Contractor's improper posting of the required signs, reasonable grounds did not exist for removal, the Contractor shall reimburse the City of San Francisco for the cost incurred in storage and towing. The failure of the Contractor to provide reimbursement or to agree to assume all liability for any improper posting shall result in the DPT's denial of any future requests by that Contractor for removal of vehicles in violation.

The Contractor shall notify the DPT at (415) 554-2323 at least five working days before starting any work that may impact parking meters, so that arrangements may be made by the City to have the meters removed at no cost to the Contractor.

Parking meters and parking meter standards damaged or loosened by the Contractor's operations will be repaired or replaced as necessary by the City of San Francisco. However, all expenses in connection therewith shall be borne by the Contractor.

The Contractor shall notify the Engineer at least 60 days prior to closing a city street for a weekend to allow the DPT to provide Parking Control Officers (PCO's) for traffic control during detours for weekend city street closure. As directed by the Engineer, the Contractor shall cooperate with local authorities and PCO's for the purpose of handling traffic on the streets affected by the work. The Contractor shall make arrangements with the DPT, at the following telephone numbers, to keep the working area clear of parked vehicles as necessary:

Applying for and Registering Tow-Away Zones	(415) 554-9928
Towing Cars from Tow-Away Zones	(415) 553-1200

The Contractor shall also provide the Engineer with the following notices:

30 days but not more than 45 days prior to occupying City streets as Temporary Construction Easements.

60 days but not more than 75 days prior to closing any ramps.

60 days but not more than 75 days prior to occupying any State right-of-way. Attention is directed to section entitled "Areas for Contractor's Use" in these special provisions.

45 days but not more than 60 days prior to closing bus access to the east loop ramp of the Transbay transit Terminal.

60 days but not more than 75 days in advance of the commencement of demolition operations on existing bents 1 through 6 and installation of interim pre-stress rods. Attention is directed to section entitled "Order of Work" elsewhere in these special provisions.

45 days but not more than 60 days in advance of obstructing access to any business or residence. Local access is to be maintained to all businesses or residences unless otherwise noted or shown on contract plans.

As shown on the contract plans, during the retrofit of the existing Bent R-6, the Contractor shall maintain an entrance width of at least 14 feet to Stillman Street from 4th Street.

Removal of the eastbound structure from 4th Street to 3rd Street and adjacent to Stillman Street shall only be performed during weekends. During this bridge removal, the Contractor shall not obstruct more than one business or residential structure at a time on Stillman Street per weekend. Attention is directed to the section entitled "Order of Work" elsewhere in these special provisions for the definition of a weekend.

For all of the Contractor's operations requiring the obstruction of a portion of Stillman or Perry Streets, the Contractor shall provide immediate through access, no less than 14 feet wide, to all emergency vehicles during emergencies. Thirty days but not more than 45 days prior to commencement of bridge removal over Stillman Street, the Contractor shall provide for Engineer's review and approval a written contingency plan on the methods for providing this emergency vehicle access to any portion of Stillman Street.

Obstruction of Perry Street shall be limited to a period of not more than 18 months from the inception date of the initial closure.

The Contractor shall maintain access to 340 Bryant Street during the business hours of 7:00 a.m. to 5:00 p.m. during weekdays. Any of the Contractor's operations in conflict with existing business driveways shall be performed during weekends.

Garage access for deliveries and shuttle service to 425 1st Street shall be maintained at all times.

Access to the Clocktower Building shall be maintained in its existing configuration, or as shown on the plans, except during the removal of the eastbound structure. During the removal of the eastbound structure, when requested by the Engineer, the Contractor shall allow for brief and regular intervals of access for collection of garbage and recycling bins.

For the schedule of Pacific Bell Park events the Contractor shall contact Giant Enterprises at (415) 972-1800.

Whenever vehicles or equipment are parked on the shoulder within 6 feet of a traffic lane, the shoulder area shall be closed with fluorescent traffic cones or portable delineators placed on a taper in advance of the parked vehicles or equipment and along the edge of the pavement at 25 feet intervals to a point not less than 25 feet past the last vehicle or piece of equipment. A minimum of 9 cones or portable delineators shall be used for the taper. A C23 (Road Work Ahead) or C24 (Shoulder Work Ahead) sign shall be mounted on a portable sign stand with flags. The sign shall be placed where designated by the Engineer.

Lanes shall be closed only during the hours shown on the charts included in this section "Maintaining Traffic." Except work required under Sections 7-1.08 and 7-1.09, work that interferes with public traffic shall be performed only during the hours shown for lane closures. Lanes shall only be closed on those roadways for which lane closure charts have been provided.

Designated legal holidays are: January 1st, the third Monday in February, the last Monday in May, July 4th, the first Monday in September, Thanksgiving Day, and December 25th. When a designated legal holiday falls on a Sunday, the following Monday shall be a designated legal holiday.

Minor deviations from the requirements of this section concerning hours of work which do not significantly change the cost of the work may be permitted upon the written request of the Contractor, if in the opinion of the Engineer, public traffic will be better served and the work expedited. These deviations shall not be adopted by the Contractor until the Engineer has approved the deviations in writing. All other modifications will be made by contract change order.

Chart No. 1
Multilane Lane Requirements

Location: Eastbound I-80 – From the First/Essex Street on-ramps to the Yerba Buena Island off ramp

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

Legend:

1	One lane open in direction of travel
2	Two adjacent lanes open in direction of travel
3	Three adjacent lanes open in direction of travel
4	Four adjacent lanes open in direction of travel (see remarks)
	No lane closure allowed

REMARKS: Weekday daytime lane closure is subject to the following restriction: This lane closure may not be installed between 0700 and 0900 hours (if the closure is not already in place by 0700 hours, installation of closure CANNOT begin until after 0900 hours).

Chart No. 2
Multilane Lane Requirements

Location: Westbound I-80 – From the SF– Oakland Bay Bridge Toll Plaza to the Fremont Street off-ramp

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

Legend:

1	One lane open in direction of travel
2	Two adjacent lanes open in direction of travel
3	Three adjacent lanes open in direction of travel
4	Four adjacent lanes open in direction of travel
	No lane closure allowed

REMARKS:

Chart No. 3
Multilane Lane Requirements

Location: Eastbound I-80 – From the 8th Street on-ramp to the First/Essex on-ramps

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

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

____ No lane closure allowed

REMARKS:

Chart No. 4
Multilane Lane Requirements

Location: Westbound I-80 – From the Fremont Street off-ramp to the 4th Street on-ramp

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

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

____ No lane closure allowed

REMARKS:

Chart No. 5A
Ramp Lane Requirements

Location: Eastbound I-80 – On the Essex Street on-ramp

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

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: For simultaneous closure of both Essex and First on-ramps see Chart No. 6. See Construction Area Signs plans for detour no. 16.

Chart No. 5B
Ramp Lane Requirements

Location: Eastbound I-80 – On First Street on-ramp

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

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: For simultaneous closure of both the First and Essex on-ramps see Chart No. 6. See Construction Area Signs plans for detour no. 14

Chart No. 6
Ramp Lane Requirements

Location: Eastbound I-80 – Simultaneous closure of BOTH the Essex Street AND First Street on-ramps

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

Legend:

X Ramps may be closed

No work that interferes with public traffic will be allowed

REMARKS: See Construction Area Signs plans for detour no. 13.

Chart No. 7
Ramp Lane Requirements

Location: Eastbound I-80 – On the Sterling Street on-ramp

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

Legend:

1 A minimum of one paved ramp lane, not less than 10 feet wide, shall be open for use by public traffic

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS: See Construction Area Signs plans for detour no. 15.

Chart No. 8
Ramp Lane Requirements

Location: Eastbound I-80 – On the 5th Street on-ramp

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

Legend:

1 A minimum of one paved ramp lane, not less than 10 feet wide, shall be open for use by public traffic

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:
1. Three lanes shall be maintained at the entrance to this ramp at all times unless the ramp is closed.
2. See Construction Area Signs plans for detour no. 19.

Chart No. 9
Ramp Lane Requirements

Location: Westbound I-80 – On the 5th Street off-ramp

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

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 10
Ramp Lane Requirements

Location: Westbound I-80 – On the Fremont Street off-ramp (right side)

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

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 11
Ramp Lane Requirements

Location: Westbound I-80 – On the Harrison Street off-ramp (left side)

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

Legend:

X Ramp may be closed

No work that interferes with public traffic will be allowed

REMARKS:

Chart No. 12
Multilane Lane Requirements

Location: Eastbound I-80 – From the 4th Street off-ramp to the Essex Street on-ramp

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

Legend:

X Freeway may be closed

No lane closure allowed

REMARKS: See Construction Area Signs plans for detour no. 21.

Chart No. 13
Multilane Lane Requirements

Location: Westbound I-80 – From the Fremont Street (right side) off-ramp to the 4th Street on-ramp

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

Legend:

X Freeway may be closed

No lane closure allowed

REMARKS: See Construction Area Signs plans for detour no. 22.

Chart No. 14A
Multilane Lane Requirements

Location: On northbound 5th Street from Harrison Street to Bryant Street.

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

Legend:

1 One lane open in direction of travel

No lane closure allowed

REMARKS:

1. One right turn lane shall be maintained on the approach to Bryant Street in addition to the above through lane requirements.

2. No lanes of northbound 5th Street shall be closed during full Street closure of 2nd Street or 3rd Street.

3. Parking shall be prohibited on this block as well as the block to the north and to the south in order to provide continuity and adequate transition.

Chart No. 14B
Multilane Lane Requirements

Location: On southbound 5th Street from Harrison Street to Bryant Street.

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

Legend:

1 One lane open in direction of travel

No lane closure allowed

REMARKS:

1. One left turn lane shall be maintained on the approach to Bryant Street in addition to the above through lane requirements.

2. No lanes of southbound 5th street shall be closed during full street closure of 2nd Street or 4th Street.

3. Parking shall be prohibited on this block as well the block to the north and to the south in order to provide continuity and adequate transition.

Chart No. 15
Multilane Lane Requirements

Location: On southbound 4th Street from Harrison Street to Bryant Street.

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

Legend:

2 Two adjacent lanes open in direction of travel

3 Three adjacent lanes open in direction of travel, including one diamond lane.

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for only demolition and erecting and removing falsework, except during Pacific Bell Park events. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 10.

2. On days of Pacific Bell Park events, street shall remain opened, with all lanes opened, from two hours before the start of the event until two hours after the end of the event.

3. No lanes of 4th Street shall be closed during full street closure of 2nd Street.

4. Parking shall be prohibited on this block as well the block to the north and to the south in order to provide continuity and adequate transition.

Chart No. 16
Multilane Lane Requirements

Location: On northbound 3rd Street from Bryant Street to Harrison Street.

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

Legend:

3 Three adjacent lanes open in direction of travel

4 Four adjacent lanes open in direction of travel, including one existing diamond lane

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday only for demolition, and erecting and removing falsework, except during Pacific Bell Park events. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 9.

2. On days of Pacific Bell Park events, street shall remain opened, with all lanes opened, from two hours before the start of the event until two hours after the end of the event.

3. No lanes of 3rd Street shall be closed during full street closure of 2nd Street.

4. Parking is prohibited on the east side of 3rd Street from Bryant Street to Harrison Street from 7a.m. to 9a.m. and from 4p.m. to 7p.m., Monday through Friday. The same restrictions apply to the west side of 3rd Street from Bryant Street to Perry Street. Parking is prohibited on the west side of 3rd Street from Perry Street to Harrison Street from 7a.m. to 7p.m. During these times, the parking lanes become operational traffic lanes.

Chart No. 17A
Multilane Lane Requirements

Location: On northbound 2nd Street from Bryant Street to Harrison Street.

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

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for only demolition and erecting and removing falsework, except during Pacific Bell Park events. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 11.

2. On days of Pacific Bell Park events, street shall remain opened, with all lanes opened, from two hours before the start of the event until two hours after the end of the event.

3. No lanes of northbound 2nd Street shall be closed during full street closures of 3rd Street or Howard Street or during closure of the 1st Street, Essex Street or Sterling Street on-ramps.

4. Parking is prohibited on this east side of this block from 4p.m. to 7p.m., Monday through Friday. During this time, the parking lane becomes an operational traffic lane.

Chart No. 17B
Multilane Lane Requirements

Location: On southbound 2nd Street from Bryant Street to Harrison Street.

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

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework, except during Pacific Bell Park events. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 11.

2. On days of Pacific Bell Park events, street shall remain open, with all lanes open, from two hours before the start of the event until two hours after the end of the event.

3. No lanes of southbound 2nd Street shall be closed during full street closure of 1st Street or during closure of the 1st Street, Essex Street or Sterling Street on-ramps.

Chart No. 18
Multilane Lane Requirements

Location: On southbound 1st Street from Howard Street to Folsom Street.

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

Legend:

2 Two adjacent lanes open in direction of travel

3 Three adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 8.

2. No lanes of 1st Street shall be closed during full street closure of Beale Street or Howard Street.

Chart No. 19
Multilane Lane Requirements

Location: On southbound Beale Street from Mission Street to Folsom Street.

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

Legend:

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 1 and no. 2.

2. No lanes of Beale Street shall be closed during full street closure of Howard Street.

3. Parking may be prohibited on the adjacent blocks of Beale Street in order to provide adequate transition to the lane configuration between Harrison Street and Bryant Street.

Chart No. 20A
Multilane Lane Requirements

Location: On eastbound and westbound Bryant Street from Sterling to Rincon.

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

Legend:

No lane closure allowed.

1 One lane open in direction of travel.

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 7.

Chart No. 20B
Multilane Lane Requirements

Location: On eastbound Bryant Street from 2nd Street to Delancy Street.

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

Legend:

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 7.

2. No lanes of eastbound Bryant Street shall be closed during closure of the 5th Street or Sterling Street on-ramps.

Chart No. 21A
Multilane Lane Requirements

Location: On eastbound Harrison Street from 2nd Street to 1st Street.

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

Legend:

1 One lane open in direction of travel

No lane closure allowed

REMARKS:

1. One right turn lane shall be maintained at Essex Street in addition to the above through lane requirements.

2. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 18.

3. No lanes of eastbound Harrison Street shall be closed during full street closure of Folsom Street or Bryant Street or during closure of the Sterling Street on-ramp.

Chart No. 21B
Multilane Lane Requirements

Location: On westbound Harrison Street from 1st Street to 2nd Street.

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

Legend:

1 One lane open in direction of travel

No lane closure allowed

REMARKS:

1. One left turn lane shall be maintained at 2nd Street in addition to the above through lane requirements.

2. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 18.

3. No lanes of westbound Harrison Street, with exception of left turn pockets, shall be closed during full street closure of 2nd Street or Howard Street.

Chart No. 22
Multilane Lane Requirements

Location: On eastbound Folsom Street from 2nd Street to 1st Street

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

Legend:

2 Two adjacent lanes open in direction of travel

3 Three adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

1. One right turn lane shall be maintained on the approach to Essex Street in addition to the above through lane requirements.

2. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 6.

3. No lanes of westbound Folsom Street shall be closed during full street closure of 1st Street or Harrison Street.

Chart No. 23A
Multilane Lane Requirements

Location: On eastbound Howard Street from Main Street to Beale Street.

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

Legend:

1 One lane open in direction of travel

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 3.

Chart No. 23B
Multilane Lane Requirements

Location: On westbound Howard Street from Main Street to Beale Street.

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

Legend:

1 One lane open in direction of travel

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 3.

2. No lanes of this block of westbound Howard Street shall be closed during full street closure of Beale Street or Harrison Street.

3. Parking is prohibited on the north side of Howard Street from 4p.m. to 6p.m., Monday through Friday. During this time, the parking lane becomes an operational traffic lane.

Chart No. 24
Multilane Lane Requirements

Location: On westbound Howard Street from 1st Street to 2nd Street.

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

Legend:

2 Three adjacent lanes open in direction of travel

3 Four adjacent lanes open in direction of travel

No lane closure allowed

REMARKS:

1. Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 4.

2. No lanes of this block of westbound Howard Street shall be closed during full street closure of 1st Street.

3. Parking is prohibited on the north side of Howard Street from 4p.m. to 6p.m., Monday through Friday. During this time, the parking lane becomes an operational traffic lane.

Chart No. 25
Multilane Lane Requirements

Location: On northbound Fremont Street from Folsom Street to the TL-Line.

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

Legend:

1 One lane open in direction of travel

No lane closure allowed

REMARKS:
Street may be closed on weekends from 8p.m. Friday to 5a.m. Monday for demolition and erecting and removing falsework. Adjacent streets shall not be simultaneously closed. See Construction Area Signs plans for detour no. 5.

Chart No. 26
Multilane Lane Requirements

Location: Eastbound on I-80 – From the 4th Street off-ramp to Treasure Island

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

Legend:

X	Freeway may be closed
	No lane closure allowed

REMARKS: This chart applies ONLY to bridge removal in Stage 3 element B as shown on sheet SC-21. See Construction Area Signs plans for detour no. 13.

When using Chart No. 26 the Contractor shall place Portable Changeable Message Signs at the following locations:

1. Southbound Route 101 in Marin County south of the San Pedro Undercrossing, Postmile 12.64.
2. Northbound Route 101 in San Francisco County north of the 23rd Street Overcrossing, Postmile 3.40.
3. Southbound Route 101 in San Francisco County at South Van Ness On-ramp, Postmile R4.80.
4. Eastbound Oak Street at Laguna Street in the City and County of San Francisco.
5. Southbound Gough Street at Turk Street in the City and County of San Francisco.
6. Northbound Route 280 in San Francisco County south of Mission Overcrossing, Postmile R3.10.
7. Northbound Route 101 in San Francisco County at Executive Park Undercrossing, Postmile 0.10.
8. Eastbound Route 80 in San Francisco County east of the 7th street Off-ramp, Postmile 4.50.
9. Northbound Route 101 in San Mateo County north of the Embarcadero Overcrossing, Postmile 0.03
10. Northbound Route 101 in San Mateo County north of the Broadway Overcrossing, Postmile 17.04.

exact locations and sign messages to be determined by the Engineer.

Chart No. 27
Multilane Lane Requirements

Location: Eastbound I-80 – From the 4th Street off-ramp to Pier W1

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

Legend:

2 Two adjacent lanes open in direction of travel

No lane closure allowed

REMARKS: This chart applies only to the extended weekend closures for bridge removal and erection of falsework for Stage 4 construction as shown on plan sheets SC-28 through SC-30.
In addition to the mainline closure indicated above, the on-ramps from First Street, Essex Street, and Sterling Street will also be closed continuously from 10pm Friday to 5am Monday. See Construction Area Signs plans for detour no. 20.

Chart No. 28
Ramp Lane Requirements

Location: Eastbound I-80 – On the First Street on-ramp and the Essex Street on-ramp simultaneously

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

Legend:

X Ramps may be closed simultaneously

No work that interferes with public traffic will be allowed

REMARKS: This chart applies only to the extended weekend closures for bridge removal and erection of falsework in Stage 3 elements B and C as shown on Sheet SC-21. See Construction Area Signs plans for detour no. 13.

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

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

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

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

Erection of girders over traffic lanes shall be undertaken on one span at a time. During girder erection, public traffic in the lanes over which girders are being placed shall be routed around the work area by means of a local detour as shown on the plans.

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

Regardless of the construction procedure, methods and equipment selected, the Contractor shall have necessary materials and equipment on the site to erect or remove the girders or falsework in any one span or over any one opening prior to detouring or stopping public traffic, and shall erect or remove the girders or falsework in an expeditious manner in order that inconvenience to public traffic will be at a minimum.

10-1.30 CLOSURE REQUIREMENTS AND CONDITIONS

Lane closures shall conform to the provisions in "Maintaining Traffic" of these special provisions and these special provisions.

The term closure, as used herein, is defined as the closure of a traffic lane or lanes, including ramp or connector lanes, within a single traffic control system.

CLOSURE SCHEDULE

By noon Monday, the Contractor shall submit a written schedule of planned closures for the following week period, defined as Friday noon through the following Friday noon.

The Closure Schedule shall show the locations and times when the proposed closures are to be in effect. The Contractor shall use the Closure Schedule request forms furnished by the Engineer. Closure Schedules submitted to the Engineer with incomplete, unintelligible or inaccurate information will be returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Amendments to the Closure Schedule, including adding additional closures, shall be submitted to the Engineer, in writing, at least 3 working days in advance of a planned closure. Approval of amendments to the Closure Schedule will be at the discretion of the Engineer.

The Contractor shall confirm, in writing, all scheduled closures by no later than 8:00 a.m. 3 working days prior to the date on which the closure is to be made. Approval or denial of scheduled closures will be made no later than 4:00 p.m. 2 working days prior to the date on which the closure is to be made. Closures not confirmed or approved will not be allowed.

Confirmed closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer for the following working day.

CONTINGENCY PLAN

The Contractor shall prepare a contingency plan for reopening closures to public traffic. The Contractor shall submit the contingency plan for a given operation to the Engineer concurrent with the advance closure schedule referenced above, or, should that not be possible due to rapidly changing conditions, within one working day of the Engineer's request.

LATE REOPENING OF CLOSURES

If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in Section 8-1.05, "Temporary Suspension of Work," of the Standard Specifications. The Contractor shall not make any further closures until the Engineer has accepted a work plan, submitted by the Contractor, that will insure that future closures will be reopened to public traffic at the specified time. The Engineer will have 2 working days to accept or reject the Contractor's proposed work plan. The Contractor will not be entitled to any compensation for the suspension of work resulting from the late reopening of closures.

For each 10-minute interval, or fraction thereof past the time specified to reopen the closure, the Department will deduct $8,500.00 per interval from moneys due or that may become due the Contractor under the contract.

COMPENSATION

The Contractor shall notify the Engineer of any delay in the Contractor's operations due to the following conditions, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of those conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09:

A. The Contractor's proposed Closure Schedule is denied and his planned closures are within the time frame allowed for closures in "Maintaining Traffic" of these special provisions, except that the Contractor will not be entitled to any compensation for amendments to the Closure Schedule that are not approved.

B. The Contractor is denied a confirmed closure.

Should the Engineer direct the Contractor to remove a closure prior to the time designated in the approved Closure Schedule, any delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay within the meaning of Section 8-1.09, "Right of Way Delays," and compensation for the delay will be determined in conformance with the provisions in Section 8-1.09.

10-1.31 TRAFFIC CONTROL SYSTEM FOR LANE CLOSURE

A traffic control system shall consist of closing traffic lanes and ramps in conformance with the details shown on the plans, the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and amendments under "Construction Area Traffic Control Devices," the provisions under "Maintaining Traffic" and "Construction Area Signs" of these special provisions, and these special provisions.

The provisions in this section will not relieve the Contractor of responsibility for providing additional devices or taking measures as may be necessary to comply with the provisions in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

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.

The first and second paragraphs in Section 85-1.06, "Placement," of the Standard Specifications are amended to read:

Except as otherwise provided in this Section 85-1.06, pavement markers shall be cemented to the pavement with hot melt bituminous adhesive or Rapid Set Type epoxy adhesive in conformance with the manufacturer's instructions.

In areas of new construction where the markers are protected from all traffic, including the Contractor's vehicles, Standard Set Type adhesive conforming the provisions in Section 95-2.05 may be used. The protection from all traffic shall be for at least 3 hours after marker placement when the pavement surface temperature is 55° F. or above, at least 24 hours when the temperature is between 41° F. and 55° F., and at least 48 hours when the temperature is 41° F. or below.

Section 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers (State Specification 8040-51B-09)" of the Standard Specifications is renamed "Standard Set Epoxy Adhesive for Pavement Markers (State Specification 8040-09)."

If components in the traffic control system are displaced or cease to operate or function as specified, from any cause, during the progress of the work, the Contractor shall immediately repair the components to the original condition or replace the components and shall restore the components to the original location.

STATIONARY LANE CLOSURE

When lane and ramp closures are made for work periods only, at the end of each work period, components of the traffic control system, except portable delineators placed along open trenches or excavation adjacent to the traveled way, shall be removed from the traveled way and shoulder. If the Contractor so elects, the components may be stored at selected central locations, designated by the Engineer within the limits of the highway right of way.

Each vehicle used to place, maintain and remove components of a traffic control system on multilane highways shall be equipped with a Type II flashing arrow sign which shall be in operation when the vehicle is being used for placing, maintaining or removing the components. Vehicles equipped with Type II flashing arrow sign not involved in placing, maintaining or removing the components when operated within a stationary type lane closure shall only display the caution display mode. The sign shall be controllable by the operator of the vehicle while the vehicle is in motion. The flashing arrow sign shown on the plans shall not be used on the vehicles which are doing the placing, maintaining and removing of components of a traffic control system and shall be in place before a lane closure requiring the sign's use is completed.

Placement and removal operations during stationary lane closures shall be treated as moving lane closures, as specified herein.

MOVING LANE CLOSURE

Flashing arrow signs used in moving lane closures shall be truck-mounted. Changeable message signs used in moving lane closure operations shall conform to the provisions in Section 12-3.12, "Portable Changeable Message Signs," of the Standard Specifications, except the signs shall be truck-mounted and the full operation height of the bottom of the sign may be less than 7 feet above the ground, but should be as high as practicable.

Flashing arrow signs shall be in the caution display mode when used on 2-lane, 2-way roadways.

Truck-mounted attenuators (TMA) for use in moving lane closures shall be any of the following approved models, or equal:

A. Hexfoam TMA Series 3000, Alpha 1000 TMA Series 1000 and Alpha 2001 TMA Series 2001, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076, Telephone (312) 467-6750.

   1. Distributor (Northern): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828, Telephone 1-800-884-8274, FAX (916) 387-9734.
   2. Distributor (Southern): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805, Telephone 1-800-222-8274.

B. Cal T-001 Model 2 or Model 3, manufacturer and distributor: Hexcel Corporation, 11711 Dublin Boulevard, P.O. Box 2312, Dublin, CA 94568, Telephone (510) 828-4200.

C. Renco Rengard Model Nos. CAM 8-815 and RAM 8-815, manufacturer and distributor: Renco Inc., 1582 Pflugerville Loop Road, P.O. Box 730, Pflugerville, TX 78660-0730, Telephone 1-800-654-8182.

Each TMA shall be individually identified with the manufacturer's name, address, TMA model number, and a specific serial number. The names and numbers shall each be a minimum 13 mm high and located on the left (street) side at the lower front corner. The TMA shall have a message next to the name and model number in 0.5 inch high letters which states, "The bottom of this TMA shall be _____ in ± _____ in above the ground at all points for proper impact performance." Any TMA which is damaged or appears to be in poor condition shall not be used unless recertified by the manufacturer. The Engineer shall be the sole judge as to whether used TMAs supplied under this contract need recertification. Each unit shall be certified by the manufacturer to meet the requirements for TMA in conformance with the standards established by the Transportation Laboratory.

Approvals for new TMA designs proposed as equal to the above approved models shall be in conformance with the procedures (including crash testing) established by the Transportation Laboratory. For information regarding submittal of new designs for evaluation contact: Transportation Laboratory, 5900 Folsom Boulevard, Sacramento, California 95819.

New TMAs proposed as equal to approved TMAs or approved TMAs determined by the Engineer to need recertification shall not be used until approved or recertified by the Transportation Laboratory.

PAYMENT

The contract lump sum price paid for traffic control system shall include full compensation for furnishing all labor, materials (including signs), tools, equipment, and incidentals, and for doing all the work involved in placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of the traffic control system shown on the plans, and for all work necessary in arranging and managing parking enforcement on City streets, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The adjustment provisions in Section 4-1.03, "Changes," of the Standard Specifications shall not apply to the item of traffic control system. Adjustments in compensation for traffic control system will be made only for increased or decreased traffic control system required by changes ordered by the Engineer and will be made on the basis of the cost of the increased or decreased traffic control necessary. The adjustment will be made on a force account basis as provided in Section 9-1.03, "Force Account Payment," of the Standard Specifications for increased work and estimated on the same basis in the case of decreased work.

Traffic control system required by work which is classed as extra work, as provided in Section 4-1.03D of the Standard Specifications, will be paid for as a part of the extra work.

10-1.32 TEMPORARY PAVEMENT DELINEATION

Temporary pavement delineation shall be furnished, placed, maintained, and removed in conformance with the provisions in Section 12-3.01, "General," of the Standard Specifications and these special provisions. Nothing in these special provisions shall be construed as reducing the minimum standards specified in the Manual of Traffic Controls published by the Department or as relieving the Contractor from the responsibilities specified in Section 7-1.09, "Public Safety," of the Standard Specifications and these special provisions.

GENERAL

Whenever the work causes obliteration of pavement delineation, temporary or permanent pavement delineation shall be in place prior to opening the traveled way to public traffic. Laneline or centerline pavement delineation shall be provided at all times for traveled ways open to public traffic. On multilane roadways (freeways and expressways) edgeline delineation shall be provided at all times for traveled ways open to public traffic.

The Contractor shall perform the work necessary to establish the alignment of temporary pavement delineation, including required lines or marks. Surfaces to receive temporary pavement delineation shall be dry and free of dirt and loose material. Temporary pavement delineation shall not be applied over existing pavement delineation or other temporary pavement delineation. Temporary pavement delineation shall be maintained until superseded or replaced with a new pattern of temporary pavement delineation or permanent pavement delineation.

Temporary pavement markers, including underlying adhesive, and painted traffic stripe and pavement marking which are applied to the final layer of surfacing or existing pavement to remain in place or which conflicts with a subsequent or new traffic pattern for the area shall be removed when no longer required for the direction of public traffic, as determined by the Engineer.

TEMPORARY LANELINE AND CENTERLINE DELINEATION

Whenever lanelines or centerlines are obliterated and temporary pavement delineation to replace the lines is not shown on the plans, the minimum laneline and centerline delineation to be provided for that area shall be temporary pavement markers placed at longitudinal intervals of not more than 24 feet. The temporary pavement markers shall be the same color as the laneline or centerline the pavement markers replace. Temporary pavement markers shall be, at the option of the Contractor, one of the temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "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 24 feet and shall be used for a maximum of 14 days on lanes opened to public traffic. Prior to the end of the 14 days the permanent pavement delineation shall be placed. If the permanent pavement delineation is not placed within the 14 days, the Contractor shall replace the temporary pavement markers and provide additional temporary pavement delineation and shall bear the cost thereof. The additional temporary pavement delineation to be provided shall be equivalent to the pattern specified for the permanent pavement delineation for the area, as determined by the Engineer.

Where "no passing" centerline pavement delineation is obliterated, the following "no passing" zone signing shall be installed prior to opening the lanes to public traffic. C18 (ROAD CONSTRUCTION AHEAD) or C23 (ROAD WORK AHEAD) signs shall be installed from 1,000 feet to 2,000 feet ahead of "no passing" zones. R63 (DO NOT PASS) signs shall be installed at the beginning and at every 2,000 feet interval within "no passing" zones. For continuous zones longer than 2 miles , W71 (NEXT _____ MILES) signs shall be installed beneath the C18 or C23 signs installed ahead of "no passing" zones. R64 (PASS WITH CARE) signs shall be installed at the end of "no passing" zones. The exact location of "no passing" zone signing will be as determined by the Engineer and shall be maintained in place until permanent "no passing" centerline pavement delineation has been applied. The signing for "no passing" zones, shall be removed when no

longer required for the direction of public traffic. The signing for "no passing" zones shall conform to the provisions in "Construction Area Signs" of these special provisions, except for payment.

Full compensation for furnishing, placing, maintaining, and removing the temporary pavement markers (including underlying adhesive, layout (dribble) lines to establish alignment of temporary pavement markers or used for temporary laneline and centerline delineation and signing specified for "no passing" zones) for those areas where temporary laneline and centerline delineation is not shown on the plans and for providing equivalent patterns of permanent traffic lines for those areas when required, shall be considered as included in the contract prices paid for the items of work that obliterated the laneline and centerline pavement delineation and no separate payment will be made therefor.

TEMPORARY EDGELINE DELINEATION

On multilane roadways (freeways and expressways), whenever edgelines are obliterated and temporary pavement delineation to replace those edgelines is not shown on the plans, the edgeline delineation to be provided for those areas adjacent to lanes open to public traffic shall be as follows:

A. Temporary pavement delineation for right edgelines shall, at the option of the Contractor, consist of either a solid 4 inch wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, or traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 100 feet.

B. Temporary pavement delineation for left edgelines shall, at the option of the Contractor, consist of either solid 4 inch wide traffic stripe of the same color as the stripe the temporary edgeline delineation replaces, traffic cones, portable delineators or channelizers placed at longitudinal intervals not to exceed 100 feet or temporary pavement markers placed at longitudinal intervals of not more than 6 feet. Temporary pavement markers used for temporary left edgeline delineation shall be one of the types of temporary pavement markers listed for short term day/night use (14 days or less) or long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Traffic stripe (4 inch wide) placed as temporary edgeline delineation which will require removal shall conform to the provisions of "Temporary Traffic Stripe (Paint)" of these special provisions. The quantity of temporary traffic stripe (paint) used for this temporary edgeline delineation will not be included in the quantities of paint to be paid for.

The lateral offset for traffic cones, portable delineators or channelizers used for temporary edgeline delineation shall be as determined by the Engineer. If traffic cones or portable delineators are used as temporary pavement delineation for edgelines, the Contractor shall provide personnel to remain at the project site to maintain the cones or delineators during the hours of the day that the portable delineators are in use.

Channelizers used for temporary edgeline delineation shall be the surface mounted type and shall be orange in color. Channelizer bases shall be cemented to the pavement in the same manner provided for cementing pavement markers to pavement in "Pavement Markers" of these special provisions, except epoxy adhesive shall not be used to place channelizers on the top layer of pavement. Channelizers shall be, at the Contractor's option, one of the surface mount types (36 inches) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary edgeline delineation shall be removed when no longer required for the direction of public traffic as determined by the Engineer.

The quantity of channelizers used as temporary edgeline delineation will not be included in the quantity of channelizers to be paid for. Full compensation for furnishing, placing, maintaining and removing temporary edgeline delineation for those areas where temporary edgeline delineation is not shown on the plans shall be considered as included in the contract prices paid for the items of work that obliterated the edgeline pavement delineation and no separate payment will be made therefor.

TEMPORARY TRAFFIC STRIPE (PAINT)

Temporary traffic stripe consisting of painted traffic stripe shall be applied and maintained at the locations shown on the plans. The painted temporary traffic stripe shall be complete in place at the location shown prior to opening the traveled way to public traffic.

Temporary painted traffic stripe shall conform to the provisions in "Paint Traffic Stripes and Pavement Markings" of these special provisions, except for payment. At the option of the Contractor, either one or 2 coats shall be applied regardless of whether on new or existing pavement.

When painted traffic stripe is specified for temporary left edgeline delineation, temporary pavement markers placed at longitudinal intervals of not more than 6 feet may be used in place of the temporary painted traffic stripe. Temporary pavement markers shall be one of the types of temporary pavement markers listed for long term day/night use (6 months or less) in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. When temporary reflective pavement markers are used in place of temporary painted traffic stripe, payment for those temporary pavement markers will be made on the basis of the theoretical quantity of temporary traffic stripe (paint) required for the left edgeline the temporary pavement markers replace.

Attention is directed to "Remove Traffic Stripe and Pavement Marking" of these special provisions and to amendments under "Existing Highway Facilities" of these special provisions regarding removal of painted traffic stripe and handling and disposal of removed yellow painted traffic stripe.

TEMPORARY PAVEMENT MARKING (PAINT)

Temporary pavement marking consisting of painted pavement marking shall be applied and maintained at the locations shown on the plans. The painted temporary pavement marking shall be complete in place at the location shown prior to opening the traveled way to public traffic.

Temporary painted pavement marking shall conform to the provisions in "Paint Traffic Stripes and Pavement Markings" of these special provisions, except for payment. At the option of the Contractor, either one or 2 coats shall be applied regardless whether on new or existing pavement.

Attention is directed to "Remove Traffic Stripe and Pavement Marking" of these special provisions and to amendments under "Existing Highway Facilities" of these special provisions regarding removal of painted pavement markings and handling and disposal of removed yellow painted pavement marking.

TEMPORARY PAVEMENT MARKERS

Temporary pavement markers shall be applied at the locations shown on the plans. The pavement markers shall be applied complete in place at the locations shown prior to opening the traveled way to public traffic.

Temporary pavement markers shown on the plans shall be, at the option of the Contractor, one of the temporary pavement markers for long term day/night use (6 months or less) listed in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

Temporary pavement markers shall be placed in conformance with the manufacturer's instructions and shall be cemented to the surfacing with the adhesive recommended by the manufacturer, except epoxy adhesive shall not be used in areas where removal of the pavement markers will be required.

Where the temporary pavement delineation shown on the plans for lanelines or centerlines consists entirely of a pattern of broken traffic stripe and pavement markers, the Contractor may use groups of the temporary pavement markers for long term day/night use (6 months or less) in place of the painted temporary traffic stripe. The groups of pavement markers shall be spaced as shown on the plans for a similar pattern of permanent traffic line, except pavement markers shown to be placed in the gap between the broken traffic stripe shall be placed as part of the group to delineate the pattern of broken temporary traffic stripe. The kind of laneline and centerline delineation selected by the Contractor shall be continuous within a given location. Payment for those temporary pavement markers used in place of temporary traffic stripe will be made on the basis of the theoretical length of the patterns of temporary traffic stripe (paint).Retroreflective pavement markers conforming to the provisions in "Pavement Markers" of these special provisions may be used in place of temporary pavement markers for long term day/night use (6 months or less) except to simulate patterns of broken traffic stripe. Placement of the retroreflective pavement markers used for temporary pavement markers shall conform to the provisions in "Pavement Markers" of these special provisions except the waiting period provisions before placing the pavement markers on new asphalt concrete surfacing as specified in Section 85-1.06, "Placement," of the Standard Specifications shall not apply and epoxy adhesive shall not be used to place pavement markers in areas where removal of the pavement markers will be required.

Amendments to Section 85-1.06 "Placement" are in "Pavement Markers" of these special provisions.

Temporary traffic stripe (paint) and temporary pavement marking (paint) will be measured and paid for in the same manner specified for paint traffic stripe (1-coat) and paint pavement marking (1-coat) in Section 84-3.06, "Measurement," and Section 84-3.07, "Payment," of the Standard Specifications.

Full compensation for removing painted traffic stripe, when no longer required, as determined by the Engineer, shall be considered as included in the contract price paid per linear foot for temporary traffic stripe (paint) and no separate payment will be made therefor.

Full compensation for removing painted pavement marking, when no longer required, as determined by the Engineer, shall be considered as included in the contract price paid per square foot for temporary pavement marking (paint) and no separate payment will be made therefor.

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 and as amended in "Pavement Markers" in these special provisions. Temporary pavement markers used for temporary laneline and centerline delineation for areas which are not shown on the plans will not be included in the quantities of temporary pavement markers to be paid for. Full compensation for removing temporary pavement markers, when no longer required, shall be considered as included in the contract unit price paid for temporary pavement marker and no separate payment will be made therefor.

10-1.33 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 amendments under "Construction Area Traffic Control Devices," of these special provisions, 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.

10-1.34 PORTABLE CHANGEABLE MESSAGE SIGN

Portable changeable message signs shall be furnished, placed, operated, and maintained at those locations shown on the plans or where designated by the Engineer in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Attention is directed to "Maintaining Traffic" of these special provisions regarding the use of the portable changeable message signs.

10-1.35 TEMPORARY RAILING

Temporary railing (Type K) shall be placed as shown on the plans, as specified in the Standard Specifications or these special provisions or where ordered by the Engineer and shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

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

Temporary railing (Type K), conforming to the details shown on project plans may be used. Temporary railing (Type K) fabricated prior to January 1, 1993, and conforming to 1988 Standard Plan B11-30 may be used, provided the fabrication date is printed on the required Certificate of Compliance and vertical holes are not drilled in the top of the temporary railing to secure temporary traffic screen to the temporary railing.

Attention is directed to "Public Safety" and "Order of Work" of these special provisions.

Temporary railing (Type K) placed in conformance with the provisions in "Public Safety" of these special provisions will be neither measured nor paid for.

10-1.36 CHANNELIZER (SURFACE MOUNTED)

Channelizers (Surface Mounted) shall conform to the provisions in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Channelizers (Surface Mounted) 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 (surface mounted) (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.

10-1.37 TEMPORARY TRAFFIC SCREEN

Temporary traffic screen shall be furnished, installed, and maintained on top of temporary railing (Type K) at the locations designated on the plans, specified in the special provisions or directed by the Engineer and shall conform to the provisions specified for traffic handling equipment and devices in Section 12, "Construction Area Traffic Control Devices," of the Standard Specifications and these special provisions.

Temporary traffic screen panels shall be new or used CDX Grade, or better, plywood or weather resistant strandboard mounted and anchored on temporary railing (Type K). Wale boards shall be new or used Douglas fir, rough sawn, Construction Grade, or better. Pipe screen supports shall be new or used galvanized steel pipe, Schedule 40. Nuts, bolts, and washers shall be cadmium plated. Screws shall be black or cadmium plated flat head, cross slotted screws with full thread length.

When no longer required, as determined by the Engineer, temporary traffic screen shall be removed from the site of the work and shall become the property of the Contractor.

Temporary traffic screen will be measured by the linear foot from actual measurements along the line of the completed temporary traffic screen, at each location designated on the plans, specified or directed by the Engineer. If the Engineer orders a lateral move of temporary railing, with temporary traffic screen attached, and the repositioning is not shown on the plans, moving the temporary traffic screen will be paid for as part of the extra work for moving the temporary railing as specified in Section 12-4.01, "Measurement and Payment," of the Standard Specifications. Temporary traffic screen placed in excess of the length shown, specified or directed by the Engineer will not be paid for.

The contract price paid per linear foot for temporary traffic screen shall include full compensation for furnishing all labor, materials (including anchoring systems), tools, equipment, and incidentals, and for doing all the work involved in installing, maintaining, and removing the temporary traffic screen, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.38 TEMPORARY CRASH CUSHION MODULE

This work shall consist of furnishing, installing, and maintaining sand filled temporary crash cushion modules in groupings or arrays at each location shown on the plans, as specified in these special provisions or where designated by the Engineer. The grouping or array of sand filled modules shall form a complete sand filled temporary crash cushion in conformance with the details shown on the plans and these special provisions.

Attention is directed to "Public Safety", "Order of Work", and "Temporary Railing" of these special provisions.

Whenever the work or the Contractor's operations establishes a fixed obstacle, the exposed fixed obstacle shall be protected with a sand filled temporary crash cushion. The sand filled temporary crash cushion shall be in place prior to opening the lanes adjacent to the fixed obstacle to public traffic.

Sand filled temporary crash cushions shall be maintained in place at each location, including times when work is not actively in progress. Sand filled temporary crash cushions may be removed during a work period for access to the work provided that the exposed fixed obstacle is 15 feet or more from a lane carrying public traffic and the temporary crash cushion is reset to protect the obstacle prior to the end of the work period in which the fixed obstacle was exposed. When no longer required, as determined by the Engineer, sand filled temporary crash cushions shall be removed from the site of the work.

At the Contractor's option, the modules for use in sand filled temporary crash cushions shall be either Energite III Inertial Modules, Fitch Inertial Modules or TrafFix Sand Barrels manufactured after March 31, 1997, or equal:

A. Energite III and Fitch Inertial Modules, manufactured by Energy Absorption Systems, Inc., One East Wacker Drive, Chicago, IL 60601-2076. Telephone 1-312-467-6750, FAX 1-800-770-6755

   1. Distributor (North): Traffic Control Service, Inc., 8585 Thys Court, Sacramento, CA 95828. Telephone 1-800-884-8274, FAX 1-916-387-9734
   2. Distributor (South): Traffic Control Service, Inc., 1881 Betmor Lane, Anaheim, CA 92805. Telephone 1-800-222-8274, FAX 1-714-937-1070

B. TrafFix Sand Barrels, manufactured by TrafFix Devices, Inc., 220 Calle Pintoresco, San Clemente, CA 92672. Telephone 1-949 361-5663, FAX 1-949 361-9205

   1. Distributor (North): United Rentals, Inc., 1533 Berger Drive, San Jose, CA 95112. Telephone 1-408 287-4303, FAX 1-408 287-1929
   2. Distributor (South): Statewide Safety & Sign, Inc., P.O. Box 1440, Pismo Beach, CA 93448. Telephone 1-800-559-7080, FAX 1-805 929-5786

Modules contained in each temporary crash cushion shall be of the same type at each location. The color of the modules shall be the standard yellow color, as furnished by the vendor, with black lids. The modules shall exhibit good workmanship free from structural flaws and objectionable surface defects. The modules need not be new. Good used undamaged modules conforming to color and quality of the types specified herein may be utilized. If used Fitch modules requiring a seal are furnished, the top edge of the seal shall be securely fastened to the wall of the module by a continuous strip of heavy duty tape.

Modules shall be filled with sand in conformance with the manufacturer's directions, and to the sand capacity in pounds 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 12 feet of the traveled way. The marker panel, when required, shall be firmly fastened to the crash cushion with commercial quality hardware or by other methods determined by the Engineer.

At the completion of the project, temporary crash cushion modules, sand filling, pallets or frames, and marker panels shall become the property of the Contractor and shall be removed from the site of the work. Temporary crash cushion modules shall not be installed in the permanent work.

Temporary crash cushion modules will be measured by the unit as determined from the actual count of modules used in the work or ordered by the Engineer at each location. Temporary crash cushion modules placed in conformance with the provisions in "Public Safety" of these special provisions and modules placed in excess of the number specified or shown will not be measured nor paid for.

Repairing modules damaged by public traffic and all on-site cleanup work for 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.

10-1.39 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.

The first paragraph in Section 15-1.02, "Preservation of Property" of the Standard Specifications is amended to read:

> Existing facilities which are to remain in place shall be protected in conformance with the provisions in Sections 7-1.11, "Preservation of Property," and 7-1.12, "Idemnification and Insurance," and in Section 8-1.10, "Utility and Non-Highway Facilities."

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

Section 15-2.02B, "Traffic Stripes and Pavement Markings," of the Standard Specifications is amended to read:

> Traffic stripes and pavement markings shall be removed by any method that does not materially damage the existing pavement. Pavement marking images shall be removed in such a manner that the old message cannot be identified. Where grinding is used, the pavement marking image shall be removed by grinding a rectangular area. The minimum dimensions of the rectangle shall be the height and width of the pavement marking. Residue resulting from removal operations shall be removed from pavement surfaces by sweeping or vacuuming before the residue is blown by the action of traffic or wind, migrates across lanes or shoulders, or enters into drainage facilities.

Traffic stripes shall be removed before any change is made in the traffic pattern.

The first paragraph in Section 15-2.02C, "Pavement Markers," of the Standard Specifications is amended to read:

Pavement markers, including underlying adhesive, shall be removed by such methods that will cause the least possible damage to the pavement or surfacing. Damage to the pavement or surfacing caused by pavement marker removal shall be repaired by the Contractor at the Contractor's expense by methods acceptable to the Engineer.

Section 15-2.07, "Payment," of the Standard Specifications is amended by adding the following paragraph after the third paragraph:

Full compensation for additional grinding outside the limits of the existing pavement marking image to obtain a rectangular area shall be considered as included in the contract price paid for the item of work involved and no additional compensation will be allowed therefor.

Plans of the existing bridges may be requested by fax from the Office of Structure Maintenance and Investigations, 1801 30th Street, Sacramento, California, Fax (916) 227-8357.

Plans of the existing bridges available to the Contractor are reproductions of the original contract plans with significant changes noted and working drawings and do not necessarily show normal construction tolerances and variances. Where dimensions of new construction required by this contract are dependent on the dimensions of the existing bridges, the Contractor shall verify the controlling field dimensions and shall be responsible for adjusting dimensions of the work to fit existing conditions.

EXISTING PAINT SYSTEMS

The existing paint systems on Bridge Number 34-0118R consist of vinyl wash undercoats and alkyd finish paints. Prior paint systems of this bridge consisted of red lead undercoats and aluminum finish coat paint. The existing paint systems on Bridge Numbers 34-0119Y and 34-0088 contain red lead primer or undercoats and zinc rich intermediate coats. Any work that disturbs the existing paint system will expose workers to health hazards and will (1) produce debris containing heavy metal in amounts that exceed the thresholds established in Titles 8 and 22 of the California Code of Regulations or (2) produce toxic fumes when heated. All debris produced when the existing paint system is disturbed shall be contained.

Debris Containment and Collection Program

Prior to starting work, the Contractor shall submit a debris containment and collection program to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, for debris produced when the existing paint system is disturbed. The program shall identify materials, equipment, and methods to be used when the existing paint system is disturbed and shall include working drawings of containment systems, loads applied to the bridge by containment structures, and provisions for ventilation and air movement for visibility and worker safety.

If the measures being taken by the Contractor are inadequate to provide for the containment and collection of debris produced when the existing paint system is disturbed, the Engineer will direct the Contractor to revise the operations and the debris containment and collection program. The directions will be in writing and will specify the items of work for which the Contractor's debris containment and collection program is inadequate. No further work shall be performed on the items until the debris containment and collection program is adequate and, if required, a revised program has been approved for the containment and collection of debris produced when the existing paint system is disturbed.

The Engineer will notify the Contractor of the approval or rejection of the submitted or revised debris containment and collection program within 2 weeks of submittal of the Contractor's program or revised program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised debris containment and collection program, nor for delays to the work due to the Contractor's failure to submit an acceptable program.

Full compensation for the debris containment and collection program shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

Safety and Health Provisions

Attention is directed to Section 7-1.06, "Safety and Health Provisions," of the Standard Specifications. Work practices and worker health and safety shall conform to the California Code of Regulations, Title 8, Construction Safety Orders, including Section 1532.1, "Lead."

The Contractor shall furnish the Engineer a written Code of Safe Practices and shall implement an Injury and Illness Prevention Program and a Hazard Communication Program in conformance with the requirements of Construction Safety Orders, Sections 1509 and 1510.

Prior to starting work that disturbs the existing paint system, and when revisions to the program are required by Section 1532.1, "Lead," the Contractor shall submit the compliance programs required in subsection (e)(2), "Compliance Program," of Section 1532.1, "Lead," of the Construction Safety Orders to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The compliance programs shall include the data specified in subsections (e)(2)(B) and (e)(2)(C) of Section 1532.1, "Lead." Approval of the compliance programs by the Engineer will not be required. The compliance programs shall be reviewed and signed by a Certified Industrial Hygienist (CIH) who is certified in comprehensive practice by the American Board of Industrial Hygiene (ABIH). Copies of all air monitoring or jobsite inspection reports made by or under the direction of the CIH in conformance with Section 1532.1, "Lead," shall be furnished to the Engineer within 10 days after the date of monitoring or inspection.

Full compensation for furnishing the Engineer with the submittals and for implementing the programs required by this safety and health section shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

Debris Handling

Debris produced when the existing paint system is disturbed shall not be temporarily stored on the ground. Debris accumulated inside the containment system shall be removed before the end of each work shift. Debris shall be stored in approved, leakproof containers and shall be handled in such a manner that no spillage will occur.

Disposal of debris produced when the existing paint system is disturbed shall be performed in conformance with all applicable Federal, State, and Local hazardous waste laws. Laws that govern this work include:

A. Health and Safety Code, Division 20, Chapter 6.5 (California Hazardous Waste Control Act).

B. Title 22; California Code of Regulations, Division 4.5, (Environmental Health Standards for the Management of Hazardous Waste).

C. Title 8, California Code of Regulations.

Except as otherwise provided herein, debris produced when the existing paint system is disturbed shall be disposed of by the Contractor at an approved Class 1 disposal facility in conformance with the requirements of the disposal facility operator. The debris shall be hauled by a transporter currently registered with the California Department of Toxic Substances Control using correct manifesting procedures and vehicles displaying current certification of compliance. The Contractor shall make all arrangements with the operator of the disposal facility and perform any testing of the debris required by the operator.

At the option of the Contractor, the debris produced when the existing paint system is disturbed may be disposed of by the Contractor at a facility equipped to recycle the debris, subject to the following requirements:

A. Copper slag abrasive blended by the supplier with a calcium silicate compound shall be used for blast cleaning.

B. The debris produced when the existing paint system is disturbed shall be tested by the Contractor to confirm that the solubility of the heavy metals is below regulatory limits and that the debris may be transported to the recycling facility as a non-hazardous waste.

C. The Contractor shall make all arrangements with the operator of the recycling facility and perform any testing of the debris produced when the existing paint system is disturbed that is required by the operator.

Full compensation for debris handling and disposal shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

Work Area Monitoring

The Contractor shall perform work area monitoring of the ambient air and soil in and around the work area at the bridge site to verify the effectiveness of the containment system. The work area monitoring shall consist of collecting, analyzing, and reporting air and soil test results and recommending the required corrective action when specified exposure levels are exceeded. The work area monitoring shall be carried out under the direction of a CIH. The samples shall be collected at locations designated by the Engineer.

Air samples shall be collected and analyzed in conformance with National Institute for Occupational Safety and Health (NIOSH) methods. Air samples for lead detection shall be collected and analyzed in conformance with NIOSH Method 7082, with a limit of detection of at least 0.5 $\mu g/m^3$. Air samples for detection of other metals shall be collected and analyzed in conformance with NIOSH Method 7300, with a limit of detection of at least one percent of the appropriate Permissible Exposure Limits (PELs) specified by the California/Occupational Safety and Health Administration

(Cal/OSHA). Alternative methods of sample collection and analysis, with equivalent limits of detection, may be used at the option of the Contractor.

The airborne metals exposure, outside either the containment system or work areas, shall not exceed the lower of either: (1) 10 percent of the Action Level specified for lead by Section 1532.1, "Lead," of the Construction Safety Orders, or (2) 10 percent of the appropriate PELs specified for other metals by Cal/OSHA.

The air samples shall be collected at least once per week during progress of work that disturbs the existing paint system. All air samples shall be analyzed within 48 hours at a facility accredited by the Environmental Lead Laboratory Accreditation Program of the American Industrial Hygiene Association (AIHA). When corrective action is recommended by the CIH, additional samples may be required by the Engineer to be taken, at the Contractor's expense.

Four soil samples shall be collected prior to the start of work, and 4 soil samples shall be collected within 36 hours following completion of cleaning operations of existing steel. Where the cleaning operations extend over large areas of soil or many separate areas of soil at each bridge site, the samples shall be collected at various times during the contract when determined by the Engineer. A soil sample shall consist of 5 plugs, each 3/4 inch in diameter and 1/2 inch deep, taken at each corner and center of a one square meter area. Soil samples shall be analyzed for total lead in conformance with Method 3050 in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods," SW-846 published by the United States Environmental Protection Agency.

There shall be no increase in the concentrations of heavy metal in the soil in the area affected when the existing paint system is disturbed. When soil sampling, after completion of work that disturbs the existing paint system, shows an increase in the concentrations of heavy metal, the area affected shall be cleaned and resampled at the Contractor's expense until soil sampling and testing shows concentrations of heavy metal less than or equal to the concentrations collected prior to the start of work.

In areas where there is no exposed soil, there shall be no visible increase in the concentrations of heavy metal on the area affected when the existing paint system is disturbed. Any visible increase in the concentrations of heavy metal, after completion of work that disturbs the existing paint system, shall be removed at the Contractor's expense.

Air and soil sample laboratory analysis results, including results of additional samples taken after corrective action as recommended by the CIH, shall be submitted to the Engineer. The results shall be submitted both verbally within 48 hours after sampling and in writing with a copy to the Contractor, within 5 days after sampling. Sample analysis reports shall be prepared by the CIH as follows:

A. For both air and soil sample laboratory analysis results, the date and location of sample collection, sample number, contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post Mile will be required.

B. For air sample laboratory analysis results, the following will be required:

1. List of emission control measures in place when air samples were taken.
2. Air sample results shall be compared to the appropriate PELs.
3. Chain of custody forms.
4. Corrective action recommended by the CIH to ensure airborne metals exposure, outside either the containment system or work areas, is within specified limits.

C. For soil sample laboratory analysis results, the concentrations of heavy metal expressed as parts per million will be required.

Work area monitoring will be paid for on the basis of a lump sum price.

The contract lump sum price paid for work area monitoring shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in collecting and analyzing samples of ambient air and soil for heavy metals, complete in place, including reporting the test results, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Containment System

At the option of the Contractor, the containment system shall consist of either (1) a ventilated containment structure, (2) vacuum shrouded surface preparation equipment and drapes, tarps, or other materials, or (3) an equivalent containment system. The containment system shall contain all water, resulting debris, and visible dust produced when the existing paint system is disturbed.

The containment system shall provide the clearances specified under "Maintaining Traffic" of these special provisions, except that when no clearances are specified a vertical clearance of 15 feet and a horizontal clearance of 32 feet shall be provided for the passage of public traffic.

Falsework or supports for the ventilated containment structure shall not extend below the vertical clearance level nor to the ground line at locations within the roadbed.

The ventilated containment structure shall conform to the provisions for falsework in Section 51-1.06, "Falsework," of the Standard Specifications.

The minimum total design load of the ventilated containment structure shall consist of the sum of the dead and live vertical loads. Dead load shall consist of the actual load of the ventilated containment structure. Live loads shall consist of a uniform load of not less than 45 pounds per square foot, which includes 20 pounds per square foot of sand load, applied over the area supported, and in addition, a moving 1000 pound concentrated load shall be applied to produce maximum stress in the main supporting elements. Assumed horizontal loads need not be included in the design of the ventilated containment structure.

The ventilated containment structure shall be supported with either rigid or flexible supports. The rigid or flexible containment materials on the containment structure shall retain airborne particles but may allow airflow through the containment materials. Flexible materials shall be supported and fastened to prevent escape of abrasive and blast materials due to whipping from traffic or wind and to maintain clearances.

All mating joints between the ventilated containment structure and the bridge shall be sealed. Sealing may be by overlapping of seams when using flexible materials or by using tape, caulking, or other sealing measures.

Multiple flap overlapping door tarps shall be used at entry ways to the ventilated containment structure to prevent dust or debris from escaping.

Baffles, louvers, flapper seals, or ducts shall be used at make-up air entry points to the ventilated containment structure to prevent escape of abrasives and resulting surface preparation debris.

The ventilated containment structure shall be properly maintained while work is in progress and shall not be changed from the approved working drawings without prior approval of the Engineer.

The ventilation system in the ventilated containment structure shall be of the forced input airflow type with fans or blowers.

Negative air pressure shall be employed within the ventilated containment structure and will be verified by visual methods by observing the concave nature of the containment materials while taking into account wind effects or by using smoke or other visible means to observe airflow. The input airflow shall be properly balanced with the exhaust capacity throughout the range of operations.

The exhaust airflow of the ventilation system in the ventilated containment structure shall be forced into dust collectors (wet or dry) or bag houses.

Full compensation for the containment system shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

Protective Work Clothing and Hygiene Facilities

Wherever there is exposure or possible exposure to heavy metals or silica dust at the bridge site, the Contractor shall, for State personnel: (1) furnish, clean, and replace protective work clothing and (2) provide access to hygiene facilities. The furnishing, cleaning, and replacement of protective work clothing and providing access to hygiene facilities shall conform to the provisions of subsections (g), "Protective work clothing and equipment," and (i), "Hygiene facilities and practices," of Section 1532.1, "Lead," of the Construction Safety Orders, and will be required for no more than 3 people.

The protective work clothing and access to hygiene facilities shall be provided during exposure or possible exposure to heavy metals or silica dust at the bridge site and during the application of the undercoats of paint.

Protective work clothing and hygiene facilities shall be inspected and approved by the Engineer before being used by State personnel.

The protective work clothing shall remain the property of the Contractor at the completion of the contract.

Full compensation for protective work clothing and access to hygiene facilities for State personnel shall be considered as included in the contract price paid for the item of work causing the existing paint system to be disturbed, and no additional compensation will be allowed therefor.

ABANDON MANHOLE

Existing manholes, where shown on the plans to be abandoned, shall be abandoned.

ABANDON CULVERT

Existing culverts, where shown on the plans to be abandoned, shall be abandoned in place or, at the option of the Contractor, the culverts shall be removed and disposed of. Resulting openings into existing structures that are to remain in place shall be plugged with commercial quality concrete containing not less than 505 pounds of cement per cubic yard.

Abandoning culverts in place shall conform to the following:

A. Culverts that intersect the side slopes shall be removed to a depth of not less than 3 feet measured normal to the plane of the finished side slope, before being abandoned.

B. Culverts 12 inches in diameter and larger, shall, at the Contractor's option, be backfilled with either sand, controlled low strength material or slurry cement backfill conforming to the provisions in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications by any method acceptable to the Engineer that completely fills the pipe. Sand backfill material shall be clean, free draining, and free from roots and other deleterious substances.

C. The ends of culverts shall be securely closed by a 0.5 foot thick tight fitting plug or wall of commercial quality concrete.

Culverts shall not be abandoned until their use is no longer required. The Contractor shall notify the Engineer in advance 5 days of any intended culvert or pipeline 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 yard determined from the dimensions of the culverts and pipelines to be abandoned.

The contract price paid per cubic yard 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 3 feet below finished grade.

REMOVE METAL BEAM GUARD RAILING

Existing metal beam guard railing, where shown on the plans to be removed, shall be removed and disposed of.

Existing concrete anchors or steel foundation tubes shall be completely removed and disposed of. Full compensation for removing concrete anchors shall be considered as included in the contract price paid per linear foot for remove metal beam guard railing and no separate payment will be made therefor.

Full compensation for removing cable anchor assemblies, terminal anchor assemblies or steel foundation tubes shall be considered as included in the contract price paid per linear foot for remove metal beam guard railing and no separate payment will be made therefor.

REMOVE SIGN STRUCTURE

Existing sign structures, where shown on the plans to be removed, shall be removed and disposed of.

Overhead sign structure removal shall consist of removing posts, frames, portions of foundations, sign panels, walkways with safety railings, and sign lighting electrical equipment.

Bridge mounted sign structure removal shall consist of removing sign panels and frames, sign lighting electrical equipment, walkways with safety railings, structural braces and supports, and hardware.

A sign structure shall not be removed until the structure is no longer required for the direction of public traffic.

Electrical wiring shall be removed to the nearest pull box. Fuses within spliced connections in the pull box shall be removed and disposed of.

Electrical equipment, where shown on the plans, shall be salvaged.

REMOVE PAVEMENT MARKER

Existing pavement markers, including underlying adhesive, when no longer required for traffic lane delineation as determined by the Engineer, shall be removed and disposed of.

Full compensation for removing and disposing of pavement markers and underlying adhesive shall be considered as included in the contract lump sum price paid for bridge removal at various locations and no separate payment will be made therefor.

REMOVE TRAFFIC STRIPE AND PAVEMENT MARKING

Traffic stripe and pavement marking shall be removed at the locations shown on the plans and as directed by the Engineer.

Attention is directed to "Water Pollution Control (Storm Water Pollution Prevention Plan)" of these special provisions.

Waste from removal of yellow thermoplastic traffic stripe and pavement marking contains lead chromate in average concentrations greater than or equal to 5 parts per million Soluble Lead or 1000 parts per million Total Lead. Yellow thermoplastic traffic stripe exists as shown on the plans. Residue produced from when yellow thermoplastic paint is removed may contain heavy metals in concentrations that exceed thresholds established by the California Health and Safety Code and may produce toxic fumes when heated.

The removed yellow thermoplastic shall be disposed of at a Class 1 disposal facility or a Class 2 disposal facility permitted by the Regional Water Quality Control Board in conformance with the requirements of the disposal facility operator within 90 days after accumulating 220 pounds of residue and dust. The Contractor shall make necessary arrangements with the operator of the disposal facility to test the yellow thermoplastic as required by the facility and these special provisions. Testing shall include, at a minimum, (1) Total Lead and Chromium by EPA Method 7000 series and (2) Soluble Lead and Chromium by California Waste Extraction Test. From the first 4.4 cubic yards of waste or portion thereof, if less than 4.4 cubic yards of waste are produced, a minimum of four randomly selected samples shall be taken and analyzed. From each additional 1.1 cubic yards of waste or portion thereof, if less than 1.1 cubic yards are produced, a minimum of one additional random sample shall be taken and analyzed. The Contractor shall submit the name and location of the disposal facility and analytical laboratory along with the testing requirements to the Engineer not less than 5 days prior to the start of removal of yellow thermoplastic traffic stripe. The analytical laboratory shall be certified by the Department of Health Services Environmental Laboratory Accreditation Program. Test results shall be provided to the Engineer for review prior to signing a waste profile as requested by the disposal facility, prior to issuing an EPA identification number, and prior to allowing removal of the waste from the site.

The Contractor shall prepare a project specific Lead Compliance Plan to prevent or minimize worker exposure to lead while handling removed yellow thermoplastic and yellow paint residue. Attention is directed to Title 8, California Code of Regulations, Section 1532.1, "Lead," for specific Cal-OSHA requirements when working with lead.

The Lead Compliance Plan shall contain the elements listed in Title 8, California Code of Regulations, Section 1532.1(e)(2)(B). Before submission to the Engineer, the Lead Compliance Plan shall be approved by an Industrial Hygienist certified in Comprehensive Practice by the American Board of Industrial Hygiene. The Plan shall be submitted to the Engineer at least 7 days prior to beginning removal of yellow thermoplastic and yellow paint.

Prior to removing yellow thermoplastic and yellow painted traffic stripe and pavement marking, personnel who have no prior training, including State personnel, shall complete a safety training program provided by the Contractor that meets the requirements of Title 8, California Code of Regulations, Section 1532.1, "Lead," and the Contractor's Lead Compliance Program.

Personal protective equipment, training, and washing facilities required by the Contractor's Lead Compliance Plan shall be supplied to State personnel by the Contractor. The number of State personnel will be 30.

Where grinding or other methods approved by the Engineer are used to remove yellow thermoplastic and yellow painted traffic stripe and pavement marking, the removed residue, including dust, shall be contained and collected immediately. Sweeping equipment shall not be used. Collection shall be by a high efficiency particulate air (HEPA) filter equipped vacuum attachment operated concurrently with the removal operations or other equally effective methods approved by the Engineer. The Contractor shall submit a written work plan for the removal, storage, and disposal of yellow thermoplastic and yellow painted traffic stripe and pavement marking to the Engineer for approval not less than 15 days prior to the start of the removal operations. Removal operations shall not be started until the Engineer has approved the work plan.

The removed yellow thermoplastic shall be stored and labeled in covered containers. Labels shall conform to the provisions of Title 22, California Code of Regulations, Sections 66262.31 and 66262.32. Labels shall be marked with date when the waste is generated, the words "Hazardous Waste", composition and physical state of the waste (for example, asphalt grindings with thermoplastic or paint), the word "Toxic", the name and address of the Engineer, the Engineer's telephone number, contract number, and Contractor or subcontractor. The containers shall be a type approved by the United States Department of Transportation for the transportation and temporary storage of the removed residue. The containers shall be handled so that no spillage will occur. The containers shall be stored in a secured enclosure at a location within the project limits until disposal, as approved by the Engineer.

If the yellow thermoplastic traffic stripe residue is transported to a Class 1 disposal facility, a manifest shall be used, and the transporter shall be registered with the California Department of Toxic Substance Control. The Engineer will obtain the United States Environmental Protection Agency Identification Number and sign all manifests as the generator within 2 working days of receiving sample test results and approving the test methods.

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 thermoplastic traffic stripe shall be considered as included in the contract price paid per linear foot for remove thermoplastic traffic stripe (yellow) and no separate payment will be made therefor.

REMOVE DRAINAGE FACILITY

Existing culverts, inlets, and manhole, where any portion of these structures is within 3 feet of the grading plane in excavation areas, or within 1 foot of original ground in embankment areas or where shown on the plans to be removed, shall be completely removed and disposed of.

REMOVE ASPHALT CONCRETE DIKE

Existing asphalt concrete dike, where shown on the plans to be removed, shall be removed.

Prior to removing the dike, the outside edge of the asphalt concrete to remain in place shall be cut on a neat line to a minimum depth of 0.17 foot.

The dike shall be removed in such a manner that the surfacing which is to remain in place is not damaged.

The dike shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

REMOVE ASPHALT CONCRETE

Existing asphalt concrete, where shown on the plans to be removed, shall be removed.

Prior to removing the asphalt concrete, the outside edge of the asphalt concrete to remain in place shall be cut on a neat line to a minimum depth of 0.17 foot.

The asphalt concrete shall be removed in such a manner that the surfacing which is to remain in place is not damaged.

The asphalt concrete shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13 of the Standard Specifications.

REMOVE ROADSIDE SIGN

Existing roadside signs, at those locations shown on the plans to be removed, shall be removed and disposed of.

Existing roadside signs shall not be removed until replacement signs have been installed or until the existing signs are no longer required for the direction of public traffic, unless otherwise directed by the Engineer.

REMOVE CHAIN LINK FENCE

Existing chain link fence, where shown on the plans to be removed, shall be removed and disposed of..

Chain link post foundations shall be removed to a depth of 3 feet and disposed of.

Full compensation for removing and disposing of chain link post foundations shall be considered as included in the contract price paid per linear foot for remove chain link fence and no separate payment will be made therefor.

REMOVE GATE

Existing gate, including post footings, where shown on the plans to be removed, shall be removed and disposed of.

RESET ROADSIDE SIGN

Existing roadside signs, where shown on the plans to be reset, shall be removed and reset.

Unless otherwise shown on the plans, 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.

REMOVE CRASH CUSHION

Existing crash cushions, where shown on the plans to be removed, shall be removed and disposed of.

PLANE ASPHALT CONCRETE PAVEMENT

Existing asphalt concrete pavement shall be planed at the locations and to the dimensions shown on the plans.

Except as provided herein, planing asphalt concrete pavement shall be performed, at the option of the Contractor, either by the cold planing or heater planing method. The use of the heater planing method shall be subject to approval of the local Air Pollution Control Officer.

Cold planing machines shall be equipped with a cutter head not less than 30 inches in width and shall be operated so 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.

Heater planing machines shall have, in combination or separately, a means for heating and cutting the asphalt concrete surface and blading the displaced material into windrows in one continuous forward motion. Heat shall be applied uniformly to the area to be planed and shall be accurately controlled according to conditions and the road surfacing being planed. The cutting width of the blade shall be not less than 35 inches.

Heater planing operations shall not be performed at times where there is danger of igniting entrapped gases from sewers or gas mains, if an open flame is used in the heater. The heater planing method shall not be used in areas where the heat generated by the heater planing equipment may damage adjacent shrubs or the foliage on overhanging tree limbs.

The depth, width and shape of the cut shall be as shown on the typical cross sections or as designated by the Engineer. The final cut shall result in a uniform surface conforming to the typical cross sections. The outside lines of the planed area shall be neat and uniform. Planing asphalt concrete pavement operations shall be performed without damage to the surfacing to remain in place.

Planed widths of pavement shall be continuous except for intersections at cross streets where the planing shall be carried around the corners and through the conform lines. Following planing operations, a drop-off of more than 0.15 ft. will not be allowed between adjacent lanes open to public traffic.

Where transverse joints are planed in the pavement at conform lines, no drop-off shall remain between the existing pavement and the planed area when the pavement is opened to public traffic. If asphalt concrete has not been placed to the level of existing pavement before the pavement is to be opened to public traffic, a temporary asphalt concrete taper shall be constructed. Asphalt concrete for temporary tapers shall be placed to the level of the existing pavement and tapered on a slope of 1:30 (vertical: horizontal) or flatter to the level of the planed area.

Asphalt concrete for temporary tapers shall be commercial quality and may be spread and compacted by any method that will produce a smooth riding surface. Temporary asphalt concrete tapers shall be completely removed, including the removal of loose material from the underlying surface, before placing the permanent surfacing. The removed material shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Operations shall be scheduled so that not more than 7 days shall elapse between the time when transverse joints are planed in the pavement at the conform lines and the permanent surfacing is placed at the conform lines.

The material planed from the roadway surface, including material deposited in existing gutters or on the adjacent traveled way, shall be removed and disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications. Removal operations of planed material shall be concurrent with planing operations and follow within 50 feet of the planer, unless otherwise directed by the Engineer.

Planing asphalt concrete pavement will be measured by the square yard. The quantity to be paid for will be the actual area of surface planed irrespective of the number of passes required to obtain the depth shown on the plans.

The contract price paid per square yard for plane asphalt concrete pavement shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in planing asphalt concrete surfacing and disposing of planed material, including furnishing the asphalt concrete for and constructing, maintaining, removing, and disposing of temporary asphalt concrete tapers, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

EXISTING HIGHWAY IRRIGATION FACILITIES

Existing irrigation facilities within the limits of work shall remain in place. Irrigation facilities that are damaged by the Contractor's operation shall be reported immediately to the Engineer.

Water shall be maintained in conformance with the provisions in Section 20-5.025, "Maintain Existing Water Supply," of the Standard Specifications.

If the Contractor's operations damage the existing irrigation facilities, the damaged facilities shall be repaired or replaced, at the Contractor's expense, as follows:

Repair or replacement of damaged facilities shall be completed within 10 working days of the damage.

Replaced irrigation facilities shall be new and of equal or better quality than the damaged facility. Replacement irrigation facilities shall be compatible with the irrigation systems to remain.

After repair or replacement of the facilities is complete, the Contractor shall demonstrate to the Engineer that the repaired or replaced facilities operate properly. When remote control valves are repaired or replaced, the valves shall be tested with the irrigation controller in the automatic mode.

BRIDGE REMOVAL

Removing portions of bridges shall conform to the provisions in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions. Bridge removal locations shall be defined as follows:

BRIDGE REMOVAL, LOCATION A
FREMONT STREET OFF-RAMP
(BRIDGE NO. 34-0127S)

BRIDGE REMOVAL, LOCATION B
HARRISON STREET OFF-RAMP
(BRIDGE NO. 34-0128K)

BRIDGE REMOVAL, LOCATION C
INTERIM GTR OFF-RAMP
(BRIDGE NO. 34-0145)

BRIDGE REMOVAL, LOCATION D
INTERIM TBT ON-RAMP
(BRIDGE NO. 34-0143)

BRIDGE REMOVAL, LOCATION E
INTERIM TBT OFF-RAMP
(BRIDGE NO. 34-0146)

BRIDGE REMOVAL, LOCATION F
INTERIM EASTBOUND DETOUR
(BRIDGE NO. 34-0151)

BRIDGE REMOVAL, LOCATION G
INTERIM ESSEX STREET ON-RAMP
(BRIDGE NO. 34-0149)

BRIDGE REMOVAL, LOCATION H
INTERIM FIRST STREET ON-RAMP
(BRIDGE NO. 34-0150)

BRIDGE REMOVAL, LOCATION I
INTERIM FREMONT STREET OFF-RAMP
(BRIDGE NO. 34-0148)

BRIDGE REMOVAL, LOCATION J
INTERIM FIFTH STREET ON-RAMP
(BRIDGE NO. 34-0152)

BRIDGE REMOVAL (PORTION), LOCATION K
TRANSBAY TERMINAL RAMPS (RETROFIT)
(BRIDGE NO. 34-0119Y)

BRIDGE REMOVAL (PORTION), LOCATION L
BAYSHORE VIADUCT – 4TH STREET (RETROFIT)
(BRIDGE NO. 34-0088)

BRIDGE REMOVAL, LOCATION M (STAGE 1)
SFOBB SAN-FRANCISCO APPROACH-MAINLINE
(BRIDGE NO. 34-0126R/L)

BRIDGE REMOVAL, LOCATION M (STAGE 2)
SFOBB-SAN FRANCISCO APPROACH-MAINLINE
(BRIDGE NO. 34-0126R/L)

BRIDGE REMOVAL, LOCATION M (STAGE 3)
SFOBB-SAN FRANCISCO APPROACH-MAINLINE
(BRIDGE NO. 34-0126R/L)

BRIDGE REMOVAL, LOCATION M (STAGE 4)
SFOBB-SAN FRANCISCO APPROACH-MAINLINE
(BRIDGE NO. 34-0126R/L)

BRIDGE REMOVAL, LOCATION M (STAGE 5)
SFOBB-SAN FRANCISCO APPROACH-MAINLINE
(BRIDGE NO. 34-0126R/L)

BRIDGE REMOVAL (PORTION), LOCATION N
SFOBB WEST ANCHORAGE
(BRIDGE NO. 34-0003)

BRIDGE REMOVAL (PORTION), LOCATION O
4TH STREET OVERCROSSING INTERIM STRUCTURE
(BRIDGE NO. 34-0153T)

Removal of interim supports will be paid for in the bridge removal (portion) location defined by the stage in which they are removed.

Removal of the timber and angles at the upper deck cross over will be paid for in the bridge removal (portion) location defined by the stage in which they are removed.

Removal of prestressing rods, pipe sleeves and bearing plates will be paid for in the bridge removal (portion) location defined by the stage in which they are removed.

Removal of portions of curbs and barriers on the mainline structure shown on plans for the interim structures will be paid for as bridge removal defined by the location of bridge removal for the interim structures.

Grinding concrete surfaces shall conform to the provisions for grinding portland cement concrete pavement as specified in Section 42-2, "Grinding," of the Standard Specifications, except that profilograph testing will not be required.

Full compensation for grinding concrete surfaces at SFOBB West Anchorage (Bridge No. 34-0003) shall be considered as included in the contract lump sum price paid for bridge removal (portion), location N and no separate payment will be allowed therefor.

The ends of the cut reinforcement shall be painted with a zinc rich coating conforming to the provisions for painting damaged galvanized surfaces in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Full compensation for constructing the gaps at the tops of the columns at Bayshore Viaduct-4th Street Retrofit (Bridge No. 34-0088), including removal of concrete, cutting and coating reinforcement, and filling the gaps with polystyrene, shall be considered as included in the contract lump sum price paid for bridge removal (portion), location L and no separate payment will be allowed therefor.

Removal of the corners of the columns at Bayshore Viaduct-4th Street Retrofit (Bridge No. 34-0088) will be paid for as bridge removal (portion), location L.

Full compensation for removing the existing asphalt concrete, ballast and structural concrete for construction of the block dam and joint seal assembly at the TBT-East loop location shall be considered as included in the contract price paid per cubic yard for structural concrete bridge and no separate payment will be allowed therefor.

All removed materials that are not to be salvaged or used in the reconstruction shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The Contractor shall submit a complete bridge removal plan to the Engineer detailing procedures and sequence for removing portions of bridge, including all features necessary to remove the bridges in a safe and controlled manner.

The bridge removal plan shall be furnished for all bridge removal locations and shall include the following:

A. The bridge removal sequence for the entire structure, including staging of bridge removal;
B. Equipment locations on the structure during removal operations;
C. Temporary support shoring or temporary bracing;

D. Locations where work is to be performed over traffic; and

E. Details and locations of protective covers or other measures to assure that people, property, and improvements will not be endangered.

Temporary support shoring, temporary bracing, and protective covers as required, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

The assumed horizontal load to be resisted by the temporary support shoring and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence or other causes, and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 10 percent of the total dead load of the structure to be removed.

The following additional requirements apply to the removal of portions of bridges that are over or adjacent to roadways that may be closed to public traffic for only brief periods of time:

A. The closure of roadways to public traffic shall conform to the provisions in "Order of Work" and "Maintaining Traffic" of these special provisions.

B. Prior to closing a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary workers, materials, and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to public traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.

C. All removal operations shall be performed during periods of time that the roadway is closed to public traffic except as specified herein for preliminary work.

D. Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level that in the judgment of the Engineer would constitute a hazard to the public. Such preliminary work shall also be limited to operations that cannot cause debris or any other material to fall onto the roadway. Protective covers may be used to perform preliminary work such as chipping or cutting the superstructure into segments, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Protective covers shall extend at least 4 feet beyond the limit of the work underway. Bottom slabs of box girders may be considered to be protective covers for preliminary work performed on the top slab inside the limits of the exterior girders.

E. Temporary support shoring, temporary bracing, and protective covers shall not encroach closer than 8 feet horizontally from the edge or 15 feet vertically above any traffic lane or shoulder that is open to public traffic.

F. During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway provided adequate protection is furnished for all highway facilities and local streets. The minimum protection for paved areas shall be a 2-feet thick earthen pad or a 1-inch thick steel plate placed over the area where debris can fall. Prior to reopening the roadway to public traffic, all debris, protective pads, and devices shall be removed and the roadway swept clean with wet power sweepers or equivalent methods.

G. The removal operations shall be conducted in such a manner that the portion of the structure not yet removed remains in a stable condition at all times. For girder bridges, each girder shall be completely removed within a span before the removal of the adjacent girder is begun. For slab type bridges, removal operations within a span shall be performed along a front that roughly parallels the primary reinforcing steel.

The following additional requirements apply to the removal of portions of bridges whenever the removal work is to be performed over public traffic or railroad property:

A. A protective cover supported by falsework or members of the existing structure shall be constructed before beginning bridge removal work.

B. The construction and removal of the protective cover, and the installation and removal of temporary railings shall conform to the provisions in "Order of Work," "Maintaining Traffic," and "Temporary Railing" of these special provisions.

C. The protective cover shall prevent any materials, equipment, or debris from falling onto public traffic. The protective cover shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 2 inches. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from sifting down upon the traveled way and shoulders.

D. The protective cover shall extend at least 10 feet beyond the outside face of the bridge railing.

E. During the removal of bridge segments, and when portions of the bridge, such as deck slabs or box girder slabs, comply with the requirements for the protective cover, a separate protective cover need not be constructed.

F. Before removal, the protective cover shall be cleaned of all debris and fine material.

G. The protective cover shall provide the openings specified under "Maintaining Traffic" of these special provisions, except that when no openings are specified for bridge removal, a vertical opening of 15 feet and a horizontal opening of 32 feet shall be provided for the passage of public traffic.

H. Falsework or supports for protective covers shall not extend below the vertical clearance level nor to the ground line at any location within the roadbed.

The Contractor shall submit working drawings, with design calculations, to the Engineer for the proposed bridge removal plan. The bridge removal plan shall be prepared by an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be adequate to demonstrate the stability of the structure during all stages of the removal operations. Calculations shall be provided for each stage of bridge removal and shall include dead and live load values assumed in the design of protective covers. At a minimum, a stage will be considered to be removal of the deck, the soffit, or the girders, in any span; or walls, bent caps, or columns at support locations.

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

The time to be provided for the Engineer's review of the working drawings for removing specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
Frame 7U of Mainline	10*
Frame 8U of Mainline	13
Mainline over 2nd Street	10
Mainline over 3rd Street	10
Mainline over 4th Street	10
Frame 5L of Mainline east of 2nd Street	10
Eastbound interim structure over 3rd Street	10
Eastbound interim structure over 4th Street	10
Interim Mainline widening over 4th Street	10
Harrison Off Ramp	7
* 12 weeks for stage 6 of Frame 7U	

A bridge removal plan submittal shall consist of no more than one bridge location per working drawing submittal.

At a bridge site where a bridge removal plan is required, the Contractor's registered engineer shall be present at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure of operation proposed to correct or remedy the occurrence.

REMOVE CONCRETE

Concrete, where shown on the plans to be removed, shall be removed.

The pay quantities of concrete to be removed will be measured by the cubic yard, measured before and during removal operations.

Removing concrete barrier will be measured by the linear foot, measured along the barrier before removal operations.

Concrete removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

REMOVE CONCRETE BARRIER

Concrete barrier, where shown on the plans to be removed, shall be removed.

Concrete barrier removed shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

10-1.40 TEMPORARY SUPPORTS

Temporary supports for existing structures during bridge removal, reconstruction and retrofit work shall be designed, furnished, constructed, monitored, maintained and removed in accordance with the requirements of these special provisions.

Temporary support locations are defined as follows:

LOCATION A
INTERIM GTR OFF RAMP
(Bridge No. 34-0145)

LOCATION B
SFOBB-SAN FRANCISCO APPROACH (REPLACE)
MAINLINE
(Bridge No. 34-0126R/L)

Construction sequence and application of temporary support jacking loads shall be as shown on the plans.

Temporary supports shall include jacking assemblies and appurtenant items necessary to jack and support the structures.

Attention is directed to the sections, "Order of Work," and "Maintaining Traffic," of these special provisions regarding the construction sequences and the required openings in temporary supports for the use of public traffic.

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 1000 pounds per inch for each 1/8 inch 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 temporary support 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. The letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the temporary support 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 temporary support members to sustain the stresses required by the temporary support design. This welding certification shall be in writing, shall be signed by an engineer who is registered as a Civil Engineer in the State of California, and shall be provided prior to placing any concrete for which the temporary support is being erected to support.

The Contractor's engineer who signs the temporary support drawings shall also certify in writing that the temporary support 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 temporary support members to sustain the stresses required by the temporary support design. The engineer who signs the drawings may designate a representative to perform this certification. Where temporary support 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 temporary support design or supervising temporary support construction, and shall be registered as a Civil Engineer in the State of California. For other temporary support, the designated representative shall be qualified to perform this work and shall have at least three years of combined experience in temporary support design or supervising temporary support 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.

TEMPORARY SUPPORT DESIGN AND DRAWINGS

The Contractor shall submit to the Engineer working drawings and design calculations for the temporary supports. Such drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary support working drawings and design calculations shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design

calculations and times for review for temporary supports shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications.

In addition to the requirements in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications, the following requirements shall apply:

The time to be provided for the Engineer's review of the working drawings for specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
INTERIM GTR OFF RAMP (Bridge No. 34-0145)	4
SFOBB-SAN FRANCISCO APPROACH (REPLACE) MAINLINE (Bridge No. 34-0126R/L)	10

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

The temporary support working drawings shall include descriptions and values of all loads, including construction equipment loads, descriptions of equipment to be used, complete details and calculations for jacking and supporting the existing structure, provisions to jack the structure should settlement occur in the temporary supports, and descriptions of the displacement monitoring system. The displacement monitoring system shall include equipment to be used, location of control points, method and schedule of taking measurements.

A redundant system of supports shall be provided during the entire jacking operation for backup should any of the jacks fail. The redundant system shall include stacks of steel plates added as necessary to maintain the redundant supports at each jack location within 1/4 inch of the jacking sill or corbels.

For temporary supports over railroads, approval by the Engineer of the temporary support drawings will be contingent upon the drawings being satisfactory to the railroad company involved.

When footing type foundations are to be used, the Contractor shall determine the bearing value of the soil and shall show the values assumed in the design of the temporary supports on the temporary support drawings. Anticipated temporary support foundation settlement shall be shown on the temporary support drawings.

When pile type foundations are to be used, the temporary support drawings shall show the maximum horizontal distance that the top of a temporary support pile may be pulled in order to position it under its cap. The temporary support plans shall also show the maximum allowed deviation of the top of the pile, in its final position, from a vertical line through the point of fixity of the pile.

The Contractor may use the permanent piles as part of the temporary support foundation. Permanent piles shall not be moved or adjusted from the locations shown on the plans. Any use of the permanent piles and the loads imposed on them shall be shown on the temporary support drawings. Should the Contractor propose to provide piles longer than required for the work in order to support the temporary supports above the elevation of the top of the footing and later cut off the piles at their final elevation, shear devices adequate to transfer all pile reactions into the footing will be required.

Temporary support footings shall be designed to carry the load imposed upon them without exceeding the estimated soil bearing values and anticipated settlements.

Where temporary supports are supported on the deck of an existing structure then temporary supports shall conform to the following:

Temporary supports shall bear directly on girder stems or bent caps or shall bear on support sills which are structurally adequate to transmit the load to the stems or cap without over stressing any member of the new or existing structure. Temporary supports shall not induce permanent forces into the completed structure or produce cracking.

Temporary supports shall be in place beneath the existing beneath the new structure where temporary support loads are imposed upon the structure. Such temporary supports shall be designed and constructed to support all loads imposed upon the structure from the upper structure and any other loads imposed as a result of the proposed construction operations.

Bracing shall be provided, as necessary, to withstand all imposed loads during erection and removal of any temporary supports. The temporary support drawings shall show provisions for such temporary bracing or methods to be used to conform to these requirements during each phase of erection and removal. Wind loads shall be included in the design of such bracing or methods. Wind loads shall conform to the provisions in Section 51-1.06A(1), "Design Loads," of the Standard Specifications.

The temporary support design calculations shall show a summary of computed stresses in the (1) temporary supports, (2) connections between temporary supports and the existing structure and (3) existing load supporting members. The computed stresses shall include the effect of the jacking sequence. The temporary support design calculations shall also include a lateral stiffness assessment of the temporary support system and conform to the design values shown on the plans.

The design of temporary supports will not be approved unless it is based on the use of loads and conditions which are no less severe than those described in the Section, "Temporary Support Design Criteria," of these special provisions and on the use of allowable stresses which are no greater than those described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications.

If falsework loads are imposed on temporary supports, the temporary supports shall also satisfy the deflection criteria described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications.

TEMPORARY SUPPORT DESIGN CRITERIA

The temporary supports shall support the initial jacking loads and the minimum temporary support design loads and the minimum lateral design forces and criteria shown on the plans. The vertical design loads shall be adjusted for the weight of temporary supports and jacks, construction equipment loads and additional loads imposed by the Contractor's operations. The construction equipment loads shall be the actual weight of the construction equipment but in no case shall be less than 20 pounds per square foot of deck surface area of the frame involved. A frame is defined as the portion of the bridge between expansion joints.

The temporary supports shall resist the specified lateral design forces applied at the point where the column to be removed meets the superstructure. The lateral design forces to be resisted shall be increased to be compatible with the temporary support lateral stiffness if the stiffness exceeds the specified minimum. The temporary supports resisting transverse lateral loads shall be placed within a distance of not more than 1/2 of the span length from the existing bent. The temporary supports resisting longitudinal lateral loads shall be placed within the frame having columns removed.

The structure shall be mechanically connected to the temporary supports. The temporary supports shall be mechanically connected to their foundations. The mechanical connections shall be capable of resisting the lateral temporary support design forces and rotational requirements shown on the plans. Friction forces developed between the existing structure and temporary supports shall not be used to reduce the lateral forces and shall not be considered as an effective mechanical connection. The mechanical connections shall be designed to tolerate adjustments to the temporary support frame throughout the use of the temporary supports.

If the concrete is to be prestressed, the temporary supports shall be designed to support any increased or readjusted loads caused by the prestressing forces.

MANUFACTURED ASSEMBLIES

Manufactured assemblies shall conform to the provisions in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications and these special provisions.

Each jack shall be equipped with either a pressure gage or a load cell for determining the jacking force. Pressure gages shall have an accurately reading dial at least 6-inches in diameter. Each jack shall be calibrated by a private laboratory approved by the Transportation Laboratory within 6 months prior to use and after each repair. Each jack and its gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force and shall be accompanied by a certified calibration chart. Load cells shall be calibrated and provided with an indicator by which the jacking force is determined.

SPECIAL LOCATIONS

Temporary supports shall conform to the provisions for falsework in Section 51-1.06A(3), "Special Locations," of the Standard Specifications.

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 less than 15 feet from the edge of a traffic lane. For two-way traffic openings, temporary crash cushion modules shall be installed at the departing end of temporary railings less than 6 feet from edge of a traffic lane.

The installation of temporary crash cushion modules, if required, shall be complete before temporary support erection is begun. Temporary crash cushion modules at temporary supports shall not be removed until such removal is approved by the Engineer.

Temporary crash cushion modules installed as specified above will be measured and paid for as provided in "Temporary Crash Cushion Module," of these special provisions except that when the Engineer's Estimate does not include a contract item for temporary crash cushion modules, full compensation for furnishing, placing, maintaining, repairing, replacing and removing the temporary crash cushion modules at temporary support locations as specified in these special provisions shall be considered as included in the contract prices paid for the various items of work requiring temporary supports and no separate payment will be made therefor.

TEMPORARY SUPPORT CONSTRUCTION

Temporary support construction shall conform to the provisions for falsework in Section 51-1.06B, "Falsework Construction," of the Standard Specifications and these special provisions.

Welding, welder qualification, and inspection of welding for all steel members shall conform to the requirements of ANSI/AASHTO/AWS D1.5.

Prior to proceeding with bridge removal, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the temporary supports, including jacking and displacement monitoring systems, for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the temporary supports, including jacking and displacement monitoring systems, conform to the working drawings, and that the material and workmanship are satisfactory for the purpose intended. A copy of this certification shall be available at the site of the work at all times.

The Contractor's registered engineer shall be present at the bridge site at all times when jacking operations or adjustments are in progress and when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the jacking and removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure or proposed operation to correct or remedy the occurrence.

The Contractor shall perform an initial survey as part of the displacement monitoring system to record the location of the existing structure prior to the commencement of any work. Two copies of the survey shall be signed by an engineer, who is registered as a Civil Engineer in the State of California, and submitted to the Engineer.

Vandal-resistant displacement monitoring equipment shall be provided and maintained. Vertical and horizontal displacements of the temporary supports and the existing structure shall be monitored continuously during jacking operations and shall be accurately measured and recorded at least weekly during removal and reconstruction work. As a minimum, elevations shall be taken prior to the start of jacking operations, immediately after jacking is complete, after bridge removal is complete, before connecting the retrofitted superstructure to the substructure, and after the temporary supports have been removed. As a minimum, the existing structure shall be monitored at the bent and at mid span of both adjoining spans. Control points at each location shall be located near the center and at both edges of the superstructure. The records of vertical and horizontal displacement shall be signed by an engineer who is registered as a Civil Engineer in the State of California and available to the Engineer at the jobsite during normal working hours, and a copy of the record shall be delivered to the Engineer at the completion of reconstructing each bent.

A force equal to the initial jacking load or the dead load shown on the plans shall be applied to the structure by the temporary support system and held until all initial compression and settlement of the system is completed before bridge removal work at the location being supported is begun.

Jacking operations shall be carefully controlled and monitored to ensure that the jacking loads are applied simultaneously to prevent distortion and excessive stresses that would damage the structure. The superstructure shall be jacked as necessary to maintain the total vertical displacements at control points to less than 1/4 inch from the elevations recorded prior to jacking or as modified by the Engineer.

Should unanticipated displacements, cracking or other damage occur, the construction shall be discontinued until corrective measures satisfactory to the Engineer are performed. Damage to the structure as a result of the Contractor's operations shall be repaired by the Contractor according to the requirements in Section 7-1.11, "Preservation of Property," of the Standard Specifications.

Following completion of the reconstruction, the monitored control points shall not deviate from the vertical position by more than 1/4 inch from the initial survey elevations or the elevations as modified by the Engineer.

REMOVING TEMPORARY SUPPORTS

Removing temporary supports shall conform to the provisions for falsework in Section 51-1.06C, "Removing Falsework," of the Standard Specifications; except that when public traffic is carried on the structure on temporary supports, no temporary supports shall be released until the supported concrete has attained 100 percent of the specified strength.

Attachments shall be removed from the existing structure and concrete surfaces restored to original conditions, except where permanent alterations are shown on the plans.

PAYMENT

The contract lump sum price paid for temporary supports shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in designing, constructing, maintaining, and removing the temporary supports, including jacking the existing structure and monitoring displacements, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.41 PROTECTIVE BARRIER

Protective barrier shall be required whenever work is to be performed over or within a horizontal distance of 20 feet from traffic or railroad property and shall conform to the provisions of the Standard Specifications and these special provisions.

A protective barrier shall consist of a protective cover, netting or other means as approved by the Engineer to prevent any tools, materials, equipment or debris from falling onto the traffic or railroad property.

The Contractor shall submit working drawings, with design calculations, to the Engineer for the protective barrier proposed. The drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

The protective barrier working drawings and design calculations shall conform to Section 5-1.02, "Plans and Working Drawings" of the Standard Specifications.

Working drawings for the protective barrier shall include stress sheets, shop details, manufacturer product information for any manufactured assemblies to be used, erection and removal plans.

The protective barrier working drawings shall include descriptions and values of all loads, including construction equipment loads and loads imposed upon the existing structure, descriptions of equipment to be used and wind loads.

The protective barrier working drawings shall show details and locations of any proposed attachments to the structure.

The protective barrier design calculations shall show a summary of computed stressed in the (1) protective barrier, (2) connections between the protective barrier and the existing structure, (3) any fabricated items or assemblies.

Protective barriers shall be designed, as required, in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and the following:

- The vertical load used for the design of the protective barriers shall be 150 percent of the design load previously specified in Section 51-1.06A(1), "Design Loads" of the Standard Specifications.
- The assumed horizontal load to be resisted by the protective barriers shall be the sum of the actual horizontal loads due to equipment, construction sequence, the anticipated wind and other causes, but in no case shall the assumed horizontal load to be resisted in any direction be less than 5 percent of the total vertical load.

Whenever protective barrier is located over the roadway, the protective barrier shall extend at least 4 feet beyond the limit of the work underway and maintain a maximum distance of 10 feet vertically from the work.

Protective barriers shall provide the openings specified under "Maintaining Traffic" of these special provisions, except that when no openings are specified a vertical opening of 15 feet and a horizontal opening equal to the width of the roadway shall be provided for the passage of public traffic.

Protective barriers shall provide minimum clearances as required under "Relations with Railroad Company" of these special provisions for the passage of railroad traffic.

Supports for protective barrier shall not extend below the vertical clearance level nor to the ground line at any location within the roadbed.

The construction and removal of the protective barrier system shall conform to the requirements under "Order of Work" and "Maintaining Traffic" of these special provisions.

Before removal, protective barrier shall be cleaned of all debris and fine material.

Protective covers may be used in order to perform work such as cleaning, painting or cutting the superstructure, bridge or rivet removal, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Safety railings shall be installed on all sides of protective covers used to perform preliminary work and shall be fully sheathed with plywood.

The following additional requirements apply to protective covers:

- The protective cover shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 2 inches. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from sifting down upon the traveled way and shoulders.
- Protective covers may be used in order to perform work such as cleaning, painting or cutting the superstructure, bridge or rivet removal, provided the covers are of sufficient strength to support all loads and are sufficiently tight to prevent dust and fine material from sifting down onto the traveled way. Safety railings shall be installed on all sides of protective covers used to perform preliminary work and shall be fully sheathed with plywood.

The Contractor shall allow a minimum of 6 weeks for the review of the protective barrier working drawings and design calculations.

For protective barrier over railroads, approval by the Engineer of the protective barrier working drawings and design calculations will be contingent upon the drawings being satisfactory to the railroad company involved.

Prior to proceeding with erecting the protective barrier, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect the protective barrier for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the protective barrier substantially conforms to the details on the working drawings, and that the material and workmanship are satisfactory for the purpose intended. As copy of this certification shall be available at the site of the work at all times.

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

10-1.42 PIN COLUMN

Pin column, consisting of removing expansion joint filler, cutting bar reinforcing steel, painting the ends of the cut reinforcement, and furnishing and installing Type B seal shall conform to the details shown on the plans and these special provisions.

Removing expansion joint filler and cutting bars shall conform to the provisions in "Bridge Removal" of these special provisions.

The ends of the cut reinforcement shall be painted with a zinc rich coating conforming to the provisions for painting damaged galvanized surfaces in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Furnishing and installing Type B seal shall conform to the provisions in "Sealing Joints," of these special provisions.

Pin column will be paid for on a lump sum basis.

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

10-1.43 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 "Preservation of Property," and "Indemnification and Insurance" of these special provisions.

Existing highway improvements and facilities, adjacent property, utility and non-highway facilities, and trees and plants that are not to be removed, shall be protected from injury or damage resulting from the Contractor's operations. Only trees and plants that are designated or marked for removal by the Engineer shall be removed.

Vegetation shall be cleared and grubbed only within the excavation and embankment slope lines.

At locations where there is no grading adjacent to a bridge or other structure, clearing and grubbing of vegetation shall be limited to 5 feet outside the physical limits of the bridge or structure.

Existing vegetation outside the areas to be cleared and grubbed shall be protected from injury or damage resulting from the Contractor's operations.

Activities controlled by the Contractor, except cleanup or other required work, shall be confined within the graded areas of the roadway.

Nothing herein shall be construed as relieving the Contractor of the Contractor's responsibility for final cleanup of the highway as provided in Section 4-1.02, "Final Cleaning Up," of the Standard Specifications.

10-1.44 EARTHWORK

Earthwork shall conform to the provisions in Section 19, "Earthwork," of the Standard Specifications and these special provisions.

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

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

> In addition to the requirements in Sections 5-1.02, "Plans and Working Drawings," and 5-1.02A, "Trench Excavation Safety Plans," plans of the shoring details for excavations on or affecting railroad property will be reviewed for adequacy of protection provided for railroad facilities, property and traffic. Those plans shall be submitted at least 12 weeks before the Contractor intends to begin excavation requiring the shoring. Approval by the Engineer of the plans for the shoring details will be contingent upon the plans being satisfactory to the railroad company involved.

The seventh paragraph in Section 19-3.03, "Cofferdams," of the Standard Specifications is amended to read:

> In conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," the Contractor shall submit to the Engineer, for approval, drawings showing the Contractor's proposed method of cofferdam construction and other details left open to the Contractor's choice or not fully shown on the plans. Working drawings for cofferdams shall include all design calculations and shall be signed by an Engineer who is licensed as a Civil Engineer in the State of California. Except for drawings of cofferdams on or affecting railroad property, the drawings shall be submitted at least

3 weeks in advance of the time the Contractor begins construction of the cofferdams. Drawings of cofferdams on or affecting railroad property shall be submitted at least 12 weeks in advance of the time the Contractor begins construction of the cofferdams. Approval by the Engineer of the drawings for the cofferdams will be contingent upon the plans being satisfactory to the railroad company involved.

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.

Lean concrete backfill will be measured and paid for in the same manner as slurry cement backfill.

Removing and disposing of materials resulting from drilling holes for cast-in-drilled-hole concrete piling and materials removed from the inside of the open ended steel shells pile will be measured and paid for by the cubic yard as structure excavation of the types listed in the Engineer's Estimate.

HAZARDOUS AND NON-HAZARDOUS MATERIAL EXCAVATION

Attention is directed to "Hazardous and Non-Hazardous Material, General" elsewhere in these special provisions regarding handling of hazardous material.

Attention is directed to the following tables that summarize the material characterization in the areas to be excavated.

Excavated non-RCRA hazardous material and non-hazardous material may be reused as backfill at its original excavation location. Excavated RCRA hazardous material and surplus non-RCRA hazardous material shall be transported to a disposal facility permitted to accept the materials. Surplus non-hazardous 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.

RCRA and non-RCRA hazardous material shall be transferred directly from the excavation to a registered transport vehicle, a storage container approved for transport of hazardous waste by the United States Department of Transportation, or a stockpile location approved by the Engineer. Non-hazardous material shall be transferred directly from the excavation to a transport vehicle, a storage container, or a stockpile location approved by the Engineer. Stockpile locations shall be maintained in accordance with the following requirements:

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

B. The material shall be stored on undamaged 60-mil high density polyethylene or an equivalent impermeable barrier unless the stockpiling location is on a paved surface. If the location is on a paved surface the thickness of the barrier can be reduced to 20-mil high density polyethylene or its equivalent. The dimensions of the barrier shall exceed by a minimum of 1 foot the dimensions of the stockpile at all times. Any seams in the barrier shall be sealed to prevent leakage.

C. At the end of each day and during storm events the material shall be covered with undamaged 12-mil polyethylene or an equivalent impermeable barrier to prevent windblown dispersion and precipitation run-off and run-on. When more than one sheet is required to cover the material, the sheets shall be overlapped a minimum of 1.5 feet in a manner that prevents water from flowing onto the material. The cover shall be secured in a manner that keeps it in place at all times. Driven anchors shall not be used except at the perimeter of the stockpile. The cover shall be inspected and maintained in accordance with the requirements of "Water Pollution Control" of these special provisions.

These stockpiling requirements apply to all temporary storage of RCRA and non-RCRA hazardous material, and non-hazardous material outside of an excavation or a transport container including, but not limited to, staging of excavated material next to the excavation prior to pick up by loading equipment, accumulating material for full transport loads, and awaiting test results required by a disposal facility. The removal of stockpiles shall begin within 30 days of accumulating 220 pounds of hazardous material. After final removal has occurred the Contractor shall be responsible for any cleanup deemed necessary by the Engineer.

All RCRA and non-RCRA hazardous material, and non-hazardous material on exteriors of transport vehicles shall be removed and placed either into the current transport vehicle or the excavation prior to the vehicle leaving the exclusion zone. RCRA and non-RCRA hazardous material, or non-hazardous material shall not be deposited on public roads. The Contractor shall indemnify the State from any costs due to spillage during the transport of the RCRA and non-RCRA hazardous material, or non-hazardous material to the disposal facility.

The Contractor shall prevent the flow of surface water and groundwater from entering any excavation in accordance with "Non-Storm Water Discharges" of these special provisions. The Contractor shall treat all water removed from the excavations in accordance with "Non-Storm Water Discharges" of these special provisions.

Full compensation for loading, stockpiling, transporting, and disposing of non-RCRA hazardous material shall be considered as included in the contract price paid per cubic yard for roadway excavation (Type NRH), structure excavation (retaining wall – Type NRH), structure excavation Type NRH, structure excavation Type DNRH, structure excavation (16"-42") Piling Type DNRH, structure excavation (60"-84") Piling Type DNRH, structure excavation (90"-108") Piling Type DNRH, and no additional compensation will be allowed therefor.

Full compensation for loading, stockpiling, transporting, and disposing of RCRA hazardous material shall be considered as included in the contract price paid per cubic yard for roadway excavation (Type RH), structure excavation Type RH retaining wall, and structure excavation Type RH, and no additional compensation will be allowed therefor.

Full compensation for loading, stockpiling, transporting, and disposing of non-hazardous material shall be considered as included in the contract price paid per cubic yard for roadway excavation (Type NH), roadway excavation (detour removal), structure excavation, Type NH retaining wall, structure excavation Type DNH, structure excavation (soldier pile wall), structure excavation (16"-42") Piling Type DNH, structure excavation (60"-84") Piling Type DNH, structure excavation (90"-108") Piling Type DNH, and structure excavation Type NH, and no additional compensation will be allowed therefor.

SOIL ANALYTICAL RESULTS

Westbound and 4th Street On-Ramp Seismic Retrofit			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
L-96	L96-1	0-25	Non-Hazardous Material
	L96-2		
L-97	L97-1	0-10	Non-RCRA Hazardous Material
	L97-2	10-25	Non-Hazardous Material
L-98	L98	0-10	Non-RCRA Hazardous Material
		10-25	Non-Hazardous Material
L-99	L99	0-25	Non-Hazardous Material
L-100	L100	0-25	Non-Hazardous Material
L-101	L101	0-10	Non-RCRA Hazardous Material
		10-25	Non-Hazardous Material
L-102	L102	0-25	Non-RCRA Hazardous Material
L-103	L103	0-10	Non-RCRA Hazardous Material
		10-25	Non-Hazardous Material
L-104/Bent 5	L104-1	0-10	Non-RCRA Hazardous Material
	L104-2	10-25	Non-Hazardous Material
	L104-3		
K2-98	K98	0-15	Non-RCRA Hazardous Material
		15-25	Non-Hazardous Material
K2-99	K99	0-10	Non-RCRA Hazardous Material
		10-25	Non-Hazardous Material
K2-100	K100	0-10	Non-RCRA Hazardous Material
		10-25	Non-Hazardous Material
K2-101	K101	0-10	Non-RCRA Hazardous Material
			Non-Hazardous Material

Transbay Terminal Loop Seismic Retrofit			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
2	TTB2-1	0-15	Non-RCRA Hazardous Material
	TTB2-2		
3	TTB3-1	0-5	Non-Hazardous Material
	TTB3-2		
4 and 5	TTB4-1	0-5	Non-Hazardous Material
	TTB4-2		
6 and 7	TTB7-1	0-5	Non-Hazardous Material
	TTB7-2		
8	TTB8-1	0-5	Non-Hazardous Material
	TTB8-2		
	TTB8-3		
9	TTB9-1	0-10	RCRA Hazardous Material
	TTB9-2		
	TTB9-3		
	TTB9-4		
10	TTB10-1	0-5	Non-RCRA Hazardous Material
	TTB10-2	5-15	Non-Hazardous Material
11	TTB11-1	0-15	Non-RCRA Hazardous Material
	TTB11-2		
12	TTB12-1	0-10	Non-RCRA Hazardous Material
	TTB12-2		
13	TTB13-1	0-3	Non-RCRA Hazardous Material
	TTB13-2	3-10	Non-Hazardous Material
14	TTB14-1	0-15	Non-Hazardous Material
	TTB14-2		
15	TTB15-1	0-10	Non-RCRA Hazardous Material
	TTB15-2		
16	TTB16-1	0-10	Non-Hazardous Material
	TTB16-2		
	TTB16-3		
17	TTB17-1	0-10	Non-Hazardous Material
	TTB17-2		

Transbay Terminal Loop Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
33	DTB33-1	0-3	Non-RCRA Hazardous Material
	DTB33-2		
34	DTB34-1	0-3	Non-RCRA Hazardous Material
	DTB34-2		
35	DTB35-1	0-3	Non-RCRA Hazardous Material
	DTB35-2		
36	DTB36-1	0-3	Non-RCRA Hazardous Material
	DTB36-2		
37	DTB37-1	0-3	Non-RCRA Hazardous Material
	DTB37-2		
38	DTB38-1	0-3	Non-RCRA Hazardous Material
39	DTB39-1	0-3	Non-Hazardous Material
	DTB39-2		
40	DTB40-1	0-3	Non-Hazardous Material
	DTB40-2		
41	DTB41-1	0-3	Non-Hazardous Material
	DTB41-2		
42	DTB42-1	0-3	Non-RCRA Hazardous Material
	DTB42-2		
43	DTB43-1	0-3	Non-RCRA Hazardous Material
	DTB43-2		
44	DTB44-1	0-3	RCRA Hazardous Material
	DTB44-2		
45	DTB45-1	0-3	Non-RCRA Hazardous Material
	DTB45-2		
46	DTB46-1	0-3	Non-RCRA Hazardous Material
	DTB46-2		
47	DTB47-1	0-3	Non-RCRA Hazardous Material
	DTB47-2		
48	DTB48-1	0-3	RCRA Hazardous Material
	DTB48-2		
49	DTB49-1	0-3	RCRA Hazardous Material
	DTB49-2		
50	DTB50-1	0-3	Non-RCRA Hazardous Material
	DTB50-2		
51	DTB51-1	0-3	Non-RCRA Hazardous Material
	DTB51-2		
52	DTB52-1	0-3	RCRA Hazardous Material
	DTB52-2		
53	DTB53-1	0-3	RCRA Hazardous Material
	DTB53-2		
54	DTB54-1	0-3	Non-RCRA Hazardous Material
55	DTB55-1	0-3	Non-Hazardous Material
	DTB55-2		
56	DTB56-1	0-3	Non-Hazardous Material
	DTB56-2		
57	DTB57-1	0-3	Non-Hazardous Material
	DTB57-2		

Transbay Terminal Loop Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
58	DTB58-1	0-3	Non-RCRA Hazardous Material
	DTB58-2		
59	DTB59-1	0-3	Non-RCRA Hazardous Material
	DTB59-2		

Retaining Walls			
Location	Sample Location	Zone (ft bgs)	Soil Characterization
Retaining Wall No. 1	D10	0-3	Non-Hazardous Material
	D11		
	T15-3		
	T16-1	3-10	Non-RCRA Hazardous Material
	A-15		
	A-17		
Retaining Wall No. 2	D25	0-2	Non-RCRA Hazardous Material
Retaining Wall No. 3	D7	0-3	Non-Hazardous Material
	D20		
	T20-2		
Retaining Wall No. 4	B-13	0-5	Non-RCRA Hazardous Material
	TH26-1		
Bridge No. 34-0130M	B-1	0-6	Non-RCRA Hazardous Material
	B-2		
	D6		
	TH26-1		
	TH27-1		
First Street Wall	B-3	0-20	Non-RCRA Hazardous Material
	B-4		
	B-5		
	T22-1		
Bridge No. 34-0142M	TNF36-1	0-10	Non-RCRA Hazardous Material
	TNF37-1		
	TNF38-1		
	B-9		
	B-10	10-15	Non-Hazardous Material
	B-14		
	B-15		
	A-19		
Bridge No. 34-0141M	TNF36-1	0-3	Non-RCRA Hazardous Material
	B-11	3-5	Non-Hazardous Material

SFOBB West Approach Mainline Structure Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
Cellular Structures	A-1	0-15	Non-RCRA Hazardous Material
	A-2		
	A-3		
	TNF2-1		
	TNF2-2		
	TNF3-1		
	TNF3-2		
	TNF6-1		
	TNF6-2		
2 and 3	TNF7-1	0-10	Non-RCRA Hazardous Material
	TNF7-2		
	TNF7-3		
	TNF7-4		
	D78		
4	TNF8-1	0-5	Non-RCRA Hazardous Material
	TNF8-2		
5	D75	0-3	Non-RCRA Hazardous Material
	D76		
	D77		
6	T1-1	0-10	Non-RCRA Hazardous Material
	T1-2		
	T1-3		
	T1-4		
	T1-5		
7	D72	0-3	Non-RCRA Hazardous Material
	D73	3-15	Non-Hazardous Material
	A-4		
8	T2-2	0-10	Non-RCRA Hazardous Material
	T2-3		
	T2-4		
	T2-5		
9	D69	0-5	Non-RCRA Hazardous Material
	D70		
	D71	5-15	Non-Hazardous Material
	A-5		
10	T3-1	0-10	Non-RCRA Hazardous Material
	T3-2		
	T3-3		
	T3-4		
11	D65	0-3	Non-RCRA Hazardous Material
	D67		
	D68	3-15	Non-Hazardous Material
	A-6		
12	T4-1	0-10	Non-Hazardous Material
	T4-2		
	T4-3		
	T4-5		

Con't. SFOBB West Approach Mainline Structure Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
13	D62	0-3	RCRA Hazardous Material
	D63		
	D64	3-15	Non-Hazardous Material
	A7		
14	T5-1	0-10	Non-RCRA Hazardous Material
	T5-2		
	T5-3		
	T5-4		
	T5-5		
15	D59	0-5	Non-RCRA Hazardous Material
	D60		
	D61	5-10	Non-Hazardous Material
	A-8		
16	T6-1	0-15	Non-Hazardous Material
	T6-2		
	T6-3		
	T6-4		
17	D56	0-5	Non-RCRA Hazardous Material
	D57		
	D58	5-10	Non-Hazardous Material
	A-9		
18	T7-1A	0-15	Non-Hazardous Material
	T7-2		
	T7-3		
	T7-4		
19	D54	0-5	Non-Hazardous Material
	D55		
	T8-1		
	T8-2		
	T8-3		
	T8-4		
20	D51	0-10	Non-RCRA Hazardous Material
	D52		
	D53		
	A-10		
21	T9-1	0-10	Non-RCRA Hazardous Material
	T9-2		
	T9-3		
22	D48	0-3	Non-RCRA Hazardous Material
	D49		
	D50	3-10	Non-Hazardous Material
	A-11		
23	T10-1	0-5	Non-Hazardous Material
	T10-2		
	T10-3		
24	D46	0-3	Non-Hazardous Material
	D47		

Con't. SFOBB West Approach Mainline Structure Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
25	T11-1	0-3	Non-RCRA Hazardous Material
	T11-2	3-15	Non-Hazardous Material
	T11-3		
26	D44	0-3	Non-RCRA Hazardous Material
	D45		
27	T12-1	0-3	Non-RCRA Hazardous Material
	T12-2	3-10	Non-Hazardous Material
	T12-3		
28	D42	0-15	Non-Hazardous Material
	D43		
	A-12		
29	T13-1	0-5	Non-Hazardous Material
	T13-2		
	T13-3		
30	D40	0-5	Non-RCRA Hazardous Material
	D41	5-10	Non-Hazardous Material
	A-13		
31	D38	0-3	Non-RCRA Hazardous Material
	D39		
	T14-1		
	T14-2		
	T14-3		
32	T15-1	0-5	Non-Hazardous Material
	T15-2		
	T15-3		
33	D10	0-5	Non-Hazardous Material
	D11		
	A-14		
34	T16-1	0-10	Non-RCRA Hazardous Material
	A-15	10-15	Non-Hazardous Material
	A-17		
35 and 36	D9	0-3	RCRA Hazardous Material
	D12		
37	T17-1	0-3	Non-RCRA Hazardous Material
38	D8	0-1.5	Non-Hazardous Material
	D13		
39 and 40	T18-1	0-10	Non-RCRA Hazardous Material
41	D7	0-0.5	Non-Hazardous Material
	D14		
42 and 43	T19-1	0-3	Non-RCRA Hazardous Material
	T19-2		
44 and 45	D15	0-3	Non-RCRA Hazardous Material
	D20		
46	T20-1	0-5	Non-Hazardous Material
	T20-2		
47	D16	0-3	Non-RCRA Hazardous Material
	D21		
48	T21-3	0-.0.5	Non-Hazardous Material

Con't. SFOBB West Approach Mainline Structure Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
49	D22	0-3	Non-RCRA Hazardous Material
50	T22-1 T22-2	0-4	Non-RCRA Hazardous Material
51	D24	0-3	Non-Hazardous Material

Harrison Street Off-Ramp Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
100	D8 T18-1	0-10	Non-RCRA Hazardous Material
101	TH22-1	0-10	Non-Hazardous Material
102	D2	0-3	Non-RCRA Hazardous Material
103	TH23-1	0-10	Non-Hazardous Material
104	D3	0-3	Non-RCRA Hazardous Material
105	TH24-1	0-10	Non-Hazardous Material
106 and 107	D4	0-3	Non-Hazardous Material
108	TH25-1	0-3	Non-RCRA Hazardous Material
109	D5 A-18	0-15	Non-Hazardous Material
110 and 111	TH26-1	0-5	Non-RCRA Hazardous Material
112	D6	0-0.5	Non-RCRA Hazardous Material
113	TH27-1	0-0.5	Non-RCRA Hazardous Material

Fremont Street Off-Ramp Demolition			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
201	T19-1	0-3	Non-RCRA Hazardous Material
	T19-2		
202 and 203	D17	0-0.5	Non-RCRA Hazardous Material
204	TF21-1	0-1	Non-RCRA Hazardous Material
205 and 206	D18	0-3	Non-RCRA Hazardous Material
207	TF22-1	0-1	Non-RCRA Hazardous Material
208	D19	0-0.5	Non-RCRA Hazardous Material
209, 210, & 211	D25	0-0.5	Non-RCRA Hazardous Material
212, 213, 214, & 215	D26	0-2	Non-RCRA Hazardous Material
216, 217, & 218	D27	0-0.5	Non-RCRA Hazardous Material
219, 220, & 221	D28	0-3	Non-RCRA Hazardous Material
222	D29	0-5	Non-Hazardous Material
	TF27-1		
223	TF28-1	0-5	Non-RCRA Hazardous Material
224	D30	0-3	Non-Hazardous Material
225	TF29-1	0-5	Non-Hazardous Material
226	D31	0-3	Non-Hazardous Material
227	TF30-1	0-5	Non-RCRA Hazardous Material
228	D32	0-3	Non-Hazardous Material
229	TF31-1	0-5	Non-Hazardous Material
230	D33	0-3	Non-Hazardous Material
231	TF32-1	0-15	Non-Hazardous Material
232	D34	0-3	Non-Hazardous Material
233	TF33-1	0-5	Non-Hazardous Material
234	D35	0-5	Non-Hazardous Material
235	TF34-1	0-15	Non-RCRA Hazardous Material
236	D36	0-3	Non-Hazardous Material
237	TF35-1	0-5	Non-Hazardous Material
238 and 239	D37	0-5	Non-RCRA Hazardous Material
	TF36-1	5-10	Non-Hazardous Material
	TNF36-1		
Fremont St. Off-Ramp Touchdown Bent 240 and Retaining Wall	TNF37-1	0-5	Non-Hazardous Material
	TNF38-1		

SFOBB West Approach Mainline Structure Retrofit - 4th Street			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
L-104/R-102	L104-1	0-10	Non-RCRA Hazardous Material
	L104-2	10-25	Non-Hazardous Material
	L104-3		
L-6/R-6	T1-1	0-10	Non-RCRA Hazardous Material
	T1-2		
	T1-3		
	T1-4		
	T1-5		

SFOBB West Approach Mainline Structure Retrofit - Byrant Street			
Abutment	Sample Location	Zone (ft bgs)	Soil Characterization
1	R1-1	0-2	Non-RCRA Hazardous Material
	R1-2	2-10	Non-Hazardous Material
2	R2-1	0-25	Non-RCRA Hazardous Material
	R2-2	25-55	Non-Hazardous Material
3	R3-1	0-30	Non-RCRA Hazardous Material
	R3-2		
4	R4-1	0-35	Non-Hazardous Material
	T27-2		
5	R5-1	0-35	Non-RCRA Hazardous Material
	R5-2		
6	T28-1	0-60	Non-RCRA Hazardous Material
	T28-2		

New SFOBB West Approach Mainline Structure			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
New Bent Fifth 1 to New Bent Fifth 5	TNF2-1	0-15	Non-RCRA Hazardous Material
	TNF2-2		
	TNF3-1		
	TNF3-2		
	A-1		
	A-2		
	A-3		
New Bent Fifth 6	TNF6-1	0-15	Non-RCRA Hazardous Material
	TNF6-2		
New Bent Fifth 7	TNF7-1	0-10	Non-RCRA Hazardous Material
	TNF7-2		
	TNF7-3		
	TNF7-4		
New Bent Fifth 8	TNF8-1	0-3	RCRA Hazardous Material
	TNF8-2	3-5	Non-RCRA Hazardous Material
New Bent 1	T1-1	0-10	Non-RCRA Hazardous Material
	T1-2		
	T1-3		
	T1-4		
	T1-5		
New Bent 2	T2-2	0-10	Non-RCRA Hazardous Material
	T2-3		
	T2-4		
	T2-5		
New Bent 3	T3-1	0-10	Non-RCRA Hazardous Material
	T3-2		
	T3-3		
	T3-4		
New Bent 4	T4-1	0-10	Non-RCRA Hazardous Material
	T4-2		
	T4-3		
	T4-4		
	T4-5		
New Bent 5	T5-1	0-10	Non-RCRA Hazardous Material
	T5-2		
	T5-3		
	T5-4		
	T5-5		
New Bent 6	T6-1	0-10	Non-Hazardous Material
	T6-2		
	T6-3		
	T6-4		
New Bent 7	T7-1A	0-15	Non-Hazardous Material
	T7-2		
	T7-3		
	T7-4		

Con't. New SFOBB West Approach Mainline Structure			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
New Bent 8	T8-1	0-5	Non-Hazardous Material
	T8-2		
	T8-3		
	T8-4		
New Bent 9	T9-1	0-10	Non-RCRA Hazardous Material
	T9-2		
	T9-3		
New Bent 10	T10-1	0-5	Non-Hazardous Material
	T10-2		
	T10-3		
New Bent 11	T11-1	0-3	Non-RCRA Hazardous Material
	T11-2	3-5	Non-Hazardous Material
	T11-3		
New Bent 12	T12-1	0-3	Non-RCRA Hazardous Material
	T12-2	3-10	Non-Hazardous Material
	T12-3		
New Bent 13	T13-1	0-5	Non-Hazardous Material
	T13-2		
	T13-3		
New Bent 14	T14-1	0-3	Non-RCRA Hazardous Material
	T14-2		
	T14-3		
New Bent 15	T15-1	0-5	Non-Hazardous Material
	T15-2		
	T15-3		
New Bent 16	T16-1	0-0.5	Non-Hazardous Material
New Bent 17	T17-1	0-3	Non-RCRA Hazardous Material
New Bent 18	T18-1	0-10	Non-RCRA Hazardous Material
New Bent 19	T19-1	0-3	Non-RCRA Hazardous Material
	T19-2		
New Bent 20	T20-1	0-5	Non-Hazardous Material
	T20-2		
New Bent 21	T21-3	0-0.5	Non-Hazardous Material
New Bent 22	T22-1	0-4	Non-RCRA Hazardous Material
	T22-2		
New Bent 23	T23-1	0-2	Non-RCRA Hazardous Material
	T23-2		
New Bent 24	T24-1	0-5	Non-Hazardous Material
	T24-2		
	T24-3		
New Bent 25	T25-1	0-25	Non-Hazardous Material
	T25-2		
	T25-3		
New Bent 26	T26-1	0-35	Non-RCRA Hazardous Material
	T26-2		
New Bent 27	T27-1	0-30	Non-RCRA Hazardous Material
	T27-2	30-55	Non-Hazardous Material
New Bent 28	T28-1	0-60	Non-RCRA Hazardous Material
	T28-2		

New Harrison Street Off-Ramp			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
22	TH22-1	0-10	Non-Hazardous Material
23	TH23-1	0-10	Non-RCRA Hazardous Material
24	D4	0-3	Non-Hazardous Material
25	TH25-1	0-3	Non-RCRA Hazardous Material
26	TH26-1	0-5	Non-RCRA Hazardous Material

New Fremont Street Off-Ramp			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
20	T19-1	0-3	Non-RCRA Hazardous Material
	T19-2		
21	TF21-1	0-1	Non-RCRA Hazardous Material
22	TF22-1	0-1	Non-RCRA Hazardous Material
23, 24, 25, and 26	D25	0-3	Non-RCRA Hazardous Material
	D26		
	D27		
	D28		
27	D29	0-5	Non-Hazardous Material
	TF27-1		
28	TF28-1	0-5	Non-RCRA Hazardous Material
29	TF29-1	0-5	Non-Hazardous Material
30	TF30-1	0-5	Non-RCRA Hazardous Material
31	TF31-1	0-5	Non-Hazardous Material
32	TF32-1	0-15	Non-Hazardous Material
33	TF33-1	0-5	Non-Hazardous Material
34	TF34-1	0-15	Non-RCRA Hazardous Material
35	TF35-1	0-5	Non-Hazardous Material
36	TF36-1	0-5	Non-RCRA Hazardous Material
		5-10	Non-Hazardous Material

SFOBB West Approach Temporary Structure Alignment T5 ON			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
Abutment1 and Bents 2, 3, 4, 5, & 6	A-1	0-15	Non-RCRA Hazardous Material
	A-2		
	A-3		
	TNF2-1		
	TNF2-2		
	TNF3-1		
	TNF3-2		
	TNF6-1		
	TNF6-2		
	TNF7-1		
	TNF7-2		
	TNF7-3		
	TNF7-4		
	D78		

SFOBB West Approach Temporary Structure Temporary Supports			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
New Bent 28 and Bents 5 & 6	R5-1	0-60	Non-RCRA Hazardous Material
	R5-2		
	T28-1		
	T28-2		
New Bent 27	T27-1	0-30	Non-RCRA Hazardous Material
	T27-2	30-35	Non-Hazardous Material
Bent 4	R4-1	0-35	Non-Hazardous Material
	T27-2		
New Bent 26	T26-1	0-35	Non-RCRA Hazardous Material
	T26-2		
Bent 3	R3-1	0-30	Non-RCRA Hazardous Material
	R3-2		
New Bent 25	T25-1	0-25	Non-Hazardous Material
	T25-2		
	T25-3		
Bent 2	R2-1	0-25	Non-RCRA Hazardous Material
	R2-2	25-55	Non-Hazardous Material
New Bent 24 & Bent 1A	T24-1	0-5	Non-Hazardous Material
	T24-2		
	T24-3		
Bent 1B	R1-1	0-2	Non-RCRA Hazardous Material
	R1-2	2-10	Non-Hazardous Material
New Bent 23	T23-1	0-2	Non-RCRA Hazardous Material
	T23-2		
New Bent 22	T22-1	0-4	Non-RCRA Hazardous Material
	T22-2		
New Bent 21	T21-3	Surface	Non-Hazardous Material

SFOBB West Approach Temporary Structure Alignment UFT			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
1, 2, & 3	R5-1	0-60	Non-RCRA Hazardous Material
	R5-2		
	T28-1		
	T28-2		
4	T27-1	0-30	Non-RCRA Hazardous Material
	T27-2	30-35	Non-Hazardous Material
5	T26-1	0-35	Non-RCRA Hazardous Material
	T26-2		
6	T25-1	0-25	Non-Hazardous Material
	T25-2		
	T25-3		
7	T24-1	0-5	Non-Hazardous Material
	T24-2		
	T24-3		
8	D24	0-2	Non-Hazardous Material
9	T22-1	0-3	Non-RCRA Hazardous Material
10	B3	0-3	Non-RCRA Hazardous Material
	T21-3		

SFOBB West Approach Temporary Structure Alignment FIRT			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
Abutment 1	T22-1	0-3	Non-RCRA Hazardous material
2	T23-1	0-2	Non-RCRA Hazardous Material
	T23-2		
3	T24-1	0-5	Non-Hazardous Material
	T24-2		
	T24-3		
4	T25-1	0-25	Non-Hazardous Material
	T25-2		
	T25-3		
5	R3-1	0-30	Non-RCRA Hazardous Material
	R3-2		
6L	R4-1	0-35	Non-Hazardous Material
	T27-2		

SFOBB West Approach Temporary Structure Alignment EST			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
Abutment 1	T23-1	0-2	Non-RCRA Hazardous Material
	T23-2		
2	T24-1	0-5	Non-Hazardous Material
	T24-2		
	T24-3		
3	T25-1	0-25	Non-Hazardous Material
	T25-2		
	T25-3		
4R and 4L	R3-1	0-30	Non-RCRA Hazardous Material
	T25-2		
	T26-1		
6R	R4-1	0-35	Non-Hazardous Material
	T27-2		

SFOBB West Approach Temporary Structure Alignment TBTON			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
Abutment 1	DTB42-2	0-3	Non-RCRA Hazardous Material
2	DTB44-2	0-3	RCRA Hazardous Material
3	DTB46-1	0-3	Non-RCRA Hazardous Material
	DTB47-1		
4	DTB48-1	0-3	RCRA Hazardous Material

SFOBB West Approach Temporary Structure Alignment ST6D			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
2A	D59	0-5	Non-RCRA Hazardous Material
	D60		
	D61	5-10	Non-Hazardous Material
	A8		
3B	T6-1	0-15	Non-Hazardous Material
	T6-2		
	T6-3		
	T6-4		
4A	D56	0-5	Non-RCRA Hazardous material
	D57		
	D58	5-10	Non-Hazardous Material
	A9		
5A	T71-A	0-15	Non-Hazardous Material
	T7-2		
	T7-3		
	T7-4		
6A	D54	0-5	Non-Hazardous Material
	D55		
	T8-1		
	T8-2		
	T8-3		
	T8-4		
7B & 8A	A10	0-10	Non-RCRA Hazardous Material
	D51		
	D52		
	D53		
	T9-1		
	T9-2		
	T9-3		
9A	D48	0-3	Non-RCRA Hazardous Material
	D49		
	D50	3-10	Non-Hazardous Material
	A11		
10A	T10-1	0-5	Non-Hazardous Material
	T10-2		
	T10-3		
11B	D46	0-3	Non-Hazardous Material
	D47		
12A	T11-1	0-3	Non-RCRA Hazardous Material
	T11-2		
	T11-3	3-5	Non-Hazardous Material
13B	D44	0-3	Non-RCRA Hazardous Material
	D45		
14A	T12-1	0-3	Non-RCRA Hazardous Material
	T12-2	3-10	Non-Hazardous Material
	T12-3		

Con't. SFOBB West Approach Temporary Structure Alignment ST6D			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
15A	D42	0-15	Non-Hazardous Material
	D43		
	A12		
16A	T13-1	0-5	Non-Hazardous Material
	T13-2		
	T13-3		
17B	T14-1	0-5	Non-RCRA Hazardous Material
	T14-2		
	T14-3		
	D40	5-10	Non-Hazardous Material
	D41		
	A13		
18A	D38	0-3	Non-RCRA Hazardous Material
	D39		
	T14-1		
	T14-2		
	T14-3		
19A	T15-1	0-5	Non-Hazardous Material
	T15-2		
	T15-3		
20A	D10	0-5	Non-Hazardous Material
	D11		
	A14		
21B	T16-1	0-0.5	Non-Hazardous Material

SFOBB West Approach Temporary Structure Alignment GTR			
Bent	Sample Location	Zone (ft bgs)	Soil Characterization
Abutment 4	TF22-1	0-1	Non-RCRA Hazardous Material
3	T18-1	0-10	Non-RCRA Hazardous Material
2	T19-1	0-3	Non-RCRA Hazardous Material
	T19-2		

Landscape			
Area	Sample Location	Zone (ft bgs)	Soil Characterization
Area adjacent to Bryant Street	L1	0-2	Non-RCRA Hazardous Material
	L2		
	L3		
	L4		
	L5		
	L6		
	L7		
Area adjacent to 5th Street	L8	0-2	Non-RCRA Hazardous Material
	L9		
	L10		
	L11		
	L12		
	L13		
	L14		
Fremont Street Off	L15	0-2	Non-RCRA Hazardous Material

KEY:

ft bgs - feet below ground surface

NOTE:
Information presented in the soil analytical results tables is based on the *Site Investigation Report - West Approach Project, Transbay Terminal Loop, San Francisco, California June 1999*, and *Addendum Site Investigation Report - West Approach Project, Bayshore Retrofit Portion, Westbound and 4th Street On-Ramp, San Francisco Oakland Bay Bridge, San Francisco, California, August 1999*, prepared by Professional Service Industries, Inc.

The objective of the site investigation was to determine the contaminant concentration of fill material that would be excavated during this project. The boring operation was terminated upon encountering native material (rock and clay). The native material is assumed to be non-hazardous.

Surplus excavated material shall become the property of the Contractor and shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

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 0.17 foot before removing the surfacing. Full compensation for cutting the existing surfacing shall be considered as included in the contract price paid per cubic meter for roadway excavation and no additional compensation will be allowed therefor.

The portion of imported borrow placed within 60 inches of the finished grade shall have a Resistance (R-Value) of not less than 15.

SOLDIER PILE WALL EARTHWORK

General

Cross sections of the site in the vicinity of the soldier pile wall are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

The Contractor shall submit to the Engineer working drawings and a construction sequence for the proposed method of soldier pile wall construction for the site. The drawings shall conform to the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications and these special provisions. The drawings shall be signed by an engineer who is registered as a Civil Engineer in the State of California. One set of the drawings and construction sequence, and one copy of the design calculations, shall be furnished to the Engineer. The working drawings and construction sequence shall include, but not be limited to, defining order of work, traffic control, method of installation of soldier piles, method of

placing lagging, limits of structure excavation lifts, and type of drilling and excavation equipment to be used. The Contractor shall allow 3 weeks after complete drawings and all support data are submitted for the review and approval of the proposed method of soldier pile wall construction.

Should the Engineer fail to complete the review and approval within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in working drawings and construction sequence plan review and approval for the soldier pile wall, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays" of the Standard Specifications.

Structure Excavation (Soldier Pile Wall)

Excavation and construction of the soldier wall shall proceed from the top down in lifts.

Care shall be taken in performing structure excavation (soldier pile wall) for placement of lagging such that a minimal void behind the lagging is required to be backfilled.

Excavation in front of the wall shall not extend more than 3 feet below the level of the top of the wall or elevation of the previous lift.

At the end of the work shift, shotcrete shall be in place the full height of the exposed excavation face.

Structure Backfill (Soldier Pile Wall)

Material for structure backfill behind lagging shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill," of the Standard Specifications. Structure backfill behind lagging shall be compacted by hand tamping, mechanical compaction or other means approved by the Engineer.

Structure backfill in fill areas behind the lagging shall be keyed into the existing or excavated back slope.

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.

Lean concrete backfill in the portions of the drilled holes occupied by lagging and in front of the soldier pile flanges shall be removed as necessary to install lagging.

Concrete Backfill

Concrete backfill encasing the steel soldier piles below the lagging shall be Class A concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions.

MEASUREMENT AND PAYMENT (EARTHWORK)

If structure excavation or structure backfill involved in bridges is not otherwise designated by type, and payment for the structure excavation or structure backfill has not otherwise been provided for in the Standard Specifications or these special provisions, the structure excavation or structure backfill will be paid for at the contract price per cubic yard for structure excavation (bridge) or structure backfill (bridge).

Structure excavation, designated as Type DNRH or Type DNH, for footings at the locations shown on the plans will be measured and paid for by the cubic yard as structure excavation Type DNRH or Type DNH. Ground water or surface water is expected to be encountered at these locations, but seal course concrete is not shown or specified.

10-1.45 EARTH RETAINING STRUCTURES

Earth retaining structures shall be constructed at the locations and in conformance with the details shown on the plans and these special provisions.

The earth retaining structure to be constructed shall be Mechanically Stabilized Embankment (MSE) walls Locations A, B, and C as shown on the plans.

At the Contractor's option, one of the following acceptable alternative earth retaining systems may be constructed:

Proprietary Earth Retaining System	Address and Phone Number
Reinforced Earth	The Reinforced Earth Company 25651 Atlantic Ocean Drive, Suite A-13 Lake Forest, CA 92630 (949) 587-3060
Retained Earth (1.52-meter square concrete face panels)	Foster Geotechnical 1660 Hotel Circle North – Suite 304 San Diego, CA 92108 (619) 688-2400
MSE Plus	SSL 4740 Scotts Valley Drive, Suite "E" Scotts Valley, CA 95066 (831)430-9300

Attention is directed to the section, "Engineering Fabrics" of these special provisions.

Only one type of earth retaining system shall be used at any one location.

The above list of acceptable alternative earth retaining systems has been selected from the Department's current list of prequalified earth retaining systems and is limited only to those systems determined to have characteristics suitable for this project. Among the alternatives shown, some systems may be proprietary.

The list of prequalified earth retaining systems has been developed from data previously furnished by suppliers or manufacturers of each system. Approval of additional earth retaining systems is contingent on the system meeting the full range of parameters for which prequalification is required. The prequalification requirements can be obtained from the Office of Structure Design, Mail Station 9, 1801 30th Street, Sacramento, CA 95816.

If the Contractor elects to use a proprietary earth retaining system from the list of acceptable alternative systems, the Contractor shall submit complete working drawings for each installation of the system to the Office of Structure Design (OSD) in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. For initial review, 4 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to OSD for final approval and use during construction.

Working drawings shall be 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

The Contractor shall verify the existing ground elevations at the site before preparing the working drawings. The working drawings shall contain all information required for the proper construction of the system at each location including existing ground line at face of wall as verified at the site and any required revisions or additions to drainage systems or other facilities. The working drawings shall be supplemented as necessary with calculations for the particular installation. The working drawings and calculations shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

One set of the corrected prints on 60 pound (minimum) bond paper, 22" x 34" in size, of all working drawings prepared by the Contractor for each earth retaining structure shall be furnished to OSD within 3 weeks after final working drawing approval.

The top of wall profile of alternative earth retaining systems shall conform to that of the Mechanically Stabilized Embankment (MSE) walls Locations A, B, and C shown on the plans. The bottom of wall elevations shall be at or below the elevations shown on the plans. The height and length to be used for any system shall be the minimums for that system that will effectively retain the earth behind the structure for the loading conditions and the contours, profile or slope lines shown on the plans. The length of soil reinforcement for any system shall be not less than that shown on the plans. In addition, if the plans or special provisions indicate limiting parameters for alternative systems, the system shall conform to those parameters.

EARTHWORK

Excavation and backfill shall conform to the details shown on the plans, the provisions in Section 19, "Earthwork," of the Standard Specifications, and these special provisions.

Structure backfill for earth retaining structures with metallic soil reinforcement shall consist of material free from organic material and substantially free of shale or other soft, poor durability particles; shall not contain slag aggregate or

recycled materials, such as glass, shredded tires, portland cement concrete rubble, asphaltic concrete rubble, or other unsuitable material as determined by the Engineer; and shall meet the following requirements:

Gradation		
Sieve Size	Percentage Passing	California Test
6"	100	202
3"	78 - 100	
* No. 4	----	
No. 30	0 - 60	
* No. 200	0 - 25	
Test	Requirement	California Test
* Sand Equivalent	12 min.	217
* Plasticity Index	10 max.	204
Minimum Resistivity	1500 ohm-cm min.	643
Chlorides	500 ppm max.	422
Sulfates	2000 ppm max.	417
* If 12 percent or less passes the No. 200 sieve and 50 percent or less passes the No. 4 sieve, the sand equivalent and plasticity index requirements shall not apply.		

Permeable material shall be used for the portion of the structure backfill for earth retaining structures with soil reinforcement within the limits shown on the plans. Permeable material shall be Class 1, Type B, conforming to the provisions in Section 68-1.025, "Permeable Material," of the Standard Specifications and the following requirements:

Property Requirements

Test	Requirement	California Test
Minimum Resistivity	1500 ohm-cm min.	643
Chlorides	500 ppm max.	422
Sulfates	2000 ppm max.	417
pH	5.5 to 10.0	643

Structure backfill for earth retaining structures with soil reinforcement shall be compacted to a relative compaction of not less than 90 percent except that when the backfill is within 150 feet of a bridge abutment or for a minimum depth of 3 feet below the grading plane for the width between the outer edges of shoulders, the backfill shall be compacted to a relative compaction of not less than 95 percent.

A relative compaction of not less than 95 percent shall be obtained for embankment under earth retaining structures with soil reinforcement within the limits established by inclined planes sloping 1:1.5 (vertical:horizontal) out and down from lines one foot outside the bottom limits of structure backfill including permeable material, when required.

Structure backfill material shall be placed and compacted simultaneously with the erection of the facing panels. Placement and compaction shall be accomplished without distortion of the soil reinforcement or displacement of facing panels. Structure backfill at the front of the wall shall be completed prior to backfilling more than 15 feet above the bottom of the lowermost face element.

Sheepsfoot or grid-type rollers shall not be used for compacting material within the limits of the soil reinforcement. Hand-held or hand-guided compacting equipment shall be used to compact structure backfill material within 3 feet of the facing panels.

At each level of the soil reinforcement, the structure backfill shall be constructed to a plane 0.1-foot above the elevation of the soil reinforcement connection, and shall start 3 feet from the back of the face panel and extend for at least the remaining length of soil reinforcement. This grading shall be complete before placing the next layer of soil reinforcement.

Water used for earthwork or dust control within 500 feet of any portion of earth retaining structures with metallic soil reinforcement shall conform to the provisions for water in conventionally reinforced concrete work in Section 90-2.03, "Water," of the Standard Specifications.

CONCRETE

Concrete used in precast and cast-in-place reinforced concrete members of earth retaining structures shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

The concrete leveling pads shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications. Concrete for the leveling pads shall be placed at least 24 hours prior to erecting face panels.

ARCHITECTURAL SURFACE TEXTURE.--Exposed surfaces of precast and cast-in-place concrete members shall receive an architectural surface texture consisting of a fractured rib surface finish as shown on the plans and conforming to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions

The fractured rib texture shall be required at the concrete surfaces shown on the plans and 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 1/4 inch for each 10 feet 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.

TEST PANEL.--A test panel at least 4' x 4' in size shall be successfully completed at a location approved by the Engineer before beginning work on architectural textures. The test panel shall be constructed and finished with the materials, tools, equipment and methods to be used in constructing the architectural texture. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified finish, texture and color are obtained, as determined by the Engineer.

The test panel approved by the Engineer shall be used as the standard of comparison in determining acceptability of architectural texture for concrete surfaces.

FORM LINERS.--Form liners shall be used for textured concrete surfaces and shall be installed in accordance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (psi)	D 412	130 to 900
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (psi)	D 2370	2600 minimum

Cuts and tears in form liners shall be sealed and repaired in accordance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 8 foot minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

RELEASING FORM LINERS.--Products and application procedures for form release agents shall be approved by the form liner manufacturer. Release agents shall not cause swelling of the liner material or delamination from the forms. Release agents shall not stain the concrete or react with the liner material. For reliefs simulating fractured concrete or wood grain surfaces the application method shall include the scrubbing method using a natural bristle scrub brush in the direction of grooves or grain. The release agent shall coat the liner with a thin film. Following application of form release agent, the liner surfaces shall be cleaned of excess amounts of agent using compressed air. Buildup of form release agent caused by the reuse of a liner shall be removed at least every 5 uses.

Form liners shall release without leaving particles or pieces of liner material on the concrete and without pulling or breaking concrete from the textured surface. The concrete surfaces exposed by removing forms shall be protected from damage.

ABRASIVE BLASTING.--The architectural texture shall be abrasive blasted with fine abrasive to remove the sheen without exposing coarse aggregate.

CURING.--Concrete surfaces with architectural texture shall be cured only by the forms-in-place or water methods. Seals and curing compounds shall not be used.

REINFORCEMENT

Reinforcing steel shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and to the provisions in "Reinforcement" of these special provisions.

GALVANIZING

Soil reinforcement, connecting elements, and other steel components that are in contact with the earth shall be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

INSPECTION WIRE

If a proprietary alternative system is selected, inspection elements representative of the particular soil reinforcement shall be furnished in the same number and approximate location as detailed for the Mechanically Stabilized Embankment.

The threaded end may be formed before or after galvanizing. The end 4 inches of the wire shall be coated with 2 applications of an approved unthinned commercial quality zinc-rich primer (organic vehicle type). The threaded end of the wire shall be encapsulated with corrosion inhibiting mastic filled, round vinyl enclosure secured with a nylon tie as shown on the plans. If the threaded end is galvanized after threading, the threads shall be cleaned with a die before painting. There shall be no damage to the unthreaded portion of the galvanized inspection wire.

After placement of an inspection element and placement of backfill to a level at least 2 feet above the inspection element, the void in the face panel shall be dry packed with portland cement grout as shown on the plans. Dry pack shall conform to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications, except that the proportion of cement to sand shall be that required to achieve a 28-day mortar compressive strength of 1000 psi to 1600 psi.

DRAINAGE SYSTEM

The drainage system shall conform to the details shown on the plans and these special provisions.

Corrugated steel pipe shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications.

Perforated steel pipe underdrains and underdrain outlets and risers shall conform to the provisions in Section 68-1, "Underdrains," of the Standard Specifications.

The class of rock used for rock slope protection at drain pipe outlets shall be No. 3 Backing, and shall conform to the provisions in Section 72-2, "Rock Slope Protection," of the Standard Specifications.

Permeable material shall be Class 1, Type B, conforming to the provisions in Section 68-1.025, "Permeable Material," of the Standard Specifications and these special provisions.

Permeable material and filter fabric shall be placed along with structure backfill as shown on the plans. Compaction of the permeable material for the drainage system outside the limits of the soil reinforcement is not required, and equipment shall not be operated directly on the permeable material or filter fabric. If a sloped layer of permeable material is placed to facilitate the work or to satisfy safety considerations, the vertical limits of permeable material shall remain unchanged and the thickness of the layer of permeable material shall be measured normal to the slope.

Filter fabric shall conform to the provisions for fabric for underdrains in Section 88-1.03, "Filter Fabric," of the Standard Specifications and shall be placed at the locations and in conformance with the details shown on the plans and these special provisions.

Immediately prior to placing, the subgrade to receive the filter fabric shall conform to the compaction and elevation tolerance specified for the material involved and shall be free of loose or extraneous material and sharp objects that may damage the filter fabric during installation.

Filter fabric shall be handled and placed in conformance with the manufacturer's recommendations.

The fabric shall be stretched, aligned, and placed in a wrinkle-free manner.

Adjacent borders of the fabric shall be overlapped from 12 to 18 inches or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The stitches shall number 5 to 7 per inch of seam.

Should the fabric be damaged during placing, the torn or punctured section shall be repaired by placing a piece of fabric that is large enough to cover the damaged area and which meets the overlap requirement.

During spreading of the permeable material a minimum of 6 inches of the material shall be maintained between the fabric and the Contractor's equipment. Where structure backfill material is to be placed on the filter fabric, a minimum of 18 inches of structure backfill material shall be maintained between the fabric and the Contractor's equipment. Equipment or vehicles shall not be operated or driven directly on the filter fabric.

Adhesive for bonding filter fabric to concrete panels shall conform to the requirements in Federal Specification MMM-A-121.

Concrete panel surfaces which are to receive filter fabric shall be dry and thoroughly cleaned of dust and deleterious materials.

STATE-DESIGNED EARTH RETAINING STRUCTURES

If the Contractor elects to construct one of the earth retaining structures shown on the plans, the structure shall be constructed to the lines and grades and the details shown on the plans, in conformance with these special provisions and the following:

MECHANICALLY STABILIZED EMBANKMENT

This work shall consist of constructing earth retaining structures of mechanically stabilized embankments with concrete face panels in conformance with the details shown on the plans and these special provisions.

Resin bonded cork for horizontal joints shall conform to the requirements in ASTM Designation: D 1752, Type II with a compressive load of not less than 100 psi.

Pipe for the pipe pin shall conform to the requirements in ASTM Designation: A 53, Standard weight, except the amount of the zinc coating per square foot of actual surface shall average not less than 2.0 ounces and no individual specimen shall show less than 1.8 ounces.

The button on the button-headed wires shall conform to the provisions in Section 50-1.05, "Prestressing Steel," of the Standard Specifications.

The coupler at the mat connection shall be a seamless steel sleeve. The coupler shall be applied over the button-headed wires and swaged by means of a hydraulic press. The coupler shall develop the minimum tensile strength of the wire without exceeding a total slip of the wires of 0.25-inch.

Splicing of the welded wire mat along its length shall be by a mechanical coupler which will develop the minimum tensile strength of the wire. The mechanical coupler shall be approved by the Engineer.

MW70 and MW130 steel wire shall conform to the requirements in ASTM Designation: A 82. The welded wire mat shall conform to the requirements in ASTM Designation: A 185.

MD70 and MD130 deformed steel wire may be substituted for MW70 and MW130 steel wire, respectively. The welded wire mat utilizing deformed steel wire shall conform to the requirements in ASTM Designation: A 497.

PROPRIETARY EARTH RETAINING SYSTEMS

If the Contractor elects to construct one of the acceptable proprietary alternative earth retaining systems, the structure shall be constructed to the lines and grades shown on the plans. The construction shall include a drainage system as shown on the plans, and conform to the details shown on the approved working drawings, these special provisions, approved proprietary system details and special provisions, and the following:

The location of the top level of soil reinforcement, assuming no leveling pad settlement, shall be placed parallel to the top of wall and at a distance below the top of wall as shown on the plans within a maximum tolerance of plus 1.5 inches.

The top of top face panels, assuming no leveling pad settlement, shall be parallel to the top of the wall at the distance below the top of wall as shown on the plans within a maximum tolerance of plus 1.5 inches.

MEASUREMENT AND PAYMENT

Earth retaining structures will be measured and paid for by the square foot. Regardless of the type of earth retaining structure actually constructed, the square foot area for payment will be based on the vertical height and length of each section of Mechanically Stabilized Embankment (MSE) walls Locations A, B, and C shown on the plans which was or would have been constructed. The vertical height of each section will be taken as the difference in elevation on the outer face from the bottom of the lowermost face element to the top of wall profile.

The contract price paid per square foot for earth retaining structure at each location shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the earth retaining structure and inspection elements, including architectural surface texture, earthwork, leveling pad, barrier slab, and drainage systems, 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 revisions to the barrier support, drainage system, or other facilities made necessary by the use of an alternative earth retaining system shall be considered as included in the contract price paid per square foot for earth retaining structure and no separate payment will be made therefor.

10-1.46 CONTROLLED LOW STRENGTH MATERIAL

Controlled low strength material shall consist of a workable mixture of aggregate, cementitious materials, and water and shall conform to the provisions for slurry cement backfill in Section 19-3.062, "Slurry Cement Backfill," of the Standard Specifications and these special provisions.

At the option of the Contractor, controlled low strength material may be used as structure backfill for pipe culverts, except that controlled low strength material shall not be used as structure backfill for aluminum and aluminum-coated culverts nor for culverts having a diameter or span greater than 20 feet.

When controlled low strength material is used for structure backfill, the width of the excavation shown on the plans may be reduced so that the clear distance between the outside of the pipe and the side of the excavation, on each side of the pipe, is a minimum of 12 inches. This minimum may be reduced to 6 inches when the height of cover is less than or equal to 20 feet or the pipe diameter or span is less than 42 inches.

Controlled low strength material in new construction shall not be permanently placed higher than the basement soil. For trenches in existing pavements, permanent placement shall be no higher than the bottom of the existing pavement permeable drainage layer. If a drainage layer does not exist, permanent placement in existing pavements shall be no higher than one inch below the bottom of the existing asphalt concrete surfacing or no higher than the top of base below the existing portland cement concrete pavement. The minimum height that controlled low strength material shall be placed, relative to the culvert invert, is 0.5 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 50 pounds per square inch and 100 pounds per square inch for pipe culverts having a height of cover of 20 feet or less and a minimum 28-day compressive strength of 100 pounds per square inch for pipe culverts having a height of cover greater than 20 feet. Compressive strength shall be determined in conformance with the requirements in ASTM Designation: D 4832.
B. When controlled low strength material is used as structure backfill for pipe culverts, the sections of pipe culvert in contact with the controlled low strength material shall conform to the requirements of Chapter 850 of the Highway Design Manual using the minimum resistivity, pH, chloride content, and sulfate content of the hardened controlled low strength material. Minimum resistivity and pH shall be determined in conformance with the requirements of California Test 643. The chloride content shall be determined in conformance with the requirements of California Test 422 and the sulfate content shall be determined in conformance with the requirements of California Test 417.
C. Cement shall be any type of portland cement conforming to the requirements in ASTM Designation: C 150; or any type of blended hydraulic cement conforming to the requirements in ASTM Designation: C 595M or the physical requirements in ASTM Designation: C 1157M. Testing of cement will not be required.

D. Admixtures may be used in conformance with the provisions in Section 90-4, "Admixtures," of the Standard Specifications. Chemical admixtures containing chlorides as Cl in excess of one percent by mass of admixture, as determined in conformance with the requirements of California Test 415, shall not be used. If an air-entraining admixture is used, the maximum air content shall be limited to 20 percent. Mineral admixtures shall be used at the Contractor's option.

Materials for controlled low strength material shall be thoroughly machine-mixed in a pugmill, rotary drum or other approved mixer. Mixing shall continue until the cementitious material and water are thoroughly dispersed throughout the material. Controlled low strength material shall be placed in the work within 3 hours after introduction of the cement to the aggregates.

When controlled low strength material is to be placed within the traveled way or otherwise to be covered by paving or embankment materials, the material shall achieve a maximum indentation diameter of three inches 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.

10-1.47 LIGHTWEIGHT EMBANKMENT MATERIAL (CELLULAR CONCRETE)

The work shall consist of constructing a Lightweight Embankment Material (cellular concrete) to the lines, grades, and dimensions shown on the plans, in accordance with the Standard Specifications, these special provisions and as directed by the Engineer.

The Contractor shall furnish a mix design which will produce a cast density (at point of placement) of 24 to 36 pcf with a minimum compressive strength of 80 psi at 28 days. The Contractor shall provide the Engineer with a Work Plan of the equipment and procedures proposed at least 10 working days prior to placement; items in the submittal shall include:

1. Material list of items; manufacturer's specifications;
2. Mix design, including laboratory data using the mix design verifying mass and strength requirements;

At the Contractor's option, a mix design of the Lightweight Embankment Material (cellular concrete) having a compressive strength may be submitted and used for the lift immediately below the pavement structural section.

Admixtures for accelerating the set time may be used in accordance with the manufacturer's recommendations. A foaming agent shall be used and shall be tested in accordance with ASTM C 796. Mixing water shall be potable and free of deleterious amounts of acids, alkali, salts, oils, and organic materials.

Portland Cement shall comply with ASTM C150, Type II. Pozzolans and other cementitious materials may be used when specifically approved by the manufacturer of the foaming agent.

At the point of placement, the density shall be in accordance with the specified cast density. A single cast density test shall represent the lesser of 300 cubic yards or one day's production.

The compressive strength shall be tested in accordance with ASTM C 495, except as follows:

1. Unless otherwise approved by the Engineer, the specimens shall be 3-inch by 6-inch cylinders. During molding, place the concrete in two approximately equal layers, and raise and drop the cylinders approximately 1 inch three times on a hard surface after placing each layer; no rodding shall be allowed. Specimens shall be covered and protected immediately after casting to prevent damage and loss of moisture.
2. Specimens shall be moist cured in the molds for a period of seven (7) days prior to the 28-day compressive strength test. Specimens shall not be oven dried.

Lightweight Embankment Material (cellular concrete) shall be placed to the designated dimensions as specified in Sections 19-1.03, "Grade Tolerance," and 19-6, "Embankment Construction," of the Standard Specifications.

Lift thickness for Lightweight Embankment Material (cellular concrete) shall not exceed 1.0 feet. Where more than one lift is required, the layer to receive the next lift shall be scarified with a broom or rake to provide surface roughness. After curing for 12 hours, any crumbling area on the surface should be removed and scarified before the next layer is placed. Surface stepping shall be limited to 6 inches.

A minimum 12-hour waiting time between lifts shall be required. If ambient temperatures are anticipated to be below 40^0 F. within 24 hours after placement, the mixing water should be heated when specifically approved by the manufacturer of the foaming agent, or placement shall be prohibited during such period. Placement shall not be allowed on frozen ground.

Cement and water may be premixed and delivered to the site; and foam shall be added at the site. Slurry coats and multilayer casting are acceptable methods of installation. Subgrade to receive Lightweight Embankment Material (cellular concrete) shall be free of all loose and extraneous material. Subgrade shall be uniformly moist, and any excess water standing on the surface shall be removed prior to placing Lightweight Embankment Material (cellular concrete).

After placing the final lift of Lightweight Embankment Material (cellular concrete), all exposed surfaces shall be covered with a prime coat. The prime coat shall conform to the requirements in Section 94, "Asphaltic Emulsions," of the Standard Specifications. A prime coat of SS-1 shall be applied uniformly at a rate of between 0.15 and 0.25 gallons per square-yard, with the exact rate determined by the Engineer.

Placement and compaction of the pavement structural section atop the Lightweight Embankment Material (cellular concrete), described elsewhere in these special provisions, shall be accomplished without damage to the Lightweight Embankment Material (cellular concrete); damaged areas shall be removed and repaired at the Contractor's expense. The exposed sides of the Lightweight Embankment Material (cellular concrete) shall be covered with embankment material compacted to a relative compaction of not less than 90 percent.

Pay quantities for Lightweight Embankment Material (cellular concrete) will be measured by the cubic yard, to the lines and grade shown on the plans and as directed by the Engineer.

The contract price paid per cubic yard for Lightweight Embankment Material (cellular concrete) shall include full compensation for furnishing all labor, materials (including furnishing and applying the prime coat and any adjacent embankment material), tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing, the Lightweight Embankment Material (cellular concrete), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.48 AIR AND WATER SUPPLY LINES

Air and water lines identified on the plans shall be of the size shown and shall conform to the details shown on the plans, and these special provisions.

WORKING DRAWINGS

The Contractor shall submit complete working drawings.

The working drawings shall be supplemented by manufacturer's descriptive data, performance data and installation instructions for the following: Working drawings shall be submitted as described elsewhere in these specifications.

Pipe
Weldoletts ball valve
Hose faucet
Insulated flange
Wrapping material
Supports
Gate valves

For initial review, 5 sets of drawings shall be submitted. After review, 6 sets shall be submitted to the Engineer for final approval and use during construction.

MATERIALS

Piping

Air and Water piping shall be A-53 Schedule 40 black steel pipe conforming to Section 70-1.02B "Welded Steel Pipe," of the Standard Specifications except that the coating on underground piping shall be as specified in these special provisions. The coating on the above ground pipe shall be as specified in the Standard Specifications.

Pipe fittings

Pipe fittings shall be welded black steel to match pipe.

Steel pipe coating, shall be factory applied plastic. Pipe coating shall be Standard Pipe Protection, X-Tru-Coat (20-mil thick); Pipe Line Service Corporation, Republic; 3M Company, Scotchkote 205 (912-mil thick); or equal.

Pipe wrapping tape and primer

Pipe wrapping tape shall be pressure sensitive polyvinyl chloride or pressure sensitive polyethylene tape having nominal thickness or 20-mils. Wrapping tape shall be Polyken, 922, Manville, Trantex VID-20; Scotchrap, 51; or equal.

Pipe wrapping primer shall be compatible with the pipe wrapping tape used.

Insulating Flange

The insulating flange shall consist of a ductile iron flange installed with an insulating gasket, washer and sleeve. The insulating gasket shall be the same diameter as the flange and shall be constructed of neoprene coated phenolic. The insulating sleeve shall fit around the bolts and shall be made of 1/32-inch phenolic. The insulating washer shall fit over the sleeve and under the steel washer installed with the bolt. The washer shall be made of phenolic and shall be 1/8-inch in thickness.

Ball valve

Ball valve shall be two piece, minimum 400-pound WOG, bronze body and chrome plated or brass ball with full size port. Valve shall be Nibco Scott, T-580; Watts, B-6000; Kitz, 56; or equal.

Hose faucet

Hose faucet shall be compression type, angle pattern, tee handle, 3/4 inch female thread with hose end, rough brass. Hose faucet shall be supplied with an integral or nonremovable threaded outlet vacuum breaker which meets the requirements of the American Society of Sanitary Engineering (ASSE) Standard: 1011.Hose faucet shall be Nibco, No. 63VB; Chicago, No. 13T; or equal.

Gate valve (3-inch and larger, below ground)

Gate valve (3-inch and larger, below ground) shall be AWWA double disc, hub or rubber ring type, removable bonnet and non-rising stem, equipped with operating nuts, 200-pound working pressure, and Tee handle wrench for each valve. Valve shall be Mueller, A-2380;American Valve, Model 28; or equal.

Gate valve (3-inch and larger, above ground)

Above ground valves shall be similar to below ground valves except that they shall have a permanently installed hard steel.

Valve box

Valve box shall be precast high density concrete with polyethylene face and cast iron traffic rated cover marked "WATER," or "AIR" as applicable. Extension shall be provided as required. Valve box shall be Christy, B3; Brooks Products Company, 3TL; Frazer, 3; or equal.

Fabricated steel supports and fasteners

Fabricated steel supports and fasteners shall be in conformance with the details shown on the plans, the provisions in Section 75, "Miscellaneous Metal" of the Standard Specifications, and these special provisions. Bolts and nuts shall be in accordance with Section 55, "Steel Structures," of the Standard Specifications. Anchors shall be resin capsule type.

INSTALLATION

Cutting pipe

All pipe shall be cut straight and true and the ends shall be reamed to the full inside diameter of the pipe after cutting.

All pipe shall be cut by a power hacksaw, a circular cutting machine using an abrasive wheel, or in a squire-end saw vise by means of a hand saw. The pipe shall be reamed after cutting and rough edges or burrs removed so that a smooth and unobstructed flow will be obtained. Outside of pipe shall be beveled as required for welding.

Damaged piping

Pipe that is cracked or otherwise damaged shall be removed from the work.

Cleaning and closing of pipe

The interior of all pipe shall be cleaned before installation. All openings shall be capped or plugged as soon as the pipelines are installed to prevent the entrance of any materials. The caps or plugs shall remain in place until their removal is necessary for completion of the installation. All completed systems shall be flushed or blown out.

Disinfecting

Water pipes shall be disinfected by adding dry chlorine tablets to the inside of the water piping during installation. After completion the pipe shall be filled and allowed to stand. The amount of chlorine and the time the pipe is left undisturbed after the initial filling shall be as recommended by the chlorine tablet supplier but in no case shall be less then 4 hours. After the disaffection is completed the water will be drained to waste before the pipe is put into service.

Wrapping and coating steel pipe

Steel pipe buried in the ground shall be wrapped or shall be plastic coated as specified herein:

1. Wrapped steel pipe shall be thoroughly cleaned and primed as recommended by the tape manufacturer.
2. Tapes shall be tightly applied with ½ uniform lap, free from wrinkles and voids with approved wrapping machines and experienced operators to provide not less than 40 mils thickness.
3 Plastic coating on steel pipe shall be factory applied. Coating imperfections and damage shall be repaired to the satisfaction of the Engineer.
4. Field joints, fittings and valves for wrapped and plastic coated steel pipe shall be covered to provide continuous protection by puttying and double wrapping with 20-mil thick tape. Wrapping at joints shall extend a minimum of 6 inches over the adjacent pipe covering. Width of tape for wrapping fittings shall not exceed 2 inches. Adequate tension shall be applied so tape will conform closely to contours of fittings. Putty tape insulation compounds approved by the Engineer shall be used to fill voids and provide a smooth even surface for the application of the tape wrap.

Wrapped or coated pipe, fittings, and filed joints shall be approved by the Engineer after assembly. Piping shall be placed on temporary blocks to allow for inspection. Deficiencies shall be repaired to the satisfaction of the Engineer before backfilling or closing in.

TESTING

Water and air supply lines shall be tested in accordance with the provisions in Section 70-1.02B, 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. All leaks shall be repaired and all defective materials shall be replaced by the Contractor at his expense.

The air and water lines shall be tested as a unit.

MEASUREMENT AND PAYMENT

Supply line (bridge) will be measured and paid for by the linear foot in the same manner specified for welded steel pipe in Section 70-1.04, "Measurement," and Section 70-1.05, "Payment" of the Standard Specifications.

Full compensation for furnishing and installing pipe supports, and excavation and backfill for air and water supply lines shall be considered as included in the contract price paid per linear foot for 6-inch supply line (bridge) and no additional compensation will be allowed therefor.

Full compensation for relocating items, abandoning pipe, valves, and fittings, removing and capping existing pipe, and all testing and repair shall be considered as included in the contract price paid per linear foot for supply line (bridge) and no additional compensation will be allowed therefor.

10-1.49 MOVE-IN/MOVE-OUT (EROSION CONTROL)

Move-in/move-out (erosion control) shall include moving onto the project when an area is ready to receive erosion control as determined by the Engineer, setting up all required personnel and equipment for the application of erosion control materials and moving out all personnel and equipment when erosion control in that area is completed.

When areas are ready to receive applications of erosion control (Type D), as determined by the Engineer, the Contractor shall begin erosion control work in that area within 5 working days of the Engineer's notification to perform the erosion control work.

Attention is directed to the requirements of erosion control (Type D) elsewhere in these special provisions.

Quantities of move-in/move-out (erosion control) will be determined as units from actual count as determined by the Engineer. For measurement purposes, a move-in followed by a move-out will be considered as one unit.

The contract unit price paid for move-in/move-out (erosion control) shall include full compensation for furnishing all labor, materials (excluding erosion control materials), tools, equipment, and incidentals and for doing all the work involved in moving in and removing from the project all personnel and equipment necessary for application of erosion control (Type D), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

No adjustment of compensation will be made for any increase or decrease in the quantities of move-in/move-out (erosion control) required, regardless of the reason for the increase or decrease. The provisions in Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications shall not apply to the item of move-in/move-out (erosion control).

10-1.50 EROSION CONTROL (TYPE D)

Erosion control (Type D) shall conform to the provisions in Section 20-3, "Erosion Control," of the Standard Specifications and these special provisions and shall consist of applying erosion control materials to embankment and excavation slopes and other areas disturbed by construction activities and as shown on the plans, except in areas of erosion control (mulch).

Hydroseeding shall consist of mixing and applying seed, commercial fertilizer, stabilizing emulsion and other materials, or any combination thereof, with fiber and water.

Topsoil obtained from within the project limits will be considered as selected material and will be measured and paid for in conformance with the provisions in Section 19-2.07, "Selected Material."

Imported topsoil will be measured by the ton or cubic yard, and quantities of fiber and straw will be measured by the pound or ton, determined in conformance with the provisions in Section 9-1.01, "Measurement of Quantities." When paid for by the cubic yard, imported topsoil will be measured in the vehicle at the point of delivery.

Stabilizing emulsion will be measured by the pound or ton as the weight of solids applied. The weight of solids per gallon of stabilizing emulsion will be determined by multiplying the percent of solids in the emulsion by the weight per gallon of the emulsion. The percent of solids and the weight per gallon of the emulsion will be determined by California Test 402, in the same manner as provided for determining the percent of nonvolatile content and the weight per gallon of paint.

Commercial fertilizer will be measured by the pound or ton, determined from marked weight and sack count.

Pure live seed will be measured by the pound, determined by multiplying the percentage of purity by the percentage of germination by the bulk weight of the seed.

Items of work, measured in conformance with the provisions in Section 20-3.06, "Measurement," and Section 9-1.01, "Measurement of Quantities," will be paid for at the contract prices per ton or cubic yard for imported topsoil, and per pound or ton for straw, commercial fertilizer, pure live seed, fiber and stabilizing emulsion.

Erosion control (Type D) shall be applied when an area is ready to receive erosion control as determined by the Engineer and in conformance with the provisions in "Move-in/Move-out (Erosion Control)" of these special provisions.

Prior to installing erosion control materials, soil surface preparation shall conform to the provisions in Section 19-2.05, "Slopes," of the Standard Specifications, except that rills and gullies exceeding 2 inches in depth or width shall be leveled. Vegetative growth, temporary erosion control materials, and other debris shall be removed from areas to receive erosion control.

MATERIALS

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

Fiber shall have the moisture content of the fiber marked on the package.

Seed shall have been tested for purity and germination not more than 12 months prior to the application of the seed. Seed with a germination rate lower than the minimum rate specified may be used when approved by the Engineer in writing.

The percentage of seed germination shall include the germination percentage of any hard and dormant seed.

Seed specified without a germination requirement, at the time of sowing, shall be from the previous or current year's harvest, and shall be labeled to include the name, date (month and year) collected and the name and address of the seed supplier.

Inoculated seed shall be sown within 90 days of inoculation.

Seed

Seed shall conform to the provisions in Section 20-2.10, "Seed," of the Standard Specifications. Individual seed species shall be measured and mixed in the presence of the Engineer.

Seed shall be delivered to the project site in unopened separate containers with the seed tag attached. Containers without a seed tag attached will not be accepted.

A sample of approximately one ounce of seed will be taken from each seed container by the Engineer.

Legume Seed

Legume seed shall be pellet-inoculated or industrial-inoculated and shall conform to the following:

A. Inoculated seed shall be inoculated in conformance with the provisions in Section 20-2.10, "Seed," of the Standard Specifications.
B. Inoculated seed shall have a calcium carbonate coating.
C. Industrial-inoculated seed shall be inoculated with Rhizobia and coated using an industrial process by a manufacturer whose principal business is seed coating and seed inoculation.
D. Industrial-inoculated seed shall be sown within 180 calendar days after inoculation.
F. Legume seed shall consist of the following:

LEGUME SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Pounds Pure Live Seed Per Acre (Slope Measurement)
Lupinus succulentus (Arroyo Lupine)	70	2.0
Trifolium incarnatum (Crimson Clover)	60	3.0

Non-legume seed shall consist of the following:

NON-LEGUME SEED

Botanical Name (Common Name)	Percent Germination (Minimum)	Pounds Pure Live Seed Per Acre (Slope Measurement)
Eschscholzia californica (California Poppy)	50	1.0
Clarkia amoena (Farewell to Spring)	50	1.0
Hordeum brachyantherum (California Meadow Barley)	60	18.0
Avena sativa ‘rubra' (California Red Oats)	60	18.0
Vulpia microstachys (Six Weeks Fescue)	60	4.0
Festuca rubra ‘Molate' (Molate Red Fescue)	60	18.0

Commercial Fertilizer

Commercial fertilizer shall conform to the provisions in Section 20-2.02, "Commercial Fertilizer," of the Standard Specifications and shall have a guaranteed chemical analysis of 6 percent nitrogen, 20 percent phosphoric acid and 20 percent water soluble potash.

Straw

Straw shall conform to the provisions in Section 20-2.06, "Straw," of the Standard Specifications and these special provisions.

Wheat and barley straw shall be derived from irrigated crops.

Prior to delivery of wheat or barley straw to the project site, the Contractor shall provide the name, address and telephone number of the grower.

Straw shall be derived from wheat or barley.

Compost

Compost shall be derived from green material consisting of chipped, shredded or ground vegetation or clean processed recycled wood products or a Class A, exceptional quality biosolids composts, as required by the United States Environmental Protection Agency (EPA), 40 CFR, Part 503c regulations or a combination of green material and biosolids compost. The compost shall be processed or completed to reduce weed seeds, pathogens and deleterious material, and shall not contain paint, petroleum products, herbicides, fungicides or other chemical residues that would be harmful to plant or animal life.

Other deleterious material, plastic, glass, metal or rocks shall not exceed 0.1 percent by weight or volume. A minimum internal temperature of 135˚ F. shall be maintained for at least 15 continuous days during the composting process. The compost shall be thoroughly turned a minimum of 5 times during the composting process and shall go through a minimum 90-day curing period after the 15-day thermophilic compost process has been completed. Compost shall be screened through a maximum 0.25-inch screen. The moisture content of the compost shall not exceed 35 percent. Compost products with a higher moisture content may be used provided the weight of the compost is increased to equal the compost with a moisture content of 35 percent. Moist samples of compost on an as received basis shall be dried in an oven at a temperature between 220˚ F. and 240˚ F. until a constant dry weight of the sample is achieved. The percentage of moisture will be determined by dividing the dry weight of the sample by the moist weight of the sample and then multiplying by 100. Compost will be tested for maturity and stability with a Solvita test kit. The compost shall measure a minimum of 6 on the maturity and stability scale.

Stabilizing Emulsion

Stabilizing emulsion shall conform to the provisions in Section 20-2.11, "Stabilizing Emulsion," of the Standard Specifications and these special provisions.

Stabilizing emulsion shall be in a dry powder form, may be reemulsifiable, and shall be a processed organic adhesive derivative of Plantago ovata used as a soil tackifier.

APPLICATION

Erosion control materials shall be applied in separate applications in the following sequence:

A. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment within 60 minutes after the seed has been added to the mixture:

Material	Pounds Per Acre (Slope Measurement)
Legume Seed	5
Non-Legume Seed	60
Fiber	200
Compost	500

B. The Contractor may dry apply compost at the total of the rates specified in the preceding table and the following table instead of including it as part of the hydro-seeding operations. In areas where the compost is dry applied, all compost for that area shall be applied before the next operation.
C. Straw shall be applied at the rate of 2 tons per acre based on slope measurements. Incorporation of straw will not be required. Straw shall be distributed evenly without clumping or piling.
D. The following mixture in the proportions indicated shall be applied with hydro-seeding equipment:

Material	Pounds Per Acre (Slope Measurement)
Fiber	200
Compost	500
Commercial Fertilizer	100
Stabilizing Emulsion (Solids)	135

The ratio of total water to total stabilizing emulsion in the mixture shall be as recommended by the manufacturer.

Once straw work is started in an area, stabilizing emulsion applications shall be completed in that area on the same working day.

The proportions of erosion control materials may be changed by the Engineer to meet field conditions.

MEASUREMENT AND PAYMENT

Compost (erosion control) will be measured by the pound or ton, whichever unit is designated in the Engineer's Estimate The weight will be as determined by the Engineer from marked mass and sack count or from scale weighings.

The contract price paid per pound or ton for compost (erosion control) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in applying compost for erosion control, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.51 EROSION CONTROL (MULCH)

Erosion control (mulch) shall conform to the provisions for mulch in Section 20-4, "Highway Planting," of the Standard Specifications and these special provisions.

Erosion control (mulch) shall consist of applying mulch at the rate specified herein to areas as shown on the plans. Erosion control (mulch) shall extend to the edge of retaining walls, fences, dikes and paving, and to within 4 feet of the flow line of unpaved drainage ditches and 3 feet from the edge of paved drainage ditches. The finished surface after spreading mulch shall be approximately one inch below the top of adjacent curbs or pavement.

Erosion control (Mulch) shall be applied within 10 working days after imported topsoil has been placed; or, if the area on which the erosion control is to be placed is finished during the winter season as specified in "Water Pollution Control" of these special provisions, the erosion control (mulch) shall be applied immediately after placement of imported topsoil, unless otherwise directed by the Engineer.

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

MATERIALS

Materials shall conform to the provisions in Section 20-2, "Materials," of the Standard Specifications and the following:

Mulch shall be wood chips.

APPLICATION

Erosion control (mulch) shall be applied as follows:

A. Mulch shall be applied at a uniform depth of 4 inches.

MEASUREMENT AND PAYMENT

Erosion control (mulch) will be measured and paid for by the cubic meter in the same manner specified for mulch in Section 20-4.09, "Measurement," and Section 20-4.10, "Payment," of the Standard Specifications.

Erosion control (mulch) placed at locations other than as shown on the project plans or directed by the Engineer, in conformance with the Contractor's "Storm Water Pollution Prevention Plan," will not be measured and will be paid for as specified in "Water Pollution Control" of these special provisions.

The contract price paid per cubic yard for erosion control (mulch) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in placing erosion control (mulch), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.52 FIBER ROLLS

Fiber rolls shall conform to the details shown on the plans and these special provisions.

MATERIALS

Fiber rolls shall consist of one of the following:

A. Fiber rolls shall be constructed on the project site with manufactured blankets consisting of one material or a combination of materials consisting of wood excelsior, rice or wheat straw, or coconut fibers. Blankets shall measure approximately 6 to 8 feet wide by 65 to 95 feet in length. Wood excelsior material shall have individual fibers, 80 percent of which shall be 6 inches or longer in fiber length. Blankets shall have a photodegradable plastic netting or biodegradeable jute, sisal or coir fiber netting on at least one side. The blanket shall be rolled on the blanket's width and secured with jute twine spaced 6 feet apart along the roll for the full length and 6 inches from each end of the individual rolls The finished roll diameter shall be a minimum of 8 inches and a maximum of 10 inches and shall weigh not less than 0.25 pounds per linear foot. Overlapping of more than one blanket may be required to achieve the finished roll diameter. When overlapping is required, blankets shall be longitudinally overlapped 6 inches along the length of the fabric.

B. Fiber rolls shall be pre-manufactured rice or wheat straw, wood excelsior or coconut fiber rolls encapsulated within a photodegradable plastic or biodegradeable jute, sisal or coir fiber netting. Each roll shall be a minimum of 8 inches and a maximum of 10 inches in diameter, 10 feet to 20 feet in length and shall weigh not less than 1.08 pounds per linear foot. The netting shall have a minimum durability of one year after installation. The netting shall be secured tightly at each end of the individual rolls.

Stakes shall be fir or pine and shall be a minimum of 3/4 inch x 1-1/2 inches x 24 inches in length. Metal stakes may be used as an alternative. The Contractor shall submit a sample of the metal stake to the Engineer prior to installation. The tops of the metal stakes shall be bent over at a 90-degree angle. No additional compensation will be allowed for the use of a metal stake.

INSTALLATION

Fiber rolls shall be joined tightly together to form a single linear roll that is installed approximately parallel to the slope contour. Fiber rolls shall be installed prior to the application of other erosion control materials.

Furrows shall be constructed at a slight angle to the slope contour as shown on the plans, to a depth of 2 inches to 4 inches, and at a sufficient width to hold the fiber rolls.

Rolls shall be installed in the furrows with the first row installed 18 inches above the toe of slope. Individual rolls shall be placed with adjacent ends butted firmly to each other to create a continuous linear roll.

Stakes shall be installed 2 feet apart along the total length of the rolls and 12 inches from the end of each individual roll. Stakes shall be driven flush or a maximum of 2 inches above the roll.

MEASUREMENT AND PAYMENT

Fiber rolls will be measured by the lineal foot from end to end along the centerline of the installed rolls.

The contract price paid per lineal foot for fiber rolls shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing fiber rolls, complete in place, including stakes, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.53 IRRIGATION CROSSOVERS

Irrigation crossovers shall conform to the provisions in Section 20-5, "Irrigation Systems," of the Standard Specifications and these special provisions.

Materials shall be commercial quality unless otherwise specified. Materials containing asbestos fibers shall not be used.

Schedule 40 plastic pipe supply lines shall conform to the requirements in ASTM Designation: D1785.

Solvent cement and primer for PVC plastic pipe and fittings for supply line shall be of commercial quality specifically manufactured for use with rigid PVC plastic pipe and fittings and shall be applied separately. Solvent cement shall conform to the requirements of the local Air Quality Management District.

Conduit for irrigation crossovers shall conform to the provisions in this Section 20-2.16.

Conduit placed in open trenches shall be corrugated high density polyethylene pipe (CHDPE), corrugated steel pipe, corrugated aluminum pipe or acrylonitrile-butadiene-styrene (ABS) composite pipe.

Plastic Pipe (locator) shall be Schedule 40 white polyvinyl chloride (PVC) pipe.

Section 20-2.24, "Valve Boxes," of the Standard Specifications is amended to read:

Valve boxes and valve box covers shall be precast portland cement concrete, fiberglass or reinforced plastic and shall conform to the special provisions. Valve box covers shall be marked "WATER" in cast-in-place letters not less than one inch high.

Valve boxes shall not have side openings.

Irrigation crossovers shall include conduits, water line crossovers, sprinkler control crossovers and appurtenances. Sizes of the conduits, water line crossovers and sprinkler control crossovers shall be as shown on the plans or as specified in the special provisions.

Section 20-5.03B "Conduit for Water Line Crossovers and Sprinkler Control Crossovers," of the Standard Specifications is renamed to "Conduit for Irrigation Crossover".

The installation of conduit for irrigation crossovers shall conform to the provisions in this Section 20-5.03B.

Conduits for irrigation crossovers shall conform to the provisions in Section 20-2.16, "Conduit," of the Standard Specifications.

Quantities of galvanized steel pipe and plastic pipe supply lines and irrigation lines, and the quantities of corrugated high density polyethylene pipe conduit, to be paid for by the linear foot will be determined from the slope length designated by the Engineer. Pipe and conduit placed in excess of the lengths designated will not be paid for.

Full compensation for sprinkler control crossovers, water line crossovers, pavement markers, pull wires, pull boxes and appurtenances, and for pressure testing the water line crossover in the conduit shall be considered as included in the contract prices paid per linear foot for the various sizes and types of conduit for irrigation crossovers in which the sprinkler control crossovers and water line crossovers are installed and no separate payment will be made therefor.

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

Splices for low voltage control and neutral conductors shall conform to the provisions in Sections 86-2.09C, "Connectors and Terminals," 86-2.09D, "Splicing and Terminations," and 86-2.09E, "Splice Insulation," except "Method B" splice insulation, as shown on the plans, shall not be used.

Conductors shall be buried directly in the ground, except as follows:

> Conductors shall be installed in electrical conduit when conductors are to be surface mounted, installed in or on bridge structures, installed under paved areas, installed in conduit for water line crossovers and sprinkler control crossovers, or placed in concrete. Surface-mounted conduits, conduits installed in or on bridge structures; conduits installed in concrete; and conduits installed by jacking or drilling shall be the rigid steel type. All other electrical conduit, including electrical conduit installed in irrigation crossover conduits for water line crossovers and sprinkler control crossovers and conduits under paved areas shall be non-metallic.

When no conductors are installed in electrical conduits, pull boxes for irrigation crossovers shall be installed on a foundation of compacted soil.

10-1.54 IMPORTED TOPSOIL

Imported topsoil shall conform to the provisions in Section 20-2, "Materials," and Section 20-3, "Erosion Control," of the Standard Specifications. The finished surface after spreading shall be approximately 2 inches below top of adjacent curbs and pavement.

Imported topsoil shall be applied immediately after all other contract work in the area has been completed, and except for erosion control (mulch), which shall be applied as a last item of work, unless otherwise directed by the Engineer.

10-1.55 WATER METERS

Water meters for the irrigation systems will be furnished and installed by the serving utility at the locations shown on the plans.

Upon receipt of a written request from the Contractor, the Engineer will make arrangements with the serving utility to install the water meters. The State will pay the costs and fees charged by the serving utility for the installations.

10-1.56 AGGREGATE SUBBASE

Aggregate subbase shall be Class 4 and shall conform to the provisions in Section 25, "Aggregate Subbases," of the Standard Specifications and these special provisions.

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

> Aggregate for Class 4 aggregate subbase shall be clean and free from organic matter and other deleterious substances and shall conform to the grading and quality requirements set forth in the special provisions. Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material shall not exceed 50 percent of the total volume of the aggregate used.

The restriction that the amount of reclaimed material included in Class 4 aggregate subbase not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 4 aggregate subbase may include reclaimed glass. Aggregate subbase incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate subbase.

The percentage composition by mass of Class 4 aggregate subbase shall conform to the following grading requirements:

Grading Requirements (Percentage Passing)

Sieve Sizes	Operating Range	Contract Compliance
----	----	----
----	----	----
2.5 inch	100	100
No.30	30-65	25-70
No.200	0-15	0-18

Class 4 aggregate subbase shall also conform to the following quality requirements:

Quality Requirements

Test	Operating Range	Contract Compliance
Sand Equivalent	21 Min.	18 Min.
Resistance (R-value)	----	50 Min.

The provisions of the last 4 paragraphs in Section 25-1.02A, "Class 1, Class 2, and Class 3 Aggregate Subbases," of the Standard Specifications shall apply to Class 4 aggregate subbase.

Regardless of the class of aggregate subbase supplied under the provisions of this section, payment for all aggregate subbase will be made as Class 4 aggregate subbase.

10-1.57 AGGREGATE BASE

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

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

> Aggregate for Class 2 aggregate base shall be free from organic matter and other deleterious substances, and shall be of such nature that it can be compacted readily under watering and rolling to form a firm, stable base. Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material shall not exceed 50 percent of the total volume of the aggregate used.
>
> The aggregate shall not be treated with lime, cement or other chemical material before the Durability Index test is performed. Untreated reclaimed asphalt concrete and portland cement concrete will not be considered to be treated with lime, cement or other chemical material for purposes of performing the Durability Index test.

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

> Aggregate for Class 3 aggregate base shall conform to the requirements set forth in the special provisions. Aggregate may include material processed from reclaimed asphalt concrete, portland cement concrete, lean concrete base, cement treated base or a combination of any of these materials. The amount of reclaimed material shall not exceed 50 percent of the total volume of the aggregate used.
>
> The grading of aggregate for Class 3 aggregate base shall, at the option of the Contractor, conform either to the grading specified in the special provisions or to either the 1-1/2 inch maximum or the 3/4 inch maximum grading for Class 2 aggregate base specified in Section 26-1.02A, "Class 2 Aggregate Base." Once a grading is selected, the grading shall not be changed without written approval of the Engineer.

The restriction that the amount of reclaimed material included in Class 3 aggregate base not exceed 50 percent of the total volume of the aggregate used shall not apply. Aggregate for Class 3 aggregate base may include reclaimed glass. Aggregate base incorporating reclaimed glass shall not be placed at locations where surfacing will not be placed over the aggregate base.

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

Grading Requirements (Percentage Passing)

Sieve Sizes	0.75 inch Maximum		1.5 inch Maximum	
	Operating Range	Contract Compliance	Operating Range	Contract Compliance
2.0 inch			100	100
1.5 inch			90-100	87-100
1.0 inch	100	100	-----	-----
0.75 inch	90-100	87-100	50-85	45-90
No.4	35-60	30-65	25-45	20-50
No.30	10-30	5-35	10-25	6-29
No.200	2-11	0-14	2-11	0-14

Quality Requirements		
Tests	Operating Range	Contract Compliance
Sand Equivalent	25 min.	22 min.
Resistance(R-value)	----	78 min.

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

10-1.58 TREATED PERMEABLE BASE

Treated permeable base shall be asphalt treated and shall conform to the provisions in Section 29, "Treated Permeable Bases," of the Standard Specifications.

10-1.59 ASPHALT CONCRETE

Asphalt concrete shall be Type A and shall conform to the provisions in Section 39, "Asphalt Concrete," of the Standard Specifications and these special provisions.

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

> Asphalt binder to be mixed with aggregate shall be a steam-refined paving asphalt conforming to the provisions in Section 92, "Asphalts," and shall be of the grade designated in the special provisions or as determined by the engineer.
>
> The amount of asphalt binder to be mixed with the aggregate for asphalt concrete (except Open Graded asphalt concrete) and asphalt concrete base will be determined by the Engineer in conformance with the requirements in California Test 367 using the samples of aggregates furnished by the Contractor in conformance with the provisions in Section 39-3.03, "Proportioning." The amount of asphalt binder to be mixed with the aggregate for Open Graded asphalt concrete will be determined by the Engineer in conformance with the requirements in California Test 368, using the samples of aggregates furnished by the Contractor in conformance with the provisions in Section 39-3.03.

The second paragraph in Section 39-3.02, "Drying," of the Standard Specifications is amended to read:

> Drying shall continue for a sufficient time and at a sufficiently high temperature that, at the time of spreading, the moisture content of the completed mixture shall not exceed one percent. Moisture content will be determined by California Test 310 or 370.

The fifth, sixth, seventh, and eighth paragraphs in Section 39-3.03, "Proportioning," of the Standard Specification shall not apply.

The second paragraph in Section 39-3.05, "Asphalt Concrete and Asphalt Concrete Base Storage," of the Standard Specifications is amended to read:

> Storage silos shall be equipped with a surge-batcher sized to hold a minimum of 4000 pounds of material. A surge-batcher consists of equipment placed at the top of the storage silo which catches the continuous delivery of the completed mix and changes it to individual batch delivery and prevents the segregation of product ingredients as the completed mix is placed into storage. The surge-batcher shall be center loading and shall be thermally insulated or

heated or thermally insulated and heated to prevent material buildup. Rotary chutes shall not be used as surge-batchers.

The surge-batcher shall be independent and distinct from conveyors or chutes used to collect or direct the completed mixture being discharged into storage silos and shall be the last device to handle the material before it enters the silo. Multiple storage silos shall be served by an individual surge-batcher for each silo. Material handling shall be free of oblique movement between the highest elevation (conveyor outfall) and subsequent placement in the silo. Discharge gates on surge-batchers shall be automatic in operation and shall discharge only after a minimum of 4000 pounds of material has been collected and shall close before the last collected material leaves the device. Discharge gate design shall prevent the deflection of material during the opening and closing operation.

The second paragraph in Section 39-6.02, "Spreading," of the Standard Specifications is amended to read:

In advance of spreading asphalt concrete over an existing base, surfacing or bridge deck, if there is a contract item for asphalt concrete (leveling) or if ordered by the Engineer, asphalt concrete shall be spread by any mechanical means that will produce a uniform smoothness and texture. Asphalt concrete (leveling) shall include, but is not limited to, the filling and leveling of irregularities and ruts. Asphalt concrete used to change the cross slope or profile of an existing surface shall not be considered as asphalt concrete (leveling).

The amount of asphalt binder used in asphalt concrete placed in dikes, gutters, gutter flares, overside drains and aprons at the ends of drainage structures shall be increased one percent by mass of the aggregate over the amount of asphalt binder determined for use in asphalt concrete placed on the traveled way.

The miscellaneous areas to be paid for at the contract price per square yard for place asphalt concrete (miscellaneous area), in addition to the prices paid for the materials involved, shall be limited to ditches and asphalt concrete required to bring parking lot trench backfill to existing grade as shown on the plans.

In median areas adjacent to slotted median drains, each layer of asphalt concrete shall not exceed 3/8 inch, maximum compacted thickness.

Aggregate for asphalt concrete dikes shall be in conformance with the provisions for 3/8 inch 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.

If the finished surface of the asphalt concrete on Route 80 traffic lanes, ramps, or on any local street or any parking area does not meet the specified surface tolerances, the surfacing shall be brought within tolerance by either (1) abrasive grinding (with fog seal coat on the areas which have been ground), (2) removal and replacement or (3) placing an overlay of asphalt concrete. The method will be selected by the Engineer. The corrective work shall be at the Contractor's expense.

If abrasive grinding is used to bring the finished surface to the specified surface tolerances, additional grinding shall be performed, as necessary, to extend the area ground in each lateral direction so that the lateral limits of grinding are at a constant offset from, and parallel to, the nearest lane line or pavement edge, and in each longitudinal direction so that the grinding begins and ends at lines normal to the pavement centerline, within any ground area. Ground areas shall be neat rectangular areas of uniform surface appearance. Abrasive grinding shall conform to the provisions in the first paragraph and the last 4 paragraphs in Section 42-2.02, "Construction," of the Standard Specifications.

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 30 feet. 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 30 feet long. The end of the screed farthest from centerline shall be controlled by an automatic transverse slope device set to reproduce the cross slope designated by the Engineer.

When paving contiguously with previously placed mats, the end of the screed adjacent to the previously placed mat shall be controlled by a sensor that responds to the grade of the previously placed mat and will reproduce the grade in the new mat within a 0.01 foot 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.

A drop-off of more than 0.15-foot will not be allowed at any time between adjacent lanes open to public traffic.

Where the existing pavement is to be widened by constructing a new structural section adjacent to the existing pavement, the new structural section shall be completed to match the elevation of the edge of the existing pavement at each location prior to spreading and compacting asphalt concrete over the adjacent existing pavement.

Shoulders or median borders adjacent to a lane being paved shall be surfaced prior to opening the lane to public traffic.

Asphalt concrete surfacing shall be placed on existing surfacing, including curve widening, chain control lanes, turnouts, left turn lanes, and public and private road connections shown on the plans, unless otherwise directed by the Engineer.

Additional asphalt concrete surfacing material shall be placed along the edge of the surfacing at road connections and private drives, hand raked, if necessary, and compacted to form smooth tapered conforms. Full compensation for furnishing all labor and tools and for doing all the work necessary to hand rake these conforms shall be considered as included in the contract prices paid per ton for the various items of asphalt concrete surfacing involved and no additional compensation will be allowed therefor.

10-1.60 PILING

Piling shall conform to the provisions in Section 49, "Piling," of the Standard Specifications, and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor as provided for in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Rock cores are available for viewing at the Transportation Laboratory.

Attention is directed to "Welding Quality Control" of these special provisions.

Attention is directed to "Public Safety," of these special provisions. Before performing any pile handling or pile installation operation at any location that is closer than the length of the pile being handled or installed to the edge of any area open to public traffic or public use, the Contractor shall submit to the Engineer, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications, a detail plan of the measures that will be employed to provide for the safety of traffic and the public.

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

> At the Contractor's option, the Contractor may conduct additional foundation investigation, including installing and axial load testing additional non-production indicator piling. The Engineer shall approve locations of additional foundation testing. The Contractor shall notify the Engineer at least 5 working days prior to beginning additional foundation investigation.
>
> Additional foundation investigation shall be completed prior to requesting revised specified pile tip elevations or modification to the installation methods specified herein. Revisions to specified tip elevations and modifications to the specified installation methods will be subject to the provisions in Section 5-1.14, "Cost Reduction Incentive."
>
> Modification to the specified installation methods and specified pile tip elevation will not be considered at locations where lateral load demands control design pile tip elevations or when the plans state that specified pile tip elevation shall not be revised.
>
> The pile structural capacity design is based on the nominal strength as defined in Caltrans Bridge Design Specifications (Article 8.1.3) or the nominal resistance as defined in the Load Resistance Factor Design Bridge Design Specifications (Article 1.3.2.1). The nominal resistance of the pile, as shown on the plans, is the design capacity required to resist the factored axial load demands.
>
> Indicator compression pile load testing shall conform to the requirements in ASTM Designation: D 1143. The pile shall sustain the first compression test load applied which is equal to the nominal compression resistance, as shown on the plans, with no more than 0.5-inch total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of compression load testing.
>
> Indicator tension pile load testing shall conform to the requirements in ASTM Designation: D 3689. The loading apparatus described as "Load Applied to Pile by Hydraulic Jack(s) Acting at One End of Test Beam(s) Anchored to the Pile" shall not be used. The pile shall sustain the first tension test load applied which is equal to the nominal

tension resistance, as shown on the plans, with no more than 0.5-inch total vertical movement at the top of the pile measured relative to the top of the pile prior to the start of tension load testing.

Indicator piling shall be removed in conformance with the 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.

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

The Contractor shall be responsible for furnishing piling of sufficient length to obtain the penetration and bearing value required.

Section 49-1.04, "Test Piles," of the Standard Specifications is amended to read:

49-1.04 Load Test Piles.—When load test piles and anchor piles are shown on the plans or specified in the special provisions for a structure, the loading tests using those piles shall be completed before the remaining piles for that structure or specified control location are drilled, cast, cut to length or driven.

Load test piles shall be installed with the same type of equipment that is to be used for installation of foundation piles.

Load test piles which are shown on the plans or specified in the special provisions shall conform to the requirements for piling as specified in these specifications and, unless otherwise shown, shall be so located that they may be cut off and become a part of the completed structure.

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

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

High strength threaded steel rods shall conform to the provisions for bars in Section 50-1.05, "Prestressing Steel," except Type II bars shall be used.

High strength steel plates shall conform to the requirements in ASTM Designation: A 709, Grade 50.

Anchor nuts shall conform to the provisions in the second paragraph in Section 50-1.06, "Anchorages and Distribution."

The Contractor, at the Contractor's expense, may use additional cement or may use Type III cement in the concrete for the load test and anchor piles.

Testing of load test piles shown on the plans and specified in the special provisions will be performed by the Engineer without cost to the Contractor. The loading tests will be made when the concrete in the load test and anchor piles has developed a compressive strength of at least 2,000 pounds per square inch. The Engineer will require not more than 5 working days to perform each load test.

Should the Engineer fail to complete the load tests within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in load testing of piles, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays."

The Contractor shall furnish labor, materials, tools, equipment, and incidentals as required to assist the Engineer in the installation, operation and removal of State-furnished steel load test beams, State-furnished jacks, bearing plates, drills, and other test equipment. This work will be paid for as extra work as provided in Section 4-1.03D.

The first and second paragraphs in Section 49-1.05, "Driving Equipment," of the Standard Specifications are amended to read:

49-1.05 Driving Equipment.—Driven piles shall be installed with impact hammers that are approved in writing by the Engineer. Impact hammers shall be steam, hydraulic, air, or diesel hammers. Impact hammers shall develop sufficient energy to drive the piles at a penetration rate of not less than 1/8 inch per blow at the specified bearing value.

Vibratory hammers shall not be used for installation of piles.

Hammers with an external combustion engine that are not single action, shall have a transducer that records ram velocity.

Double acting diesel hammers with internal combustion engines shall have a transducer that records bounce chamber pressure.

For hammers with no visual way of observing the ram stroke, a printed readout showing hammer energy during driving operation shall be provided to the Engineer by the Contractor.

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

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 Section 49-1.06, "Predrilled Holes," of the Standard Specifications is amended to read:

49-1.06 Predrilled Holes.—Piles, to be driven through embankment constructed by the Contractor, shall be driven in holes predrilled or spudded through the embankment when the depth of new embankment at the pile location is in excess of 5 feet. The hole shall have a diameter of not less than the greatest dimension of the pile cross section plus 6 inches. After driving the pile the space around the pile shall be filled to ground surface with dry sand or pea gravel.

Material resulting from predrilling holes shall be disposed of as provided in Section 19-2.06, "Surplus Material. "

At the option of the Contractor, oscillators may be used to install piles or permanent casings.

The first sentence of the first paragraph in Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications is amended to read:

49-1.08 Bearing Value and Penetration.—Except for piles to be load tested, driven piles shall be driven to a bearing value of not less than the design loading shown on the plans unless otherwise specified in the special provisions or permitted in writing by the Engineer.

The third through seventh paragraphs of Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications are amended to read:

The bearing values for driven piles shall be determined from the following formula in which "P" is the safe load in pounds, "E" is the manufacturer's rating for foot-pounds of energy developed by the hammer, and "s" is the penetration per blow in inches, averaged over the last few blows.

P=

The penetration per blow "s" shall be measured only when there is no appreciable rebound of the hammer and only when the last blow is struck on a sound pile head or driving block. The penetration per blow "s" may be measured either during initial driving or during redriving following a set period as determined by the Engineer.

Section 49-1.10, "Load Testing," of the Standard Specifications is deleted.

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

Untreated and treated timber piles shall be of Douglas fir or Southern Pine timber and shall be clean peeled.

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

49-5.01 Description.—Steel piles shall include structural shape piles and pipe piles. Structural shape steel piles shall be of the rolled section shown on the plans or of the section specified in the special provisions and shall be structural steel conforming to the specifications of ASTM Designation: A 36/A 36M, or at the option of the Contractor, structural steel conforming to the specifications of ASTM Designation: A 572/A 572M.

Steel pipe piles shall conform to the following requirements:

1) Steel pipe piles less than 14 inches in diameter shall conform to the requirements in ASTM Designation: A 252, Grade 2 or 3.
2) Steel pipe piles 14 inches 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 and shall conform to the requirements in AWS D1.1 and amendments to AWS D1.1 in these specifications and the special provisions. Incomplete penetration welds and defective welds of steel pipe piles shall be repaired or restored to achieve complete joint penetration groove welds.

Steel piles shall not be joined by welded lap splicing.

The manufacturer or fabricator of steel piles shall furnish a Certificate of Compliance stating that the piles being supplied conform to these specifications and to the special provisions. The Certificate of Compliance shall include test reports for tensile, chemical, and any specified nondestructive tests. Samples for testing shall be taken from the base metal, steel, coil or from the manufactured or fabricated piles.

Section 49-5.02, "Splicing," of the Standard Specifications is amended to read:

49-5.02 Splicing.—Steel pile splices shall conform to the requirements in AWS D 1.1 and these special provisions. Structural shape steel piling splices shall be complete joint penetration groove welds. Steel pipe pile splices that are made at a permanent manufacture or fabrication facility, and that are made prior to furnishing the Certificate of Compliance shall be complete penetration welds. Steel pipe pile splices that are made in the field shall be complete joint penetration groove welds.

Ends of steel pipe piling to be spliced that have been damaged during driving shall be removed to a sound and uniform section conforming to the tolerances for diameter, edge alignment and roundness required to meet the steel pile splice welding requirements. Pipe ends shall be field cut using automated guided cutting equipment. Manual flame cutting shall not be used.

Difficult pile installation at the locations listed in the following table is anticipated due to the reasons shown in the following table:

Location	Reason for difficult pile installation
Bridge No. 34-0127S	The presence of hazardous and contaminated materials, caving soils, ground water, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0128K	e presence of hazardous and contaminated materials, caving soils, ground water, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0151	The presence of hazardous and contaminated materials, caving soils, ground water, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0149	The presence of hazardous and contaminated materials, caving soils, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0150	The presence of hazardous and contaminated materials, caving soils, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0148	The presence of hazardous and contaminated materials, caving soils, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0152	The presence of hazardous and contaminated materials, caving soils, ground water, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. RW-101	The presence of hazardous and contaminated materials, the requirements of pile embedment into rock, sound control and traffic control.
Bridge No. 34-0088	The presence of hazardous and contaminated materials, soft bay mud, caving soils, ground water, subsurface debris, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0126R	The presence of hazardous and contaminated materials, soft bay mud, caving soils, ground water, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0126L	The presence of, hazardous and contaminated materials, soft bay mud, caving soils, ground water, subsurface debris, abandoned footing slow overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge No. 34-0118R	The presence of hazardous and contaminated materials, subsurface debris, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.
Bridge Nos. 34-0129C and 34-0138C	The presence of hazardous and contaminated materials, soft bay mud, caving soils, ground water, subsurface debris, abandoned footings, low overhead clearance, underground utilities, overhead utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.

Should obstructions to installing be encountered, the Contractor shall provide special cutting tips or heavier pile sections, or shall subexcavate below the bottom of footing, or take other measures to prevent damage to the pile during installation. Cutting tips shall not create a hole larger than the diameter of the pile. Full compensation for providing special tips, heavier sections, or for subexcavating or employing other measures to prevent damage to the piles shall be considered as included in the contract price paid for the various contract items of piling work involved, and no additional compensation will be allowed therefor.

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.

With the top 3 pile diameters, piles shall not exceed the diameter shown on the plans.

Cast-in-drilled-hole concrete piling (rock socket) shall consist of drilling or coring sockets in bedrock to the depths or lengths specified and filling with reinforced concrete in conformance with the details shown on the plans and these special provisions. Cored holes, if used, shall conform to the provisions of Section 49-4.03, "Drilled Holes," of the Standard Specifications.

Permanent steel casings are required at the locations shown on the plans. Where the plans indicate that permanent steel casings are extending into bedrock, the Contractor shall extend the cast-in-drilled-hole concrete piling, including bar reinforcing steel and permanent steel casing to achieve the required embedment into bedrock. The Contractor shall extend the specified tip elevation of the cast-in-drilled-hole concrete piling (rock socket) to maintain the length in bedrock as shown on the plans. The Contractor shall also extend the inspection pipes to 4 inches clear of the bottom of the drilled or cored hole.

Section 49-4.01, "Description," of the Standard Specifications is amended to read:

49-4.01 Description.—Cast-in-place concrete piles shall consist of one of the following:

1. Steel shells driven permanently to the required bearing value and penetration and filled with concrete.
2. Steel casings installed permanently to the required penetration and filled with concrete.
3. Drilled holes filled with concrete.
4. 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 3500 pounds per square inch. At the option of the Contractor, the combined aggregate grading for the concrete shall be either the 1-inch maximum grading, the 1/2-inch maximum grading, or the 3/8-inch 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."

Cast-in-place concrete piles shall be constructed so that the excavation methods and the concrete placement procedures shall provide for placing the concrete against undisturbed material in a dry or dewatered hole.

The concrete filling for cast-in-place concrete piles shall be dense and homogeneous. The methods used to place the concrete shall prevent segregation. Concrete placed in steel shells, dry drilled holes or dewatered drilled holes shall not be permitted to fall from a height greater than 8 feet without the use of adjustable length pipes or tubes unless the flow of concrete is directed into the center of the hole using a hopper and not allowed to strike the reinforcement, reinforcement bracing and other objects in the hole.

Concrete filling for cast-in-place concrete piles shall be vibrated in the upper 15 feet of the pile.

Section 51-1.10, "Concrete Deposited Under Water," shall not apply to cast-in-drilled-hole concrete piling.

After placing concrete, the temporarily exposed surfaces of the cast-in-place concrete piles shall be cured in conformance with the provisions in Section 90-7.03, "Curing Structures."

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

49-4.03 Drilled Holes.— Except for cast-in-place concrete piling for soundwalls and retaining walls, when cast-in-place concrete piling is less than 24 inches in diameter, the Contractor may propose to increase the diameter and revise the pile tip elevation. The Contractor may propose to increase the diameter of cast-in-place concrete piling for soundwalls and retaining walls, but the pile tip elevations shall not be revised. No additional compensation or delays will be made for the Contractor's use of increased diameter cast-in-place concrete piling.

The axis of the hole shall not deviate from plumb more than 1 1/2 inches per 10 feet of length.

Care shall be taken during excavation to prevent disturbing the foundation material surrounding the pile. Equipment or methods used for excavating holes shall not cause quick soil conditions or cause scouring or caving of the hole. After excavation is begun, the pile shall be constructed expeditiously in order to prevent deterioration of the surrounding

foundation material from air slaking or from the presence of water. Deteriorated foundation material, including material that has softened, swollen or degraded, shall be removed from the sides and the bottom of the hole and shall be disposed of. The bottom of the drilled hole shall be cleaned just before placing reinforcement or concrete to remove any loose sand, gravel, dirt, and drill cuttings.

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

Water that has infiltrated the hole shall be removed before placing concrete therein. Fluvial or drainage water shall not be permitted to enter the hole.

Temporary steel casings shall be furnished and placed tight in the hole where shown on the plans and where necessary to control water or to prevent quick soil conditions or caving of the hole. Temporary casing shall be watertight and of sufficient strength to withstand the loads from installation, removal, lateral concrete pressures and earth pressures. The casing shall be non-corrugated and the surfaces shall be smooth, clean and free from hardened concrete. The casing shall be removed while the concrete is being placed. In a dewatered hole the concrete in the casing shall be maintained at a level at least 60 inches above the bottom of the casing or at a level above the bottom of the casing adequate to prevent displacement of the concrete by material from outside the casing, whichever is greater. Casing may be vibrated or hammered when required to assist in removal of the casing from the hole, to prevent lifting of the reinforcement and to prevent concrete contamination. The withdrawal of casings shall not leave voids or cause contamination of the concrete with soil or other materials.

Portions of the holes may be enlarged, backfilled with slurry cement backfill, concrete or other material, and redrilled to the specified diameter to control caving. Backfill material at enlarged piles shall be chemically compatible with concrete and steel, shall be drillable and shall have the necessary strength required for the conditions.

Drill cuttings shall be disposed of in conformance with the provisions in Section 19-2.06, "Surplus Materials." Material resulting from placing concrete in piles shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise permitted in writing by the Engineer.

The reinforcement shall be placed and secured symmetrically about the axis of the pile and shall be securely blocked to clear the sides of the hole.

Reinforcement for cast-in-drilled-hole concrete piling with increased diameters and revised tip elevations shall conform to the following:

The size and number of the reinforcing bars, the percentage of bars required to extend to the pile tip and the size and pitch of the spiral reinforcement shall conform to the details shown on the plans for the original piles.

The required length of the spiral reinforcement and of any reinforcing bars which do not extend to the pile tip shall be that length which would have been required for the original specified or ordered tip elevation.

The diameter of the spiral reinforcement shall either remain the same as required for the original pile or be increased to provide not less than the concrete cover required for the original pile. Positive means shall be provided to ensure that the reinforcement is centered in the pile.

The third paragraph of Section 49-4.04, "Steel Shells," of the Standard Specifications is amended to read:

Steel shells shall conform to the requirements for steel pipe piles specified in Section 49-5, "Steel Piles."

The second and third paragraphs of Section 49-4.05, "Inspection," of the Standard Specifications are amended to read:

Driven shells and dewatered drilled holes shall be clean and free of water before reinforcement and concrete are placed.

The Contractor shall have available at all times a suitable light for inspecting the entire length of the shells or dewatered holes before placing the reinforcement and concrete.

The provisions of "Welding Quality Control" of these special provisions shall not apply to temporary steel casings.

Cast-in-drilled-hole concrete piles 24 inches 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 3 1/2 inches. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 564 pounds of cement per cubic yard.

Gradations proposed by the Contractor for cast-in-drilled-hole concrete piling shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Sizes	Limits of Proposed Gradation
1 inch x No. 4	3/4 inch	52 - 85
1 inch x No. 4	3/8 inch	15 - 38
1/2 inch x No. 4	3/8 inch	40 - 78
3/8 inch x No. 8	3/8 inch	50 - 85

The grading requirements for coarse aggregates for cast-in-drilled-hole concrete piling are shown in the following table for each size of coarse aggregate:

Sieve Sizes	Percentage Passing Primary Aggregate Nominal Sizes					
	1" x No. 4		1/2" x No. 4		3/8" x No. 4	
	Operating Range	Contract Compliance	Operating Range	Contract Compliance	Operating Range	Contract Compliance
1 1/2"	100	100				
1"	88 - 100	86 - 100				
3/4"	X ± 15	X ± 22	100	100		
1/2"			82 - 100	80 - 100	100	100
3/8"	X ± 15	X ± 22	X ± 15	X ± 22	X ± 15	X ± 20
No. 4	0 - 16	0 - 18	0 - 15	0 - 18	0 - 25	0 - 28
No. 8	0 - 6	0 - 7	0 - 6	0 - 7	0 - 6	0 - 7

The combined aggregate grading for the 1/2" x No. 4 primary aggregate nominal size or for the 3/8" x No. 8 primary aggregate nominal size shall be within the following limits:

Grading Limits of Combined Aggregate		
	Percentage Passing	
Sieve Sizes	1/2" Maximum	3/8" Maximum
3/4-inch	100	100
1/2-inch	90 - 100	90 - 100
3/8-inch	55 - 86	55 - 86
No. 4	45 - 63	45 - 63
No. 8	35 - 49	35 - 49
No. 16	25 - 37	25 - 37
No. 30	15 - 25	15 - 25
No. 50	5 - 15	5 - 15
No. 100	1 - 8	1 - 8
No. 200	0 - 4	0 - 4

The combined aggregate grading used in concrete for cast-in-drilled-hole concrete piling shall be either the 1" maximum grading, the 1/2" maximum grading, or the 3/8" maximum grading:

Grading Limits of Combined Aggregate			
	Percentage Passing		
Sieve Sizes	1" Max.	1/2" Max.	3/8" Max.
1 1/2"	100		
1"	90 - 100		
3/4"	55 - 100	100	100
1/2"		90 - 100	100
3/8"	45 - 75	55 - 86	50 - 100
No. 4	35 - 60	45 - 63	45 - 63
No. 8	27 - 45	35 - 49	35 - 49
No. 16	20 - 35	25 - 37	25 - 37
No. 30	12 - 25	15 - 25	15 - 25
No. 50	5 - 15	5 - 15	5 - 15
No. 100	1 - 8	1 - 8	1 - 8
No. 200 75-µm	0 - 4	0 - 4	0 - 4

All references in the Standard Specifications to the aggregate grading tables in Section 90-3, "Aggregate Gradings," of the Standard Specifications, shall also apply to the aggregate grading tables specified herein.

Slurry shall be commercial quality mineral or synthetic drilling slurry and shall conform to the requirements of these special provisions.

Water for slurry shall conform to the provisions in Section 90-2.03, "Water," of the Standard Specifications and these special provisions. Natural ground water in the drilled hole may be used for slurry when approved by the Engineer.

Slurry shall not weaken the bond between the concrete and both the reinforcement and the foundation material at the sides of the excavation.

The Contractor shall sample and test all slurry in the presence of the Engineer, unless otherwise directed. The date, time, names of the persons sampling and testing the slurry, and results of the tests shall be recorded by the Contractor and shall be approved by the Engineer before concrete is placed. A copy of slurry test results shall be delivered to the Engineer at the completion of each pile.

SLURRY.--

Mineral--Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken from the slurry tank and from near the bottom of the hole have consistent specified properties. Subsequently, slurry shall be sampled at least twice per shift as long as the specified properties remain consistent.

Slurry that is not recirculated in the drilled hole shall be sampled and tested at least every two hours after beginning its use. The slurry shall be sampled midheight and near the bottom of the hole. Slurry shall be recirculated when tests show that the samples taken from midheight and near the bottom of the hole do not have consistent specified properties.

Slurry shall also be sampled and tested prior to final cleaning of the bottom of the hole and again just prior to placing concrete. Samples shall be taken from midheight and near the bottom of the hole. Cleaning of the bottom of the hole and placement of the concrete shall not start until tests show that the samples taken from midheight and near the bottom of the hole have consistent specified properties.

Mineral slurry shall be tested for conformance to the requirements shown in the following table:

MINERAL SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - before placement in the drilled hole - during drilling - prior to final cleaning - immediately prior to placing concrete	 64.3* to 69.1* 64.3* to 75.0*	 Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/quart) bentonite attapulgite	 28 to 50 28 to 40	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - immediately prior to placing concrete	 less than or equal to 4.0	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40 degrees Fahrenheit (4 degrees Celsius) when tested.		

Any caked slurry on the sides or bottom of hole shall be removed before placing reinforcement. If concrete is not placed immediately after placing reinforcement, the reinforcement shall be removed and cleaned of slurry, the sides of the drilled hole cleaned of caked slurry, and the reinforcement again placed in the hole for concrete placement.

Synthetic.--Synthetic slurries shall be used in conformance with the manufacturer's recommendations and these special provisions. The following synthetic slurries may be used:

PRODUCT	MANUFACTURER
SlurryPro CDP	KB Technologies Ltd. Suite 216 735 Broad Street Chattanooga, TN 37402 (800) 525-5237
Super Mud	PDS Company 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 (pcf) - during drilling - prior to final cleaning - just prior to placing concrete	 less than or equal to 67.0* less than or equal to 64.0*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/quart) - during drilling -prior to final cleaning - just prior to placing concrete	 50 to 120 less than or equal to 70	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	6 to 11.5	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning - just prior to placing concrete	 less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40 degrees Fahrenheit (4 degrees Celsius) when tested.		

Super Mud synthetic slurries shall be tested for conformance to the requirements shown in the following table:

SUPER MUD PDS Company		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - prior to final cleaning - just prior to placing concrete	less than or equal to 64.0*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/quart) - during drilling - prior to final cleaning - just prior to placing concrete	32 to 60 less than or equal to 60	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40 degrees Fahrenheit (4 degrees Celsius) when tested.		

Shore Pac GCV synthetic slurries shall be tested for conformance to the requirements shown in the following table:

Shore Pac GVC CETCO Drilling Products Group		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - prior to final cleaning - just prior to placing concrete	less than or equal to 64.0*	Mud Weight (Density) API 13B-1 Section 1
Viscosity (seconds/quart) - during drilling - prior to final cleaning - just prior to placing concrete	33 to 74 less than or equal to 57	Marsh Funnel and Cup API 13B-1 Section 2.2
pH	8 to 10.0	Glass Electrode pH Meter or pH Paper
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, slurry may be used in salt water, and the allowable densities may be increased up to 2 pcf. Slurry temperature shall be at least 40 degrees Fahrenheit (4 degrees Celsius) when tested.		

Water.--At the option of the Contractor water may be used as slurry when casing is used for the entire length of the drilled hole.

Water slurry shall be tested for conformance to the requirements shown in the following table:

WATER SLURRY		
PROPERTY	REQUIREMENT	TEST
Density (pcf) - prior to final cleaning - just prior to placing concrete	63.5 *	Mud Weight (Density) API 13B-1 Section 1
Sand Content (percent) - prior to final cleaning -just prior to placing concrete	less than or equal to 0.5	Sand API 13B-1 Section 5
*When approved by the Engineer, salt water slurry may be used, and the allowable densities may be increased up to 2 pcf..		

Construction.--The Contractor shall submit a placing plan to the Engineer for approval prior to producing the test batch for cast-in-drill hole piling and at least 10 working days prior to constructing piling. The plan shall include complete description, details, and supporting calculations as listed below:

Requirements for all cast-in-drilled hole piling:

1. Concrete mix design, certified test data, and trial batch reports.
2. Drilling or coring methods and equipment.
3. Proposed 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.
9. Methods for controlling the size of the piling within the top 3 pile diameters.

Additional requirements when concrete is placed under slurry:

1. Concrete batching, delivery, and placing systems with time schedules and capacities therefor. Time schedules shall include the time required for each concrete placing operation at each pile.
2. Concrete placing rate calculations. When requested by the Engineer, calculations shall be based on the initial pump pressures or static head on the concrete and losses throughout the placing system, including anticipated head of slurry and concrete to be displaced.
3. Suppliers test reports on the physical and chemical properties of the slurry and any proposed slurry chemical additives including Material Safety Data Sheet.
4. Slurry testing equipment and procedures.
5. Removal and disposal of excavation, slurry, and contaminated concrete, including methods and rates of removal.
6. Slurry agitating, recirculating, and cleaning methods and equipment.

In addition to compressive strength requirements, the consistency of the concrete to be deposited under slurry shall be verified before use by producing a batch to be tested. The test batch shall be produced and delivered to the job under conditions and in time periods similar to those expected during the placement of concrete in the piles. Concrete for the test batch shall be placed in an excavated hole or suitable container of adequate size to allow testing in accordance with California Test 533. Depositing of test batch concrete under slurry will not be required. 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 the specified nominal penetration and a penetration of at least 2 inches after twice that time has elapsed. For piles where the time required for each concrete placing operation, as submitted in the placing plan, will be more than 2 hours, the test batch shall demonstrate that the proposed concrete mix design achieves both the specified nominal penetration and a penetration of at least 2 inches after that time plus 2 hours has elapsed. The time period shall begin at the start of placement. The concrete shall not be vibrated or agitated during the test period. Upon completion of testing, the concrete shall be disposed of in accordance with Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Concrete deposited under slurry shall not be vibrated until all temporary casing is removed and concrete contaminated with soil, slurry, or other materials is removed. Concrete deposited under slurry shall be vibrated in the upper 6 feet of the pile.

When slurry is used, the slurry level shall be maintained within one foot of the top of the drilled hole.

The concrete deposited under slurry shall be carefully placed in a compact, monolithic mass and by a method that will prevent washing of the concrete. Placing concrete shall be a continuous operation lasting not more than the time required for each concrete placing operation at each pile, as submitted in the placing plan, unless otherwise approved in writing by the Engineer. The concrete shall be placed with concrete pumps and delivery tube system of adequate number and size to complete the placing of concrete in the time specified. The delivery tube system shall consist of one of the following:

1. A tremie tube or tubes which are each at least 10-inches in diameter fed by one or more concrete pumps.
2. One or more concrete pump tubes each fed by a single concrete pump.

The delivery tube system shall consist of watertight tubes with sufficient rigidity to keep the ends always in the mass of concrete placed. If only one delivery tube is utilized to place the concrete, the tube shall be placed near the center of the drilled hole. Multiple tubes shall be uniformly spaced in the hole. Internal bracing for the steel reinforcing cage shall accommodate the delivery tube system. Tremies shall not be used for piles without space for a 10-inch tube.

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.

Spillage of concrete into the slurry during concrete placing operations shall not be allowed. Delivery tubes shall be capped with a water tight cap, or plugged above the slurry level with a good quality, tight fitting, moving plug that will expel the slurry from the tube as it is charged with concrete. The cap or plug shall be designed to be released as the tube is charged. The pump discharge or tremie tube shall extend to the bottom of the hole before charging the tube with concrete. After charging the delivery tube system with concrete, the flow of concrete through a tube shall be induced by slightly raising the discharge end. During concrete placement, the tip of the delivery tube shall be maintained to prevent reentry of the slurry into the tube. Until at least 10 feet of concrete has been placed, the tip of the delivery tube shall be within 6 inches of the bottom of the drilled hole, and then the embedment of the tip shall be maintained at least ten feet below the top surface of the concrete. Rapid raising or lowering of the delivery tube shall not be permitted. If the seal is lost or the delivery tube becomes plugged and must be removed, the tube shall be withdrawn, the tube cleaned, the tip of the tube capped to prevent entrance of the slurry, and the operation restarted by pushing the capped tube 10 feet into the concrete and then reinitiating the flow of concrete.

A log of the placing of the concrete in each drilled hole shall be maintained by the Contractor when concrete is deposited under slurry. The log shall show the pile location, tip elevation, dates of excavation and concrete placement, total quantity of concrete deposited, length and tip elevation of any casing, and details of any hole stabilization method and materials used. The log shall include an 8 1/2" x 11" sized graph of the concrete placed versus depth of hole filled. The graph shall be plotted continuously throughout placing of concrete. The depth of drilled hole filled shall be plotted vertically with the pile tip oriented at the bottom and the quantity of concrete shall be plotted horizontally. Readings shall be made at least at each 5 foot of pile depth, and the time of the reading shall be indicated. The graph shall be labeled with the pile location, tip elevation, cutoff elevation, and the dates of excavation and concrete placement. The log shall be delivered to the Engineer within one working day of completion of placing concrete in the pile.

After placing reinforcement and prior to placing concrete in the drilled hole, if drill cuttings settle out of slurry, the bottom of the drilled hole shall be cleaned. The Contractor shall verify that the bottom of the drilled hole is clean.

If temporary casing is used, concrete placed under slurry shall be maintained at a level at least 5 feet above the bottom of the casing. The withdrawal of casings shall not cause contamination of the concrete with slurry.

Material resulting from using slurry shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

Permanent steel casings shall be furnished and placed tight in the hole where shown on the plans. The provisions of Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications shall not apply to permanent steel casings. Permanent casings shall be watertight shall conform to the provisions of "Steel Pipe Piling" of these special provisions, and where thicknesses of the casings are not shown on the plans, shall be of sufficient strength to withstand the loads from installation procedures, lateral concrete pressures, and earth pressures.

If conditions render it impossible or inadvisable in the opinion of the Engineer to dewater the permanent steel casing prior to drilling or coring the rock socket below, then the bottom of the casing shall be sealed in conformance with the provisions in Section 51-1.10, "Concrete Deposited Under Water," of the Standard Specifications. The sealed casing shall then be dewatered and cleaned out as specified herein.

Acceptance Testing and Mitigation.--Vertical inspection pipes for acceptance testing shall be provided in all cast-in-drilled hole piles that are 24 inches in diameter or larger, except when the holes are dry or when the holes are dewatered without the use of temporary casing to control ground water.

Inspection pipes shall be Schedule 40 polyvinyl chloride pipe with an inside diameter of 2 inches. Each inspection pipe shall be capped top and bottom and shall have watertight couplers to provide a clean, dry and unobstructed 2-inch diameter clear opening from 3 feet above the pile cutoff down to the bottom of the reinforcing cage.

If the Contractor drills the hole below the specified tip elevation, the reinforcement and the inspection pipes shall be extended to 3 inches clear of the bottom of the drilled hole.

Inspection pipes shall be placed around the pile, inside the outermost spiral or hoop reinforcement, and 3 inches clear of the vertical reinforcement, at a uniform spacing not exceeding 2 feet 9 inches measured along the circle passing through the centers of inspection pipes. A minimum of 2 inspection pipes per pile shall be used. When the vertical reinforcement is not bundled and each bar is not more than one inch in diameter, inspection pipes may be placed 2 inches clear of the vertical reinforcement. The inspection pipes shall be placed to provide the maximum diameter circle that passes through the centers of the inspection pipes while maintaining the clear spacing required herein. The pipes shall be installed in straight alignment and securely fastened in place to prevent misalignment during installation of the reinforcement and placing concrete in the hole.

The Contractor shall log the location of the inspection pipe couplers with respect to the plane of pile cut off, and these logs shall be delivered to the Engineer upon completion of the placement of concrete in the drilled hole.

After placing concrete and before requesting acceptance tests, each inspection pipe shall be tested by the Contractor in the presence of the Engineer by passing a 1.90 inch diameter rigid cylinder 2 feet long through the complete length of pipe. If the 1.90-inch diameter rigid cylinder fails to pass any of the inspection pipes, the Contractor shall attempt to pass a 1.26-inch diameter rigid cylinder 4.5 feet long through the complete length of those pipes in the presence of the Engineer. If an inspection pipe fails to pass the 1.26-inch diameter cylinder, the Contractor shall immediately fill all inspection pipes in the pile with water.

The Contractor shall replace each inspection pipe that does not pass the 1.26-inch diameter cylinder with a 2-inch diameter hole cored through the concrete for the entire length of the pile. Cored holes shall be located as close as possible to the inspection pipes they are replacing, no more than 6 inches inside the reinforcement, and coring shall not damage the pile reinforcement. Cored holes shall be made with a double wall core barrel system utilizing a split tube type inner barrel. Coring with a solid type inner barrel will not be allowed. Coring methods and equipment shall provide intact cores for the entire length of the pile concrete. The coring operation shall be logged by an Engineering Geologist or Civil Engineer licensed in the State of California and experienced in core logging. Coring logs shall include complete descriptions of inclusions and voids encountered during coring, and shall be delivered to the Engineer upon completion. Concrete cores shall be preserved, identified with the exact location the core was recovered from within the pile, and made available for inspection by the Engineer.

Acceptance tests of the concrete will be made by the Engineer, without cost to the Contractor. Acceptance tests will evaluate the homogeneity of the placed concrete. Tests will include gamma-gamma logging. Tests may also include crosshole sonic logging and other means of inspection selected by the Engineer. The Contractor shall not conduct operations within 26 feet of the gamma-gamma logging operations. The Contractor shall separate reinforcing steel as necessary to allow the Engineer access to the inspection pipes to perform gamma-gamma logging or other acceptance testing. After requesting acceptance tests and providing access to the piling, the Contractor shall allow 3 weeks for the Engineer to conduct these tests and make determination of acceptance if the 1.90-inch diameter cylinder passed all inspection pipes, and 4 weeks if only the 1.26-inch diameter cylinder passed all inspection pipes.. Should the Engineer fail to complete such tests within the time allowance, and if in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in inspection, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

All inspection pipes and cored holes 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, $525 per cubic yard for the portion of the pile affected by the anomalies. The volume, in cubic yards, 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 yards, as determined by the Engineer, multiplied by the distance, in yards, 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 $525. 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-Post Mile, 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-Post Mile, 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.

STEEL PIPE PILING

General

Steel pipe piling shall consist of steel shells for open ended cast-in-steel-shell concrete piling, and permanent steel casing for cast-in-drilled-hole concrete piling. Steel pipe piling shall conform to the provisions in Section 49-5, "Steel Piles," of the Standard Specifications and these special provisions.

Wherever reference is made to the following American Petroleum Institute (API) specifications in the Standard Specifications, on the project plans, or in these special provisions, the year of adoption for these specifications shall be as follows:

API Codes	Year of Adoption
API 2B	1990
API 5L	1995

All requirements of the codes listed above shall apply unless specified otherwise in the Standard Specifications, on the plans or in these special provisions.

Only steel pipe pile seam welds may be made by the electric resistance welding method. Such welds shall be welded in conformance with the requirements in API 5L and any amendments to API 5L in the Standard Specifications or these special provisions.

Seams in steel pipe piles made by submerged arc welding may be welded in conformance with the requirements in API 5L and any amendments to API 5L in the Standard Specifications or these special provisions.

Handling devices may be attached to steel pipe piling. Welds attaching these devices shall be aligned parallel to the axis of the pile and shall conform to the requirements for field welding specified herein. Permanent bolted connections shall be corrosion resistant. Prior to making attachments, the Contractor shall submit a plan to the Engineer that includes the locations, handling and fitting device details, and connection details. Attachments shall not be made to the steel pipe piling until the plan is approved in writing by the Engineer. The Engineer shall have 7 days to review the plan. Should the Engineer fail to complete the review within 7 days, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the plan, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Each length of steel pipe piling shall be marked in conformance with the requirements in ASTM Designation: A 252.

For steel pipe piling, including bar reinforcement in the piling, the Engineer shall be allowed 48 hours to review the "Welding Report," specified in "Welding Quality Control" of these special provisions, and respond in writing after the required items have been received. No field welded steel pipe piling shall be installed, and no reinforcement in the piling shall be encased in concrete until the Engineer has approved the above requirements in writing. Should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

At the Contractor's option, a steel pipe pile may be re-tapped to prevent pile set-up; however, the field welded splice shall remain at least 3 feet above the work platform until that splice is approved in writing by the Engineer.

Manufactured Steel Pipe

Manufactured steel pipe is defined as pipe produced at a permanent facility where an automatic welding process, electric resistance welder, or seamless pipe operation is used in conformance with ASTM Designations: A 252, A 53, A 135, A 139, API 5L, or AWWA C200; where this steel pipe can be produced in lengths at least 9 m long without a circumferential splice; and where this manufacturing can be done on a daily basis. Manufactured steel pipe is not a specifically engineered product. (i.e., Manufactured steel pipe is an off-the-shelf item.)

Manufactured steel pipe used for steel pipe piling shall conform to the following requirements:

A. The outside circumference of the steel pipe piling end shall not vary by more than 3/8 inch from that corresponding to the diameter shown on the plans.
B. The maximum allowable misalignment for adjacent steel pipe pile edges to be welded shall be 0.1875 times the wall thickness, but not more than 1/16 inch.
C. Steel pipe pile straightness shall conform to the requirements in API 5L, Section 7.6, "Straightness."
D. Welds made at a permanent manufacturing facility shall be made by either an automatic welding process or an electric resistance welding process.

Fabricated Steel Pipe

Fabricated steel pipe is defined as pipe produced at a permanent facility where a variety of steel fabrication including roll forming and welding steel plate into pipe is performed, where this pipe is at least 3/4 inch in wall thickness, where this pipe is produced in conformance with API 2B, and where this fabrication can be done on a daily basis. Fabricated steel pipe is a specifically engineered product. (i.e., Fabricated steel pipe is engineered for a specific project.)

Fabricated steel pipe used for steel pipe piling shall conform to API 2B and the following requirements:

A. An API site license and API monogram are not required.
B. Weld filler metal shall conform to the requirements of AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest, and verification test requirements need not be conducted if certified test reports are provided for the consumables to be used.

Field Welding

Field welding of steel piling is defined as welding performed after the certificate of compliance has been furnished by the manufacturer or fabricator and shall conform to the following requirements:

A. Match marking of pipe ends at the manufacturing or fabrication facility is recommended for piling to ensure weld joint fit-up. Prior to positioning any 2 sections of steel pipe to be spliced by field welding, including those that have been match marked at the manufacturing or fabrication facility, the Contractor shall equalize the offsets of the pipe ends to be joined and match mark the pipe ends.
B. Welds made in the flat position or vertical position (where the longitudinal pipe axis is horizontal) shall be single-vee groove welds. Welds made in the horizontal position (where the longitudinal pipe axis is vertical) shall be single-bevel groove welds. Joint fit-ups shall conform to the requirements for tubular sections in AWS D1.1 and these special provisions.
C. The minimum thickness of the backing ring shall be 1/4 inch, and the ring shall be continuous. Splices in the backing ring shall be made by complete penetration welds. These welds shall be completed and inspected prior to final insertion into a pipe end. Attachment of backing rings to pipe ends shall be done using the minimum size and spacing of tack welds that will securely hold the backing ring in place. Tack welding shall be done in the root area of the weld splice. Cracked tack welds shall be removed and replaced prior to subsequent weld passes. The gap between the backing ring and the steel pipe piling wall shall be no greater than 5/64 inch. One localized portion of the splice, that is equal to or less than a length that is 20 percent of the outside circumference of the pipe, as determined by the Engineer, may be offset by a gap equal to or less than 1/4 inch provided that this localized portion is first seal welded using shielded metal arc E7016 or E7018 electrodes. The Contractor shall mark this localized portion so that it can be referenced during any required nondestructive testing (NDT). Backing rings shall have a minimum width of 1 1/2 times the thickness of the pile to be welded so that they will not interfere with the interpretation of the NDT.
D. For steel pipe with an outside diameter greater than 44 inches, and with a wall thickness greater than 1 inch, the root opening tolerances may be increased to a maximum of 3/16 inch over the specified tolerances.
E. Weld filler metal shall conform to the requirements shown in AWS D1.5 for the welding of ASTM Designation: A 709, Grade 50 steel, except that the qualification, pretest, and verification test requirements need not be conducted if certified test reports are provided for the consumables to be used.
F. For field welding, including attaching backing rings and making repairs, the preheat and interpass temperature shall be in conformance with AWS D1.1, Section 3.5, "Minimum Preheat and Interpass Temperature Requirements," and with Table 3.2, Category C; and the minimum preheat and interpass temperature shall be 150° F., regardless of the pipe pile wall thickness or steel grade. In the event welding is disrupted, preheating to 150° F. must occur before welding is resumed.
G. Welds shall not be water quenched. Welds shall be allowed to cool unassisted.

Radiographic, magnetic particle, or ultrasonic testing shall be used to assure soundness of backing rings in conformance with the requirements in AWS D1.1, Section 6.

NONDESTRUCTIVE TESTING FOR STEEL PIPE PILING

Steel pipe piling shall receive nondestructive testing (NDT) in conformance with these special provisions.

Nondestructive Testing of Welds made at a Manufacturing or Fabrication Facility

Twenty-five percent of each longitudinal, circumferential, or spiral weld made at a permanent manufacturing or fabrication facility shall receive NDT. If repairs are required in a portion of the weld, additional NDT shall be performed. The additional NDT shall be made on both sides of the repair for a length equal to 10 percent of the length of the pipe outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative weld length equal to or more than 10 percent of the length of the pipe outside circumference, then the entire weld shall receive NDT.

Circumferential or spiral welds shall receive NDT by either radiographic, radioscopic, real time imaging systems, or ultrasonic methods that are in conformance with the requirements in AWS D1.1. When a radioscopic or real time imaging method is used for inspection of these welds, the fluoroscope shall be evaluated in conformance with the requirements in API 5L, Section 9.7.3.8, "Procedure for Evaluating In-Motion Operation of a Fluoroscope."

At the option of the Contractor, seam welds made by the submerged arc welding process may receive NDT in conformance with the requirements in API 5L or in AWS D1.1.

The acceptance and repair criteria for NDT performed in conformance with the requirements in AWS D1.1 shall conform to the requirements in Section 6 of that code, for cyclically loaded nontubular connections subject to tensile stress.

Welds made by electric resistance welding shall receive ultrasonic testing (UT) in conformance with the requirements in API 5L

When radiological inspection is performed in conformance with the requirements in API 5L, the testing shall also conform to the following additional provisions:

A. Image quality indicators (IQI) shall conform to AWS D1.1, Section 6.17.1.
B. IQI placement shall conform to AWS D1.1, Section 6.35.5.
C. IQIs shall be positioned on the base metal.
D. Procedures shall be qualified in conformance with the requirements in AWS D1.1, Section 6.35.3.
E. Personnel shall be qualified in conformance with the requirements in AWS D1.1, Section 6.35.4.
F. Film radiography shall be performed in conformance with the requirements in AWS D1.1, Section 6, Part E.

When UT is performed in conformance with the requirements in API 5L, the testing shall also conform to the following additional provisions:

A. For electric resistance welds, the acceptance limits of Section 9.7.4.3 shall be based on only a type V10 notch or a type P notch at 10% t or less.
B. For seam welds made by the submerged arc welding process, the acceptance limits of Section 9.7.4.3 shall be based on only a type N5 notch. Reinspection of indicated imperfections by film radiological methods will not be allowed.
C. The ultrasonic instrument shall be suitable for use with transducers oscillating at frequencies between 2.25 and 5 megahertz.

Nondestructive Testing of Field Welds

Personnel performing ultrasonic testing (UT) for field welds will be required to verify their qualifications prior to performing nondestructive testing by both written and practical exams. Information regarding these exams is available at the Transportation Laboratory.

At the option of the Contractor, either ultrasonic testing (UT) or radiographic testing (RT) shall be used as the method of NDT for splices made by field welding steel pipe piling. This NDT shall be used for each field weld, including welds that are made onto a portion of the steel pipe piling that has been installed and any repair made to a splice weld. Testing shall be done at locations selected by the Engineer. The length of a splice weld, not including repairs, where NDT is to be performed, shall have a cumulative weld length that is equal to 25 percent of the pipe outside circumference. The Engineer may select several locations on a given splice for NDT. 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. The additional NDT shall be made on both sides of the repair for a length equal to 10 percent of the length of the pipe outside circumference. After the additional NDT is performed, and if more repairs are required that have a cumulative weld length equal to or more than 10 percent of the length of the pipe outside circumference, then the entire splice weld shall receive NDT.

OPEN ENDED CAST-IN-STEEL SHELL CONCRETE PILING.--Cast-in-steel shell concrete piling shall consist of driven open ended steel shells filled with reinforced cast-in-place concrete and shall conform to the provisions in Section 49-4, "Cast-in-Place Concrete Piles," of the Standard Specifications and these special provisions.

Attention is directed to "Steel Pipe Piling" of these special provisions.

In addition to driving, it is anticipated that drilling through the center of open ended steel shells to obtain the specified penetration may be necessary. The diameter of the drilled hole shall be less than the inside diameter of the piling. Equipment or methods used for drilling holes shall not cause quick soil conditions or cause scouring or caving of the hole. Drilling shall not be used within 5 feet of the specified tip elevation.

At the Contractor's option, the Contractor may use either the 1/2" maximum combined aggregate grading or the 3/8" maximum combined aggregate grading. The grading requirements for the optional 1/2" maximum coarse aggregate or the 3/8" maximum coarse aggregate are shown in the following table:

Percentage Passing Primary Aggregate Nominal Size				
	1/2"x No. 4		3/8" x No. 8	
Sieve Sizes	Operating Range	Contract Compli-ance	Operating Range	Contract Compli-ance
3/4"	100	100		
1/2"	82 - 100	80 - 100	100	
3/8"	X ± 15	X ± 22	X ± 15	X ± 20
No. 4	0 - 15	0 - 18	0 - 25	0 - 28
No. 8	0 - 6	0 - 7	0 - 6	0 - 7

In the table above, the symbol X is the gradation which the Contractor proposes to furnish for the 3/8-inch sieve size.

The gradation proposed by the Contractor for the optional 1/2" x No. 4 primary aggregate or for the 3/8" x No. 8 primary aggregate shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Size	Limits of Proposed Gradation
1/2" x No. 4	3/8"	40 - 78
3/8" x No. 8	3/8"	50 - 85

The combined aggregate grading for the 1/2" x No. 4 primary aggregate nominal size or for the 3/8" x No. 8 primary aggregate nominal size shall be within the following limits:

Grading Limits of Combined Aggregate		
	Percentage Passing	
Sieve Sizes	1/2" Maximum	3/8" Maximum
3/4-inch	100	100
1/2-inch	90 - 100	90 - 100
3/8-inch	55 - 86	55 - 86
No. 4	45 - 63	45 - 63
No. 8	35 - 49	35 - 49
No. 16	25 - 37	25 - 37
No. 30	15 - 25	15 - 25
No. 50	5 - 15	5 - 15
No. 100	1 - 8	1 - 8
No. 200	0 - 4	0 - 4

The piles shall be installed open ended and no internal plates shall be used.

The Contractor shall submit for approval by the Engineer a cleanout method for open ended cast-in-steel shell concrete piling. Care shall be taken during cleaning out of open ended steel shells to prevent disturbing the foundation material surrounding the pile. The pile shall not be cleaned out below the limit of clean out shown on the plans. Equipment or methods used for cleaning out steel shells shall not cause quick soil conditions or cause scouring or caving around or below

the piles. Open ended steel shells shall be free of any soil, rock or other material deleterious to the bond between concrete and steel prior to placing reinforcement and concrete.

After the steel shells have been cleaned out, the pile shall be constructed expeditiously in order to prevent deterioration of the surrounding foundation material from the presence of water. Deteriorated foundation materials, including materials that have softened, swollen or degraded, shall be removed from the bottom of the steel shells and shall be disposed of.

Material resulting from cleaning out the steel shells shall be disposed of in conformance of the provisions of Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise specified or permitted by the Engineer. Attention is directed to "Hazardous and Non-hazardous Material Excavation" of these special provisions.

The reinforcement shall be placed and secured symmetrically about the axis of the pile and shall be securely blocked to clear the sides of the open ended steel shell.

The nominal and maximum penetrations shown in the table in Section 90-6.06, "Amount of Water and Penetration," are amended to read:

The range of nominal penetration is 2 1/2 inches to 3 1/2 inches with a maximum penetration of 4 inches. Type F or Type G chemical admixtures may be required to achieve the specified penetration. When admixtures are used in accordance with the requirements in Section 90-4, "Admixtures," the penetration of the concrete will be measured after the admixture is added.

If conditions render it impossible or inadvisable in the opinion of the Engineer to dewater the open ended cast-in-steel shell concrete piling prior to placing reinforcement and concrete, then the bottom of the shell shall be sealed in conformance with the provisions in Section 51-1.10, "Concrete Deposited Under Water," of the Standard Specifications. The sealed shell shall then be dewatered and cleaned out as specified herein.

Full compensation for drilling through the center of open ended steel shells to obtain the specified penetration and for disposing of this material shall be considered as included in the contract unit price paid for drive pile and no additional compensation will be allowed therefor.

STEEL SOLDIER PILING

This work at the First Street On-Ramp Retaining Wall shall consist of furnishing and installing steel piling; cleaning and preparing portions of the pile for splicing; splicing steel piles; securing the piling prior to and during concrete encasement; shaping the tops of the piles; cleaning and preparing portions of the pile for welding concrete anchors; and furnishing, cleaning and welding concrete anchors to piling in accordance with the details shown on the plans, and these special provisions.

Materials

Concrete anchors shall conform to the provisions for stud connectors in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Stud connectors shall be Type B as defined in AWS D1.5, Section 7.

Steel soldier piles shall be placed in a drilled hole and shall be plumbed and aligned before placing concrete backfill and lean concrete backfill. Alignment shall be maintained while placing backfill material in the drilled holes.

Cleaning and preparing the pile shall be performed in heat affected areas before splicing steel piles or welding stud type shear connectors.

MEASUREMENT AND PAYMENT (PILING)

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

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

49-6.02 Payment.—Timber, steel, and precast prestressed concrete piles, and cast-in-place concrete piles consisting of driven shells filled with concrete, will be paid for at the contract price per linear foot for furnish piling and the contract unit price for drive pile.

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

The contract price paid per linear foot 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 sixth paragraph in Section 49-6.02, "Payment," of the Standard Specifications is amended to read:

If precast prestressed concrete piling or steel pipe piling is manufactured or fabricated more than 300 air miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impractical and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing piling of the types shown in the Engineer's Estimate will be reduced $5000 for each manufacture or fabrication site located more than 300 air line miles from both Sacramento and Los Angeles and an additional $3000 ($8000 total) for each manufacture or fabrication site located more than 3000 air line miles from both Sacramento and Los Angeles.

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

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

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

Load test piles and adjacent anchor piles that become a part of the completed structure, or are shown on the plans, or are specified, will be paid for at the contract prices for the type or class of piling shown in the Engineer's Estimate.

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

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

Cast-in-place concrete piling shall conform to the provisions Section 49-6.02, "Payment," of the Standard Specifications except that, when the diameter of cast-in-place concrete piling is shown on the plans as 24-inch or larger, reinforcement in the piling will be paid for as bar reinforcing steel (bridge), and at locations other than where cast-in-drilled-hole piling (rock socket) is shown, removing and disposing of the material resulting from drilling holes will be paid for by the cubic yard for structure excavation of the types shown in the Engineer's Estimate.

Full compensation for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversize cast-in-drilled-hole concrete piling, filling cave-ins and oversize piles with concrete, and redrilling through concrete shall be considered as included in the contract prices paid per linear foot for cast-in-drilled-hole concrete piling of the sizes listed in the Engineer's Estimate, and no additional compensation will be allowed therefor.

Full compensation for slurry, depositing concrete under slurry, test batches, inspection pipes, filling inspection holes and pipes with grout, drilling oversize cast-in-drilled-hole concrete piling, filling cave-ins and oversize piles with concrete, and redrilling through concrete shall be considered as included in the contract prices paid per meter for cast-in-drilled-hole concrete piling of the sizes listed in the Engineer's Estimate and no additional compensation will be allowed therefor.

The contract price paid per linear foot for cast-in-drilled-hole concrete piling (rock socket) of the sizes listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in drilling or coring holes, disposing of the material resulting from drilling or coring holes, and furnishing and placing concrete and reinforcement, complete in place, to the required penetration, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract price paid per linear foot for permanent steel casing of the sizes listed in the Engineer's estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing permanent steel casing, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

Additional permanent steel casing and cast-in-drilled-hole concrete piling, including inspection pipes, and bar reinforcing steel, required to extend the permanent steel casing into bedrock and to maintain the length of cast-in-drilled-hole concrete piling (rock socket) into bedrock, as shown on the plans, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

Full compensation for cleaning out the open ended steel shells prior to installing reinforcement and filling with concrete, except for disposing of materials removed from the inside of the pile, and for placing seal course concrete and dewatering the open ended steel shells, as shown on the plans, and as specified in these special provisions, and as directed by the Engineer shall be considered as included in the contract unit price paid for drive pile and no additional compensation will be allowed therefor.

Removing and disposing of materials removed from the inside of the open ended steel shells pile will be measured and paid for as specified in "Earthwork" of these special provisions.

Full compensation for conforming to the provisions in "Steel Pipe Piling" and "Nondestructive Testing" of these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

The contract price paid per linear foot for steel soldier pile (W18 x 76) at First Street Retaining Wall shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the steel piles at the site to the required penetration, including securing the piling to maintain accurate alignment prior to and during encasing the pile with concrete, shaping pile tops, cutting holes for pile anchors, cleaning and preparing heat affected areas of piles for splicing and welding concrete anchors to the piles, splicing steel piles, furnishing pile anchors, and furnishing, cleaning, and welding concrete anchors to the piles as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.61 DRILLED HOLES

Holes for steel soldier piles shall be drilled into natural foundation materials at the location shown on the plans and shall conform to the provisions in Section 49, "Piling," of the Standard Specifications and these special provisions.

Foundation recommendations are included in the "Information Handout" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Drilled holes shall be accurately located and shall be straight and true. When the piles are plumbed and aligned, the steel piles shall be at least one inch clear of the sides of the hole for the full length of the hole to be filled with concrete backfill and lean concrete backfill. Holes which do not provide the clearance around steel piles shall be reamed or enlarged at the Contractor's expense.

Temporary casings or tremie seals shall be furnished and placed where necessary to control water or to prevent caving of the hole.

Difficult drilling is anticipated due to the presence of hazardous and contaminated materials, cobbles and boulders, underground utilities, the requirements of pile embedment into rock, sound control, vibration monitoring and traffic control.

Attention is directed to rock subsurface foundation material at the soldier pile retaining wall site. Conventional drilling equipment for drilling in soils may not be suitable for drilling piling for the soldier pile retaining wall.

Loose materials existing at the bottom of the hole after drilling operations have been completed shall be removed before placing the pile.

Materials resulting from drilling holes shall be disposed of in conformance with the provisions in Section 19-2.06, "Surplus Material," of the Standard Specifications.

Drilling mud or chemical stabilizers shall not be used. Surface water shall not be permitted to enter the hole and all water in the hole shall be removed before placing concrete therein.

Casing, if used in drilling operations, shall be removed from the hole as concrete is placed therein. The bottom of the casing shall be maintained not more than 60 inches nor less than 12 inches below the top of the concrete during casing withdrawal and concrete placing operations. Separation of the concrete during withdrawal operations shall be avoided by hammering or otherwise vibrating the casing. The methods used to withdraw temporary casings shall preclude contamination of the concrete and commingling of the soil and concrete or of any ground water and concrete.

If piles with larger diagonal dimensions are substituted for the piles shown on the plans, the Contractor shall, at his expense, ream or enlarge the drilled hole to provide a hole diameter at least four inches larger than the diagonal dimension of the pile.

The contract price paid per linear foot for cast-in-drilled-hole of the diameter shown on the plans shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in drilling holes for soldier piles, including disposing of the material resulting from drilled holes, dewatering, casing holes and removing casing, and providing tremie seals, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.62 PRESTRESSING CONCRETE

Prestressing concrete shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Prestressing steel and anchorages that will not be embedded in concrete within one year of placing the steel shall be painted with a zinc-rich coating conforming to the specifications for painting damaged galvanized surfaces as specified in Section 75-1.05, "Galvanizing," of the Standard Specifications.

The first paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

The Contractor shall submit to the Engineer at the Office of the Resident Engineer, Department of Transportation, 151 Fremont Street, San Francisco, CA 94105, for approval in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings of the prestressing system proposed for use. For initial review, 6 sets of such drawings shall be submitted for railroad bridges and 4 sets shall be submitted for other structures. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the said Office for final approval and for use during construction.

The first paragraph in 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.

After final fabrication of the seven-wire prestressing steel strand, no electric welding of any form shall be performed on the prestressing steel.

The sixth paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

At the completion of each structure on the contract, one set of reduced prints on 20 pound (minimum) bond paper, 11 inches by 17 inches in size, of the corrected original tracings of all working drawings for each structure shall be furnished to the Engineer. Reduced prints of drawings which are common to more than one structure shall be submitted for each structure. An index prepared specifically for the drawings for each structure containing sheet numbers and titles shall be included on the first reduced print in the set for each structure. Reduced prints for each structure shall be arranged in the order of drawing numbers shown in the index.

The seventh paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

The edge of the corrected original tracing image shall be clearly visible and visually parallel with the edges of the page. A clear, legible symbol shall be provided as near to the upper left side of each page as is feasible within the original print to show the amount of reduction and a horizontal and vertical scale shall be provided on each reduced print to facilitate enlargement to original scale.

The eighth paragraph in Section 50-1.02, "Drawings," of the Standard Specifications is amended to read:

For railroad bridges, in addition to the reduced prints of the working drawings, the Contractor shall furnish to the Engineer one set of working drawings consisting of either ink tracings on cloth, ink tracings on polyester base drafting film, silver sensitized cloth duplicate tracings or silver sensitized polyester based reproduction films with matte surface on both sides.

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

Prestressing steel for post-tensioning which is installed in members prior to placing and curing of the concrete, shall be continuously protected against rust or other corrosion, until grouted, by means of a corrosion inhibitor placed in the ducts or applied to the steel in the duct. The corrosion inhibitor shall conform to the provisions in Section 50-1.05, "Prestressing Steel," of the Standard Specifications.

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

The maximum temporary tensile stress (jacking stress) in prestressing steel shall not exceed 75 percent of the specified minimum ultimate tensile strength of the prestressing steel. Pretensioned prestressing steel shall be anchored at stresses that will result in the ultimate retention of working forces at not less than those shown on the plans, but in no case shall the stress at anchorages after seating exceed 70 percent for normal relaxation strand, or 75 percent for low relaxation strand, of the specified minimum ultimate tensile strength of the prestressing steel.

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

Working force and working stress will be considered as the force and stress remaining in the prestressing steel after all losses, including creep and shrinkage of concrete, elastic compression of concrete, creep of steel, losses in post-tensioned prestressing steel due to sequence of stressing, friction and take up of anchorages, and all other losses peculiar to the method or system of prestressing have taken place or have been provided for.

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

Each jack used to stress tendons shall be equipped with either: (1) two pressure gages or (2) one pressure gage and a load cell, at the option of the Contractor. The jack body shall be permanently marked with the ram area. Each pressure gage shall be fully functional and have an accurately reading dial at least 6 inches in diameter. The jack and each gage shall be calibrated as a unit with the cylinder extension in the approximate position that it will be at final jacking force. The load cell, if used, shall be calibrated and shall be provided with an indicator which may be used to determine the prestressing force in the tendon. The range of the load cell shall be such that the lower 10 percent of the manufacturer's rated capacity will not be used in determining the jacking stress. The jacking equipment calibration procedure shall be as follows:

Each jack used to stress tendons, which are permanently anchored at 25 percent or more of the specified minimum ultimate tensile strength of the prestressing steel, shall be calibrated by the Transportation Laboratory within one year prior to use and after each repair, unless otherwise directed. The Contractor shall be responsible for:

1) scheduling the calibration of the jacking equipment with the Transportation Laboratory, telephone (916) 227-7000;
2) verifying that the jack and supporting systems are complete, with proper components, and are in good operating condition;
3) mechanically calibrating the gages with a dead weight tester or other approved means prior to calibration of the jacking equipment by the Transportation Laboratory,
4) providing sufficient labor, equipment, and material to install and support the jacking and calibration equipment and to remove the equipment after the calibration is complete, and;
5) plotting the calibration results.

Each jack used to stress tendons, which are permanently anchored at less than 25 percent of the specified minimum ultimate tensile strength of the prestressing steel, shall be calibrated by a private laboratory approved by the Transportation Laboratory within 6 months prior to use and after each repair, unless otherwise directed.

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

Full compensation for furnishing and placing additional concrete and deformed bar reinforcing steel required by the particular system used, ducts, anchoring devices, distribution plates or assemblies and incidental parts, for furnishing samples for testing, for calibration of jacking equipment done by a private laboratory, and for pressure grouting ducts shall be considered as included in the contract lump sum price paid for prestressing cast-in-place concrete or in the contract price for furnish precast members, and no additional compensation will be allowed therefor.

High-strength rods conforming to ASTM Designation: A722 as shown on the plans shall conform to the specifications for high-strength bars as specified herein.

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 such bridges the Contractor may, in accordance with the provisions of Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications and these special provisions, propose an alternative prestressing system utilizing bonded partial length tendons providing the proposed system and associated details meet the following requirements:

The proposed system and details must provide moment and shear resistances at least equal to those used for the design of the structure shown on the plans.

The concrete strength shall not be less than that shown on the plans.

Not less than 35 percent of the total prestressing force at any section shall be provided by full length draped tendons.

Anchorage blocks for partial length tendons shall be located so that they will not interfere with the placement of any utility facilities shown on the plans or of any future utilities to be placed through openings shown on the plans.

Temporary prestressing tendons, if used, shall be detensioned and any temporary ducts shall be filled with grout before completion of the work. Temporary tendons shall be either removed or fully encased in grout before completion of the work.

All details of the proposed system, including supporting checked calculations, shall be included in the drawings submitted in accordance with 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.

10-1.63 PRESTRESSING

Prestressing of high strength bars shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications and these special provisions.

Prestressing of high strength bar locations shall be defined as follows:

PRESTRESSING (LOCATION A)
INTERIM FREEMONT STREET OFF-RAMP
(Bridge No. 34-0148)

PRESTRESSING (LOCATION B)
TRANSBAY TERMINAL RAMPS (RETROFIT)
(Bridge No. 34-0119Y)

PRESTRESSING (LOCATION C)
SFOBB SAN FRANCISCO APPROACH – MAINLINE
(Bridge No. 34-0126R/L)

PRESTRESSING (LOCATION D)
SFOBB SAN FRANCISCO APPROACH – LOWER DECK WIDEN AND RETROFIT
(Bridge No. 34-0118R)

Working drawings for the prestressing shall include details for connections, anchor plates, bearing plates, stressing and grouting procedures. Bearing pads shall be bonded and grouted in conformance with the requirements of Section 50-1.09 "Bonding and Grouting," of the Standard Specifications.

Exposed anchor plates, bearing plates and anchorage devices and prestressing steel that is not in encased in grout shall be cleaned and painted in conformance with "Clean and Paint Structural Steel" of these special provisions.

Anchor plates for prestressing shall be the size shown on the plans. Any additional anchorage device required for the prestressing system shall be in addition to the anchor plates shown.

Prestressing will be paid for on a lump sum basis.

The contract lump sum price paid for prestressing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing the prestressing system, complete in place, including bonding and grouting bearing pads and grouting high-strength bars in pipe sleeves, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.64 TIEDOWN ANCHORS

Tiedown anchors in bridge footings; consisting of steel bar or strand tendons with anchorage assemblies that are grouted in cored, formed and drilled holes; shall conform to the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications, these special provisions and the details shown on the plans.

Whenever "member" is referred to in Section 50, "Prestressing Concrete," of the Standard Specifications it shall be considered to mean tiedown anchor.

Attention is directed to "Order of Work" of these special provisions regarding the sequence of tiedown installation and footing construction.

Foundation recommendations are included in the "Materials Information" available to the Contractor in conformance with the provisions in Section 2-1.03, "Examination of Plans, Specifications, Contract, and Site of Work," of the Standard Specifications.

Difficult tiedown installation is anticipated due to the presence of soft bay mud overlying dense soils, hazardous and contaminated materials, high ground water, subsurface concrete debris, low overhead clearance, sound control, vibration monitoring.

The Contractor shall determine the bond length necessary to meet acceptance criteria specified herein.

The submittal of microfilms will not be required for tiedown anchor installations.

Alternative details for the anchorage enclosure device may be submitted to the Engineer for approval if necessary to accommodate the anchorage assembly being used.

MATERIALS

When calculating the minimum cross sectional area of steel bars or strands, the ultimate strength, f_{pu}, of 150 kips per square inch for prestressing steel shall be used.

The steel tube and bearing plate of the anchorage assembly and the anchorage enclosure assembly shall conform to the provisions of Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. The steel tube and bearing plate and the anchorage enclosure shall be galvanized after fabrication.

The permanent bearing plate of the tiedown anchor shall effectively distribute the design force (T), uniformly to the top of the footing. The size of and thickness of the bearing plate shall be such that the footing concrete bearing stress does not exceed 2400 pounds per square inch and the bending stress does not exceed 0.9 f_y for steel.

Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. The grout will not be required to pass through a screen with a 0.07-inch maximum clear opening prior to being introduced into the grout pump. Fine aggregate may be added to the grout mixture of Portland cement and water outside of the grouted sheathing in drilled holes that are 8 inches or greater in diameter, but only to the extent that the cement content of the grout is not less than 846 pounds per cubic yard of grout. Fine aggregate, if used, shall conform to the provisions in Section 90-2, "Materials," and Section 90-3, "Aggregate Gradings," of the Standard Specifications.

When a bond breaker is shown on the plans near the bearing plate, the bond breaker shall be a 1/4" premolded joint filler conforming to the provisions in Section 51-1.12C, "Premolded Expansion Joint Fillers," of the Standard Specifications.

Smooth and corrugated plastic sheathing, including joints, shall be watertight. Polyvinyl chloride (PVC) sheathing shall conform to ASTM Designation: D 1784, Class 13464-B. High density polyethylene (HDPE) sheathing shall have a density between 0.940 and 0.960-g/cm^3 as measured in accordance with ASTM Designation: D 792, A-2. Corrugated plastic sheathing shall be PVC or HDPE.

The transition between the corrugated plastic sheathing and the anchorage assembly shall be an approved detail that allows stressing to the design force without evidence of distress in the corrugated plastic sheathing.

Additional requirements for tiedowns with bar type tendons are as follows:

A. Corrugated sheathing for bar tendons shall have a nominal wall thickness of 40 mils .

Additional requirements for tiedowns with strand type tendons are as follows:

A. The strand anchorage assembly shall include an approved permanent type wedge retaining device. Where high strength bolts are a part of the device, the tensile capacity of the high strength bolts shall be 0.3 times the ultimate strength of the strands.
B. Corrugated HDPE sheathing for strands shall have a nominal wall thickness of 60 mils . Corrugated PVC sheathing for strands shall have a nominal wall thickness of 40 mils .
C. The individual strands of a tendon, except for the bonded length, shall be fully coated with corrosion inhibiting grease and then encapsulated by a smooth polypropylene or HDPE sheath. Polypropylene sheathing shall have a density between 900 kg/m^3 and 910 kg/m^3. The minimum sheath wall thickness shall be 1.0 mm. The corrosion inhibiting grease shall fill all space between strand wires and shall encapsulate the strand giving an encasement diameter at least 5 mils greater than the diameter of the bare strand. The sheath shall be hot melt extruded onto the strand or shall be shop applied by an approved method that assures that all spaces between the sheath and the strand and between the strand wires are filled with corrosion inhibiting grease.
D. The corrosion inhibiting grease shall provide a continuous non brittle film of corrosion protection to the prestressing steel and lubrication between the strand and the sheathing, shall resist flow from the sheathing, shall be chemically stable and non reactive with the prestressing steel, sheathing material and concrete, and shall be organic with appropriate polar, moisture displacing, and corrosion inhibiting additives.
E. The corrosion inhibiting grease shall have the physical properties listed in Table 3.2.1 of the Post Tensioning Manual, Fourth Edition, by the Post Tensioning Institute and as modified below. At least 40 days before use, a sample from the lot to be used and test results shall be provided for the corrosion inhibiting grease.

Test	Requirements	ASTM Designation:
Water Soluble Ions: Nitrates	10 ppm max.	D 3867
Corrosion Test: 5% Salt Fog @ 100° F. 5 mils coating on 3" X 6" Q panel Type S, 1000 hrs. min.	Grade 7 or better	B 117, D 610
Compatibility with sheathing: Hardness change & volume change of polymer after exposure to grease 40 days at 150° F.	15% max. 10% max.	D 4289, Except use D 792 for density

F. A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications, shall be furnished to the Engineer certifying that the corrosion inhibiting grease complies with the requirements herein if sample and test results are not provided for the lot used.

CONSTRUCTION

Tiedown anchors shall be installed in accordance with the manufacturer's recommendations. In case of a conflict between the manufacturer's recommendations and these special provisions, these special provisions shall prevail.

Water and grout from tiedown anchor construction operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into landscaping, gutters or other drainage facilities. Excessive amounts of water shall not be used in any of the drilling and the tiedown anchor installation procedures.

The holes through footings shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

The holes drilled in the foundation materials shall be drilled to a depth sufficient to provide the necessary bond length beyond the minimum unbonded length shown on the plans. The diameter of the hole shall be large enough to provide a minimum of one inch grout cover over the corrugated plastic sheathing for the full-length of the tendon. Centralizers shall be used full-length of the tendon.

For tiedown anchors installed without driven structural elements, construction of the drilled hole in the foundation material shall conform to the following:

A. Tiedown anchor holes in foundation material shall be drilled by either the rotary or percussion drilling method.

Prior to installing each tiedown anchor into the anchor hole, the anchor shall be clean and free of oil, grease, dirt or other extraneous substance.

The transition between the corrugated plastic sheathing and the anchorage assembly shall be an approved detail that allows stressing to the design force without evidence of distress in the corrugated plastic sheathing.

Tiedown anchor steel shall be protected prior to completion of all grouting against rust, corrosion, and physical damage in conformance with the provisions in Section 50, "Prestressing Concrete," of the Standard Specifications. In addition, there shall be no evidence of distress in the plastic sheathing or crushing of the cement grout within the sheathing.

Pregrouting shall occur at least 48 hours before placing the tendon in the drilled hole.

Tiedown anchor grout placed in the drilled hole shall be placed using grout tubes.

Grout for all stages shall be injected at the low end of the void being filled and shall be expelled at the high end until there is no evidence of entrapped air, water or diluted grout.

After initial grouting, the tiedown anchor shall remain undisturbed until the grout has reached a strength sufficient to provide anchorage during load testing.

Secondary grouting shall be completed after the tiedown anchor has been locked off at the required load.

Bars for multiple bar tendons shall be stressed simultaneously.

Additional requirements for tiedowns with bar type tendons are as follows:

A. The bar tendons in the unbonded area shall be sheathed with smooth plastic that extends into the steel tube of the permanent tieback anchorage assembly, as shown on the plans. For this portion of smooth sheathing there is no minimum wall thickness and the sheathing shall be either PVC or HDPE.

B. In addition, bar tendons shall be sheathed full-length with corrugated plastic. The annular space between the bar and the corrugated sheathing shall be pregrouted prior to placing the tendons in the drilled hole.
C. There shall be a seal between the smooth sheathing and the corrugated sheathing at the top and bottom of the length of smooth sheathing.
D. For bar tendons, the initial grout in the drilled hole may be placed before or after insertion of the bar tendons.
E. For drilled holes 6 inches in diameter or less, the initial grouting outside of the corrugated plastic sheathing shall extend to two feet below the end of the steel tube of the anchorage assembly. For drilled holes greater than 6 inches in diameter the initial grouting outside of the corrugated plastic sheathing shall be within the limits of the bonded length.

Additional requirements for tiedowns with strand type tendons are as follows:

A. Strand tendons shall be sheathed with corrugated plastic. The individual strands within the bonded length shall be separated by spaces so that the entire surface of each strand is bonded in the grout.
B. At the Contractor's option, the strands may be pregrouted in the corrugated plastic sheathing within the bond length. If the corrugated sheathing is pregrouted before placing the tendon in the drilled hole, the corrugated sheathing shall lap the smooth sheathing on the strands by 2 feet and be completely filled with grout at the time of pregrouting. If the corrugated sheathing is not pregrouted within the full length of the bonded length before placing the tendon in the drilled hole, the corrugated sheathing shall extend the full length of the tendon and shall be grouted after placing the tendon in the drilled hole except for a minimum length of 2 feet at the bottom of the tendon that shall be pregrouted before placing the tendon in the drilled hole. The annulus between the strands and the corrugated sheathing shall be grouted prior to placing the initial grout in the drilled hole.
C. Grout shall not be placed in the drilled hole until the strand tendons are installed complete in place in the drilled hole.

Testing

All tiedowns shall be load tested by either a performance test or a proof test. The magnitude of applied test loads shall be determined with a calibrated pressure gauge or a load cell. Movements of the end of the tiedown anchor, relative to an independent fixed reference point, shall be measured and recorded to the nearest 0.001 inch at each load increment during the load tests. The Contractor shall perform the measuring and recording.

At the completion of testing tiedown anchors, or when requested by the Engineer, the Contractor shall furnish to the Engineer complete test results for each tiedown anchor tested. Data for each test shall list key personnel, test loading equipment, tiedown anchor location, hole diameter, method of drilling, and bonded and unbonded length of tiedown anchor. Test data shall also list quantity of grout and grout pressure used within the bonded length of the tiedown anchor, amount of ground water encountered, the time and dates of drilling, tiedown anchor installation, grouting, and testing. The tiedown anchor end movements at each increment of load or at each increment of time during the load hold period of the loading schedule shall be included in the test data.

Load testing shall be performed against temporary bearing yokes that bear directly against the permanent bearing plate. Tiedown anchors shall not be stressed against new footing concrete until the concrete has attained a compressive strength of 2600 pounds per square inch . Temporary yokes shall remain the property of the Contractor.

A minimum of 2 tiedown anchors shall be performance tested at each footing. The Engineer shall determine the location of the tiedown anchors to be performance tested.

The performance test or proof test shall be conducted by measuring the test load applied to the tiedown anchor and recording the tiedown anchor end movement (measured at the end of the tiedown anchor) during incremental loading and unloading the tiedown anchor in accordance with the loading schedule. The test load shall be held constant for 10 minutes. During the load hold, the movement of the end of the tiedown anchor shall be measured at 1, 2, 3, 4, 5, 6, and 10 minutes. If the total recorded movement between one minute and 10 minutes exceeds 1.0 mm, the test load shall be held for an additional 50 minutes. Total movement shall be measured at 15, 20, 25, 30, 45, and 60 minutes. If the load is held for 60 minutes, a creep curve showing the creep movement between one minute and 60 minutes shall be plotted as a function of the logarithm of time.

LOADING SCHEDULES		
PERFORMANCE TEST		PROOF TEST
	(CONT'D)	
AL	AL	AL
0.20T	0.20T	0.20T
AL	0.40T	0.40T
0.20T	0.60T	0.60T
0.40T	0.80T	0.80T
AL 0.20T	1.00T (TEST LOAD)	1.00T (TEST LOAD)
0.40T	AL	AL
0.60T		
AL		
0.20T		
0.40T		
0.60T		
0.80T (CONT'D)		
T = Design force for the tiedown anchor shown plans AL = Alignment load = 0.10T		

For performance and proof tests, each increment of load shall be applied in less than one minute and held for at least one minute but not more than 2 minutes or as specified above. The observation period for the load hold shall start when the pump begins to apply the last increment of load.

The jacking equipment, including the tiedown anchor movement measuring system, shall be stable during all phases of the tiedown anchor loading operations.

All tiedown anchors not performance tested shall be proof tested. If 1.0 times the design force cannot be obtained, the tiedown anchor shall be replaced. Tiedown anchors shall not be retested, unless the tiedown bond length is post-grouted after the unacceptable test.

A performance tested or proof tested tiedown anchor shall conform to the following acceptance criteria:

A. The measured elastic movement of the end of the tiedown tendon exceeds 0.80 of the theoretical elongation of the unbonded length plus the jacking length at the maximum test load; and
B. The creep movement of the end of the tiedown anchor, between one and 10 minutes, is less than 0.04 inches.

Performance tested or proof tested tiedowns that fail to meet the acceptance criterion Number 2 will be acceptable if the maximum load is held for 60 minutes and the creep curve plotted from the movement data indicates a creep rate of less than 0.08 inch for the last log cycle of time between 6 and 60 minutes.

Lock-off

After successful testing of the tiedown anchors, the tiedown anchors shall be locked off at a force equal to 60 kips at bent 1 and 40 kips at bents 9, 10, 12, 13, 15, & 16. The lock-off force is the load on the jacks that is maintained while the tiedown anchor head or anchor nuts on the tiedown anchor are permanently set. Immediately after lock-off, a lift-off test shall be performed to demonstrate that the specified lock-off force was obtained. Adjustments in the shim thickness shall be made if required to achieve the specified lock-off force.

For strand tendons, the permanent wedges shall be fully set in the tiedown anchor head while the tendon is stressed to the test load of 1.0T, and then locked off at the lock-off force by removal of the shims or other appropriate means.

The permanent strand wedges shall bear uniformly against the wedge retainer device when torque is applied to the high strength bolts.

After lock-off, the grout shall be extended to the secondary grout level shown on the plans. At least 24 hours after the secondary grout has set, the remaining void in the steel tube and bearing plate shall be filled with grout. Grout shall be injected at the low end and expelled at the high end until there is no evidence of entrapped air or water. A minimum grout head of 2 feet shall be maintained until the grout has set.

The tiedown anchor head or anchor nuts shall be enclosed with a grouted anchorage enclosure device. After grouting the steel tube, the bearing plate surface shall be cleaned, silicon sealant placed, and the anchorage enclosure bolted in place. After bolting the anchorage enclosure in place the void in the anchorage enclosure shall be filled with grout by injecting grout at the low end of the void and venting at the high end. Any holes in the top of the anchorage enclosure used for grout placement shall be cleaned and sealed with silicon sealant.

MEASUREMENT AND PAYMENT

No payment will be made for tiedown anchors that do not pass the specified testing requirements.

Tiedown anchors will be measured and paid for by the unit, and the number for payment will be determined by the requirements of the details shown on the plans. No change in the number of tiedown anchors to be paid for will be made because of the use by the Contractor of an alternative number of tiedown anchors.

The contract unit price paid for tiedown anchor shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the tiedown anchors (including testing), 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 coring concrete shall be considered as included in the contract unit price paid for tiedown anchors and no separate payment will be made therefor.

10-1.65 CATHODIC PROTECTION

GENERAL

This work shall consist of providing cathodic protection for air and water pipes in accordance with the details shown on the plans and the requirements in these special provisions.

SUBMITTALS

Descriptive data for anodes, test stations, test boxes, and fusion welded connections shall be submitted for approval.

PRODUCTS

Anodes

Anodes shall be magnesium, prepackaged in cloth bags containing hydrated gypsum and bentonite clay; Dow, Galvo Mag; Kaiser, Electromag; or equal.

Anode test station.--

Anode test station shall be conduit mounted non-metallic terminal board with integral compression-fit base and screw on cover. The terminal board shall have nickel plated brass factory installed hardware. The test station shall be fabricated of white polycarbonate.

Anode test box.--

Anode test box shall be precast concrete box with terminal board as described herein and cast iron locking traffic cover marked "ANODE"; Christy, B3; Brooks, 3TL; or equal.

Conductors.--

Conductors shall be solid No. 12 AWG copper, Type TW or THW, insulation colored black for anode and red for all others.

Fusion weld material.--

Fusion weld material shall be a mixture of copper oxide and aluminum.

INSTALLATION

Impervious wrapping around the cloth bag packaged anode shall be removed immediately before installing the anode.

Anodes shall be installed at the locations shown on the plans. The packaged anode shall be wetted thoroughly before backfilling. Backfill material placed to one foot above the anode shall be native soil, free from aggregate larger than 1/2 inch in size.

Conductors shall be connected to pipes by fusion welding. All connections shall be insulated watertight after inspection by the Engineer.

Fusion weld connection to steel surface shall be made of molten copper produced by exothermic reaction following ignition of a mixture of copper oxide and aluminum flowing into weld cavity of a properly fitting graphite mold.

Each pipe conductor shall connect only one pipe to a terminal on the terminal board in the anode test box except where otherwise shown on the plans.

Pipe conductors shall have one foot slack at pipe connections and 2 feet slack at the anode test box.

Conductors shall be direct buried and located safe from damage due to construction operations.

All metals connected to cathodic protection, shall be coated or tape-wrapped as specified under "Air and Water Supply Lines" of these special provisions. Cathodically protected metals shall be isolated from all other metals.

CATHODIC PROTECTION TESTING

Cathodic protection systems shall be tested by a corrosion technician certified by the National Association of Corrosion Engineers (NACE). Tests shall include the following:

1. Isolation of protected metal from electrical conduit, piping for air or water, or other metals.

   If the same potential is measured from a stationary copper-copper sulphate half cell to any foreign structure as to the protected structure, the protected structure shall be deemed to be metallically connected to the foreign structure and the installation shall be deemed unacceptable.

2. Anode current.

3. Polarized potential.

   An instant-off potential of less then 850 millivolts shall be deemed to indicate an unacceptable installation. The instant-off potential shall be the voltage between the protected structure and a copper-copper sulphate half cell measured after the immediate shift that occurs when anode current is interrupted, but before any further current decay.

4. Anode potential.

   The anode open-circuit potential shall be at least 95 percent of the value listed in the manufacturer's published data for the type of anode furnished.

The tests shall be performed after all reinforcing steel, conduits, pipes and other foreign structures that might be inadvertently connected to the protected structures have been installed and backfilled or encased.

The corrosion technician shall submit a written report certifying the cathodic protection. The report shall indicate each measurement made and its recorded value.

If it is found that the protected pipe is not isolated from the existing piping the insulated flanges shall be repaired to provided the required isolation. If the instant-off potential is less than 850 millivolts then the anode shall be re-installed until this value is achieved.

The contract lump sum price paid for cathodic protection shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in the cathodic protection system for the air and water supply lines, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.66 SAN FRANCISCO MANHOLE

San Francisco manholes shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications, amendments for Section 51, "Concrete Structures" under "Concrete Structures" of these special provisions, and these special provisions.

The contract unit price paid for San Francisco manhole shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in San Francisco manhole, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.67 SAN FRANCISCO STORM WATER INLET

San Francisco storm water inlets shall conform to the provisions in Section 51, "Concrete Structures" of the Standard Specifications, amendments for Section 51, "Concrete Structures" under "Concrete Structures" of these special provisions, and these special provisions.

The contract unit price paid for San Francisco storm water inlet shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in San Francisco storm water inlet, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.68 CLASS B CONCRETE (BACKFILL)

At locations where pipe is to be backfilled with Class B concrete as shown on the plans, the concrete backfill shall conform to the provisions in "Portland Cement Concrete" of these special provisions.

The concrete backfill shall be placed in the trench against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the pipe, and voids in, or segregation of the concrete. Foreign material which falls into the trench, prior to or during placing 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.

The surface of the concrete backfill shall be broomed with a heavy broom to produce a uniform rough surface if asphalt concrete is to be placed directly thereon.

No material shall be placed on top of the concrete backfill until 8 hours after placing the concrete backfill.

The quantity of concrete in concrete backfill to be paid for by the cubic yard will be determined from the dimensions shown on the plans or other dimensions as may be ordered in writing by the Engineer. Concrete placed outside the limits shown on the plans or ordered by the Engineer will not be measured nor paid for.

The contract price paid per cubic yard for Class B concrete (backfill) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in Class B concrete (backfill), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.69 CLASS D CONCRETE (BACKFILL)

At locations where pipe is to be backfilled with Class D concrete as shown on the plans, the concrete backfill shall conform to the provisions in "Portland Cement Concrete" of these special provisions.

The concrete backfill shall be placed in the trench against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the pipe, and voids in, or segregation of, the concrete. Foreign material which falls into the trench, prior to or during placing 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.

The surface of the concrete backfill shall be broomed with a heavy broom to produce a uniform rough surface if asphalt concrete is to be placed directly thereon.

No material shall be placed on top of the concrete backfill until 8 hours after placing the concrete backfill.

The quantity of concrete in concrete backfill to be paid for by the cubic yard will be determined from the dimensions shown on the plans or other dimensions as may be ordered in writing by the Engineer. Concrete placed outside the limits shown on the plans or ordered by the Engineer will not be measured nor paid for.

The contract price paid per cubic yard for Class D concrete (backfill) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in Class D concrete (backfill), 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 CONCRETE STRUCTURES

Portland cement concrete structures shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

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

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

GENERAL.

Ten days prior to placing infill wall concrete, where infill walls are placed up to the bottom of existing girders, the Contractor shall submit to the Engineer for approval details of the procedure to be used to assure placement of concrete to provide full bearing under the existing girders.

Polyethylene filler shall be of commercial quality.

The retaining wall at First Street shall be cured by the forms-in-place method.

The formlines of exposed new concrete surfaces shall match the formlines of exposed existing concrete surfaces.

Shotcrete shall not be used as a alternative construction method for reinforced concrete members unless otherwise specified.

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

Form panels for exposed surfaces shall be plywood conforming to or exceeding the requirements of U.S. Product Standard PS 1 for Exterior B-B (Concrete Form) Class I Plywood or any material which will produce a smooth uniform concrete surface substantially equal to that which would result from the use of such plywood.

The third paragraph in Section 51-1.15, "Drains in Walls," of the Standard Specifications is amended to read:

In addition to the drain holes and weep holes specified in the preceding paragraph, holes approximately 3 inches in diameter for relief of hydrostatic pressure shall be provided at the bottom of walls, immediately above the footing, at approximately 15-foot centers.

The first paragraph of Section 51-1.20, "Sidewalks, Curbs and Stairways on Structures," of the Standard Specifications is amended to read:

The concrete shall be finished in conformance with the provisions for finishing surfaces in Section 73-1.06, "Sidewalk, Gutter Depression, Island Paving, Curb Ramp (Wheelchair Ramp), and Driveway Construction," except that surfaces shall not be marked.

When a roughened concrete surface is shown on the plans, the existing concrete surface shall be roughened to a full amplitude of approximately 1/4-inch by abrasive blasting, water blasting or mechanical equipment.

Neoprene strip shall be furnished and installed at abutment backwall joint protection in accordance with the details shown on the plans, the provisions in the Standard Specifications, and these special provisions.

Furnishing and installation of neoprene strip shall conform to the requirements for strip waterstops as provided in Section 51-1.145, "Strip Waterstops," of the Standard Specifications, except that protective board will not be required.

All forms shall be removed between the hinge and 5 feet past the access openings in cells of cast-in-place box girder bridges that have access openings near hinges.

Materials for access opening covers in soffits of new cast-in-place concrete box girder bridges shall conform to the provisions for materials in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

MASS CONCRETE

All concrete used in the portions of structures where the concrete being placed has a minimum dimension that exceeds 7 feet and, at the Contractor's option, other concrete shall conform to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions..

The Contractor shall control the internal temperature of the mass concrete as necessary during the pre-cooling, concrete placement, and post-cooling phases to meet the acceptance criteria for mass concrete specified herein.

Materials

Either Type A admixture or a Type D admixture conforming to the requirements of ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications shall be used at such dosage that will produce a workable concrete suitable for its intended use. The admixture at such dosage shall not cause an increase in drying shrinkage of the mass concrete in excess of that permitted in ASTM Designation: C 494.

Working Drawings

The Contractor shall submit to the Engineer working drawings with design calculations, for the proposed pre-cooling materials, if used, concrete placement, post-cooling system and the temperature monitoring and recording system for each typical mass concrete element. A typical mass concrete element is a structure element that consists of either a cast-in-drilled hole pile, bent cap, or a portion thereof, with the same dimensions, location, and the least dimension conforming to that of mass concrete. The proposed post-cooling system and the temperature monitoring and recording system shall be prepared by

an engineer who is registered as a Civil Engineer in the State of California. The design calculations shall be based on the 2-D Schmidt model or equivalent and shall adequately demonstrate that the mass concrete acceptance criteria are not exceeded. Working drawings for each typical mass concrete element shall include the requirements listed below and specified herein.

A. Dimensions of each typical mass concrete element.
B. Types and dimensions of materials to be used for mass concrete forms and insulation, and time frames for when the concrete forms and insulation will be removed.
C. Assumptions for average ambient air and average surface water temperature for time period of placement.
D. Substructure placing diagram showing the typical mass concrete element placing sequence and construction joint locations. Placement of mass concrete elements in the superstructure shall conform to Section 51-1.06A "Falsework Design and Drawings," of the Standard Specifications.
E. Identify areas where steep cooling gradients may occur and how they will be avoided.
F. Peak temperature and at what approximate time it will occur.

The working drawings and design calculations for each typical mass concrete element to be placed shall conform to the requirements in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The number of sets of drawings and design calculations and times for review for each typical mass concrete element shall be the same as specified for falsework working drawings in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications. Should the Engineer fail to review the complete working drawing submittal within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the working drawing submittal, an extension of time commensurate with the delay in completion of the work thus caused will be granted in accordance with Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Pre-Cooling Mass Concrete Materials

The Contractor may pre-cool the mass concrete materials. If the Contractor elects to pre-cool mass concrete materials, the Contractor shall state, in the working drawings, measures to be taken to pre-cool materials.

Mass Concrete Placement

The Contractor shall state, in the working drawings, construction procedures for concrete handling and concrete scheduling to be implemented in the field to place the mass concrete in the substructure and the superstructure, including stating the proposed maximum allowable temperature of mass concrete at placement.

Post-Cooling System for Mass Concrete

The Contractor shall design and install a post-cooling system for each mass concrete element. The post-cooling system shall be an embedded cooling pipe system within each mass concrete element. Horizontal construction joints will not be permitted in the footings or in the caps. The contractor in the working drawings shall provide a detailed layout of proposed embedded cooling pipe system, including pipe spacing, water temperature, rate of flow, and approximate duration of cooling. In addition, a item list of embedded cooling pipe system materials and details showing the support of the cooling pipes at fixed locations shall also be provided.

The following elements are required for an embedded cooling pipe system:

A. Forms shall be designed so that shutdown of cooling or temperature recording activities is not necessary if forms are removed.
B. The Contractor shall provide thermometers to measure water temperatures at supply and return manifolds.
C. Cooling pipes shall be steel pipes. Surface connections to the cooling pipes shall be removable to a depth of 4 inches. Cooling pipes shall be satisfactorily secured to bar reinforcing steel to prevent movement or damage during mass concrete placement.
D. Water shall be from the local domestic water supply
E. Prior to the placement of the mass concrete, the cooling pipe system shall be pressure tested by the Contractor in the presence of the Engineer for leaks at 120 percent of the maximum pressure it will receive during use. All leaks shall be repaired and the cooling pipe system retested by the Contractor in the presence of the Engineer until satisfactory results are obtained.

Temperature Monitoring and Recording System for Mass Concrete

To verify the effectiveness of the post-cooling system in regulating the internal temperatures and the surface-to-center temperature gradients of the mass concrete, the Contractor shall design and implement a temperature monitoring and recording system for each mass concrete placement.

The temperature monitoring and recording system for mass concrete shall consist of thermocouples connected to a data acquisition system capable of printing, storing, and downloading data to a computer with temperatures from the thermocouples in the mass concrete and the air. The Contractor shall provide a minimum of 10 thermocouples for each mass concrete element, with 3 located at the center of the mass concrete, 3 located 3 inches from the edge of the concrete from top to bottom, 3 located transversely, randomly placed in the mass concrete subject to approval by the Engineer, and one for the air temperature.

Wiring from thermocouples cast into the concrete shall be protected in conduits securely tied to the bar reinforcement to prevent movement. Wire runs shall be kept as short as possible. The end of the thermocouple shall not come into contact with either a support or concrete form, or bar reinforcing steel. Drawings for the temperature monitoring and recording system for each mass concrete placement shall include:

A. Type and description of equipment to be used in the temperature monitoring and recording system.
B. Detailed layouts for all thermocouples in each mass concrete placement.
C. Details of computer printout spreadsheet and graphs for temperatures at each thermocouple and temperature differentials between thermocouples for each typical mass concrete placement.

The Contractor shall allow 10 working days for the review and the approval of the proposed layout plan for placement of thermocouples at piers. Mass concrete and air temperatures shall be monitored and recorded continuously for 2 weeks. As a minimum, temperature readings and temperature differentials shall be taken every hour for two weeks. The records and graphs of the temperatures and temperature differentials for each mass concrete element placed shall be signed by an engineer who is registered as a Civil Engineer in the State of California and available to the Engineer at the jobsite during normal working hours, and a copy of the record shall be delivered to the Engineer at the end of each day of the monitoring period starting on the day after the mass concrete placement has been completed.

Construction for Mass Concrete

The Contractor shall install the thermocouples, temperature monitoring and recording systems, thermocouple supports, formwork and concrete placement in conformance with the approved working drawings and design calculations.

Prior to proceeding with each mass concrete element placement, an engineer for the Contractor who is registered as a Civil Engineer in the State of California shall inspect and test both the post-cooling system and the temperature monitoring and recording system, for conformity with the working drawings. The Contractor's registered engineer shall certify in writing that the post-cooling system and the temperature monitoring and recording system, substantially conform to the working drawings and that the material and workmanship are satisfactory for the purpose intended. A copy of this certification shall be available at the site of the work at all times.

The Contractor's registered engineer shall be present at the bridge site at all times when mass concrete operations are in progress. The Contractor's registered engineer shall inspect the mass concrete element placement operation, the post-cooling system and the temperature monitoring and recording system, when required, and report in writing on a daily basis the progress and status of the systems. A copy of the daily report shall be available at the site of the work at all times.

Coolant circulation shall be in progress or the cooling pipes shall be filled with coolant at the time concrete placement begins.

Care shall be taken during mass concrete consolidation to prevent damage to the embedded cooling pipe system and to the temperature monitoring and recording system.

Cooling pipes that are damaged during the mass concrete placement shall be removed and replaced immediately as directed by the Engineer.

After the mass concrete pour has been topped out and finished it shall be revibrated and refinished. Revibration shall extend below the top mat of reinforcement and shall be done as late as the concrete will again respond to vibration. For concrete pours without top reinforcement, revibration shall extend to a depth of 6 inches.

When the mass concrete has reached its initial peak temperature, cooling shall be continued for a period of at least 1 to 2 weeks at a rate such that the concrete temperature drop generally does not exceed 1.8° F. per day. When the rate of temperature change is exceeded, post-cooling operations shall be stopped until the temperature rises again. Cooling shall resume when concrete temperature approaches the initial peak temperature.

After cooling has been completed and the pipe is no longer needed, it shall be grouted full with a non-shrink grout mixture in conformance with the requirements in ASTM Designation: C 1107 and ASTM Test Designation: C 827 for 0.0% shrinkage, and 0.0% min, 4.0% max. expansion. The grout shall remain under pressure until final set has been attained. Non-shrink grout shall be mixed, placed, and cured in accordance with the requirements of the manufacturer, and as approved by the Engineer.

After surface connections to the cooling pipe are removed, the holes shall be reamed and filled with magnesium phosphate concrete conforming to Section 83-2.02D(1), "General," of the Standard Specifications.

Acceptance Criteria for Mass Concrete

In addition to meeting the concrete acceptance criteria, the acceptance criteria for mass concrete is as follows:

A. The maximum allowable peak temperature of in-place mass concrete is 150° F.
B. The maximum allowable temperature differential between any surface exterior temperature and the center interior temperature of the mass concrete is 68° F.

If the Contractor fails to meet either or both of the acceptance criteria for mass concrete specified above, as determined by the Engineer, the typical mass concrete element placement will be rejected.

If the Contractor fails to meet either or both of the acceptance criteria for mass concrete specified above, then the Contractor shall, at the Contractor's expense modify the design or construction procedures and submit revised working drawings and calculations. Mass concrete placement shall not begin until the Engineer has approved the revised working drawings in writing. No extension of time or compensation will be made for modifying working drawings or supplemental calculations, for resubmittal and review of working drawings or supplemental calculations and for rejection of the mass concrete.

If an equipment failure occurs, as determined by the Engineer, in the post-cooling system or in the temperature monitoring and recording system used to monitor the mass concrete, the mass concrete element will be rejected.

FALSEWORK.--Falsework shall be designed and constructed in conformance with the requirements in Section 51-1.06, "Falsework," of the Standard Specifications and these special provisions.

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

51-1.06A Falsework Design and Drawings.—The Contractor shall submit to the Engineer working drawings and design calculations for falsework proposed for use at bridges. For bridges where the height of any portion of the falsework, as measured from the ground line to the soffit of the superstructure, exceeds 14 feet; or where any individual falsework clear span length exceeds 16 feet; or where provision for vehicular, pedestrian, or railroad traffic through the falsework is made; the drawings shall be signed by an engineer who is registered as a Civil Engineer in the State of California. Six sets of the working drawings and 2 copies of the design calculations shall be furnished. Additional working drawings and design calculations shall be submitted 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.

Attention is directed to Section 5-1.02, "Plans and Working Drawings."

For falsework over railroads, approval by the Engineer of the falsework drawings will be contingent upon the drawings being satisfactory to the railroad company involved.

Except for placement of foundation pads and piles, the construction of any unit of falsework shall not start until the Engineer has reviewed and approved the drawings for that unit.

Except as otherwise provided in the special provisions, the Contractor shall allow 3 weeks after complete drawings and all support data are submitted, for the review of any falsework plan.

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

Should the Engineer fail to complete the review within the time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in falsework plan review, the delay will be considered a right of way delay as specified in Section 8-1.09, "Right of Way Delays."

The Contractor may revise approved falsework drawings provided sufficient time is allowed for the Engineer's review and approval before construction is started on the revised portions. The additional time will not be more than that which was originally allowed.

If structural composite lumber is proposed for use, the falsework drawings shall clearly identify the structural composite lumber members by grade (E value), species, and type. The Contractor shall provide technical data from the manufacturer showing the tabulated working stress values of the composite lumber. The Contractor shall furnish a certificate of compliance as specified in Section 6-1.07, "Certificates of Compliance," for each delivery of structural composite lumber to the project site.

The falsework drawings shall include a superstructure placing diagram showing the concrete placing sequence and construction joint locations. When a schedule for placing concrete is shown on the contract plans, no deviation will be permitted.

The maximum length of falsework spans used to support T-beam girder bridges shall not exceed 14 feet plus 8.5 times the depth of the T-beam girder.

When footing type foundations are to be used, the Contractor shall determine the bearing value of the soil and shall show the values assumed in the design of the falsework on the falsework drawings.

When pile type foundations are to be used, the falsework drawings shall show the maximum horizontal distance that the top of a falsework pile may be pulled in order to position the falsework pile under its cap. The falsework plans shall also show the maximum allowed deviation of the top of the pile, in its final position, from a vertical line through the point of fixity of the pile.

For falsework piles with a calculated loading capacity greater than 100 tons, the falsework piles shall be designed by an engineer who is registered as either a Civil Engineer or a Geotechnical Engineer in the State of California, and the calculations shall be submitted to the Engineer.

Anticipated total settlements of falsework and forms shall be shown on the falsework drawings. These should include falsework footing settlement and joint take-up. Anticipated settlements shall not exceed 1 inch. Falsework supporting deck slabs and overhangs on girder bridges shall be designed so that there will be no differential settlement between the girders and the deck forms during placement of deck concrete.

Falsework footings shall be designed to carry the load imposed upon the footings without exceeding the estimated soil bearing values and anticipated settlements.

Foundations for individual steel towers where the maximum leg load exceeds 30 kips shall be designed and constructed to provide uniform settlement under all legs of each tower under all loading conditions.

The support systems for form panels supporting concrete deck slabs and overhangs on girder bridges shall also be considered to be falsework and designed as such.

Temporary bracing shall be provided, as necessary, to withstand all imposed loads during erection, construction, and removal of any falsework. The falsework drawings shall show provisions for the temporary bracing, or methods to be used to conform to this requirement during each phase of erection and removal. Wind loads shall be included in the design of the bracing or methods.

The falsework design calculations shall show the stresses and deflections in load supporting members.

The design of falsework will not be approved unless it is based on the use of loads and conditions which are no less severe than those described in Section 51-1.06A(1), "Design Loads," and based on the use of stresses and deflections which are no greater than those described in Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections." The Contractor is responsible for the proper evaluation of the falsework materials and design of the falsework to safely carry the actual loads imposed.

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

51-1.06A(1) Design Loads.—The design load for falsework shall consist of the sum of dead and live vertical loads, and an assumed horizontal load. The minimum total design load for any falsework, including members that support walkways, shall be not less than 100 pounds per square foot for the combined live and dead load regardless of slab thickness.

Dead loads shall include the loads due to the mass of concrete, reinforcing steel, forms, and falsework. The loads due to the mass of concrete, reinforcing steel, and forms shall be assumed to be not less than160 pounds per cubic foot for normal concrete and not less than 130 pounds per cubic foot for lightweight concrete.

Live loads shall consist of the actual load of any equipment to be supported by falsework applied as concentrated loads at the points of contact, and a uniform load of not less than 20 pounds per square foot applied over the area supported, plus 75 pounds per linear foot applied at the outside edge of deck overhangs.

The assumed horizontal load to be resisted by the falsework bracing system shall be the sum of the actual horizontal loads due to equipment, construction sequence, or other causes, and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 2 percent of the total dead load. The falsework shall be designed so that it will have sufficient rigidity to resist the assumed horizontal load without considering the load due to the concrete.

The minimum horizontal load to be allowed for wind on heavy-duty steel shoring or steel pipe column falsework having a vertical load carrying capacity exceeding 30 kips per leg or column shall be the sum of the products of the wind impact area, shape factor, and applicable wind pressure value for each height zone. The wind impact area is the total projected area of all the elements in the tower face or falsework bent normal to the direction of the applied wind. The shape factor shall be taken as 2.2 for heavy-duty shoring and 1.0 for pipe column falsework. Wind pressure values shall be determined from the following table:

Height Zone (Feet above ground)	Wind Pressure Value (psf)	
	Shores or Columns Adjacent to Traffic	At Other Locations
0-30	20	15
30-50	25	20
50-100	30	25
over 100	35	30

The minimum horizontal load to be allowed for wind on all other types of falsework, including falsework supported on heavy-duty shoring or pipe column falsework, shall be the sum of the products of the wind impact area and applicable wind pressure value for each height zone. The wind impact area is the gross projected area of the falsework and any unrestrained portion of the permanent structure, excluding the areas between falsework bents or towers where diagonal bracing is not used. Wind pressure values shall be determined from the following table:

Height Zone (Feet above ground)	Wind Pressure Value	
	For Members Over and Bents Adjacent to Traffic Opening	At Other Locations
0 to 30	2.0 Q psf	1.5 Q psf
30-50	2.5 Q psf	2.0 Q psf
50-100	3.0 Q psf	2.5 Q psf
Over 100	3.5 Q psf	3.0 Q psf

Q = 1 + 0.2 W; but shall not be more than 10.
W = width of the falsework system, in feet, measured in the direction of the wind force being considered.

The entire superstructure cross-section, except railing, shall be considered to be placed at one time except as provided herein. Girder stems and connected bottom slabs, if placed more than 5 days prior to the top slab, may be considered to be self supporting between falsework posts at the time the top slab is placed provided that the distance between falsework posts does not exceed 4 times the depth of the portion of the girder placed in the first pour.

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

If the concrete is to be prestressed, the falsework shall be designed to support any increased or readjusted loads caused by the prestressing forces.

Section 51-1.06A(2), "Design Stresses, Loadings, and Deflections," of the Standard Specifications is amended to read:

51-1.06A(2) Design Stresses, Loadings, and Deflections.—The maximum allowable design stresses and loadings listed in this Section 51-1.06A(2), are based on the use of undamaged, high-quality materials, and such stresses and loadings shall be reduced by the Contractor if lesser quality materials are to be used.

The maximum allowable stresses, loadings, and deflections used in the design of the falsework shall be as follows:

Timber:

Compression perpendicular to the grain	450 psi
Compression parallel to the grain	$480{,}000 \div (L/d)^2$ psi; not to exceed 1,600 psi
Flexural stress	1,800 psi; 1,500 psi for members with a nominal depth of 8 inches or less
Horizontal shear	140 psi
Axial tension	1,200 psi
Deflection due to concrete loading only	0.0042 of the span, irrespective of deflection compensated for by camber strips
Modulus of elasticity (E)	1.6×10^6 psi
Timber piles	45 tons

L = unsupported length.
d = least dimension of a square or rectangular column, or the width of a square of equivalent cross-sectional area for round columns (in the same units as L).

Timber connections shall be designed in conformance with the procedures, stresses, and loads permitted in the Falsework Manual as published by the Department of Transportation.

Steel:

For identified grades of steel, design stresses, except stresses due to flexural compression, shall not exceed those specified in the Manual of Steel Construction as published by the AISC.

When the grade of steel cannot be positively identified, design stresses, except stresses due to flexural compression, shall not exceed either those specified in the AISC Manual for ASTM Designation: A 36/A 36M steel or the following:

Tension, axial and flexural	22,000 psi
Compression, axial	$16{,}000-0.38(L/r)^2$ psi; except L/r shall not exceed 120
Shear on gross section of web of rolled shapes	14,500 psi
Web crippling for rolled shapes	27,000 psi

For all grades of steel, design stresses and deflections shall not exceed the following:

Compression, flexural	$\frac{12{,}000{,}000}{Ld/bt}$ psi, but not to exceed 22,000 psi for unidentified steel or steel conforming to the requirements in ASTM Designation: A 36/A 36M nor $0.6F_y$ for other identified steel
Deflection due to concrete loading only	0.0042 of the span, irrespective of deflection compensated for by camber strips

In the foregoing formulas, L is the unsupported length; d is the least dimension of rectangular columns, or the width of a square of equivalent cross-sectional area for round columns, or the depth of beams; b is the width and t is the thickness of the compression flange; and r is the radius of gyration of the member. All dimensions are expressed in inches. F_y is the specified minimum yield stress, in psi, for the grade of steel used.

The modulus of elasticity (E) used for steel shall be 30×10^6 psi.

Manufactured Assemblies:

The maximum loadings and deflections used on jacks, brackets, columns, joists, and other manufactured devices shall not exceed the manufacturer's recommendations except that the dead load deflection of the joists used at locations other than under deck slabs between girders shall not exceed 0.0042 of their spans. If requested by the Engineer, the Contractor shall furnish engineering data from the manufacturer verifying the manufacturer's recommendations, or shall perform tests as necessary to demonstrate the adequacy of the devices proposed for use.

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 1000 pounds per inch for each 1/8 inch 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. The letter of certification shall be signed by an engineer who is registered as a Civil Engineer in the State of California and shall be provided prior to placing any concrete for which the falsework is being erected to support.

For previously welded splices, the Contractor shall determine and perform all necessary testing and inspection required to certify the ability of the falsework members to sustain the stresses required by the falsework design. This welding certification shall be in writing, shall be signed by an engineer who is registered as a Civil Engineer in the State of California, and shall be provided prior to placing any concrete for which the falsework is being erected to support.

Section 51-1.06A(3), "Special Locations," of the Standard Specifications is amended to read:

51-1.06A(3) Special Locations.—In addition to the minimum requirements specified in this Section 51-1.06A, falsework over or adjacent to roadways or railroads which are open to traffic shall be designed and constructed so that the falsework will be stable if subjected to impact by vehicles. Falsework posts which support members that cross over a roadway or railroad shall be considered as adjacent to roadways or railroads. Other falsework posts shall be considered as adjacent to roadways or railroads only if they are located in the row of falsework posts nearest to the roadway or railroad, and the horizontal distance from the traffic side of the falsework to the edge of pavement, or to a point 10 feet from the centerline of track, is less than the total height of the falsework and forms. The Contractor shall provide any additional features for the work needed to ensure that falsework will be stable if subjected to impact by vehicles and to comply with the provisions in Section 7-1.09, "Public Safety." The falsework design at these locations shall include, but not be limited to, the following minimum provisions:

The vertical load used for the design of falsework posts and towers, but not footings, which support the portion of the falsework over openings, shall be the greater of the following:

(1) 150 percent of the design load calculated in conformance with the provisions for design load previously specified but not including any increased or readjusted loads caused by the prestressing forces, or
(2) the increased or readjusted loads caused by the prestressing forces.

Falsework posts adjacent to roadways or railroads shall consist of either steel with a minimum section modulus about each axis of 9.5 inches cubed, or sound timbers with a minimum section modulus about each axis of 250 inches cubed.

Each falsework post adjacent to roadways or railroads shall be mechanically connected to its supporting footing at its base, or otherwise laterally restrained, so as to withstand a force of not less than 2,000 pounds applied at the base of the post in any direction except toward the roadway or railroad track. The posts also shall be mechanically connected to the falsework cap or stringer. The mechanical connection shall be capable of resisting a load in any horizontal direction of not less than 1,000 pounds.

For falsework spans over roadways, all exterior falsework stringers, and stringers adjacent to the ends of discontinuous caps, the stringer or stringers over points of minimum vertical clearance and every fifth remaining stringer, shall be mechanically connected to the falsework cap or framing. The mechanical connections shall be capable of resisting a load in any direction, including uplift on the stringer, of not less than 500 pounds. The connections shall be installed before traffic is allowed to pass beneath the span. For falsework spans over railroads, all falsework stringers shall be so connected to caps.

When timber members are used to brace falsework bents which are located adjacent to roadways or railroads, all connections for the timber bracing shall be of the bolted type using 5/8 inch diameter or larger bolts.

The falsework shall be located so that falsework footings or piles are at least 3 inches clear of railing posts and barriers, and all other falsework members are at least one foot clear of railing members and barriers.

Falsework bents within 20 feet of the center line of a railroad track shall be sheathed solid in the area between 3 feet and 17 feet above the track elevation on the side facing the track. Sheathing shall consist of plywood not less than 5/8 inch thick or lumber not less than one inch thick (nominal). Bracing on these bents shall be adequate so that the bent will resist the required assumed horizontal load or 5,000 pounds, whichever is greater.

The dimensions of the clear openings to be provided through falsework for roadways shall be as specified in "Maintaining Traffic," of the special provisions.

The dimensions of clear openings to be provided through the falsework for railroads shall be as specified in "Railroad Relations and Insurance," of the special provisions.

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

51-1.06B Falsework Construction.—The falsework shall be constructed to substantially conform to the falsework drawings. The materials used in the falsework construction shall be of the quality necessary to sustain the stresses required by the falsework design. When manufactured assemblies are used in falsework, the Contractor shall furnish to the Engineer a letter of certification which certifies that all components of these manufactured assemblies are used in conformance with the manufacturer's recommendations. The workmanship used in falsework construction shall be of such quality that the falsework will support the loads imposed on the falsework without excessive settlement or take-up beyond that shown on the falsework drawings.

Falsework shall be founded on a solid footing safe against undermining, protected from softening, and capable of supporting the loads imposed on the falsework. When requested by the Engineer, the Contractor shall demonstrate by suitable load tests that the soil bearing values assumed for the design of the falsework do not exceed the supporting capacity of the soil.

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

For falsework piles with a calculated loading capacity greater than 100 tons, the Contractor shall conduct dynamic monitoring of pile driving and conduct penetration and bearing analyses based on a wave equation analysis. These analyses shall be signed by an engineer who is registered as a Civil Engineer in the State of California and submitted to the Engineer prior to completion of falsework erection.

When falsework is over or adjacent to roadways or railroads, all details of the falsework system which contribute to horizontal stability and resistance to impact, except for bolts in bracing, shall be installed at the time each element of the falsework is erected and shall remain in place until the falsework is removed.

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

Temporary railing (Type K), conforming to the provisions in Section 12-3, "Traffic-Handling Equipment and Devices," shall be installed on both sides of all vehicular openings through falsework and, when ordered by the Engineer, at all other falsework less than 12 feet from the edge of a traffic lane. Temporary railings shall begin approximately 150 feet in advance of the falsework and shall extend past the falsework, in the direction of adjacent traffic flow. For 2-way traffic openings, the temporary railing shall extend at least 60 feet past the falsework, in the direction of adjacent traffic flow. The location and length of railing and the type of flare to be used shall be as ordered by the Engineer. The clear vehicular opening between temporary railings shall be not less than that specified in the special provisions.

The installation of temporary railing shall be complete before falsework erection is begun. Temporary railing at falsework shall not be removed until the removal is approved by the Engineer.

Temporary railing (Type K) installed as specified above will be measured and paid for as provided in Section 12-4, "Measurement and Payment," except that when the Engineer's Estimate does not include a contract item for temporary railing (Type K), full compensation for furnishing, placing, maintaining, repairing, replacing, and removing the temporary railing at falsework locations as specified in this Section 51-1.06B, shall be considered as included in the contract prices paid for the various items of work requiring falsework, and no separate payment will be made therefor.

Camber strips shall be used where directed by the Engineer to compensate for falsework deflection, vertical alignment, and anticipated structure deflection. The Engineer will furnish to the Contractor the amount of camber to be used in constructing the falsework.

The Contractor shall provide tell-tales attached to the soffit forms and readable from the ground in enough systematically placed locations to determine the total settlement of the entire portion of the structure where concrete is being placed.

Deck slab forms between girders shall be constructed with no allowance for settlement relative to the girders.

Dead loads, other than those due to forms and reinforcing steel, shall not be applied to any falsework until authorized by the Engineer.

Should unanticipated events occur, including settlements that deviate by more than ±3/8 inch from those indicated on the falsework drawings, which in the opinion of the Engineer would prevent obtaining a structure conforming to the requirements of these specifications, the placing of concrete shall be discontinued until corrective measures satisfactory to the Engineer are provided. In the event satisfactory measures are not provided prior to initial set of the concrete in the affected area, the placing of concrete shall be discontinued at a location determined by the Engineer. All unacceptable concrete shall be removed.

Section 51-1.06C, "Removing Falsework," of the Standard Specifications is amended to read:

51-1.06C Removing Falsework.—Falsework supporting any span of a simple span bridge shall not be released before 10 days after the last concrete, excluding concrete above the bridge deck, has been placed. Unless otherwise permitted by the Engineer, falsework supporting any span of a continuous or rigid frame bridge shall not be released before 10 days after the last concrete, excluding concrete above the bridge deck, has been placed in that span and in the adjacent portions of each adjoining span for a length equal to at least one-half the length of the span where falsework is to be released.

Falsework for cast-in-place prestressed portions of structures shall not be released until after the prestressing steel has been tensioned.

Falsework supporting any span of a continuous or rigid frame bridge shall not be removed until all required prestressing has been completed in that span and in the adjacent portions of each adjoining span for a length equal to at least one-half the length of the span where falsework is to be released.

Falsework for arch bridges shall be removed uniformly and gradually, beginning at the crown and working toward the springing, to permit the arch to take its load slowly and evenly. Falsework for adjacent arch spans shall be struck simultaneously.

Falsework supporting overhangs, deck slabs between girders, and girder stems which slope 45 degrees or more off vertical shall not be released before 7 days after the deck concrete has been placed.

Falsework supporting the sides of the girder stems which slope less than 45 degrees off vertical may be removed prior to placing deck slab concrete, providing a reshoring system is installed. The reshoring system shall consist of lateral supports which are designed to resist all rotational forces acting on the stem, including those caused by the placement of deck slab concrete. The lateral supports shall be installed immediately after each form panel is removed and prior to the release of supports for the adjacent form panel.

Falsework for bent caps which will support steel or precast concrete girders shall not be released before 7 days after the cap concrete has been placed or until the cap has reached 80 percent of the specified strength. Girders shall not be erected onto the bent caps until the concrete in the cap has attained a compressive strength of 2,600 pounds or 80 percent of the specified strength, whichever is higher.

Unless otherwise specified, removing falsework supporting any span of structural members subject to bending, shall conform to the requirements for removing falsework supporting any span of a simple span bridge.

In addition to the above requirements, no falsework for bridge spans shall be released until the supported concrete has attained a compressive strength of 2,600 pounds or 80 percent of the specified strength, whichever is higher.

Falsework for box culverts and other structures with decks lower than the roadway pavement and with span lengths of 14 feet or less shall not be released until the last placed concrete has attained a compressive strength of 1,500 pounds per square inch, provided that curing of the concrete is not interrupted. Falsework removal for other box culverts shall conform to the requirements for release of bridge falsework.

Falsework for arch culverts shall not be released before 40 hours after the supported concrete has been placed.

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

All falsework materials shall be completely removed. Falsework piling shall be removed at least 2 feet below the surface of the original ground or original streambed. When falsework piling is driven within the limits of ditch or channel excavation areas, the falsework piling within those areas shall be removed to at least 2 feet below the bottom and side slopes of the excavated areas.

All debris and refuse resulting from the work shall be removed and the premises left in a neat and presentable condition.

In addition to the requirements in Section 51-1.06A, "Falsework Design and Drawings," of the Standard Specifications, the following requirements shall apply:

The time to be provided for the Engineer's review of the working drawings for specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	**Review Time - Weeks**
Frame 7U of Mainline	9*
Frame 8U of Mainline	12
Mainline over 2nd Street	9
Mainline over 3rd Street	9
Mainline over 4th Street	9
Frame 5L of Mainline east of 2nd Street	9
Eastbound interim structure over 3rd Street	9
Eastbound interim structure over 4th Street	9
Interim Mainline widening over 4th Street	9
Harrison Off Ramp	6
* 12 weeks for stage 6 of Frame 7U	

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

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

Where falsework is supported on the deck of a structure, construction shall conform to the following:

Falsework shall bear directly on the girder stems or bent caps of the supporting structure or shall bear on falsework sills which are structurally adequate to transmit the load to the stems or cap without stress to the deck slab.

Additional falsework shall be in place beneath the supporting structure whenever construction loads are imposed upon the supporting structure. Such additional falsework shall be designed and constructed to support all construction loads imposed upon the supporting structure from the upper structure.

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 accordance 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 such bridges, such proposals shall be in accordance with the provisions of Section 5-1.14, "Cost Reduction Incentive," of the Standard Specifications and these special provisions.

The Engineer may reject any proposal which, in his 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 the Resident Engineer, Department of Transportation, 151 Fremont Street, San Francisco, CA 94105. When notified in writing by the Engineer, the Contractor shall submit 12 sets of such CRIP plan revisions and calculations to said Office of the Resident Engineer for final approval and use during construction. The calculations must verify that all requirements are satisfied. Such CRIP plans and calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California.

Such CRIP plans shall be either 11" x 17" or 22" x 34" in size and each CRIP plan sheet and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post Mile. Each CRIP plan sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Within 3 weeks after final approval of the CRIP plan sheets, one set of the corrected good quality prints on 20 pound (minimum) bond paper (22" x 34" in size) of all CRIP plan sheets prepared by the Contractor for each CRIP shall be furnished to the Office of the Resident Engineer.

Each CRIP shall be submitted prior to completion of 25 percent of contract working days and sufficiently in advance of the start of the work that is proposed to be revised by the CRIP to allow time for review by the Engineer and correction by the Contractor of the CRIP plans and calculations without delaying the work. The Contractor shall allow a minimum of 12 weeks for the review of a CRIP. In the event that several CRIPs are submitted simultaneously, or an additional CRIP is submitted for review before the review of a previously submitted CRIP has been completed, the Contractor shall designate the sequence in which the CRIPs are to be reviewed. In such 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 two 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. Any proposal which results in a deviation in configuration may require new permits or approvals. The Contractor shall be responsible for obtaining such 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 accordance 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 it includes all aspects of the design changes for the entire structure. Any changes, such as but not limited to, additional reinforcement and changes in location of reinforcement, necessary to implement the CRIP after approval by the Engineer, shall be made at the Contractor's expense.

Modifications may be proposed in (1) the thickness of girder stems and deck slabs, (2) the number of girders, (3) the deck overhang dimensions as specified herein, (4) the amount and location of reinforcing steel, (5) the amount and location of prestressing force in the superstructure, and (6) the number of hinges, except that the number of hinges shall not be increased. The strength of the concrete used may be increased but the strength employed for design or analysis shall not exceed 6,000 psi.

Modifications proposed to the minimum amount of prestressing force which must be provided by full length draped tendons are subject to the requirements 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 such cost from any moneys due, or that may become due, the Contractor under the contract, regardless of whether or not the proposal is approved or rejected.

DECK CLOSURE POURS.--Where deck closure pour is shown on the plans, reinforcement protruding into the closure space and forms for the closure pour shall conform to the following:

During the time of placement of concrete in the deck, other than for the closure pour itself, reinforcing steel which protrudes into the closure space shall be completely free from any connection to the reinforcing steel, concrete, or other attachments of the adjacent structure, including forms. Said reinforcing steel shall remain free of any connection for a period of not less than 24 hours following completion of the pour.

Forms for the closure pour shall be supported from the superstructure on both sides of the closure space unless otherwise directed by the Engineer.

SLIDING BEARINGS.--Sliding bearings consisting of elastomeric bearing pads lubricated with grease and covered with sheet metal shall conform to the following requirements:

Grease shall conform to the requirements of Military Specification: MIL-S-8660. A uniform film of grease shall be applied to the upper surface of the pads prior to placing the sheet metal.

Sheet metal shall be commercial quality galvanized sheet steel. The sheet metal shall be smooth and free of kinks, bends, or burrs.

Construction methods and procedures shall prevent grout or concrete seepage into the sliding bearing assembly.

ELASTOMERIC BEARING PADS.--Elastomeric bearing pads shall conform to the provisions in Section 51-1.12H, "Elastomeric Bearing Pads," of the Standard Specifications and these special provisions.

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

The peel strength test will be performed after immersing the sample in water for a minimum of 10 days. The bond between elastomer and fabric shall be such that when a sample is tested for separation, it shall have a minimum peel strength of 30 pounds per inch when tested in accordance with California Test 663.

The 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 last 2 sentences of the tenth paragraph of Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearings," of the Standard Specifications are amended to read:

Pads shall be available for sampling at least 4 weeks in advance of intended use. All sample pads for testing shall be furnished by the Contractor at his expense.

The eleventh paragraph of Section 51-1.12H(1), "Plain and Fabric Reinforced Elastomeric Bearings," of the Standard Specifications are amended to read:

Specimens tested in conformance with the requirements in California Test 663 shall meet the requirements for the bond between elastomer and fabric reinforcement laminations.

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

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 0.075 inch (14-gage). Internal elastomer laminates shall have a thickness of 1/2 inch, and top and bottom elastomer covers shall each have a thickness of 1/4 inch. The combined thickness of internal elastomer laminates and top and bottom elastomer covers shall be equal to the bearing pad thickness shown on the plans. . The total out to out thickness of a pad shall not be less than the thickness shown on the plans nor more than 1/4 inch greater than that thickness. The elastomer cover to the steel laminates at the sides of the bearing shall be 1/8 inch. If guide pins or other devices are used to control the side cover over the steel laminates, any exposed portions of the steel laminates shall be sealed by vulcanized patching. The length, width, or diameter of the bearings shall be as shown on the plans.

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

One sample bearing shall be furnished to the Engineer from each lot of bearings to be furnished for the contract. Samples shall be available at least 3 weeks in advance of intended use. The sample bearing shall be one of the following:

BEARING PAD THICKNESS AS SHOWN ON THE PLANS	SAMPLE BEARING
2 inches or less.....	Smallest complete bearing shown on the plans.
Greater than 2 inches.....	* 2.25±0.125 inch thick sample not less than 8 inches by 12 inches in plan and cut by the manufacturer from the center of one of the thickest complete bearings.
* The sample bearing plus remnant parts of the complete bearing shall be furnished to the Engineer.	

DECK CRACK TREATMENT

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

The Contractor shall remove all equipment and materials from the deck and clean the surface as necessary for the Engineer to measure the surface crack intensity. Surface crack intensity will be determined by the Engineer after completion of concrete cure, prior to prestressing, and prior to the release of falsework. In any 500-square foot portion of deck within the limits of the new concrete deck, should the intensity of cracking be such that there are more than 16 feet of cracks whose width at any location exceeds 0.02 inches , 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 5 feet beyond the furthest single continuous crack outside the 500-square foot portion, measured from where that crack exceeds 0.02 inch in width, as determined by the Engineer.

Deck crack treatment shall consist of test sealing, and furnishing and applying methacrylate resin in conformance with the requirements of these special provisions. If grinding operation is required, deck treatment shall take place after grinding.

Prior to the start of deck treatment work, the Contractor shall submit for approval by the Engineer, a program for public safety associated with the use of methacrylate resin. The program shall identify materials, equipment, and methods to be used. The Contractor shall not perform deck treatment work, other than that specifically authorized in writing by the Engineer, until the program has been approved.

If the measures being taken by the Contractor are inadequate to provide for public safety associated with use of methacrylate resin, the Engineer will direct the Contractor to revise the operations and the public safety program. Directions for revisions will be in writing and will specify the items in which the Contractor's program is inadequate. No further deck treatment shall be performed until public safety measures are adequate, and a revised program for public safety has been approved.

The Engineer will notify the Contractor of the approval or rejection of any submitted or revised program for public safety associated with the use of methacrylate resin within 10 working days of receipt of the final submitted program.

The State will not be liable to the Contractor for failure to approve all or any portion of an originally submitted or revised program for public safety associated with the use of methacrylate resin, nor for any delays to the work due to the Contractor's failure to submit an acceptable program for public safety associated with the use of methacrylate resin. If the Engineer does not review or approve the program submitted by the Contractor within the time specified and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the program for public safety, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

The Contractor shall furnish an airborne emissions monitoring plan prepared by a certified industrial hygienist. Emissions will 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 work, a report by the certified industrial hygienist with results of the airborne emissions monitoring plan shall be furnished to the Engineer.

Materials

The material used for treating the deck shall be a low odor, high molecular weight methacrylate resin. Prior to adding initiator, the resin shall have a maximum volatile content of 30 percent when tested in conformance with the requirements in ASTM Designation: D 2369, and shall conform to the following:

High Molecular Weight Methacrylate (HMWM) Resin		
PROPERTY	REQUIREMENT	TEST METHOD
* Viscosity	25 cps, maximum, (Brookfield RVT with UL adaptor, 50 RPM at 77° F.)	ASTM D 2196
* Specific Gravity	0.90, minimum, at 77° F.	ASTM D 1475
* Flash Point	180° F., minimum	ASTM D 3278
* Vapor Pressure	1.0 mm Hg, maximum, at 77° F.	ASTM D 323
Tack-free time	400 minutes, maximum at 77° F.	California Test 551
PCC Saturated Surface-Dry Bond Strength	500 psi, minimum at 24 hours and 70±2° F.	California Test 551
* Test shall be performed prior to adding initiator.		

A Material Safety Data Sheet shall be furnished prior to use for each shipment of high molecular weight methacrylate resin.

The promoter and initiator, if supplied separately from the resin, shall not be mixed directly with each other. Containers of promoters and initiators shall not be stored together in a manner that will allow leakage or spillage from one to contact the containers or material of the other.

Testing

The Contractor shall allow 14 days for sampling and testing by the Engineer of the high molecular weight methacrylate resin prior to proposed use.

The Contractor shall treat a test area within the project limits of approximately 500-square foot at a location approved by the Engineer. Conditions during the test treatment shall be similar to those expected on the deck. Equipment used in the test shall be similar to those used for the deck treating operations. If the test area is on the traveled way, traffic shall not be allowed on the treated test area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

Should the above requirements for traffic use not be met, the Contractor shall suspend treating of bridge decks until another test area is treated and complies with the requirements.

Construction

Prior to deck treatment with methacrylate, the bridge deck surface shall be cleaned by abrasive blasting and all loose material shall be blown from visible cracks using high-pressure air. Concrete curing seals shall be cleaned from the deck surface to be treated, and the deck shall be dry when blast cleaning is performed. If the deck surface becomes contaminated at any time prior to placing the penetrating sealer, the deck surface shall be cleaned by abrasive blasting.

Equipment shall be fitted with suitable traps, filters, drip pans, or other devices as necessary to prevent oil or other deleterious material from being deposited on the deck.

Where abrasive blasting is being performed within 10 feet of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the abrasive and the surface being treated. The removal shall be by a vacuum attachment operating concurrently with the abrasive blasting operation.

The relative humidity shall be less than 90 percent at time of treatment.

A compatible promoter/initiator system shall be capable of providing a resin gel time of not less than 40 minutes nor more than 1.5 hours at the temperature of application. Gel time shall be adjusted to compensate for the changes in temperature throughout treatment application.

The quantity of resin mixed with promoter and initiator shall be limited to 5 gallons at a time for manual application.

Machine application of the resin shall be performed by using a two-part resin system using a promoted resin for one part and an initiated resin for the other part. This two-part resin system shall be combined at equal volumes to the spray bars through separate positive displacement pumps. Combining of the 2 components shall be by either static in-line mixers or by external intersecting spray fans. The pump pressure at the spray bars shall not be great enough to cause appreciable atomization of the resin. Compressed air shall not be used to produce the spray. A shroud shall be used to enclose the spray bar apparatus. Hand held spray apparatus shall not be used.

The Contractor shall allow methacrylate resin to be applied only to the specified area. Barrier rails, joints, and drainage facilities shall be adequately protected to prevent contamination by the treatment material. Contaminated items shall be repaired at the Contractor's expense.

The prepared area shall be dry and the surface temperature shall be less than or equal to 100° F. when the resin is applied. The rate of application of promoted/initiated resin shall be approximately100 square feet per gallon.

The deck surfaces to be treated shall be flooded with resin, allowing penetration into the concrete and filling of all cracks. The treatment shall be applied within 5 minutes after complete mixing. A significant increase in viscosity shall be cause for rejection. Excess material shall be redistributed by squeegees or brooms within 10 minutes after application.

After the resin has been applied, at least 20 minutes shall elapse before applying sand. The sand shall be No. 8/20 commercial quality dry blast sand. The sand shall be applied at a rate of 2 pounds of dry sand per square yard.

Excess sand shall be removed from the deck surface by vacuuming or sweeping prior to opening to traffic.

Traffic shall not be allowed on the treated area until (1) the treated surface is tack free (non-oily), (2) the sand cover adheres sufficiently to resist brushing by hand, and (3) the coefficient of friction of the deck is at least 0.35 when tested in conformance with the requirements in California Test 342.

MEASUREMENT AND PAYMENT.--Measurement and payment for concrete in structures shall conform to the provisions in Sections 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications and these special provisions.

The second paragraph in Section 51-1.22, "Measurement," of the Standards Specifications is amended to read:

The estimated quantity of concrete for minor structures designated as final pay in the Engineer's Estimate will not be revised as specified in Section 9-1.015, "Final Pay Items," of the Standard Specifications, when the constructed height of said minor structure, including revisions by the Engineer, is within 0.5-foot of the vertical dimension shown on the plans.

Full compensation for polyethylene filler shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no separate payment will be made therefor.

The seventh paragraph of Section 51-1.22, "Measurement," of the Standard Specifications is deleted.

The thirteenth paragraph of Section 51-1.23, "Payment," of the Standard Specifications is amended to read:

Full compensation for waterstops, strip waterstops, and neoprene strip shall be considered as included in the contract price paid per cubic yard for the various items of concrete work involved and no separate payment will be made therefor.

Full compensation for furnishing and installing access opening covers in soffits of new cast-in-place box girder bridges shall be considered as included in the contract price paid per cubic yard for structural concrete, bridge and no separate payment will be made therefor.

Full compensation for deck crack treatment, including a program for public safety and airborne monitoring, 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.

10-1.71 ARCHITECTURAL SURFACE (RETAINING WALL)

This work shall consist of constructing the architectural surface treatment for the following retaining walls as shown on the plans:

First Street On-Ramp Retaining Wall
Retaining wall No. 2
Retaining wall No. 3

Architectural surface treatment 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.

FIRST STREET RETAINING WALL

The architectural surface for the First Street On-Ramp Retaining Wall shall be a collage of bridge tower and cable forms and shall be contained in separate monolithic concrete pours, denoted as "Sections A through E", as shown on the plans, and in accordance with the Standard Specifications, and these special provisions.

The Contractor shall submit 2 sets of elevation drawings to the Engineer for approval, as provided in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The drawings shall be to scale and shall show the top and

bottom wall elevation lines. The drawings shall include, within the wall limits shown on the plans, the location of expansion joints, construction joints, and aesthetic features including the various sizes of bridge towers, main cables, and suspender cables. Tower and cable forms and layout shall be located using given control points (station/elevation) as shown on the plans.

Prior to the construction of each formed portion of the retaining wall, a layout plan shall be drawn on the base form, locating all corner points of towers main cables, and suspender cables. Curved lines which define the edges of main cables shall be constructed by locating the control points and scribing a smooth curved line through the intermediate points to the control points at either end. The layout plan shall be approved by the Engineer prior to detailed construction of form work.

All materials used for forming architectural surface treatment shall be filled and sanded to a smooth and even finish, free of wood-grain imprints and other imperfections prior to placing concrete. Joints, seams, and surface irregularities shall be filled with a one-part bituminal base filler or a 2-part epoxy filler prior to sanding. Epoxy shall conform to Section 95, "Epoxy," of the Standard Specifications. The filler compound shall be suitable for wood materials.

The second and third paragraphs of Section 95-1.02, "Sampling and Testing," of the Standard Specifications shall be amended to read:

> Tests will be conducted in conformance with the latest test methods of the American Society for Testing and Materials, Federal Test Method Standard No. 141, and 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.

Section 95-2.01, "Binder (Adhesive), Epoxy Resin Base (State Specification 8040-01F-03)," of the Standard Specification is renamed "Binder (Adhesive), Epoxy Resin Base (State Specification 8040-03)."

Section 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers (State Specification 8040-51B-07)," of the Standard Specification is renamed " Rapid Set Epoxy Adhesive for Pavement Markers (State Specification 8040-07)."

Section 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers (State Specification 8040-51B-09)," of the Standard Specification is renamed "Standard Set Epoxy Adhesive for Pavement Markers (State Specification 8040-09)."

Section 95-2.09, "Epoxy Sealant for Inductive Loops (State Specification 8040-31D-06)" of the Standard Specification is renamed " Epoxy Sealant for Inductive Loops (State Specification 8040-06)."

Architectural textures listed below are required at concrete surfaces shown on the plans:

A. Bush hammering texture
B. Smooth surface texture

The bush hammering texture shall be an architectural texture simulating the appearance of a regular rough chiseled or hammered effect imparted to the wall surface between the bridge tower and cable images. The architectural texture shall be continuous with no joints and shall have random shadow patterns. The architectural texture shall not have secondary patterns imparted by shadows or repetitive fractured surfaces.

The surface for the wall cap and bridge images that are recessed or in relief of the wall surface and wall cap, shall be smooth surface texture.

Rustication strips shall be used to delineate the components of the architectural surface treatment as shown on the plans. Materials used for rustication strips shall be at the option of the Contractor and shall result in the desired dimensions and effects as shown on the plans.

The architectural surface for the wall cap, bridge tower and cable images 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.

The smooth surface finish shall conform to Section 51-1.18B, "Class 1 Surface Finish," of the Standard Specifications and these special provisions.

Test Panel

A test panel demonstrating the wall cap, bridge images, and wall surface, similar to the detail shown for "Axonometric Mid Ground Relief," as shown on the plans, shall be constructed and successfully completed at a location approved by the Engineer before beginning work on architectural surface treatment for architectural surface (retaining wall). The test panel shall be constructed approximately 10 feet by 13 feet in size and finished with the materials, tools, equipment and methods to be used in constructing the architectural surface (retaining wall). The test panel shall accurately depict the architectural surface treatment as shown on the plans and as specified in these special provisions. If ordered by the Engineer, additional test panels shall be constructed and finished until the specified forms and texture 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. The test panel shall be safely supported in a vertical position at a location approved by the Engineer, and shall remain within the project limits until the wall construction is completed.

Form Liners

Form liners shall be used for bush hammering texture concrete surfaces and shall be installed in conformance with the manufacturer's recommendations, unless other methods of forming textured concrete surfaces are approved by the Engineer. Form liners shall be manufactured from an elastomeric material or a semi-elastomeric polyurethane material by a manufacturer of commercially available concrete form liners. No substitution of other types of formliner material will be allowed. Form liners shall leave crisp, sharp definition of the architectural surface. Recurring textural configurations exhibited by repeating, recognizable shadow patterns shall be prevented by proper casting of form liner patterns. Textured concrete surfaces with such recurring textural configurations shall be reworked to remove such patterns as approved by the Engineer or the concrete shall be replaced.

Form liners shall have the following properties:

Description	ASTM Designation:	Range
Elastomeric material		
Shore A hardness	D 2240	20 to 65
Tensile strength (psi)	D 412	130 to 900
Semi-elastomeric polyurethane		
Shore D hardness	D 2240	55 to 65
Tensile strength (psi)	D 2370	2600 minimum

Cuts and tears in form liners shall be sealed and repaired in conformance with the manufacturer's recommendations. Form liners that are delaminated from the form shall not be used. Form liners with deformations to the manufactured surface caused by improper storage practices or any other reason shall not be used.

Form liners shall extend the full length of texturing with transverse joints at 8.3-foot minimum spacing. Small pieces of form liners shall not be used. Grooves shall be aligned straight and true. Grooves shall match at joints between form liners. Joints in the direction of grooves in grooved patterns shall be located only in the depressed portion of the textured concrete. Adjoining liners shall be butted together without distortion, open cracks or offsets at the joints. Joints between liners shall be cleaned before each use to remove any mortar in the joint.

Adhesives shall be compatible with the form liner material and with concrete. Adhesives shall be approved by the liner manufacturer. Adhesives shall not cause swelling of the liner material.

Form Release Agents

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.

RETAINING WALL No. 2

Architectural surface treatment for retaining wall No.2 shall consist of constructing a board-form surface treatment, wall cap, and pilaster caps on remaining portion of existing bridge column bents 210 to 218 of Fremont Street off-ramp along Essex Street and the proposed retaining wall, as shown on the plans.

Pilaster Cap

Architectural surface treatment for the pilaster caps shall consist of constructing a pilaster cap relief on the top of each existing column bent, after removal of the top portion of the existing bridge column, and at the corner of retaining wall number 2 as shown on the plans.

Removal of the top portion of the existing bridge column shall be as shown on plans and in accordance with "Bridge Removal," of these special provisions.

RETAINING WALL No. 3

Architectural surface treatment for retaining wall No. 3 shall consist of constructing a board-form surface treatment on the proposed wall surface as shown on the plans and in conformance to the provisions specified for retaining wall No. 2.

MEASUREMENT AND PAYMENT

Architectural surface (retaining wall) will be measured and paid for by the square foot.

The contract price paid per square foot for architectural surface (retaining wall) 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 surface treatment, 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.

10-1.72 STRUCTURE APPROACH SLABS (Type N)

This work shall consist of constructing reinforced concrete approach slabs, structure approach drainage system and treated permeable base at structure approaches in accordance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

GENERAL.--Attention is directed to the section, "Engineering Fabrics," of these special provisions.

STRUCTURE APPROACH DRAINAGE SYSTEM.--The structure approach drainage system shall consist of the following:

GEOCOMPOSITE DRAIN.--Geocomposite drain shall consist of a manufactured core not less than 0.25-inch thick nor more than 2 inches thick with one or both sides covered with a layer of filter fabric that will provide a drainage void. The drain shall produce a flow rate, through the drainage void, of at least 2.0 gallons per minute per foot width at a hydraulic gradient of 1.0 and a minimum externally applied pressure of 3,500 pounds per square foot.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the geocomposite drain certifying that the drain produces the required flow rate and complies with these special provisions. The Certificate of Compliance shall be accompanied by a flow capability graph for the geocomposite drain showing flow rates and the externally applied pressures and hydraulic gradients. The flow capability graph shall be stamped with the verification of an independent testing laboratory.

Filter fabric for the geocomposite drain shall conform to the provisions for fabric for underdrains in Section 88, "Engineering Fabrics," of the Standard Specifications.

The manufactured core shall be either a preformed grid of embossed plastic, a mat of random shapes of plastic fibers, a drainage net consisting of a uniform pattern of polymeric strands forming 2 sets of continuous flow channels, or a system of plastic pillars and interconnections forming a semirigid mat.

The core material and filter fabric shall be capable of maintaining the drainage void for the entire height of geocomposite drain. Filter fabric shall be integrally bonded to the side of the core material with the drainage void. Core material manufactured from impermeable plastic sheeting having nonconnecting corrugations shall be placed with the corrugations approximately perpendicular to the drainage collection system.

The geocomposite drain shall be installed with the drainage void and the filter fabric facing the embankment. The fabric facing the embankment side shall overlap a minimum of 3 inches at all joints and wrap around the exterior edges a minimum of 3 inches beyond the exterior edge. If additional fabric is needed to provide overlap at joints and wrap-around at edges, the added fabric shall overlap the fabric on the geocomposite drain at least 6 inches and be attached thereto.

Should the fabric on the geocomposite drain be torn or punctured, the damaged section shall be replaced completely or repaired by placing a piece of fabric that is large enough to cover the damaged area and provide a 6-inch overlap.

PLASTIC PIPE.--Plastic pipe shall conform to the provisions for pipe for edge drains and edge drain outlets in Section 68-3, "Edge Drains," of the Standard Specifications.

DRAINAGE PADS.--Concrete for use in drainage pads shall be minor concrete, except the concrete shall contain not less than 470 pounds of cement per cubic yard.

TREATED PERMEABLE BASE AT BOTTOM OF GEOCOMPOSITE DRAINS.--Treated permeable base to be placed around the slotted plastic pipe at the bottom of geocomposite drains shall conform to the provisions in "Treated Permeable Base Under Approach Slabs." If asphalt treated permeable base is used, it shall be placed at a temperature of not less than 180° F. nor more than 230° F.

The filter fabric to be placed over the treated permeable base at the bottom of geocomposite drains shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications.

ENGINEERING FABRICS.--Filter fabric to be placed between the structure approach embankment material and the treated permeable base shall conform to the provisions for filter fabric for edge drains in Section 88, "Engineering Fabrics," of the Standard Specifications and these special provisions.

The subgrade to receive the filter fabric, immediately prior to placing, shall conform to the compaction and elevation tolerance specified for the material involved.

Filter fabric shall be aligned, handled and placed in a wrinkle-free manner in accordance with the manufacturer's recommendations.

Adjacent borders of the filter fabric shall be overlapped from 12 to 18 inches or stitched. The preceding roll shall overlap the following roll in the direction the material is being spread or shall be stitched. When the fabric is joined by stitching, it shall be stitched with yarn of a contrasting color. The size and composition of the yarn shall be as recommended by the fabric manufacturer. The stitches shall number 5 to 7 per inch of seam.

Equipment or vehicles shall not be operated or driven directly on the filter fabric.

TREATED PERMEABLE BASE UNDER APPROACH SLAB.--Treated permeable base under structure approach slabs shall consist of constructing either an asphalt treated permeable base or a cement treated permeable base in accordance with Section 29, "Treated Permeable Bases," of the Standard Specifications and these special provisions.

The type of treatment, asphalt or cement, to be used shall be at the option of the Contractor.

Not less than 30 days prior to the start of placing treated permeable base the Contractor shall notify the Engineer, in writing, which type of treated permeable base will be furnished. Once the Contractor has notified the Engineer of his selection the Contractor will not be allowed to change the type to be furnished without a prior written request to do so and approval thereof in writing by the Engineer.

Asphalt treated permeable base shall be placed at a temperature of not less than 200° F. nor more than 250° F. Material stored in excess of 2 hours shall not be used in the work.

Asphalt treated permeable base material may be spread in one layer. It shall be compacted with a vibrating shoe type compactor or rolled with a roller weighing not less than 1 1/2 tons nor more than 5 tons. Rolling shall begin as soon as the mixture has cooled sufficiently to support the weight of the rolling equipment without undue displacement.

Cement treated permeable material may be spread in one layer. The material shall be compacted with either a vibrating shoe type compactor or with a steel-drum roller weighing not less than 1 1/2 tons nor more than 5-tons. Compaction shall follow within one-half hour after the spreading operation and shall consist of 2-complete coverages of the treated material.

APPROACH SLABS

Concrete for use in approach slabs shall contain not less than 658 pounds of cement per cubic yard.

Miscellaneous steel parts and all steel components of abutment ties including plates, nuts, washers, and rods shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Structure approach slabs and sleeper slabs shall be cured for not less than 5 days prior to opening to traffic, unless, at the option of the Contractor, the structure approach slabs are constructed using concrete with a non-chloride Type C chemical admixture conforming to these special provisions.

Portland cement for use in concrete using a non-chloride Type C chemical admixture shall be Type II Modified, Type II Prestress, or Type III. Type II Modified and Type III cement shall conform to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. Type II Prestress cement shall conform to the requirements of Type II Modified cement, except the mortar containing the portland cement to be used and Ottawa sand, when tested in accordance with California Test 527, shall not contract in air more than 0.053 percent.

The non-chloride Type C chemical admixture, approved by the Engineer, shall conform to the requirements of ASTM Designation: C 494 and Section 90-4, "Admixtures," of the Standard Specifications.

The concrete with non-chloride Type C chemical admixture shall be prequalified prior to placement in accordance with the provisions for prequalification of concrete specified by compressive strength in Section 90-9.01, "General," of the Standard Specifications and the following:

Immediately after fabrication of the 5 test cylinders, the cylinders shall be stored in a temperature medium of 70 ± 3 degrees F until the cylinders are tested.

The 6-hour average strength of the 5 test cylinders shall not be less than 850 psi. No more than 2 test cylinders shall have a strength of less than 800 psi.

Building paper shall be commercial quality 30-pound felt.

Polyvinyl chloride (PVC) conduit used to encase the abutment tie rod shall be of commercial quality.

The top surface of approach slabs shall be finished in conformance with the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications. Edges of slabs shall be edger finished.

Approach slabs shall be cured with pigmented curing compound (1) in accordance with the provisions for curing structures in Section 90-7.01B, "Curing Compound Method," of the Standard Specifications.

Structure approach slabs constructed using concrete with a non-chloride Type C chemical admixture shall be cured for not less than 6 hours prior to opening to traffic. The curing period shall be considered to begin at the start of discharge of the last truck load of concrete to be used in the slab.

If the ambient temperature is below 65° F during the curing period for approach slabs using concrete with a non-chloride Type C chemical admixture, an insulating layer or blanket shall cover the surface. The insulation layer or blanket shall have an R-value rating given in the table below. At the Contractor's option, a heating tent may be used in lieu of or in combination with the insulating layer or blanket.

Temperature range during curing period	R-value, minimum
55° F. through 64° F.	1
45° F. through 54° F.	2
40° F. through 44° F.	3

JOINTS.--Hardboard and expanded polystyrene shall conform to the provisions in Section 51-1.12D, "Sheet Packing, Preformed Pads and Board Fillers," of the Standard Specifications.

Type AL joint seals shall conform to the provisions in Section 51-1.12F, "Sealed Joints" of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods.

The pourable seal between the steel angle and concrete barrier shall conform to the requirements for Type A and AL seals in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications. The sealant may be mixed by hand-held power-driven agitators and placed by hand methods. Immediately prior to placing the seal, the joint shall be thoroughly cleaned, including abrasive blast cleaning of the concrete surfaces, so that all foreign material and concrete spillage are removed from all joint surfaces. Joint surfaces shall be dry at the time the seal is placed.

MEASUREMENT AND PAYMENT.--Structural concrete, approach slab (Type N) will be measured and paid for in accordance with the provisions in Sections 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications and these special provisions.

Full compensation for the structure approach drainage system including geocomposite drain, plastic pipe, and drainage pads, treated permeable base, filter fabric, , miscellaneous metal, and pourable seals, shall be considered as included in the

contract price paid per cubic yard for structural concrete, approach slab of the type shown in the Engineer's Estimate and no additional compensation will be allowed therefor.

10-1.73 GROUT

Grout for filling voids for interim supports, except grout for column casings, shall conform to the details shown on the plans, the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications and these special provisions.

Grout will be measured and paid for as grout in the same manner specified for structural concrete, bridge in Sections 51-1.22, "Measurement," and 51-1.23, "Payment," of the Standard Specifications.

10-1.74 DRILL AND BOND DOWEL (EPOXY CARTRIDGE)

Drilling and bonding dowels with epoxy cartridges shall conform to the details shown on the plans and the requirements in these special provisions.

Reinforcing steel dowels shall conform to the provisions in "Reinforcement" of these special provisions.

Threaded rods used as dowels shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. The threaded rods shall be installed in accordance with these requirements for dowels specified herein.

The Contractor shall select an epoxy cartridge system which has passed the testing requirements of the International Conference of Building Officials (ICBO) document - AC58 and additional test requirements as specified in the Caltrans Augmentation/Revisions to ICBO AC58. Testing shall be performed by an independent testing facility and the results will be reviewed and approved by the Transportation Laboratory. The Caltrans Augmentation/Revisions to ICBO AC58 document may be obtained by contacting the Transportation Laboratory, telephone: (916) 227-7000.

The epoxy cartridge system used shall be appropriate for the ambient concrete temperature and installation conditions at the time of installation in accordance with the manufacturer's specifications.

Epoxy cartridges shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall state that the material complies in all respects to the requirements of ICBO AC58 and Caltrans Augmentation/Revisions to ICBO AC58.

Each epoxy cartridge shall be clearly and permanently marked with the manufacturer's name, model number of the epoxy cartridge system, manufacturing date, and lot number. Each carton of epoxy cartridges shall contain the manufacturer's recommended installation procedures, minimum cure time, and such warning or precautions concerning the contents as may be required by State or Federal Laws and Regulations.

The holes shall be drilled by methods that will not shatter or damage the concrete adjacent to the holes. If reinforcement is encountered during drilling, before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves, in writing, coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth recommended by the manufacturer.

The drilled holes shall be cleaned in accordance with the manufacturer's instructions and shall be dry at the time of placing the epoxy cartridge bonding material and the steel dowels. The bonding material shall be a two-component epoxy system contained in a cartridge having two separate chambers and shall be inserted into the hole using a dispensing gun and replaceable mixing nozzle approved by the manufacturer. Unless otherwise specified, the depth of hole and the installation procedure shall be as recommended by the manufacturer. A copy of the manufacturer's recommended installation procedure shall be provided to the Engineer at least 2 days prior to the start of work.

Immediately after inserting the dowels into the epoxy, the dowels shall be supported as necessary to prevent movement during curing and shall remain undisturbed until the epoxy has cured a minimum time as specified by the manufacturer. Dowels that are improperly bonded, as determined by the Engineer, will be rejected. Adjacent new holes shall be drilled, and new dowels shall be placed and securely bonded to the concrete. All work necessary to correct improperly bonded dowels shall be performed at the Contractor's expense.

Unless otherwise provided, dowels to be bonded into drilled holes will be measured and paid for as bar reinforcing steel (bridge).

Unless otherwise provided, drilling and bonding dowels with epoxy cartridges will be measured and paid for by the unit as drill and bond dowel (epoxy cartridge). The number of units to be paid for will be determined from actual count of the completed units in place.

The contract unit price paid for drill and bond dowel (epoxy cartridge) shall include full compensation for furnishing all labor, materials (except dowels), tools, equipment and incidentals, and for doing all the work involved in drilling the holes and bonding dowels with epoxy cartridges, including coring through reinforcement when approved by the Engineer, 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 DRILL AND BOND DOWELS

Drilling and bonding dowels shall conform to the details shown on the plans, the provisions in Section 83-2.02D(1), "General," of the Standard Specifications and these special provisions.

Dowels shall conform to the provisions for bar reinforcement in "Reinforcement" elsewhere in these special provisions.

If reinforcement is encountered during drilling, before specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

Unless otherwise provided, dowels to be bonded into drilled holes will be paid for as bar reinforcing steel (bridge).

Unless otherwise provided, drilling and bonding dowels will be measured and paid for by the linear foot determined by the number and the required depth of holes as shown on the plans, or as ordered by the Engineer.

The contract price paid per linear foot for drill and bond dowel shall include full compensation for furnishing all labor, materials (except reinforcing steel dowels), tools, equipment, and incidentals, and for doing all the work involved in drilling the holes, including coring through reinforcement when approved by the Engineer, and bonding the dowels, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.76 SPIN-LOCK CONCRETE ANCHORS

Spin-lock concrete anchors shall be installed at the locations shown on the plans in conformance with the recommendations of the manufacturer, the details shown on the plans and these special provisions.

Spin-lock concrete anchors are manufactured by Williams Form Engineering Corporation. The contact person, address and phone number for Williams Form Engineering Corporation are as follows:

Technical Representative
Williams Form Engineering Corporation
7601 N. Columbia Blvd.
Portland, OR 97203
(503) 285-4548

The spin-lock concrete anchors shall be R7S 150 ksi Spin-Lock Concrete Anchors conforming to ASTM Designation: A 722.

The prices quoted by the manufacturer for the spin-lock concrete anchors are $118.71 each for the 1 1/4" x 2' anchors, $397.64 each for the 1 7/8" x 8' anchors, $443.41 each for the 1 7/8" x 11' anchors, $473.92 each for the 1 7/8" x 13' anchors, $702.78 each for the 1 7/8" x 28' anchors, $733.29 each for the 1 7/8" x 30' anchors and $29.80 each for 94 pound bags of Wil-X-Cement grout. A total of sixty five 94-pound bags of Wil-X-Cement grout will be required for this project. The purchase price quoted for tools required to install the anchors is $1657.00. The rental price quoted for other equipment required to install the anchors is $1390.13 per month. The FOB location is Portland, Oregon. These prices do not include sales tax. The above prices will be firm for all orders placed on or before April 23, 2003.

Each shipment of spin-lock anchors shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificate of Compliance," of the Standard Specifications, except that said certificate shall state that the materials involved comply in all respects to the manufacturer's current published specifications for the product involved.

Spin-lock anchors will be paid for by the lump sum.

The contract lump sum price paid for spin-lock anchors shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing the anchors, complete in place, including services of the manufacturer's technical representatives, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.77 ROCK ANCHORS

Rock anchors shall conform to the requirements in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Anchors may be either slotted bolts with steel wedges or threaded bolts with expansion shells. Slots shall be forged. Bolts shall conform the requirements in ASTM Designation: A 108. Bolts and expansion shells of equal strength will be accepted. Non-ferrous parts will not be permitted. Extension studs shall conform to the requirements in ASTM Designation: A 449. Extension studs and nuts shall be galvanized.

Rock anchors shall be commercial quality.

Grout shall conform to the recommendations of the rock bolt manufacturer for the type of installation shown on the plans.

Anchor holes shall be drilled into the concrete bent caps to the diameter shown on the plans and the depth recommended by the manufacturer. Holes for the rock anchors shall be drilled by methods that will not shatter or damage the concrete adjacent to the hole. The anchors shall be installed, anchored, and grouted in drilled holes in conformance with the manufacturer's instructions.

Rock anchors will be measured and paid for by the unit as rock anchor. The number of units to be paid for will be determined from actual count of the completed units in place.

The contract unit price paid for rock anchor shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in drilling holes and furnishing and placing the anchors , complete in place, including grouting, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.78 CORE CONCRETE

Coring concrete shall consist of coring holes through reinforced concrete bridge members as shown on the plans and in conformance with the requirements in these special provisions.

The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

Water for core drilling operations shall be from the local domestic water supply or shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO_4, nor shall it contain any impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Water from core drilling operations shall not be permitted to fall on public traffic, to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

Coring concrete will be measured and paid for by the linear foot as core concrete of the sizes listed in the Engineer's Estimate. The cored concrete will be measured along the centerline of the hole without deduction for expansion joints.

The contract price paid per linear foot for core concrete of the sizes listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in coring the holes, including control of water from core drilling and repairing any damaged reinforcement, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.79 CORE AND PRESSURE GROUT DOWELS

Coring and pressure grouting dowels shall consist of coring holes through concrete, placing dowels, and filling the holes with pressurized grout, as shown on the plans and in conformance with the requirements in these special provisions.

Dowels to be placed in the cored holes shall conform to the provisions for high strength threaded bars in "Prestressing" elsewhere in these special provisions.

Dowels to be pressure grouted in cored holes will be paid for as prestressing.

The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

Water for core drilling operations shall be from the local domestic water supply or shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO_4, nor shall it contain any impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Concrete areas and steel surfaces to be in contact with the grout shall be cleaned of all loose or foreign material that would in any way prevent bonding, and concrete holes shall be flushed with water and allowed to dry to a surface dry condition immediately prior to grouting.

Grout shall conform to the requirements of either ASTM Designation: C 1107, Grade B, or ASTM Designation: C 845, Type K, and shall provide a minimum compressive strength of 5000 pounds per square inch at 28 days when tested by California Test 551. The grout shall be mixed in accordance with the manufacturer's recommendations. Water shall comply with the provisions for water for prestressed concrete work as specified in Section 90-2.03, "Water," of the Standard Specifications.

Admixtures shall not contain more than 500 parts per million of chlorides as Cl, when tested by California Test 422, and shall not contain more than 2500 parts per million of sulfates as SO_4, when tested by California Test 417.

After dowel placement, the ends of the cored hole containing the dowel shall be sealed. A vent tube shall be placed at one end and one injection feed tube at the other end. The vent tube and injection feed tube shall be placed in the same end for cored holes that have only one end. The tubes shall be placed in the hole in a manner which will allow the air to vent and the hole to be completely filled with grout. Sufficient pressure shall be achieved to ensure that the hole is free of voids. Grout shall be pumped into the holes and continually wasted until no visible slugs or other visible evidence of water or air are ejected.

Grout or water shall not be permitted to flow into any waterway, on to public traffic, across shoulders or lanes occupied by public traffic, or into gutters or other drainage facilities.

Coring concrete and pressure grouting dowels of the sizes listed in the Engineer's Estimate will be measured and paid for by the linear foot. The cored concrete will be measured along the centerline of the hole.

The contract price paid per linear foot for core concrete and pressure grout dowels of the sizes listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, except dowels, tools, equipment, and incidentals, and for doing all work involved in coring the holes, and pressure grouting the holes, including control of water from core drilling, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.80 CORE AND GROUT PIPES

Coring and grouting pipes shall consist of coring holes through concrete, placing pipes, and filling the holes with grout, as shown on the plans and in conformance with the requirements in these special provisions.

Pipes to be placed in the cored holes shall conform to the provisions for miscellaneous metal (bridge) in "Miscellaneous Metal (Bridge)" of in these special provisions.

Pipes to be grouted in cored holes will be paid for as miscellaneous metal (bridge).

The holes shall be cored by methods that will not shatter or damage the concrete adjacent to the holes.

Water for core drilling operations shall be from the local domestic water supply or shall not contain more than 1,000 parts per million of chlorides as Cl, nor more than 1,300 parts per million of sulfates as SO_4, nor shall it contain any impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.

Concrete areas and steel surfaces to be in contact with the grout shall be cleaned of all loose or foreign material that would in any way prevent bonding, and concrete holes shall be flushed with water and allowed to dry to a surface dry condition immediately prior to grouting.

Grout shall conform to the requirements of either ASTM Designation: C 1107, Grade B, or ASTM Designation: C 845, Type K, and shall provide a minimum compressive strength of 5000 pounds per square inch at 28 days when tested by California Test 551. The grout shall be mixed in accordance with the manufacturer's recommendations. Water shall comply with the provisions for water for prestressed concrete work as specified in Section 90-2.03, "Water," of the Standard Specifications.

Admixtures shall not contain more than 500 parts per million of chlorides as Cl, when tested by California Test 422, and shall not contain more than 2500 parts per million of sulfates as SO_4, when tested by California Test 417.

After pipe placement, the ends of the cored hole shall be filled with grout. A vent tube shall be placed at one end and one injection feed tube at the other end. The vent tube and injection feed tube shall be placed in the same end for cored holes that have only one end. The tubes shall be placed in the hole in a manner which will allow the air to vent and the hole to be completely filled with grout. Sufficient pressure shall be achieved to ensure that the hole is free of voids. Grout shall be pumped into the holes and continually wasted until no visible slugs or other visible evidence of water or air are ejected.

Grout or water shall not be permitted to flow into any waterway, on to public traffic, across shoulders or lanes occupied by public traffic, or into gutters or other drainage facilities.

Coring concrete and grouting steel pipes dowels of the sizes listed in the Engineer's Estimate will be measured and paid for by the linear foot. The cored concrete will be measured along the centerline of the hole.

The contract price paid per linear foot for core concrete and grout steel pipes of the sizes listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, except pipes, tools, equipment, and incidentals, and for doing all work involved in coring the holes, and grouting the holes, including control of water from core drilling, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.81 REPLACE BEARING

This work shall consist of replacing rocker bearings with elastomeric bearing pads on concrete pedestals in accordance to the details shown on the plans and these special provisions.

The bridge superstructure and portion of columns above the rocker bearings shall be raised at the bent to provide for replacing bearings. The superstructure and portion of columns above the rocker bearings shall be raised while rocker bearings are removed, elastomeric bearing pad pedestals are built, and elastomeric bearings pads are installed.

Jacking operations shall be carefully controlled so that the superstructure is raised in uniform amounts across its width at all times. The jacking operation shall not interfere with or disrupt the flow of traffic over the bridge.

At least one set of temporary supports shall be maintained at each jack location under the superstructure to prevent settlement of the superstructure during the raising operation, temporary support period, and lowering operation. Temporary supports for the structure shall conform to the provisions in 51-1.06, "Falsework," of the Standard Specifications and to these special provisions. Temporary supports shall consist of wood cribbing or wood blocking or metal plates or other fixed dimension material. Temporary supports shall have sufficient area to prevent distress of the temporary support, foundation material or superstructure.

At least 15 days before starting the work the Contractor shall submit to the Engineer complete details and working drawings of the method and equipment he proposes to use in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The drawings shall include a description of the jacking equipment, safety cribbing and sequence of operations.

The superstructure shall be raised to an elevation higher than the finished grade while new supports are constructed, and then the columns lowered onto the supports. At no time shall the superstructure be raised more than 1/4 inch above the existing roadway.

The superstructure shall be jacked and adjusted to grade uniformly and in such a manner that a roadway satisfactory for the use of public traffic is provided in conformance with the provisions in Section 7-1.08, "Public Convenience," of the Standard Specifications.

The Contractor shall construct and maintain temporary bridging at the bents with temporary asphalt concrete approach surfacing, or other temporary facilities as needed to carry public traffic.

Removing bridge portions shall conform to "Bridge Removal" of these special provisions.

Concrete for elastomeric bearing pad pedestals shall contain not less than 564 pounds of portland cement per cubic yard and shall conform to the provisions in Section 51, "Concrete Structures," of the Standard Specifications.

Columns shall not be lowered onto elastomeric pads until concrete has obtained a compressive strength of not less than 3000 psi.

Elastomeric bearing pads shall conform to Section 51-1.12, "Expansion and Fixed Joints and Bearings," of the Standard Specifications.

Bar reinforcing steel shall conform to Section 52, "Reinforcement," of the Standard Specifications.

Rocker bearing replacement will be measured by the number of units replaced. One unit shall consist of one rocker bearing assembly.

The contract unit price paid for replace bearing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals and for doing all the work involved in replacing rocker bearings with expansion bearings, complete in place, including raising the bridge and removing portions of existing bridge and constructing and maintaining temporary bridging facilities, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.82 PTFE SPHERICAL BEARING

PTFE spherical bearings, consisting of polytetrafluoro-ethylene (PTFE) and stainless steel bearing surfaces, structural steel plates and anchors shall conform to the details shown on the plans and these special provisions.

PTFE spherical bearings shall be of 2 types:

A. Fixed type with spherical bearing surfaces.
B. Expansion type with spherical and sliding bearing surfaces.

The manufacturer of the PTFE spherical bearings shall show evidence that PTFE spherical bearings furnished by the same manufacturer and used in conditions similar to this application have had at least 3 years of satisfactory service at each of 2 projects.

A qualified representative of the manufacturer shall be present during installation of the first bearing and shall be available for advice during any remaining installations.

The Contractor shall submit to the Office of the Resident Engineer, Department of Transportation, 151 Fremont Street, San Francisco, CA 94105 for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings of the PTFE spherical bearings. For initial review, 4 sets shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the Engineer for final approval and for use during construction.

The working drawings for PTFE spherical bearings shall include a description of the method of mechanical interlocking of the PTFE fabric to the metallic substrate for the PTFE bearing sole plate during concrete placement.

Working drawings shall be 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the name of the structure as shown on the contract plans, District-County-Route, bridge number, and contract number.

Working drawings shall be submitted sufficiently in advance of the start of the affected work to allow time for review by the Engineer and correction by the Contractor of the drawings without delaying the work. Such time shall be proportional to the complexity of the work but in no case shall such time be less than 6 weeks after complete drawings and all support data are submitted.

At the completion of each structure on the contract, one set of reduced prints on 20 pound (minimum) bond paper, 11" x 17" in size, of the corrected original tracings of all working drawings for each structure shall be furnished to the Engineer. Reduced prints of drawings which are common to more than one structure shall be submitted for each structure. An index prepared specifically for the drawings for each structure containing sheet numbers and titles shall be included on the first reduced print in the set for each structure. Reduced prints for each structure shall be arranged in the order of drawing numbers shown in the index.

The edge of the corrected original tracing image shall be clearly visible and visually parallel with the edges of the page. A clear, legible symbol shall be provided as near to the upper left side of each page as is feasible within the original print to show the amount of reduction and a horizontal and vertical scale shall be provided on each reduced print to facilitate enlargement to original scale.

PTFE spherical bearings shall be installed on surfaces prepared in conformance with the provisions in Section 55-3.19, "Bearings and Anchorages," of the Standard Specifications.

The manufacturer shall furnish certificates of compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications for all material used in the PTFE spherical bearings. The certification shall be supported by a copy of the results of all proof tests performed on the bearings.

PTFE surfaces of PTFE spherical bearings shall be unfilled PTFE fabric made from virgin PTFE oriented multifilament and other fibers. The resin in the filaments shall be virgin PTFE material (not reprocessed) in conformance with the requirements of ASTM Designation: D 1457.

At the highest point of substrate and after compression, the PTFE fabric shall have a minimum thickness of 1/16 inch and a maximum thickness of 1/8 inch.

Flat stainless steel surfaces shall be a weld overlay on structural steel plate, or solid or sheet stainless steel conforming to the requirements of ASTM Designation: A 240, Type 304 with a minimum thickness of 0.060 inch.

Curved stainless steel surfaces shall be solid stainless steel conforming to the requirements of ASTM Designation: A 240, Type 304.

Curved stainless steel surfaces with dimensions shown on the plans exceeding 4 inches in thickness shall be either a weld overlay on structural steel plate or solid stainless steel conforming to the requirements of ASTM Designation: A 240, Type 304. Stainless steel sheet will not be allowed.

When a weld overlay is used for stainless steel surfacing, the overlay shall be placed by submerged arc welding using Type 309L electrodes. The finished overlay shall have a 3/32 inch minimum thickness after welding, grinding and polishing. Prior to welding, the manufacturer must submit a complete weld procedure to the Engineer for approval.

When stainless steel sheets are used for stainless steel surfacing, the sheets shall be attached by perimeter arc welding using Type 309L electrodes. After completion of the weld operation, the stainless steel surface shall be smooth and free from waves.

Structural steel plates, except stainless steel, shall conform to the requirements of ASTM Designation: A 709/A 709, Grade 36 [250], 50 [345], or 50W [345W].

Welding shall conform to the requirements of ANSI/AASHTO/AWS D1.5.

Convex plate radius dimension tolerances shall be 0.000 to –0.010 inches. Concave plate radius dimensions shall be +0.010to 0.000 inches.

The bearing manufacturer shall have full size convex and concave metal templates for the 2 spherical surfaces of each bearing radius. The templates shall be available to the inspector during all bearing inspections.

The PTFE fabric on spherical or sliding bearing surfaces shall be epoxy bonded and mechanically interlocked to the steel substrate. All bonding shall be done under controlled factory conditions. The mechanical interlock on the spherical concave surface must be integrally machined into the steel substrate. Welded retention grids will not be allowed on the concave surface. Any edges, other than the selvage shall be oversown or recessed so that no cut fabric edges are exposed.

After completion of the bonding operation the PTFE surface shall be smooth and free from bubbles.

The surface of the bearing elements shall be controlled such that upon completion of the bearing assembly the PTFE to stainless steel interface shall be in full bearing.

The mating surface of the stainless steel with the PTFE surfacing shall have a polished surface finish of less than 20 microinches root-mean-square (rms), determined in conformance with the requirements in ANSI Standard B46.1.

Metal surfaces of bearings exposed to the atmosphere in the completed work, except stainless steel surfaces shall be cleaned and painted in conformance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint" of the Standard Specifications, and "Clean and Paint Structural Steel" of these special provisions.

Certification in conformance with the requirements in SSPC-QP 1, SSPC-QP 2, and SSPC-QP 3 of the "SSPC: The Society for Protective Coatings" will not be required for PTFE spherical bearings.

Finish coats will not be required on the bearings.

PTFE spherical bearing assemblies shall be assembled at the factory. Each assembly shall have a minimum of 4 temporary steel straps which are bolted to threaded holes in the masonry and sole plates so that the entire assembly is shipped as a unit and remains intact when uncrated and installed. Welding of the steel straps will not be allowed. Straps must be adequate for vertical lifting purposes. Bearing dismantling will only be allowed under the direction and in the presence of the Engineer.

During fabrication, the maximum temperature of bonded PTFE surfaces shall be 300° F.

Damaged bearings and bearings with scratched mating surfaces shall be replaced or resurfaced.

PTFE spherical bearing sole plates shall be temporarily supported during concrete placement. Temporary supports shall prevent the rotation or displacement of the bearing during concrete placing operations. Temporary supports shall not inhibit the functioning of the PTFE spherical bearing after concrete is placed. Temporary supports shall not restrict the movement at bridge joints due to temperature changes and shortening from prestress forces. Materials for temporary supports within the limits for placing concrete shall conform to the requirements for form fasteners.

PTFE spherical bearings shall have a first movement static coefficient of friction not exceeding 0.06.

Prior to proof testing, all bearings shall be permanently die-stamped on 2 of 4 sides with markings consisting of bearing number and contract number. Each bearing shall have a unique bearing number and match marks on plate edges to insure correct assembly at the job site.

Full sized PTFE spherical bearings shall be proof tested and evaluated for compression and coefficient of friction in the presence of the Engineer, unless otherwise directed. The proof tests shall be performed on samples randomly selected by the Engineer from the production bearings to be used in the work. Proof testing shall be performed by the Contractor at the manufacturer's plant or at an approved laboratory. If proof tests are not performed at the specified load, the Contractor shall perform additional physical tests in the presence of the Engineer, unless otherwise directed, to demonstrate that the requirements for proof testing at the specified load are satisfied. The Contractor shall give the Engineer at least 7 days notice before beginning proof testing. Proof testing of PTFE spherical bearings shall conform to the following requirements:

A. One bearing per lot of production bearings shall be proof tested. A lot is defined as 25 bearings or fraction thereof of the same type, within a load category.
B. The bearing types and proof tests required for each type shall be as follows:

    1. Expansion type bearings shall be proof tested for compression and coefficient of friction.

C. A load category shall consist of bearings of differing vertical load capacity within a range defined as follows:

    1. Bearings with less than or equal to 500 kips maximum vertical load capacity.
    2. Bearings with greater than 500 kips but less than or equal to 2000 kips maximum vertical load capacity.
    3. Bearings with more than 2000 kips maximum vertical load capacity.

D. Proof tests for compression: The bearing shall be held at the design rotation or 0.02 radians whichever is greater for one hour at 1.5 times the maximum vertical load shown on the plans for the bearing. The device shall be in a rotated position during the test. The rotation may be imposed on the bearing by inserting a beveled plate between the bearing and the restraining surface prior to loading.
E. Proof tests for coefficient of friction: The tests shall be performed at the maximum vertical load shown on the plans for the bearing with the test load applied for 12 hours prior to friction measurement and the following:

    1. The tests shall be arranged to allow measurement of the static coefficient of friction on the first movement of the bearing.
    2. The first movement static and dynamic coefficients of friction shall be measured at a sliding speed not exceeding one inch per minute and shall not exceed the specified coefficient of initial static friction.
    3. The test bearings shall be subjected to a minimum of 100 movements of at least one inch of relative movement at a sliding speed not exceeding 12 inches per minute. After cycling, the first movement static and dynamic coefficients of friction shall be measured again at a sliding speed not exceeding one inch per minute and shall not exceed the specified coefficient of initial static friction.

F. The bearing surfaces shall be cleaned prior to proof testing.
G. Proof testing of bearings shall be done after conditioning specimens for 12 hours at 70°±15° F.
H. The proof tested bearings shall show no visible sign of: (1) bond failure of bearing surfaces, (2) separation or lift-off of plates from each other or from PTFE surfaces, or (3) other defects. When a proof tested bearing fails to comply with these specifications, all bearings in that lot shall be individually tested for acceptance.
I. Proof test results shall be certified correct and signed by the testing laboratory personnel who conducted the test and interpreted the test results. Proof test results shall include the bearing numbers of the bearings tested.

Quantities of PTFE spherical bearings will be determined as units from actual count in the completed work. A PTFE spherical bearing with more than one PTFE surface shall be considered a single PTFE spherical bearing.

The contract unit price paid for PTFE spherical bearing shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the bearing, complete in place, including masonry and sole plates, anchor bolts and sleeves, mortaring of bolts, temporary supports, proof testing, and

cleaning and painting of PTFE spherical bearings, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

If a portion or all of PTFE spherical bearings are either fabricated or tested at a site more than 300 air line miles from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Payment to the Contractor for furnishing PTFE spherical bearings will be reduced $10,000 for any fabrication and testing site located more than 300 air line miles from both Sacramento and Los Angeles, or in the case where a fabrication or testing site is located more than 3000 air line miles from both Sacramento and Los Angeles, payment will be reduced $15,000.

10-1.83 SEALING JOINTS

Joints in concrete bridge decks and joints between concrete structures and concrete approach slabs shall be sealed in conformance with the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications and these special provisions.

Where polyurethane seals are shown on the plans, silicone sealant conforming to these specifications may be used.

The second through fourth paragraphs of Section 51-1.12F, "Sealed Joints," of the Standard Specifications are amended to read:

Type A and AL joint seals shall consist of a groove in the concrete which is filled with field mixed and placed polyurethane or silicone sealant.

Type B joint seals shall consist of a groove in the concrete which is filled with a preformed elastomeric joint seal.

Joint seal assemblies shall consist of metal or metal and elastomeric assemblies which are anchored or cast into a recess in the concrete over the joint.

The type of seal to be used for the Movement Rating (MR) shown on the plans shall be as follows:

Movement Rating (MR)	Seal Type
1/2 inch	Type A or Type B
1 inch	Type A (silicone only) or Type B
> 1 inch and ≤ 2 inches	Type B
> 2 inches	joint seal assembly

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.

For Type A and Type AL seals, a pourable 2-component polyurethane or silicone sealant that meets the test requirements in Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications and also has a minimum pot life of 10 minutes at a temperature of 90° F. may be used, at the option of the Contractor. The 2 components of polyurethane or silicone sealants shall be thoroughly mixed in the ratio recommended by the manufacturer with power driven agitators or the static mixer process, respectively.

The first and second paragraphs of Section 51-1.12F(3), "Materials and Installation," of the Standard Specifications are amended to read:

(a) Type A and AL Seal.— The sealant shall consist of a 2 component polyurethane sealant, which will withstand up to ±25 percent movement, or a 2 component silicone sealant, which will withstand up to ±50 percent movement.

Polyurethane and silicone sealants shall be tested in accordance with California Test 435. The sealants shall conform to State Specification 8030-61J-01 and the following requirements:

SPECIFICATION	REQUIREMENT
Modulus at 150 percent elongation	5-75 psi
Width of sealant after 7 days extension and one hour recovery	21/32 inch, max.
Condition 24 hours after notching	Notched or loss of bond 1/4 inch, max.
Condition of water immersed specimen at 7 days	Notched or loss of bond 1/4 inch, max.
Condition of specimen when tested in accordance with ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 25 cycles. The cycle shall be 4 hours UV exposure at 60°C and 4 hours condensate exposure at 40°C	No more than slight checking or cracking.
Grease cone penetration	4.5 - 12.0 mm.

State Specifications for polyurethane and silicone sealants may be obtained from the Transportation Laboratory.

Section 51-1.12F(3)(a), "Type A and AL Seal," of the Standard Specifications is amended by adding the following paragraphs after paragraph 8:

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

Samples of the two components, not less than one quart each, from each batch of sealant shall be submitted to the Transportation Laboratory. In addition, samples of manufacturer required primers, not less than one quart each, shall be submitted. The samples shall be furnished for testing, with the Certificate of Compliance, 30 days in advance of proposed use.

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

The seal shall be furnished full length for each joint with no more than one shop splice in any 60-foot length of seal.

One field splice per joint may be made at locations and by methods approved by the Engineer. The seals are to be manufactured full length for the intended joint, then cut at the approved splice section and rematched before splicing. The Contractor shall submit splicing details, prepared by the joint seal manufacturer, to the Engineer for approval prior to beginning splicing work.

The Contractor shall demonstrate the adequacy of the procedures to be used in the work before installing seal in the joints.

Shop splices and field splices shall have no visible offset of exterior surfaces, and shall show no evidence of bond failure.

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

The combination lubricant-adhesive shall conform to the requirements in ASTM Designation: D 4070. No material shall be used which has skinned over or which has settled in the container to the extent that it cannot be easily redispersed by hand stirring to form a smooth uniform product.

10-1.84 JOINT SEAL ASSEMBLIES (MAXIMUM MOVEMENT RATING, 4 INCHES)

Joint seal assemblies shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications, and these special provisions.

All metal parts of the joint seal assembly shall conform to the requirements in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. Bolts, nuts and washers shall conform to the requirements of ASTM Designation: A 325.

At the Contractor's option, cleaning and painting of all new metal surfaces of the joint seal assembly, except stainless steel and anchorages embedded in concrete, may be substituted for galvanizing. Cleaning and painting shall be in accordance with the provisions in "Clean and Paint Structural Steel" of these special provisions.

Conformance with the requirements in SSPC-QP 1, SSPC-QP 2, and SSPC-QP 3 of the "SSPC: The Society for Protective Coatings" will not be required for joint seal assemblies.

Sheet neoprene shall conform to the requirements for neoprene in Section 51-1.14, "Waterstops," of the Standard Specifications. The sheet neoprene shall be fabricated to fit the joint seal assembly accurately.

Metal parts of the joint seal assembly shall be pre-assembled before installation to verify the geometry of the completed seal.

The bridge deck surface shall conform to the provisions in Section 51-1.17, "Finishing Bridge Decks," of the Standard Specifications prior to placing and anchoring the joint seal assembly.

The assembly shall be placed in a blocked out recess in the concrete deck surface. The depth and width of the recess shall permit the installation of the assembly anchorage components or anchorage bearing surface to the lines and grades shown on the plans.

The sheet neoprene shall be installed at such time and in such manner that it will not be damaged by construction operations. The joint shall be cleaned of all dirt, debris and other foreign material immediately prior to installation of the sheet neoprene.

ALTERNATIVE JOINT SEAL ASSEMBLY.--At the Contractor's option, an alternative joint seal assembly may be furnished and installed provided: (1) that the quality of the alternative and its suitability for the intended application are at least equal to that of the joint seal assembly shown on the plans, (2) that acceptable working drawings and a Certificate of Compliance are furnished as specified herein and (3) that the alternative conforms to the following requirements:

The determination as to the quality and suitability of a joint seal assembly will be made in the same manner as provided in Section 6-1.05, "Trade Names and Alternatives," of the Standard Specifications. The factors to be considered will include: the ability of the assembly to resist the intrusion of foreign material and water throughout the full range of movement for the application, and the ability to function without distress to any component.

Joint seal assemblies will not be considered for approval unless it can be proven that the assembly has had at least one year of satisfactory service under conditions similar to this application.

The Contractor shall submit complete working drawings for each joint seal assembly to the Office of the Resident Engineer, Department of Transportation, 151 Fremont Street, San Francisco, CA 94105 in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall show complete details of the joint seal assembly and anchorage components and the method of installation to be followed, including concrete blockout details and any additions or rearrangements of the reinforcing steel from that shown on the plans. For initial review, 5 sets of working drawings shall be submitted. After review, between 6 and 12 sets of working drawings, as requested by the Engineer, shall be submitted to the Engineer for final approval and use during construction.

The working drawings shall be supplemented with calculations for the particular joint seal assembly, as requested by the Engineer. Working drawings shall be either 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Calculations, when requested, and working drawings shall be stamped and signed by an engineer who is registered as a Civil Engineer. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

Within 3 weeks after final working drawing approval, one set of the corrected good quality prints on 20 pound (minimum) bond paper (22" x 34" in size) of all working drawings prepared by the Contractor for each joint seal assembly shall be furnished to the Engineer.

Each shipment of joint seal materials shall be accompanied by a Certificate of Compliance as provided in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall state that the materials and fabrication involved comply in all respects to the specifications and data submitted in obtaining the approval.

The elastomer portion of the joint seal assembly shall be neoprene conforming to the requirements in Table 1 of ASTM Designation: D 2628 and the following, except that no recovery tests or compression-deflection tests will be required:

Property	Requirement	ASTM Test Method
Hardness, Type A Durometer, points	55-70	D 2240 (Modified)
Compression set, 70 hours at 212° F, maximum, percent	40	D 395 Method B (Modified)

All metal parts of an alternative joint seal assembly shall conform to the requirements above for the joint seal assembly shown on the plans. At the Contractor's option, metal parts may conform to the requirements of ASTM Designation: A 572.

The assembly and its components shall be designed to support the AASHTO HS20-44 loading with 100 percent impact. The tire contact area used to distribute the tire loads shall be 9.6 inches, measured normal to the longitudinal axis of the assembly, by 20 inches wide. The assembly shall provide a smooth riding joint without slapping of components or wheel tire rumble.

The Movement rating of the assembly shall be measured normal to the longitudinal axis of the assembly. The dimensions for positioning the assembly within the movement rating during installation shall be measured normal to the longitudinal axis, disregarding any skew of the deck expansion joint.

The assembly shall have cast-in-place anchorage components forming a mechanical connection between the joint components and the concrete deck.

The maximum depth and width of the recess shall be such that the primary reinforcement to provide the necessary strength of the structural members is outside the recess. The maximum depth and width of the recesses at abutments and at hinges shall as shown on the plans.

All reinforcement other than primary reinforcement shall continue through the recess construction joint into the recess and engage the anchorage components of the assembly.

Horizontal angle points and vertical corners at curbs in assemblies shall consist of either pre-molded sections or standard sections of the joint seal assembly that have been specially miter cut or bent to fit the structure.

The elastomer portion of the assembly shall be installed in accordance with the manufacturer's recommendations at such time and in such a manner that it will not be damaged by construction operations. The joint and blockout shall be cleaned of all dirt, debris and other foreign material immediately prior to the installation of the elastomer.

Full compensation for any additional materials or work required because of the application of the optional cleaning and painting, or use of an alternative type joint seal assembly, shall be considered as included in the contract price paid per linear foot for the joint seal assembly involved, and no additional compensation will be allowed therefor.

10-1.85 JOINT SEAL ASSEMBLIES (MOVEMENT RATING EXCEEDING 4 INCHES)

Joint seal assemblies with Movement Ratings greater than 4 inches shall consist of a metal frame system, supporting rails and support bars with intervening neoprene glands and shall conform to the details shown on the plans, the provisions in Section 51, "Concrete Structures," of the Standard Specifications and to these special provisions.

Joint seal assemblies will not be considered for approval without satisfactory evidence that the assemblies have had at least one year of satisfactory service under conditions similar to this application.

A qualified representative of the manufacturer shall be present during installation of the first assembly and shall be available for advice during any remaining installations.

The Contractor shall submit complete working drawings for each joint seal assembly to the Office of the Resident Engineer, Department of Transportation, 151 Fremont Street, San Francisco, CA 94105 in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall show complete details of the joint seal assembly and anchorage components and the method of installation to be followed, including concrete blockout details and any additions or rearrangements of the reinforcing steel from that shown on the plans. For initial review, 5 sets of drawings shall be submitted. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the Engineer for final approval and use during construction.

The working drawings shall be supplemented with complete calculations for the particular joint seal assembly, when requested by the Engineer. Working drawings shall be either 11" x 17" or 22" x 34" in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, bridge number, full name of the structure as shown on the contract plans, and District-County-Route-Post mile. The design firm's name, address, and phone number shall be shown on the working drawings. Each sheet shall be numbered in the lower right hand corner and shall contain a blank space in the upper right hand corner for future contract sheet numbers.

Calculations, when requested, and working drawings shall be stamped and signed by an engineer who is registered as a Civil Engineer. The Contractor shall allow the Engineer 4 weeks to review the drawings after a complete set has been received.

Within 3 weeks after final working drawing approval, one set of the corrected good quality prints on 20 pound (minimum) bond paper (22" x 34" in size) of all working drawings prepared by the Contractor for each joint seal assembly shall be furnished to the Engineer.

Each shipment of joint seal assembly materials shall be accompanied by a Certificate of Compliance as provided in Section 6-l.07, "Certificates of Compliance," of the Standard Specifications. The certificate shall state that the materials and fabrication involved comply in all respects to the specifications and data submitted in obtaining approval.

The neoprene glands shall conform to the requirements in Table 1 of ASTM Designation: D 2628 and the following, except that no recovery tests or compression-deflection tests will be required:

Property	Requirement	ASTM Test Method
Hardness, Type A Durometer, points	55-70	D 2240 (Modified)
Compression set, 70 hours at 212° F., maximum, percent	40	D 395 Method B (Modified)

All metal parts of the joint seal assembly shall conform to the requirements in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications. Bolts, nuts and washers shall conform to the requirements of ASTM Designation: A 325. At the Contractor's option, metal parts may conform to the requirements of ASTM Designation: A 572.

At the Contractor's option, cleaning and painting of all new metal surfaces of the joint seal assembly, except stainless steel and anchorages embedded in concrete, may be substituted for galvanizing. Cleaning and painting shall be in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications, and "Clean and Paint Structural Steel" of these special provisions.

Conformance with the requirements in SSPC-QP 1, SSPC-QP 2, and SSPC-QP 3 of the "SSPC: The Society for Protective Coatings" will not be required for joint seal assemblies.

Finish coats will not be required on joint seal assemblies.

If the assembly consists of more than one component, the design of the assembly shall be such that the external components can be removed and reinstalled at any position, within the larger one-half of the Movement Rating shown on the plans, to permit the inspection of the internal components of the assembly.

Except for components in contact with the tires, the assembly and its components shall be designed to support the AASHTO HS20-44 loading with 100 percent impact. Each component in contact with the tires shall support a minimum of 80 percent of the AASHTO HS20-44 loading with 100 percent impact. The tire contact area used to distribute the tire loads shall be 9.6 inches, measured normal to the longitudinal axis of the assembly, by 20 inches wide. The assembly shall provide a smooth riding joint without slapping of components or wheel tire rumble.

The Movement Rating of the assembly shall be measured normal to the longitudinal axis of the assembly. The dimensions for positioning the assembly within the Movement Rating during installation shall be measured normal to the longitudinal axis, disregarding any skew of the deck expansion joint. The assembly shall be capable of adjustment to the "a" dimension shown on the plans.

The maximum width of unsupported or yielding components or grooves in the roadway surface of the assembly, measured in the direction of vehicular traffic, shall be 3 inches.

The bridge deck surface shall conform to the provisions in Section 51-1.17 "Finishing Bridge Deck," of the Standard Specifications prior to placing joint seal assemblies and anchorage.

The assembly shall be completely shop-assembled and placed in a blocked out recess in the concrete deck surface. The depth and width of the recess shall permit the installation of the assembly anchorage components or anchorage bearing surface to the planned line and grade.

The maximum depth and width of the recess shall be such that the primary reinforcement to provide the necessary strength of the structural members is outside the recess. The maximum depth and width of the recesses at abutments and at hinges shall be as shown on the plans.

All reinforcement other than primary reinforcement shall continue through the recess construction joint into the recess and engage the anchorage components of the assembly.

The vertical expansion joint in barrier shall be available for inspection after placement of the recess concrete around the anchorage components of the assembly.

The assembly shall make a watertight, continuous return 6 inches up into the barrier at the low side of the deck joint. Neoprene glands shall be continuous without field splices or joints, including the return up into barrier.

Full compensation for any additional materials or work required because of the application of the optional cleaning and painting shall be considered as included in the contract price paid per linear foot for the joint seal assembly involved, and no additional compensation will be allowed therefor.

10-1.86 REINFORCEMENT

Reinforcement shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

GENERAL.-- Bar reinforcing steel that will not be embedded in concrete within one year of placing the steel shall be painted with a zinc-rich coating conforming to the specifications for painting damaged galvanized surfaces as specified in Section 75-1.05, "Galvanizing," of the Standard Specifications. Before concrete is placed, the bar reinforcing steel shall be cleaned as specified for cleaning structural steel in "Clean and Paint Structural Steel" of these special provisions.

Attention is directed to "Welding Quality Control" elsewhere in these special provisions.

Attention is directed to "Headed Bar Reinforcement" of these special provisions.

The first paragraph of Section 52-1.02A, "Bar Reinforcement," of the Standard Specifications is amended as follows:

Reinforcing bars shall be low-alloy steel deformed bars conforming to the specifications of ASTM Designation: A 706/A 706M, except that deformed or plain billet-steel bars conforming to ASTM Designation: A 615/A 615M, Grade 40 or 60, may be used as reinforcement in the following:

1. Slope and channel paving;
2. Minor structures;
3. Sign and signal foundations (pile and spread footing types);
4. Roadside rest facilities; and
5. Concrete barrier Type 50 and Type 60 series and temporary railing.

Deformations specified in ASTM Designation: A 706/A 706M will not be required on bars used as spiral or hoop reinforcement in structures and concrete piles.

Section 52-1.02C, "Welded Wire Fabric," of the Standard Specifications is amended to read:

52-1.02C Welded Wire Fabric.—Welded wire fabric shall be either plain or deformed conforming to the requirements in ASTM Designation: A 185 or ASTM Designation: A 497, respectively.

Section 52-1.02D, "Reinforcing Wires and Plain Bars," of the Standard Specifications is amended to read:

52-1.02D Reinforcing Wire.—Wire used as reinforcement in structures and concrete piles, as shown on the plans, shall be cold drawn steel wire conforming to the specifications of ASTM Designation: A 82.

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

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

The last paragraph of 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 20 feet in height, the Contractor shall submit to the Engineer for approval, in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings," working drawings and design calculations for the temporary support system to be used. The working drawings and design calculations shall be signed by an engineer who is registered as a Civil Engineer in the State of California. The temporary support system shall be designed to resist all expected loads and shall be adequate to prevent collapse or overturning of the assemblage. If the installation of forms or other work requires revisions to or temporary release of any portion of the temporary support system, the working drawings shall show the support system to be used during each phase of construction. The minimum horizontal wind load to be applied to the bar reinforcing steel assemblage, or to a combined assemblage of reinforcing steel and forms, shall be not less than 20 pounds per square foot on the gross projected area of the assemblage.

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

Except when otherwise specified, mechanical lap splicing shall conform to the details shown on the plans, the requirements for mechanical butt splices as specified in this Section 52-1.08, and Sections 52-1.08C, "Mechanical Butt Splices," 52-1.08D, "Qualification of Welding and Mechanical Splicing," and 52-1.08E, "Job Control Tests," and the following:

The mechanical lap splice shall be a unit consisting of a sleeve, in which the reinforcing bars are positioned, and a wedge driven through holes in the sleeve and between the reinforcing bars. The mechanical lap splice shall only be used for splicing non-epoxy-coated deformed reinforcing bars Nos. 4, 5 and 6.

The eighth and ninth paragraphs of Section 52-1.08, "Splicing," of the Standard Specifications are amended to read:

Unless otherwise shown on the plans or approved by the Engineer, splices in adjacent reinforcing bars at any particular section shall be staggered. The minimum distance between staggered lap splices or mechanical lap splices shall be the same length required for a lapped splice in the largest bar. The minimum distance between staggered butt splices shall be 2 feet, measured between the midpoints of the splices along a line which is centered between the axes of the adjacent bars.

Completed butt splices shall develop a minimum tensile strength, based on the nominal bar area, of 63,000 psi for ASTM Designation: A 615/A 615M Grade 40 bars, and of 80,000 psi for ASTM Designation: A 615/A 615M Grade 60 and ASTM Designation: A 706/A 706M bars. If butt splices are made between two bars of dissimilar strengths, the minimum required tensile strength for the splice shall be that required for the weaker bar.

The second sentence of the eleventh paragraph of Section 52-1.08, "Splicing," of the Standard Specifications is amended to read:

Job control tests shall be made on sample splices representing each lot of mechanical butt splices as provided in Section 52-1.08E, "Job Control Tests."

Section 52-1.08B, "Butt Welded Splices," of the Standard Specifications is replaced with the following:

52-1.08B Butt Welded Splices.—Butt welded splices in reinforcing bars shall be complete joint penetration butt welds conforming to the requirements in AWS D1.4, and the requirements of these specifications and the special provisions. At the option of the Contractor, shop produced resistance butt welds, that are produced by a fabricator who is approved by the Transportation Laboratory, may be used. These welds shall conform to the requirements of these specifications and the special provisions.

Only the joint details and dimensions as shown in Figure 3.2, "Direct Butt Joints," of AWS D 1.4-92, shall be used for making complete joint penetration butt welds of bar reinforcement. Split pipe backing shall not be used.

Material used as backing for complete joint penetration butt welds of bar reinforcement shall be a flat plate conforming to the requirements of ASTM Designation: A 709/A 709M, Grade 36[250]. The flat plate shall be 0.25-inch thick with a width, as measured perpendicular to the axis of the bar, equal to the nominal diameter of the bar, and a length which does not exceed twice the nominal diameter of the bar. The flat plate backing shall be fitted tightly to the bar with the root of the weld centered on the plate. Any bar deformation or obstruction preventing a tight fit shall be ground smooth and flush with the adjacent surface. Tack welds used to fit backing plates shall be within the weld root area so that they are completely consumed by the finished weld. Backing plates shall not be removed.

Butt welds shall be made with multiple weld passes using a stringer bead without an appreciable weaving motion. The maximum stringer bead width shall be 2.5 times the diameter of the electrode and slagging shall be performed between each weld pass. Weld reinforcement shall not exceed 1/8-inch in convexity.

Before any electrodes or flux-electrode combinations are used, the Contractor, at the Contractor's expense, shall furnish certified copies of test reports for all the pertinent tests specified in AWS A5.1, AWS A5.5, AWS A5.18 or AWS A5.20, whichever is applicable, made on electrodes or flux-electrode combinations of the same class, brand and nearest specified size as the electrodes to be used. The tests may have been made for process qualification or quality control, and shall have been made within one year prior to manufacture of the electrodes and fluxes to be used. The report shall include the manufacturer's certification that the process and material requirements were the same for manufacturing the tested electrodes and the electrodes to be used. The forms and certificates shall be as directed by the Engineer.

Electrodes for manual shielded metal arc welding of ASTM Designation: A 615/A 615M, Grade 60 bars shall conform to the requirements of AWS A5.5 for E9018-M or E10018-M electrodes.

Electrodes for manual shielded metal arc welding of ASTM Designation: A 706/A 706M bars shall conform to the requirements of AWS A5.5 for E8016-C3 or E8018-C3 electrodes.

Solid and composite electrodes for semiautomatic gas metal-arc and flux-cored arc welding of Grade 40 reinforcing bars shall conform to the requirements of AWS A5.18 for ER70S-2, ER70S-3, ER70S-6 or ER70S-7 electrodes; or AWS A5.20 for E70T-1, E70T-5, E70T-6 or E70T-8 electrodes.

Electrodes for semiautomatic welding of ASTM Designation: A 615/A 615M, Grade 60 and ASTM Designation: A 706/A 706M bars shall produce a weld metal deposit with properties conforming to the requirements of Section 5.3.4 of AWS D1.1-96 for ER80S-Ni1, ER80S-Ni2, ER80S-Ni3, ER80S-D2, E90T1-K2 and E91T1-K2 electrodes.

Reinforcing bars shall be preheated for a distance of not less than 6 inches on each side of the joint prior to welding.

For all welding of ASTM Designation: A 615/A 615M, Grade 40 or Grade 60 bars, the requirements of Table 5.2, "Minimum Preheat and Interpass Temperatures," of AWS D1.4-92 are superseded by the following:

The minimum preheat and interpass temperatures shall be 400° F. for Grade 40 bars and 600° F. for Grade 60 bars. Immediately after completing the welding, at least 6 inches of the bar on each side of the splice shall be covered by an insulated wrapping to control the rate of cooling. The insulated wrapping shall remain in place until the bar has cooled below 200° F.

When welding different grades of reinforcing bars, the electrode shall conform to Grade 40 bar requirements and the preheat shall conform to the Grade 60 bar requirements.

In the event that any of the specified preheat, interpass and post weld cooling temperatures are not met, all weld and heat affected zone metal shall be removed and the splice rewelded.

Welding shall be protected from air currents, drafts, and precipitation to prevent loss of heat or loss of arc shielding. The method of protecting the welding area from loss of heat or loss of arc shielding shall be subject to approval by the Engineer.

Reinforcing bars shall not be direct butt spliced by thermite welding.

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

Mechanical butt splices shall be the sleeve-filler metal type, the sleeve-threaded type, the sleeve-swaged type, the sleeve-filler grout type, the sleeve-lockshear bolt type, the two-part sleeve-forged bar type, or the two-part sleeve-friction bar type, at the option of the Contractor.

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

The total slip of the reinforcing bars within the splice sleeve after loading in tension to 29 ksi and relaxing to 2.9 ksi shall not exceed the values listed in the following table. The slip shall be measured between gage points that are clear of the splice sleeve.

Reinforcing Bar Number	Total Slip (mils)
4	9.84
5	9.84
6	9.84
7	13.78
8	13.78
9	13.78
10	17.72
11	17.72
14	23.62
18	29.53

The following is added after the third paragraph of Section 52-1.08C, "Mechanical Butt Splices," of the Standard Specifications:

Slip requirements shall not apply to mechanical lap splices.

The following is added after Section 52-1.08C(3), "Sleeve-Swaged Mechanical Butt Splices," of the Standard Specifications:

52-1.08C(4) Sleeve-Filler Grout Mechanical Butt Splices.—The sleeve-filler grout type of mechanical butt splices shall consist of a steel splice sleeve that fits closely over the reinforcing bars with a non-shrink grout filler in the annular space between the reinforcing bars and the sleeve and between the ends of the reinforcing bars.

No vibration or movement of the reinforcing steel or sleeve at the splice shall be allowed while the splice is developing sufficient strength to support the reinforcing bars. The Contractor shall submit complete details of the bracing and clamping system to eliminate all vibration or movement at the splice during setup of the filler in accordance with the provisions in Section 5-1.02, "Plans and Working Drawings."

52-1.08C(5) Sleeve-Lockshear Bolt Mechanical Butt Splices.—The sleeve-lockshear bolt type of mechanical butt splices shall consist of a seamless steel sleeve, center hole with centering pin, and bolts that are tightened until the bolt heads shear off with the bolt ends left embedded in the reinforcing bars. The seamless steel sleeve shall be either formed into a V configuration or shall have 2 serrated steel strips welded to the inside of the sleeve.

52-1.08C(6) Two-Part Sleeve-Forged Bar Mechanical Butt Splices.—The two-part sleeve-forged bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve that interlocks two hot-forged reinforcing bars ends. The forged bar ends may be either shop produced or field produced.

52-1.08C(7) Two-Part Sleeve-Friction Bar Mechanical Butt Splices.—The two-part sleeve-friction bar type of mechanical butt splices shall consist of a shop machined two-part threaded steel sleeve whose ends are friction welded, in the shop, to the reinforcing bars ends.

The third paragraph of Section 52-1.08D, "Qualification of Welding and Mechanical Splicing," of the Standard Specifications is replaced with the following:

Resistance butt welds shall be produced by a fabricator approved by the Transportation Laboratory.

Each operator qualification test for mechanical splices shall consist of 2 sample splices. Each mechanical splice procedure test shall consist of 2 sample splices.

For sleeve-filler, sleeve-threaded, sleeve-lockshear bolt and two-part sleeve friction bar mechanical butt splices, sample splices shall be made on the largest reinforcing bar size to be spliced by the procedure or operator being tested except that No. 14 bars may be substituted for No. 18 bars.

For sleeve-swaged and two-part sleeve-forged mechanical butt splices, and mechanical lap splices, sample splices shall be made on the largest reinforcing bar size of each deformation pattern to be spliced by the procedure or operator being tested. When joining new reinforcing bars to existing reinforcement, the qualification test sample bars shall be made with the deformation pattern of the new reinforcement to be joined.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications is replaced with the following:

52-1.08E Job Control Tests.— When mechanical butt splices, shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices are used, the Contractor shall furnish job control tests from a local qualified testing laboratory. A job control test shall consist of the fabrication, under conditions used to produce the splice, and the physical testing of 3 sample splices for each lot of 150 splices.

A lot of mechanical butt splices is defined as 150, or fraction thereof, of the same type of mechanical butt splices used for each combination of bar size and bar deformation pattern that is used in the work.

A lot of shop produced complete joint penetration butt welded splices, or shop produced resistance butt welded splices, is defined as 150, or fraction thereof, of the same type of welds used for each combination of bar size and bar deformation pattern that is used in the work.

When joining new reinforcing bars to existing reinforcement, the job control test shall be made using only the deformation patterns of the new reinforcement to be joined.

A sample splice shall consist of a splice made at the job site to connect two 30-inch, or longer, bars using the same splice materials, position, location, and equipment, and following the same procedures as are being used to make splices in the work. Shorter sample splice bars may be used if approved by the Engineer.

Sample splices shall be made and tested in the presence of the Engineer or the Engineer's authorized representative.

Sample splices shall be suitably identified with weatherproof markings prior to shipment to the testing laboratory.

For sleeve-threaded mechanical butt splices, the reinforcing bars to be used for job control tests shall be fabricated on a random basis during the cutting of threads on the reinforcing bars of each lot and shipped to the job site with the material they represent.

For shop produced complete joint penetration butt welds, shop produced resistance butt welded splices and all types of mechanical butt splices, except the sleeve-threaded type, the Engineer will designate when samples for job control tests are to be fabricated, and will determine the limits of the lot represented by each job control test.

Should the average of the results of tests made on the 3 sample splices or should more than one sample splice in any job control test fail to meet the requirements for splices, all splices represented by that test will be rejected in accordance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications. This rejection shall prevail unless the Contractor, at the Contractor's expense, obtains and submits evidence, of a type acceptable to the Engineer, that the strength and quality of the splices in the work are acceptable.

Section 52-1.08F, "Nondestructive Splice Tests" of the Standard Specifications is replaced with the following:

52-1.08F Nondestructive Splice Tests.—All required radiographic examinations of complete joint penetration butt welded splices shall be performed by the Contractor in accordance with the requirements of AWS D 1.4 and these specifications.

Prior to radiographic examination, welds shall meet the requirements of Section 4.4, "Quality of Welds," of AWS D1.4-92.

Radiographic examinations shall be performed on 25 percent of all complete joint penetration butt welded splices from a production lot. The size of a production lot will be a maximum of 100 splices. The Engineer will select the splices which will compose the production lot and also the splices within each production lot to be radiographically examined.

Should more than 12 percent of the splices which have been radiographically examined in any production lot be defective, an additional 25 percent of the splices, selected by the Engineer from the same production lot, shall be radiographically examined. Should more than 12 percent of the cumulative total of splices tested from the same production lot be defective, all remaining splices in the lot shall be radiographically examined.

Additional radiographic examinations performed due to the identification of defective splices shall be at the Contractor's expense.

All defects shall be repaired in accordance with the requirements of AWS D1.4.

In addition to radiographic examinations performed by the Contractor, any mechanical or welded splice may be subject to inspection or nondestructive testing by the Engineer. The Contractor shall provide sufficient access facilities in the shop and at the jobsite to permit the Engineer or his agent to perform the inspection or testing.

The Contractor shall notify the Engineer in writing 48 hours prior to performing any radiographic examinations.

The radiographic procedure used shall conform to the requirements of ASME Boiler and Pressure Vessels Code, Section V, Article 2 and the following:

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

For field produced complete joint penetration butt welds, no more than one weld shall be radiographed during one exposure. For shop produced complete joint penetration butt welds, if more than one weld is to be radiographed during one exposure, the angle between the root line of each weld and the direction to the radiation source shall be not less than 65 degrees.

Radiographs shall be made by either X-ray or gamma ray. Radiographs made by X-ray or gamma rays shall have densities of not less than 2.3 nor more than 3.5 in the area of interest. A tolerance of 0.05 in density is allowed for densitometer variations. Gamma rays shall be from the iridium 192 isotope and the emitting specimen shall not exceed 0.175-inch in the greatest diagonal dimension.

The radiographic film shall be placed perpendicular to the radiation source at all times; parallel to the root line of the weld unless source placement determines that the film must be turned; and as close to the root of the weld as possible.

The minimum source to film distance shall be maintained so as to insure that all radiographs maintain a maximum geometric unsharpness of 0.020 at all times, regardless of the size of the reinforcing bars.

All penetrameters shall be placed on the source side of the bar and perpendicular to the radiation source at all times. One penetrameter shall be placed in the center of each bar to be radiographed, perpendicular to the weld root, and adjacent to the weld. Penetrameter images shall not appear in the weld area.

When radiography of more than one weld is being performed per exposure, each exposure shall have a minimum of one penetrameter per bar, or three penetrameters per exposure. When 3 penetrameters per exposure are used, one penetrameter shall be placed on each of the 2 outermost bars of the exposure, and the remaining penetrameter shall be placed on a centrally located bar.

An allowable weld buildup of 1/8 inch may be added to the total material thickness when determining the proper penetrameter selection. No image quality indicator equivalency will be accepted. Wire penetrameters or penetrameter blocks shall not be used.

Penetrameters shall be sufficiently shimmed using a radiographically identical material. Penetrameter image densities shall be a minimum of 2.0 and a maximum of 3.6.

All radiographic film shall be Class 1, regardless of the size of reinforcing bars.

Radiographs shall be free of film artifacts and processing defects, including, but not limited to, streaks, scratches, pressure marks, or marks made for the purpose of identifying film or welding indications.

Each splice shall be clearly identified on each radiograph and the radiograph identification and marking system shall be established between the Contractor and the Engineer before radiographic inspection begins. Film shall be identified by lead numbers only; etching, flashing, or writing in identifications of any type will not be permitted. Each piece of film identification information shall be legible and shall include, as a minimum, the following information: Contractor's name, date, name of nondestructive testing firm, initials of radiographer, contract number, part number, and weld number. The letter "R" and repair number shall be placed directly after the weld number to designate a radiograph of a repaired weld.

Radiographic film shall be developed within a time range of one minute less to one minute more than the film manufacturer's recommended maximum development time. Sight development will not be allowed.

Processing chemistry shall be done with a consistent mixture and quality, and processing rinses and tanks shall be clean to ensure proper results. Records of all developing processes and any chemical changes to the developing processes shall be kept and furnished to the Engineer upon request. The Engineer may request, at any time, that a sheet of unexposed film be processed in the presence of the Engineer to verify processing chemical and rinse quality.

The results of all radiographic interpretations shall be recorded on a signed certification and a copy kept with the film packet.

Technique sheets prepared in accordance with ASME Boiler and Pressure Vessels Code, Section V, Article 2 Section T-291 shall also contain the developer temperature, developing time, fixing duration and all rinse times.

Individual hoops, made continuous with butt welded splices, which are substituted for spiral reinforcement, shall conform to the requirements for "Ultimate Butt Splices" of these special provisions.

SERVICE BUTT SPLICES

Service butt splices shall be used at the locations shown on the plans, and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions. Service butt splices shall be either welded or mechanical splices. Unless otherwise specified, mechanical lap splices shall be treated as service butt splices as specified herein.

General Requirements

The Contractor shall designate in writing a service butt splicing Quality Control Manager (QCM). The QCM shall be responsible directly to the Contractor for 1) the quality of all service 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 butt splicing to and from the Engineer.

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

All service prejob and production sample splices shall be 1) a minimum length of 60 inches for reinforcing bars No. 8 or smaller, and 80 inches for reinforcing bars No. 9 or larger, with the splice located at mid-point; and 2) suitably identified prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. Any splice that shows signs of tampering will be rejected.

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

Each set shall be identified as representing either a prejob or production test sample splice.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications shall not apply.

When joining new reinforcing bars to existing reinforcement, the prejob sample splices shall be made using only the deformation pattern of the new reinforcement to be joined.

The provisions for total slip shall not apply to any service splices that are welded.

The independent qualified testing laboratory used to perform the testing of all service butt sample splices shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors who will provide other services or materials for the project, and shall have the following:

A. Proper facilities, including a tensile testing machine capable of breaking the largest size of reinforcing bar to be tested.
B. A device for measuring the total slip of the reinforcing bars across the splice to the nearest 0.001 inch, that, when placed parallel to the longitudinal axis of the bar is able to simultaneously measure movement across the splice, at 2 locations, 180 degrees apart.
C. Operators who have received formal training for performing the testing requirements of ASTM Designation: A 370/A 370M and California Test 670.
D. A record of annual calibration of testing equipment performed by an independent third party that has 1) standards that are traceable to the National Institute of Standards and Technology, and 2) a formal reporting procedure, including published test forms.

Service Butt Splice Test Criteria

Service prejob sample splices and production sample splices shall be tensile tested in conformance with the requirements described in ASTM Designation: A 370/A 370M and California Test 670.

Service prejob sample splices and production sample splices shall develop a minimum tensile strength of not less than 80 ksi.

Prejob Test Requirements for Service Butt Splices

Prior to use in the work, all service butt splices shall conform to the following prejob test requirements:

A. Four prejob sample splices for each bar size of each splice type including service mechanical butt splices, service complete joint penetration butt welded splices, and service resistance butt welded splices, that will be used in the work, shall be fabricated by the Contractor. For deformation-dependent types of couplers, 4 sample prejob splices shall also be fabricated for each reinforcing bar size and deformation pattern that will be used in the work.
B. The sample splices shall be fabricated using the same splice materials, position, operators, location, and equipment, and following the same procedures as will be used to make the splices in the work.
C. At the option of the Contractor, operator qualification tests may be performed simultaneously with the preparation of prejob sample splices.
D. Unless otherwise directed in writing by the Engineer, the 4 sample splices shall be tested by the Contractor's independent qualified testing laboratory.
E. Each group of 4 samples from a prejob test shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 samples shall not be tested by the independent laboratory.
F. All 4 sample splices from each prejob test shall conform to the provisions in "Service Butt Splice Test Criteria" specified herein.
G. Prior to performing any tensile tests on prejob test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip. Should this sample not meet these requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. All 3 of these remaining samples tested shall conform to the aforementioned slip requirements.
H. For each bundle of 4 samples, a Prejob Test Report shall be prepared by the independent testing laboratory performing the testing. The report shall 1) be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California; 2) include, as a minimum, the following information for each sample: contract number, bridge number, bar size, type of splice, length of mechanical splice, physical condition of test sample splice, any notable defects, total measured slip, and ultimate strength of each splice; and 3) be submitted to the QCM for review and approval, and then to the Engineer.

Production Test Requirements for Service Butt Splices

Production tests shall be performed by the Contractor's independent laboratory for all service butt splices used in the work. Unless otherwise specified, a production test shall consist of 4 sample splices prepared for each lot of completed splices. The samples shall be prepared by the Contractor in the same manner as specified herein for service prejob sample splices, and then tested by the independent laboratory in the presence of either the Engineer or the Engineer's authorized representative.

A lot of service butt splices is defined as 1) 150, or fraction thereof, of the same type of service mechanical butt splices used for each bar size and each bar deformation pattern that is used in the work or 2) 150, or fraction thereof, of service complete joint penetration butt welded splices, or service resistance butt welded splices for each bar size used in the work.

The Engineer or the Engineer's authorized representative will be at the independent qualified testing laboratory within a maximum of 5 working days after receiving written notification that the samples are at the laboratory and ready for testing. Should the Engineer or the Engineer's authorized representative fail to be at the laboratory within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

A Production Test Report for all testing performed on each lot shall be prepared by the independent testing laboratory performing the testing and submitted to the QCM for review and approval. The report shall be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California. The report shall include, as a minimum, the following information for each sample: contract number, bridge number, lot number and location, bar size, type of splice, length of mechanical splice, physical condition of test sample splice, any notable defects, total measured slip, ultimate strength of each splice.

The QCM must review, approve, and forward each Production Test Report to the Engineer for review before any splices represented by the report are encased in concrete. The Engineer shall have 3 working days to review each Production Test Report and respond in writing after a complete report has been received. Should the Contractor elect to encase any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Prior to performing any tensile tests on production test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip. Should this sample not meet the 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 slip requirements, all splices in the lot represented by this production test will be rejected.

If 3 or more sample splices from any production test conform to the provisions in "Service Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be considered acceptable, provided all 4 samples develop a minimum tensile strength of not less than 420 Mpa.

Should only 2 sample splices from any production test conform to the provisions in "Service Butt Splice Test Criteria" specified herein, 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 or to develop a minimum tensile strength of not less than 80 ksi, all splices in the lot represented by these production tests will be rejected.

If only one sample splice from any production test conforms to the provisions in "Service Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be rejected.

If a production test for any lot fails, the Contractor will be required to repair or replace all reinforcing bars from which sample splices were removed, complete in place, before the Engineer selects any additional splices from this lot for further testing.

Whenever any lot of service butt splices is rejected, additional service butt splices shall not be used in the work until 1) the QCM performs a complete review of the Contractor's quality control process for these splices, 2) a written report is submitted to the Engineer describing the cause of failure for the splices in this lot and provisions for correcting these failures in future lots, and 3) the Engineer has provided the Contractor with written notification that the report is acceptable. The Engineer shall have 3 working days after receipt of the report to provide notification to the Contractor. Should the Engineer not provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

ULTIMATE BUTT SPLICES

Ultimate butt splices shall be either welded or mechanical splices, shall be used at the locations shown on the plans, and shall conform to the provisions in Section 52, "Reinforcement," of the Standard Specifications and these special provisions.

GENERAL REQUIREMENTS

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

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

The length of any type of ultimate mechanical butt splice shall not exceed 10 times the bar diameter of the larger bar to be spliced.

All ultimate prejob, production, and job control sample splices shall be 1) a minimum length of 60 inches for reinforcing bars No. 8 or smaller and 80 inches for reinforcing bars No. 9 or larger, with the splice located at mid-point, and 2) suitably identified prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. Any splice that shows signs of tampering will be rejected.

A minimum of one control bar shall be removed from the same bar as, and adjacent to, all ultimate prejob, production, and job control sample splices. Control bars shall be 1) a minimum length of 40 inches for reinforcing bars No. 8 or smaller and 60 inches for reinforcing bars No. 9 or larger, and 2) suitably identified prior to shipment with weatherproof markings that do not interfere with the Engineer's tamper-proof markings or seals. The portion of adjacent bar remaining in the work shall also be identified with weatherproof markings that correspond to its adjacent control bar.

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

Each sample splice and its associated control bar shall be identified and marked as a set. Each set shall be identified as representing a prejob, production, or job control sample splice.

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

Reinforcing bars, other than hoops, from which sample splices are removed, shall be repaired using ultimate mechanical butt splices conforming to the provisions in "Prejob Test Requirements for Ultimate Butt Splices" specified herein, or the bars shall be replaced in kind. These bars shall be repaired or replaced such that no splices are located in the "No Splice Zone" shown on the plans.

Section 52-1.08E, "Job Control Tests," of the Standard Specifications shall not apply.

The provisions for total slip shall not apply to any ultimate splices that are welded or that are used on hoops.

The independent qualified testing laboratory used to perform the testing of all ultimate butt sample splices and control bars shall not be employed or compensated by any subcontractor, or by other persons or entities hired by subcontractors who will provide other services or materials for the project, and shall have the following:

A. Proper facilities, including a tensile testing machine capable of breaking the largest size of reinforcing bar to be tested.
B. A device for measuring the total slip of the reinforcing bars across the splice to the nearest 0.001 inch, that, when placed parallel to the longitudinal axis of the bar is able to simultaneously measure movement across the splice, at 2 locations, 180 degrees apart.
C. Operators who have received formal training for performing the testing requirements of ASTM Designation: A 370/A 370M and California Test 670.
D. A record of annual calibration of testing equipment performed by an independent third party that has 1) standards that are traceable to the National Institute of Standards and Technology, and 2) a formal reporting procedure, including published test forms.

ULTIMATE BUTT SPLICE TEST CRITERIA

Ultimate prejob, production, and job control sample splices shall be tensile tested in conformance with the requirements described in ASTM Designation: A 370/A 370M and California Test 670.

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

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

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

Testing to determine the minimum tensile strength, in conformance with the provisions in the ninth paragraph of Section 52-1.08, "Splicing," of the Standard Specifications, will not be required.

PREJOB TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES

Prior to use in the work, all ultimate butt splices shall conform to the following prejob test requirements:

A. Eight prejob sample splices for each bar size of each splice type including ultimate mechanical butt splices, ultimate complete joint penetration butt welded splices, and ultimate resistance butt welded splices, that will be used in the work, shall be fabricated by the Contractor. For deformation-dependent types of couplers, 8 sample prejob splices shall also be fabricated for each reinforcing bar size and deformation pattern that will be used in the work.

B. The sample splices shall be fabricated using the same splice materials, position, operators, location, and equipment, and following the same procedures as will be used to make the splices in the work.

C. At the option of the Contractor, operator qualification tests may be performed simultaneously with the preparation of prejob sample splices.

D. If different diameters of hoops are shown on the plans, prejob sample splices, as described above, will only be required for the smallest hoop diameter. In addition, these splices shall be fabricated using the same radius as shown on the plans for these hoops.

E. Unless otherwise directed in writing by the Engineer, 4 prejob sample splices and control bar sets shall be shipped to the Transportation Laboratory and the remaining 4 sets shall be tested by the Contractor's independent qualified testing laboratory.

F. Each group of 4 sets from a prejob test shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 sets will not be tested by the Transportation Laboratory, nor shall they be tested by the independent laboratory.

G. All 8 sample splices from each prejob test shall conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein.

H. Prior to performing any tensile tests on prejob test sample splices, one of the 4 samples shall be tested for, and shall conform to, the provisions for total slip. Should this sample not meet these requirements, one retest, in which the 3 remaining samples are tested for total slip, will be allowed. All 3 of these remaining samples tested shall conform to the aforementioned slip requirements.

I. For each bundle of 4 sets, a Prejob Test Report shall be prepared by the independent testing laboratory performing the testing. The report shall 1) be signed by an engineer who represents the laboratory and is registered as a Civil Engineer in the State of California; 2) include, as a minimum, the following information for each set: contract number, bridge number, bar size, type of splice, length of mechanical splice, physical condition of test sample splice and control bar, any notable defects, limits of affected zone, total measured slip, location of visible necking area, ultimate strength of each splice, ultimate strength and 95 percent of this ultimate strength for each control bar, and a comparison between 95 percent of the ultimate strength of each control bar and the ultimate strength of its associated splice; and 3) be submitted to the QCM for review and approval, and then to the Engineer.

J. Test results for each bundle of 4 sets will be reported in writing to the Contractor within 10 working days after receipt of the bundle by the Transportation Laboratory. In the event that more than one bundle is received on the same day, 2 additional working days shall be allowed for providing test results for each additional bundle received. A test report will be made for each bundle received.

K. Should the Engineer fail to provide the test results within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in providing the test results, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

PRODUCTION TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES

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

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

After all splices in a lot have been completed, the QCM shall notify the Engineer in writing that all couplers in this lot conform to the specifications and are ready for testing. The sample splices will either be selected by the Engineer at the job site or a fabrication facility, provided the facility is located within a 50-mile radius of the jobsite.

At the option of the Contractor, sample splices for reinforcement at 4th Street Retrofit, may be either 1) removed from the completed lot, or 2) prepared in the same manner as specified herein for ultimate prejob sample splices and control bars.

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

The Engineer or the Engineer's authorized representative will be at the independent qualified testing laboratory within a maximum of 5 working days after receiving written notification that the samples are at the laboratory and ready for testing. Should the Engineer or the Engineer's authorized representative fail to be at the laboratory within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

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

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

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

The QCM must review, approve, and forward each Production Test Report to the Engineer for review before any splices represented by the report are encased in concrete. The Engineer shall have 3 working days to review each Production Test Report and respond in writing after a complete report has been received. Should the Contractor elect to encase any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

At the option of the Contractor, any splices at the locations listed below may be encased in concrete prior to having the QCM review, approve, and forward each Production Test Report to the Engineer. Should the Contractor exercise this option, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection.

A. 4th Street Retrofit

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

If 3 or more sample splices from any production test conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be considered acceptable.

Should only 2 sample splices from any production test conform to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, one additional production test shall be performed on the same lot of splices. Should any of the 4 sample splices from this additional test fail to conform to these provisions, all splices in the lot represented by these production tests will be rejected.

If only one sample splice from any production test conforms to the provisions in "Ultimate Butt Splice Test Criteria" specified herein, all splices in the lot represented by this production test will be rejected.

If a production test for any lot fails, the Contractor will be required to repair or replace all reinforcing bars from which sample splices were removed, complete in place, before the Engineer selects any additional splices from this lot for further testing.

Whenever any lot of ultimate butt splices is rejected, additional ultimate butt splices shall not be used in the work until 1) the QCM performs a complete review of the Contractor's quality control process for these splices, 2) a written report is submitted to the Engineer describing the cause of failure for the splices in this lot and provisions for correcting these failures in future lots, and 3) the Engineer has provided the Contractor with written notification that the report is acceptable. The Engineer shall have 3 working days after receipt of the report to provide notification to the Contractor. Should the Engineer not provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of this action, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Production tests will not be required on any repaired splice from a lot, regardless of the type of prequalified ultimate mechanical butt splice used to make the repair.

Should an additional production test be required, the Engineer may select any repaired splice for use in the additional production test.

QUALITY ASSURANCE TEST REQUIREMENTS FOR ULTIMATE BUTT SPLICES

For the first production test performed, and for at least one, randomly selected by the Engineer, of every 5 additional production tests, or portion thereof, performed thereafter, the Contractor shall concurrently prepare 4 additional ultimate job control sample splices along with associated control bars. These ultimate job control samples shall be prepared in the same manner as specified herein for ultimate prejob sample splices and control bars.

Each time 4 additional ultimate job control sample splices are prepared, 2 of these job control sample splice and associated control bar sets and 2 of the production sample splice and associated control bar sets, together, shall conform to the requirements for ultimate production sample splices in "Production Test Requirements for Ultimate Butt Splices" specified herein.

The 2 remaining job control sample splice and associated control bar sets, along with the 2 remaining production sample splice and associated control bar sets shall be shipped, unless otherwise directed in writing by the Engineer, to the Transportation Laboratory for quality assurance testing. The 4 sets shall be securely bundled together and identified by location and contract number with weatherproof markings prior to shipment. Bundles containing fewer than 4 sets will not be tested.

Quality assurance testing will be performed in conformance with the requirements for ultimate production sample splices in "Production Test Requirements for Ultimate Butt Splices" specified herein.

Test results for each bundle of 4 sets will be reported in writing to the Contractor within 3 working days after receipt of the bundle by Transportation Laboratory. In the event that more than one bundle is received on the same day, 2 additional working days shall be allowed for providing test results for each additional bundle received. A test report will be made for each bundle received. Should the Contractor elect to encase any splices prior to receiving notification from the Engineer, it is expressly understood that the Contractor will not be relieved of the Contractor's responsibility for incorporating material in the work that conforms to the requirements of the plans and specifications. Any material not conforming to these requirements will be subject to rejection. Should the Contractor elect to wait to encase any splices pending notification by the Engineer, and should the Engineer fail to complete the review and provide notification within this time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in notification, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

MEASUREMENT AND PAYMENT.--Measurement and payment for reinforcement in structures shall conform to the provisions in Sections 52-1.10, "Measurement," and 52-1.11, "Payment," of the Standard Specifications and these special provisions.

Full compensation for conforming to the provisions of "Ultimate Butt Splices," of these special provisions shall be considered as included in the contract prices paid for the various contract items of work involved and no additional compensation will be allowed therefor.

10-1.87 HEADED BAR REINFORCEMENT

Headed bar reinforcement, consisting of furnishing and friction welding or integrally forging heads onto one or both ends of bar reinforcement, shall conform to the requirements in ASTM Designation: A 970/A 970M including appendixes, the provisions of Section 52, "Reinforcement," of the Standard Specifications, the details shown on the plans, and these special provisions.

Welded headed bar reinforcement shown on the plans shall conform to the provisions for headed bar reinforcement as specified herein.

GENERAL

Prior to performing any 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; and
F. A system for marking headed bar reinforcement.

Quality Control is the responsibility of the Contractor. As a minimum, the Contractor shall perform inspection and testing prior to, during, and after welding or forging, 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 kept 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, welding or forging records, including tracking and production parameters for welds or forgings, and results of all tests performed.

A production lot of friction welded or integrally forged 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, produced from bar material of a single heat number and head material of a single heat number. A new production lot shall be started if the heat number of either the bar material or the head material changes before the maximum production lot size of 150 is reached.

The daily production log shall be submitted in writing to the Engineer within 7 days following the manufacture of any headed bar reinforcement.

The manufacturer shall furnish Certificates of Compliance accompanied by a copy of the mill test report 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 job site.

Forging of heads or integrally forged headed bar reinforcement shall conform to the requirements in ASTM Designation: A 788.

Welding, welder qualifications, and inspection of welding shall conform to the requirements for friction welding in ANSI/AWS C6.1.

Welding or forging shall be performed at an established and permanent fabrication facility.

Equipment used to perform friction welding shall be fitted with an effective in-process monitoring system to record essential production parameters that describe the process of welding the head onto the bar reinforcement. As a minimum, the parameters to be recorded shall include friction welding force, forge force, rotational speed, friction upset distance and time, forge upset distance and time, and other elements of the production process. The data from this in-process monitoring shall be recorded and preserved by the manufacturer for a minimum of one year after manufacture of the friction welded headed bars and shall be provided to the Engineer upon request.

Epoxy-coated headed bar reinforcement shall conform to the provisions in Section 52-1.02B, "Epoxy-coated Reinforcement," of the Standard Specifications and these special provisions.

All edges on epoxy-coated heads shall be rounded. Sharp edges and burrs shall be ground smooth before applying epoxy coating.

The Contractor may submit a request to the Engineer in writing, to use alternative head dimensions which are different from those specified in Table 1 of the ASTM Designation: A 970/A 970M. The alternative head dimensions shall be designed using the concrete compressive strength shown on the plans and shall be in conformance with these special provisions. Alternative head dimensions will not be considered for approval unless the Contractor can prove that the alternative heads have been successfully produced and have had at least 2 years of satisfactory service in conditions similar to this application. The Contractor shall furnish, at the Contractor's expense, documentation satisfactory to the Engineer that the alternative head dimensions are suitable for the intended application. The documentation shall include, but not be limited to, calculations and test reports showing the following:

A. The alternative head is capable of resisting the nominal tensile strength of the reinforcing bar when the bar reinforcement with the welded or forged head is embedded in concrete; and
B. Shear or bending forces do not cause premature failure of the alternative head or crushing failure of the concrete under the alternative head.

ACCEPTANCE TESTS

Acceptance tests shall be performed at the Contractor's expense, at the manufacturer's plant or at a qualified laboratory with traceability to the National Institute of Standards and Technology (NIST), and in the presence of the Engineer, unless otherwise directed in writing.

Test samples shall be randomly selected by the Engineer from each production lot of friction welded or integrally forged headed bar reinforcement, which is ready for shipment to the job site. The Engineer shall be notified in writing at least 7 days prior to conducting any tests.

A minimum of 3 samples of friction welded or integrally forged headed bar reinforcement from each production lot shall be tested. One tensile test shall be conducted on each sample.

Tensile tests shall conform to the requirements specified in Section 7 of ASTM Designation: A 970/A 970M, except that at rupture, there shall be visible signs of necking in the reinforcing bar at a minimum distance of one bar diameter away from the head to bar connection. 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 friction welded or integrally forged headed bar reinforcement represented by the tests will be rejected in conformance with the provisions in Section 6-1.04, "Defective Materials," of the Standard Specifications.

All headed bar reinforcement of each bar size from each production lot to be shipped to the site shall be tagged in a manner that each production lot can be accurately identified at the job site. All unidentified headed bar reinforcement received at the job site will be rejected.

MEASUREMENT AND PAYMENT

Quantities of headed bar reinforcement will be measured as units determined from the number of friction welded or integrally forged 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 heads and friction welding or integrally forging heads onto bar reinforcement, including conformance with 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 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.

Full compensation for placing the completed headed bar reinforcement into the work shall be considered as included in the contract price paid per pound for the bar reinforcement involved and no additional compensation will be allowed therefor.

10-1.88 SHOTCRETE

Shotcrete shall conform to the provisions in Section 51, "Concrete Structures," and Section 53, "Shotcrete," of the Standard Specifications and these special provisions.

Shotcrete operations shall completely encase all reinforcement and other obstructions shown on the plans. Exceptional care shall be taken to properly encase the reinforcement and other obstructions with shotcrete.

Attention is directed to the section, "Order of Work," in these special provisions regarding furnishing preconstruction shotcrete test panels.

Shotcrete shall be applied by the wet-mix process only.

Shotcrete shall have a minimum compressive strength of 3250 psi at 28 days or as shown on the plans, whichever is greater. No shotcrete work shall be performed prior to verification by the Engineer of the required compressive strength.

Splicing of reinforcing bars No. 7 or larger in shotcrete shall be by butt splicing only.

The Contractor shall be responsible for obtaining and testing all required preconstruction and production test cores. All coring and testing shall be at the Contractor's expense and performed in the presence of the Engineer, unless otherwise directed. The Engineer shall be notified a minimum of 24 hours prior to the Contractor performing any coring or testing operations.

All cores shall be obtained and tested for compressive strength in conformance with the requirements in ASTM Designation: C 42. Cores used for determining compressive strength shall not contain any bar reinforcement or other obstructions. The testing shall be performed at an independent testing facility approved by the Engineer. A copy of the test results shall be furnished to the Engineer within 5 days following completion of testing.

All test panels shall become the property of the Contractor and shall be disposed of in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

PRECONSTRUCTION REQUIREMENTS

Prior to performing shotcrete work, the Contractor shall construct at least 2 preconstruction shotcrete test panels for each mixture being considered unless otherwise specified.

The nozzleperson shall have a minimum of 3000 hours experience as a nozzleperson on projects with a similar application.

At least 10 working days prior to constructing any shotcrete test panels, the Contractor shall submit to the Engineer for approval, a Quality Control Plan (QCP) for the proposed method of shotcrete placement. The plan shall include the following:

A. The number and qualifications of nozzlepersons available to place shotcrete, the number of nozzlepersons on-site at any time during the shotcrete placement, description of their work schedule, and the procedures for avoiding fatigue of any nozzleperson.
B. The proposed method of placing shotcrete, including, but not limited to, application rates, details of any proposed construction joints and their locations, and methods for achieving the required thickness and surface finish.
C. The procedure for curing shotcrete surfaces.
D. The description of a debris containment system, to be used during the cleaning of bar reinforcing steel and concrete and placing of shotcrete, as required to provide for public safety.

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

Preconstruction shotcrete test panels shall be constructed by the nozzlepersons and application crew scheduled to do the work, using equipment, materials, mixing proportions, ambient temperatures and procedures proposed for the work. The preconstruction shotcrete test panels shall conform to the following:

A. One shotcrete test panel, of the size determined by the Contractor, shall be unreinforced and shall have 3 cores taken from it and tested for compressive strength. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. The test panel shall be identified and submitted to the Engineer with the test results including a description of the mixture, proportions, and ambient temperature.
B. One shotcrete test panel shall have the same (1) thickness, (2) bar size and amount of bar reinforcement or other obstructions and (3) positioning of bar reinforcement or obstructions as the most heavily reinforced section of shotcrete to be placed. The test panel shall be square with the length of the sides equal to at least 3 times the thickness of the most heavily reinforced section of shotcrete to be placed, but not less than 30 inches. After a minimum 7 days of cure, the test panel shall be broken by the Contractor, in the presence of the Engineer, into pieces no larger than ten inches in greatest dimension. The surfaces of the broken pieces shall be dense and free of laminations and sand pockets, and shall verify that the bar reinforcement or other obstructions are completely encased.
C. Both test panels shall be cured under conditions similar to the actual work.
D. At the option of the Contractor, cores to be used for determining the compressive strength may be taken from the reinforced test panel described above in lieu of making a separate unreinforced test panel as described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring or contains bar reinforcement or other obstructions, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores. If cores are taken from the reinforced test panel, the panel shall not be broken into pieces, as described above, until it has cured for a minimum of 14 days.

The requirements for constructing preconstruction shotcrete test panels may be eliminated, when approved by the Engineer, if a test panel report and certified compressive strength test data are furnished from a State highway project with a similar application of approximately equal thickness, including similar amounts and placement of reinforcement or other obstructions. The nozzle person, proposed to be used, shall have constructed the test panel described in the test panel report. The test panel report shall list the names of the application crew, equipment used, materials, mixing proportions, ambient temperatures and procedures used to make the test panels. The certified compressive strength test data shall be for cores taken from the same test panels.

PLACING

An air blowpipe shall be used during shotcrete placement to remove rebound, overspray and other debris from the areas to receive shotcrete.

Construction joints shall be tapered, and shall conform to the provisions in Sections 51-1.13, "Bonding," of the Standard Specifications.

All overspray and rebound shall be removed prior to final set and before placement of shotcrete on adjacent surfaces.

Rebound or any other material which has already exited the nozzle shall not be reused.

Shotcrete shall be cured in conformance with the provisions of Section 90-7.03, "Curing Structures," of the Standard Specifications.

When a finish coat is to be used, all loose, uneven or excess material, glaze, and rebound shall be removed by brooming, scraping, or other means and the surface left scarified. Any surface deposits which take a final set shall be removed by abrasive blasting. Prior to placing the finish coat, the receiving surface shall be washed down with an air-water blast.

Shotcrete extending into the space shown on the plans for cast-in-place concrete shall be removed.

TESTING AND ACCEPTANCE

At least 3 production shotcrete test cores shall be taken from each 300 square feet or portion thereof of shotcrete placed each day. The cores shall be 3 inches in diameter. The location where cores are to be taken will be designated by the Engineer. Test cores shall be identified by the Contractor and a description of the core location and mixture, including proportions, shall be submitted to the Engineer with the test cores, immediately after coring. Cored holes shall be filled with mortar in conformance with the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Upon receipt of the cores, the Engineer will perform a visual examination to determine acceptance, as described below. Within 48 hours after receipt, the Engineer will return the cores to the Contractor for compressive strength testing.

The compressive strength test shall be performed using the shotcrete production test cores described above. The compressive strength shall be the average strength of the 3 cores, except that, if any core should show evidence of improper coring, the core shall be discarded and the compressive strength shall be the average strength of the remaining cores.

The basis of acceptance for production shotcrete test cores shall be (1) that the core is dense and free of laminations and sand pockets, and shows that the reinforcement or other obstructions are completely encased and (2) the same as specified for test cylinders in the fourth and fifth paragraphs of Section 90-9.01, "General," of the Standard Specifications.

If any production test core shows signs of defective shotcrete as described in (1) above, the shotcrete represented by such test core will be rejected, unless the Contractor, at the Contractor's expense, obtains and submits evidence acceptable to the Engineer that the strength and quality of the shotcrete placed in the work are acceptable.

The surface finish of the shotcrete shall conform to the provisions of Section 51-1.18, "Surface Finishes," of the Standard Specifications.

MEASUREMENT AND PAYMENT

Full compensation for the Quality Control Plan, constructing and breaking test panels, furnishing and testing cores and patching cored holes shall be considered as included in the contract price paid per cubic yard for shotcrete and no additional compensation will be allowed therefor.

10-1.89 WATERPROOFING

Waterproofing shall conform to the provisions in Section 54, "Waterproofing," of the Standard Specifications and these special provisions.

Membrane waterproofing shall be applied to the painted undercoat of steel column casings in the same manner provided for waterproofing concrete surfaces.

The exposed surfaces of the membrane waterproofing applied to steel column casings shall be of uniform height above ground without unsightly bulges, depressions or other imperfections.

At the option of the Contractor, a preformed membrane waterproofing system may be furnished and applied in lieu of the asphalt membrane waterproofing specified above. Preformed membrane waterproofing shall conform to these special provisions.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be furnished for the preformed membrane sheet. The Certificate of Compliance shall include the following information: (1) type of preformed membrane sheet, and (2) the conditioner or primer application rates.

The preformed membrane waterproofing system shall consist of an adhesive, conditioner or primer applied to a prepared surface; a preformed membrane sheet of rubberized asphalt or polymer modified bitumen; mastic or tape for sealing the edges of the sheet; and a protective covering over the sheet held by an adhesive.

The preformed membrane sheet shall be either permanently applied to a polyethylene film or reinforced with a polypropylene mesh fabric, polyester/polypropylene fabric or a fiberglass mesh fabric. The membrane sheet shall conform to the following requirements:

Property	Test	Requirement	
		Polyethylene Film	Fabric Reinforced
Tensile Strength (Minimum)(1)	ASTM D 882 (2)	20 lbs/in. (3)	20 lbs/in (3)
Percent Elongation at break (Minimum) (4)	ASTM D 882 (2)	150 percent (3)	25 percent (3)
Pliability	ASTM D 146 (5)	No cracks	No cracks
Thickness (Minimum) (6)	------	60 mils 1.5 mm	60 mils
Rubberized Asphalt Softening Point (Minimum)	AASHTO T 53	165° F.	165° F.
Polymer Modified Bitumen Softening Point (Minimum)	AASHTO T 53	210° F.	210° F.

Notes:
(1) Breaking factor in machine direction.
(2) Method A, average 5 samples.
(3) At 73.4° F. ± 3.6° F.
(4) Machine direction.
(5) 180-degree bend over a one-inch mandrel at 10° F
(6) Total thickness of preformed membrane sheet and polyethylene film or fabric reinforcement.

Adhesives, conditioners, primers, mastics and sealing tapes shall be manufactured for use with the respective preformed membrane sheet materials and shall be applied according to the manufacturer's recommendations.

The protective covering shall be 1/8 inch minimum thickness hardboard or other material that furnishes equivalent protection. Backfill material and equipment shall not cut, scratch, depress or cause any other damage to the preformed membrane.

Surfaces designated to receive preformed membrane waterproofing shall be thoroughly cleaned of dirt, dust, loose or unsound concrete, and other extraneous material and shall be free from fins, sharp edges, and protrusions that would, in the opinion of the Engineer, puncture or otherwise damage the membrane. Sharp corners to be covered shall be rounded (outside) or chamfered (inside).

Surfaces shall be dry when components of the preformed membrane waterproofing system are applied.

Preformed membrane waterproofing shall not be applied to any surface until the Contractor is prepared to follow its application with the placing of the protective covering and backfill within a sufficiently short time that the membrane will not be damaged by workers or equipment, exposure to weathering, or from any other cause. Damaged membrane or protective covering shall be repaired or replaced by the Contractor at the Contractor's expense.

All projecting pipe, conduits, sleeves or other facilities passing through the preformed membrane waterproofing shall be flashed with prefabricated or field-fabricated boots, fitted coverings or other devices as necessary to provide watertight construction.

All conditioner or primers shall be thoroughly mixed and continuously agitated during application. Conditioner, primers or adhesive shall be allowed to dry to a tack free condition prior to placing membrane sheets.

The surfaces shall be recoated if membrane sheets are not placed over primer, conditioner or adhesive within the time recommended by the manufacturer.

The preformed membrane sheet shall not be applied in wet or foggy weather, nor when the ambient temperature is below 40° F.

Preformed membrane material shall be placed starting at the bottom and lapped by a minimum of 6 inches at splices and at repairs to holes or tears.

Exposed edges of membrane sheets shall have a trowelled bead of manufacturer's recommended mastic or sealing tape applied after the membrane is placed.

The surface of the preformed membrane shall be cleaned free of dirt and other deleterious material before the protective covering is placed.

The protective covering shall be placed on a coating of adhesive of a type recommended by the manufacturer. The adhesive shall be applied at a rate sufficient to hold the protective covering in position until the backfill is placed.

Preformed membrane waterproofing will be measured and paid for by the square foot as asphalt membrane waterproofing.

10-1.90 STEEL STRUCTURES

Construction of steel structures shall conform to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Metal not otherwise specified shall conform to the provisions for steel structures as specified herein.

GENERAL

Direct tension indicators shall be installed where shown on the plans.

The Contractor shall submit a grouting procedure plan for the grouting of bearing pads at the steel corbels. The grouting procedure plan shall include the proposed materials and methods to achieve full bearing between the bearing plate and the concrete bearing surface. The grouting procedure plan shall be submitted for review and approval as part of the structural steel working drawing submittal.

Attention is directed to "Welding Quality Control" of these special provisions.

The first paragraph in Section 55-1.02, "Drawings," of the Standard Specifications is amended to read:

55-1.02 Drawings.—The Contractor shall submit working drawings for structural steel to the Office of Structure Design, Documents Unit, P.O. Box 942874, Mail Stop 9, Sacramento, California 94274-0001 (1801 30th Street, Sacramento, CA 95816), telephone (916) 227-8230, for approval in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings." For initial review, 6 sets of the drawings shall be submitted for highway bridges and 10 sets shall be submitted for railroad bridges. After review, between 6 and 12 sets, as requested by the Engineer, shall be submitted to the Office for final approval and for use during construction.

Paragraphs 7 through 9 of Section 55-1.02, "Drawings," of the Standard Specifications are amended to read:

At the completion of each structure on the contract, one set of reduced prints on 20 pound (minimum) bond paper, 11 inches by 17 inches in size, of the corrected original tracings of working drawings for each structure shall be furnished to the Engineer. Reduced prints that are common to more than one structure shall be submitted for each structure. An index prepared specifically for the drawings for each structure containing sheet numbers and titles shall be included on the first reduced print in the set for each structure. Reduced prints for each structure shall be arranged in the order of drawing numbers shown in the index.

The edge of the corrected original tracing image shall be clearly visible and visually parallel with the edges of the page. A clear, legible symbol shall be provided on the upper left side of each page to show the amount of reduction and a horizontal and vertical scale shall be provided on each reduced print to facilitate enlargement to original scale.

For railroad bridges, in addition to the reduced prints of the working drawings, the Contractor shall furnish to the Engineer one set of working drawings consisting of either ink tracings on cloth, ink tracings on polyester base drafting film, silver sensitized cloth duplicate tracings, or silver sensitized polyester based reproduction films with matte surface on both sides.

Additional certified test reports for fastener assemblies will be required as specified in "Fabrication" of this specification.

MATERIALS

The first paragraph, including the material table, in Section 55-2.01, "Description," of the Standard Specifications is amended to read:

55-2.01 Description.—The various materials shall conform to the specifications of ASTM as listed in the following tabulation with certain modifications and additions as specified:

MATERIAL	SPECIFICATION
Structural steel	ASTM Designation: A 709/A 709M, Grade 36 [250] or A 36/A 36M[(a)]
High strength low alloy columbium vanadium steel	ASTM Designation: A 709/A 709M, Grade 50 [345] or A 572/A 572M, Grade 50 [345][(a)]
High strength low alloy structural steel	ASTM Designation: A 709/A 709M, Grade 50W [345 W] or A 588/A 588M[(a)]
High-yield strength, quenched and tempered alloy steel plate suitable for welding	ASTM Designation: A 709/A 709M, Grade 100 [690] and Grade 100W [690W] or A 514/A 514M[(a)]
Steel fastener components for general applications:	
Bolts and studs	ASTM Designation: A 307
Headed anchor bolts	ASTM Designation: A 307, Grade B, including S1 supplementary requirements
Nonheaded anchor bolts	ASTM Designation: A 307, Grade C, including S1 supplementary requirements and S1.6 of AASHTO Designation: M 314 supplementary requirements or AASHTO Designation: M 314, Grade 36 or 55, including S1 supplementary requirements
High-strength bolts and studs which include threaded rods and high-strength nonheaded anchor bolts	ASTM Designation: A 449, Type 1
Nuts	ASTM Designation: A 563, including Appendix X1[(b)]
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[(b)]
Hardened washers	ASTM Designation: F 436, Type 1, Circular, including S1 supplementary requirements
Direct tension indicators	ASTM Designation: F 959, Type 325, zinc-coated

Carbon steel for forgings, pins and rollers	ASTM Designation: A 668/A 668M, Class D
Alloy steel for forgings	ASTM Designation: A 668/A 668M, Class G
Pin nuts	ASTM Designation: A 36/A 36M
Carbon-steel castings	ASTM Designation: A 27/A 27M, Grade 65-35 [450-240], Class 1
Malleable iron castings	ASTM Designation: A 47, Grade 32510 or A 47M, Grade 22010
Gray iron castings	ASTM Designation: A 48, Class 30B
Carbon steel structural tubing	ASTM Designation: A 500, Grade B or A 501
Steel pipe (Hydrostatic testing will not apply)	ASTM Designation: A 53, Type E or S, Grade B; A 106, Grade B; or A 139, Grade B
Stud connectors	ASTM Designation: A 108 and ANSI/AASHTO/AWS D1.5
(a) Grades that may be substituted for the equivalent ASTM Designation: A 709 steel, at the Contractor's option, subject to the modifications and additions specified and to the requirements of A 709. (b) All zinc-coated nuts that will be tightened beyond snug or wrench tight shall be furnished with a dry lubricant conforming to Supplementary Requirement S2 in ASTM Designation: A 563.	

The second paragraph in Section 55-2.01, "Description," of the Standard Specifications is deleted.
The fifth paragraph in Section 55-2.01, "Description," of the Standard Specifications is amended to read:

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

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

55-2.02 Structural Steel.—Unless otherwise specified or shown on the plans, structural steel plates, shapes and bars shall conform to ASTM Designation: A 709/A 709M, Grade 36.

High Strength fastener assemblies, and other bolts attached to structural steel with nuts and washers shall be zinc-coated. When direct tension indicators (DTI's) are used in these assemblies, the DTI and components of the fastener assemblies shall be zinc-coated by the mechanically deposited process.

Rotational capacity tests prior to shipment to the job site shall be performed as specified in "Fabrication" of these special provisions.

FABRICATION

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

55-3.05 Flatness of Faying and Bearing Surfaces.—Surfaces of bearing and base plates and other metal bearing surfaces that are to come in contact with each other or with ground concrete surfaces or with asbestos sheet packing shall be flat to within $^{1}/_{32}$ inch tolerance in 12 inches and to within $^{1}/_{16}$ inch tolerance overall. Surfaces of bearing and base plates and other metal bearing surfaces that are to come in contact with preformed fabric pads, elastomeric bearing pads or portland cement mortar shall be flat to within $^{1}/_{8}$ inch tolerance in 12 inches and to within $^{3}/_{16}$ inch tolerance overall.

Paragraphs 1 through 5, excluding Section 55-3.14A, of Section 55-3.14, "Bolted Connections," of the Standard Specifications are amended to read:

55-3.14 Bolted Connections.—Bolted connections in structural steel joints, unless otherwise shown on the plans or specified in the special provisions, shall be made with high-strength steel fastener assemblies. These fastener assemblies shall consist of either 1) a high-strength steel bolt, nut and hardened washer , or 2) a tension control bolt, nut and hardened washer. A direct tension indicator (DTI) may be used with the high-strength bolt, nut and hardened washer assembly.

When threaded studs are shown on the plans to be used in high-strength fastener assemblies, these assemblies shall conform to the requirements specified herein for high-strength fastener assemblies.

Bolted connections using fastener assemblies shall conform to the requirements in "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts," approved by the Research Council on Structural Connections of the Engineering Foundation (RCSC Specification), and these specifications.

When reference is made to the RCSC Specification, the "Allowable Stress Design" version shall be used when allowable stress design is shown on the plans and the "Load and Resistance Factor Design" version shall be used when load factor design or load and resistance factor design is shown on the plans.

All connections made with fastener assemblies shall be tensioned as a slip critical connections, whether classified as a slip critical or bearing type connections, unless otherwise designated on the plans.

The hardened washer shall be installed under the nut or bolt head, whichever is the element turned in tightening. Nuts shall be located, wherever practicable, on the side of the member that will not be visible from the traveled way. Nuts for bolts that will be partially embedded in concrete shall be located on the side of the member that will be encased in concrete.

When the bolt head is used as the turned element, all tension testing and tension verification, including determining job inspecting torque, shall be performed by turning the bolt head.

Each length and diameter of fastener assemblies used in any one joint of a high strength bolted connection shall be from the same rotational capacity lot. The Contractor shall keep a record of which rotational capacity lots are used in each joint.

The Contractor shall provide, calibrate and maintain equipment and tools necessary for the preliminary testing, installation and inspection of fasteners.

Bolt tension measuring devices and calibrated wrenches shall be calibrated within one year prior to first being used on the job, and a minimum of once each year thereafter. This calibration shall be done by a qualified independent laboratory or authorized warranty repair and calibration center recognized by the tool manufacturer. Bolt tension measuring devices shall be calibrated, to within one percent of the actual tension value, with a minimum of 4 verification readings evenly spaced over a range of 20 to 80 percent of full scale. Calibrated wrenches shall be calibrated to within 2 percent of the actual torque value, with a minimum of 4 verification readings evenly spaced over a range of 20 to 100 percent of full scale. Test equipment used for certification and calibration standards shall be traceable to the National Institute of Standards and Technology.

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.

Prior to the use of bolt tension measuring devices or calibrated wrenches, the Contractor shall furnish to the Engineer certificates of calibration with plots of verification readings for each device or wrench.

In addition to the submittals required in Section 55-1.03, "Inspection," the Contractor shall furnish certified test reports of tests on fastener components and fastener assemblies performed prior to shipment to the job-site. Certified test reports for fastener components and fastener assemblies shall be furnished to the Engineer prior to use of the fastener assembly. The certified test reports shall include the rotational capacity lot numbers for fastener assemblies supplied and all test reports specified in the "Certification," "Report," "Number of Tests and Retests," and "Certification and Test Report" sections in the appropriate ASTM specifications for the fastener components. For ASTM Designation: A307, Grade B or Grade C anchor bolts, the chemical composition and calculated carbon equivalent of each heat of steel shall be furnished.

All bolted connection surfaces shall be prepared before assembly in conformance with the requirements in the special provisions.

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

55-3.14B Surface Preparation.—Contact surfaces of high-strength bolted connections shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel in the special provisions.

55-3.14B Installation.—If any components of fastener assemblies are furnished with water soluble lubricants, fastener installation will not be permitted when surface moisture is present at a high-strength bolted connection. If fastener assemblies are furnished with other than water soluble lubricants, the Engineer may require the Contractor to perform additional fastener testing if any fastener work or testing is performed when surface moisture is present.

Manual torque wrenches shall have either a dial gage or digital read out. Any electric, pneumatic or hydraulic calibrated wrench used to tension fasteners shall have an adjustable control unit that can be set to positively shut off at the desired torque.

Wrenches used for snugging tension control bolts in a connection prior to final tensioning shall not apply torsion to the splined end of the bolt.

The threaded ends of fastener assemblies projecting past the outer face of the nut (thread stickout), where first full formed threads are present, shall be at least flush with, but not extend more than 1/4-inch beyond, the outer face of the nut. A maximum of one additional hardened washer, in addition to the single washer required under the turned element, may be installed under the non-turning element of the fastener assembly. The thread stickout of studs, rods and anchor bolts, shall be at least 1/8-inch and there shall be a minimum of 3 full threads located within the grip of the connection. In addition a minimum of 3 full threads shall be located between the bearing surfaces of the bolt head and nut. The total stickout shall not be excessive.

Larger bolts, having diameters up to 1/4-inch greater than the diameter of the bolt shown on the plans, may be used if approved by the Engineer provided that spacing and edge distance requirements for the larger bolt are met and the net section is adequate.

When direct tension indicators are used, one DTI shall be installed under each bolt head with the DTI protrusions contacting the bearing surface of the bolt head. To tension the bolt, the bolt head shall be held stationary and the nut turned. Unless otherwise specified, manufacturer's installation procedures shall be followed. Each bolt shall be tensioned in at least 2 tightening stages until at least 50percent of the gaps on each DTI are greater than zero and less than 0.005 inch. Complete crushing of DTI protrusions (0 gaps) on any given DTI and will be cause for rejection.

The same head orientation shall be used within any one high-strength bolted connection.

55-3.14C Rotational Capacity Testing Prior to Shipment to Job Site.—Rotational capacity tests on fastener assemblies shall be performed as specified in the special provisions.

55-3.14D Installation Tension Testing and Rotational Capacity Testing After Arrival to Job Site.—Installation tension tests and rotational capacity tests on fastener assemblies shall be performed as specified in the special provisions.

55-3.14E Tension Verification of Fastener Assemblies.—Minimum fastener tension in all completed high-strength bolted connections shall be verified.

For each type of fastener assembly, at least 10 percent, but no fewer than 2 assemblies used in each high-strength bolted connection shall be checked for minimum tension, by the Contractor, in conformance with the procedure described in Section 9(b), "Arbitration Inspection," of the RCSC Specification. For determining the job inspecting torque for short bolts, the procedure described in steps 1 through 9 of the "Arbitration of Disputes, Inspection Torque Method-Short Bolts," section of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated shall replace Section 9(b)(2) of the RCSC Specification. A separate inspecting torque shall be determined and used for each different rotational capacity lot of fasteners.

The verification for minimum tension shall be performed 1) no longer than 48 hours after all fasteners in the connection have been tensioned, 2) on fastener assemblies selected by the Engineer, 3) in the presence of the Engineer, and 4) in such a manner that the Engineer can read the torque wrench gage or access the DTI gaps during inspection.

Rotational Capacity Testing Prior to Shipment to Job Site

Rotational capacity tests shall be performed on all lots of high-strength fastener assemblies prior to shipment of these lots to the job site. Zinc-coated assemblies shall be tested after all fabrication, coating and lubrication of components have been completed. One hardened washer shall be used under each nut for the tests.

Each combination of bolt production lot, nut lot and washer lot shall be tested as an assembly.

A rotational capacity lot number shall be assigned to each combination of lots tested. Each shipping unit of fastener assemblies shall be plainly marked with the rotational capacity lot number.

Two fastener assemblies from each rotational capacity lot shall be tested.

The following equipment, procedure and acceptance criteria shall be used to perform rotational capacity tests on, and determine acceptance of long bolts. Fasteners are considered to be long bolts when full nut thread engagement can be achieved when installed in a bolt tension measuring device.

Long Bolt Test Equipment:

1. Calibrated bolt tension measuring device with adequate tension capacity for the bolts being tested.
2. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of this 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 of ASTM Designation: F436.
4. Steel beam or member, such as a girder flange or cross frame, to which the bolt tension measuring device will be attached. The device must be accessible from the ground.

Long Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Insert the bolt into the bolt tension measuring device and install the required number of washers, and any additional spacers as needed, directly beneath the nut to produce the thread stickout measured in Step 2.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug tension shall not be less than the Table A value but may exceed the Table A value by a maximum of 2 kips.

Table A

High-Strength Fastener Assembly Tension Values to Approximate Snug-Tight Condition	
Bolt Diameter (inch)	Snug Tension (kips)
1/2	1
5/8	2
3/4	3
7/8	4
1	5
1 1/8	6
1 1/4	7
1 3/8	9
1 1/2	10

5. Match-mark the assembly by 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[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 material within grip of the bolt is steel. (c) When bolt lengths exceed 12 diameters, the required rotation shall be determined by actual tests in a suitable tension device simulating the actual conditions.	

6. Turn the nut to achieve the applicable minimum bolt tension value listed in Table C. After reaching this tension, record the moving torque, in foot-pounds, required to turn the nut, and also record the corresponding bolt tension value in pounds. Torque shall be measured with the nut in motion. Calculate the value, T (in ft-lbs), where T=[(the measured tension in pounds) x (the bolt diameter in inches) / 48 in/ft].

Table C

Minimum Tension Values for High –Strength Fastener Assemblies	
Bolt Diameter (inch)	Minimum Tension (kips)
1/2	12
5/8	19
3/4	28
7/8	39
1	51
1 1/8	56
1 1/4	71
1 3/8	85
1 1/2	103

7. Turn the nut further to increase bolt tension until the rotation listed in Table B is reached. The rotation is measured from the heavy reference line made on the face plate after the bolt was snug-tight. Record this bolt tension.

8. Loosen and remove the nut and examine the threads on both the nut and bolt.

Long Bolt Acceptance Criteria:

An assembly shall pass the following requirements to be acceptable: 1) the measured moving torque (Step 6) shall be less than or equal to the calculated value, T (Step 6), 2) the bolt tension measured in Step 7 shall be greater than or equal to the applicable turn test tension value listed in Table D, 3) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been

achieved, 4) the bolt does not shear from torsion or fail during the test and 5) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head is expected and will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Table D

Turn Test Tension Values	
Bolt Diameter (inch)	Turn Test Tension (kips)
1/2	14
5/8	22
3/4	32
7/8	45
1	59
1 1/8	64
1 1/4	82
1 3/8	98
1 1/2	118

The following equipment, procedure and acceptance criteria shall be used to perform rotational capacity tests on and determine acceptance of short bolts. Fasteners are considered to be short bolts are when full nut thread engagement cannot be achieved when installed in a bolt tension measuring device.

Short Bolt Test Equipment:

1. Calibrated dial or digital torque wrench. Other suitable tools will be required for performing Steps 7 and 8 of this 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 of ASTM Designation: F436.
4. Steel plate or girder with a hole to install bolt. The hole size shall be 1/16 inch greater than the nominal diameter of the bolt to be tested. The grip length, including any plates, washers, and additional spacers as needed, shall provide the proper number of threads within the grip, as required in Step 2 below.

Short Bolt Test Procedure:

1. Measure the bolt length. The bolt length is defined as the distance from the end of the threaded portion of the shank to the underside of the bolt head.
2. Install the nut on the bolt so that 3 to 5 full threads of the bolt are located between the bearing face of the nut and the underside of the bolt head. Measure and record the thread stickout of the bolt. Thread stickout is determined by measuring the distance from the outer face of the nut to the end of the threaded portion of the shank.
3. Install the bolt into a hole on the plate or girder and install the required number of washers, and additional spacers as needed, between the bearing face of the nut and the underside of the bolt head to produce the thread stickout measured in Step 2.
4. Tighten the nut using a hand wrench to a snug-tight condition. The snug condition shall be the full manual effort applied to the end of a 12-inch long wrench. This applied torque shall not exceed 20% of the maximum allowable torque in Table E.

Table E

Maximum Allowable Torque for High-Strength Fastener Assemblies	
Bolt Diameter (inch)	Torque (ft-lbs)
1/2	145
5/8	285
3/4	500
7/8	820
1	1220
1 1/8	1500
1 1/4	2130
1 3/8	2800
1 1/2	3700

5. Match-mark the assembly by placing 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 must 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 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.

Short Bolt Acceptance Criteria:

An assembly shall pass all of the following requirements to be acceptable: 1) the measured moving torque from Step 6 shall be less than or equal to the maximum allowable torque from Table E, 2) the nut shall be able to be removed from the bolt without signs of thread stripping or galling after the required rotation in Step 7 has been achieved, 3) the bolt does not shear from torsion or fail during the test and 4) the assembly does not seize before the final rotation in Step 7 is reached. Elongation of the bolt in the threaded region between the bearing face of the nut and the underside of the bolt head will not be considered a failure. Both fastener assemblies tested from one rotational capacity lot shall pass for the rotational capacity lot to be acceptable.

Installation Tension Testing and Rotational Capacity Testing After Arrival to Job Site.—Installation tension tests and rotational capacity tests on high strength fastener assemblies shall be performed by the Contractor prior to acceptance or installation, and after arrival of the fastener assemblies on the job-site. The installation tension tests and rotational capacity tests shall be performed at the job-site, in the presence of the Engineer, on each rotational capacity lot of fastener assemblies.

Installation tension tests shall be performed on 3 representative fastener assemblies in conformance with Section 8, "Installation and Tightening," of the RCSC Specification. For short bolts, Section 8(d), "Joint Assembly and Tightening of Slip-Critical and Direct Tension Connections," of the RCSC Specification shall be replaced by the "Pre-Installation Testing Procedures," of the "Structural Bolting Handbook," published by the Steel Structures Technology Center, Incorporated.

The rotational capacity tests shall be performed in conformance with the procedures 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 shipment to the jobsite, 2) fasteners are improperly handled, stored, or subjected to inclement weather prior to final tightening, 3) significant changes are noted in original surface condition of threads, washers or nut lubricant, or 4) the Contractor's required inspection is not performed within 48 hours after all fasteners in a joint have been tensioned.

Failure of a job-site installation tension test or a rotational capacity test will be cause for rejection of unused fasteners which are part of the rotational capacity lot.

When DTIs are used, installation verification tests shall be performed in conformance with appendix section X1.4 of ASTM Designation: F959, except that bolts shall be initially tensioned to a value 5 percent greater than the minimum required bolt tension

Surface Preparation

For all bolted connections, the 1) contact surfaces, 2) surfaces of outside existing members within the grip under bolt heads, nuts and washers and 3) inside surfaces of bolt holes shall be cleaned and coated before assembly in conformance with the provisions for cleaning and painting structural steel of these special provisions.

Sealing

The perimeter around all DTI gaps shall be completely sealed with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II. The sealant shall be gray in color and have a minimum thickness of 1.3 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

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

In addition to the nondestructive testing requirements in ANSI/AASHTO/AWS D1.5, 25 percent of all main member tension groove welds, in material in excess of 1/2 inch thickness, shall be ultrasonically tested.

The flat side of all butt welded joints shall not deviate from flatness by more than 3/16 inch in a length of 2 feet centered over the weld joint.

The last three paragraphs in Section 55-3.19, "Bearings and Anchorages," of the Standard Specifications are 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 requirements in Section 51-1.135, "Mortar," of the Standard Specifications except that the proportion of cement to sand shall be one to 3.

The embedded end of anchor bolts shall be either headed or with a nut and washer, and anchor bolts shall be installed with or without either pipe sleeves or corrugated metal canisters, as detailed on the plans. The anchor bolts shall be carefully installed to permit true positioning of the bearing assemblies.

When anchor bolts are installed in pipe sleeves or metal canisters, the pipes or canisters shall be completely filled with mortar. Mortaring and the construction of mortar pads under masonry plates, if required, shall be done after erection of girders and before placing deck concrete.

10-1.91 COLUMN CASINGS

Column casings shall consist of cleaned and painted structural steel shells filled with grout as shown on the plans and conforming to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Welding Quality Control" of these special provisions.

The requirements of the first sentence of paragraph 3.13.2 of AWS D1.5 will not apply for the field welding of column casings.

Structural steel for column casings shall conform to the requirements in ASTM Designation: A 36/A 36M, or at the Contractor's option, ASTM Designation: A 709/A 709M, Grade 36.

Polyethylene shall have a compressive strength of at least 10 psi at no more than 15 percent deflection determined in conformance with the requirements in ASTM Designation: D 3575, Test B. Polyethylene shall be bonded to the column using a suitable waterproof adhesive applied to the entire contact surface.

Drain extension pipe shall conform to the provisions for drainage piping in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

The spaces to be occupied by the column casing materials shall be cleared of plants and other materials prior to encasing the column.

Removed plants and other materials shall be disposed of outside the highway right of way in conformance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The same information that is on existing columns shall be painted on casings in conformance with the provisions in Section 51-1.21, "Bridge Name, Number and Bent Numbers," of the Standard Specifications.

Clean and paint structural steel

New metal surfaces, except where galvanized, shall be cleaned and painted in conformance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and these special provisions.

Prior to performing any painting or paint removal, 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 Painting Quality Work Plan (PQWP) for each item of work for which painting or paint removal is to be performed. As a minimum, each PQWP shall include the following:

A. The name of each Contractor or subcontractor to be used.
B. One copy each of all current "SSPC: The Society for Protective Coatings" specifications or qualification procedures which are applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
C. Proposed methods and equipment to be used for any paint application.
D. Proof of each of any required certifications, SSPC-QP 1 or SSPC-QP 3.

    1. In lieu of certification in conformance with the requirements in SSPC-QP 1, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 1.

The Engineer shall have 10 working days to review the PQWP submittal after a complete plan has been received. No painting or paint removal shall be performed until the PQWP for that work is reviewed by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the PQWP, 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.

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

Column casing surfaces in contact with grout shall not be considered embedded in concrete.

Column casing surfaces to be painted with waterborne inorganic zinc coating shall be blast cleaned and painted with the single undercoat prior to shipment to the job-site.

Cleaning

The surfaces to be cleaned and painted shall be dry blast cleaned in conformance with the requirements of Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of no less than 1 1/2 mils nor more than 3 1/4 mils as measured in conformance with the requirements of ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning steel shall conform to the requirements of Abrasive Specification No. 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings," and shall not contain hazardous material. Mineral and slag abrasives shall comply with the requirements for Class A, Grade 2 to 3 as defined therein.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material for steel.

Painting of column casings at SFOBB San Francisco Approach Mainline Structure

Blast cleaned surfaces shall receive a single undercoat, and a final coat where specified, consisting of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation: M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

The color of the final coat of inorganic zinc coating shall match Federal Standard 595B No. 36373.

Painting of column casings at 4th Street Retrofit

Blast cleaned surfaces shall receive a single undercoat of waterborne inorganic zinc coating, and exposed surfaces shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating. The single undercoat shall consist of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation: M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F. or more than 85° F., nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

The total dry film thickness of all applications of the single undercoat of inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

Damaged areas and areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the rinsing and testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass the following tests:

Adhesion

The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured at no more than 6 locations on each column using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Cure

The inorganic zinc coating, when properly cured, shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

At locations where finish coats are required, the surface pH of the inorganic zinc primer shall be checked in conformance with ASTM Designation: D4262 by wetting the surface with deionized water and applying pH paper with a capability of measuring in increments of 0.5 pH units. Application of finish coats will not be permitted until the surface pH is less than 8.

Except as approved by the Engineer, a minimum curing time of 72 hours shall be allowed between application of inorganic zinc coating and water rinsing.

Exposed areas of inorganic zinc coating where finish coats are specified shall be thoroughly water rinsed.

At locations where no finish coats are required, the final coat of inorganic zinc coating shall be applied after testing for adhesion, testing for cure, and completion of all operations that may damage or discolor the steel surface, including correction of runs, sags, thin and excessively thick areas in the paint film, skips and holidays, dry spray, or areas of non-uniform appearance.

At locations where finish coats are required, the area to receive the final coat of inorganic zinc coating shall be lightly roughened by abrasive blasting using an abrasive no larger than 25 mil mesh. Abrasive blasting shall remove no more than 0.5 mil of inorganic zinc. The surface to be lightly roughened shall be free from moisture, dust, grease or any deleterious material. The undercoated areas of column casing surfaces not receiving a final coat shall be protected from abrasive blast cleaning operations.

At locations where finish coats are required, the final coat of inorganic zinc coating shall be applied to the required dry film thickness in one uniform application within 24 hours after light roughening. The dry film thickness of the final coat of inorganic zinc coating shall be not less than 1 mil nor more than 3 mils .

At locations where finish coats are required, the total dry film thickness of all applications of the single undercoat and final coat of inorganic zinc coating shall be not less than 5 mils nor more than 11 mils.

At locations where finish coats are required, the first finish coat shall be applied within 48 hours following water rinsing.

The finish coat paint shall be formulated for application to inorganic zinc coating and shall conform to the following:

A.

Property	Value	ASTM Designation
Pigment content, percent	24 max.	D 3723
Nonvolatile content, mass percent	49 min.	D 2369
Viscosity, KU	75 min. to 90 max.	D 562
Fineness of dispersion, Hegman	6 min.	D 1210
Drying time at 77° F. , 50% RH, 4-mil wet film		D 1640
Set to touch, minutes	30 max.	
Dry through, hours	1 max.	
Adhesion	4A	D 3359, Procedure A

B. No visible color change in the finish coats shall occur when tested in conformance with the requirements in ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 38 cycles. The cycle shall be 4 hours of ultraviolet (UV) exposure at 140° F and 4 hours of condensate exposure at 104° F.

C. The vehicle shall be an acrylic or modified acrylic copolymer with a minimum of necessary additives.

The first finish coat shall be applied in 2 applications. The first application shall consist of a spray applied mist application. The second application shall be applied after the mist application has dried to a set to touch condition as determined by the procedure described in Section 7 of ASTM Designation: D1640. The first finish coat color shall match Federal Standard 595B No. 36628. The total dry film thickness of both applications of the first finish coat shall be not less than 2 mils.

Except as approved by the Engineer, a minimum drying time of 12 hours shall be allowed between finish coats.

The second finish coat color shall match Federal Standard 595B No. 26408. The total dry film thickness of all applications of the second finish coat shall be not less than 2 mils.

The 2 finish coats shall be applied in 3 or more applications to a total dry film thickness of not less than 4 mils nor more than 8 mils.

The total dry film thickness of all applications of inorganic zinc coating and finish coat paint shall be not less than 8 mils nor more than 14 mils.

GROUTING

Grouting shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications and these special provisions.

For non-circular columns where the minimum gap to be filled with grout is one inch and the maximum gap is greater than 4 inches, aggregate shall be used to extend the grout, but only to the extent that the cement content of the grout is not less than 846 pounds per cubic yard of grout. California Test 541 will not be required nor will the grout be required to pass through a screen with a 0.07 inch maximum clear opening prior to being introduced into the grout pump. Aggregate shall consist of at least 70 percent fine aggregate and approximately 30 percent pea gravel, by weight. Fine aggregate shall conform to the provisions of Section 90-2, "Materials," of the Standard Specifications. The size of pea gravel shall be such that 100 percent passes the 1/2 inch screen, a minimum 90 percent passes the 3/8 inch screen and not more than 5 percent passes the No. 8 screen.

The Contractor shall limit the height of each lift of grout to minimize undulations and displacements of the surface of the shell during grouting. Undulations in the shell surface, including undulations from fabrication and erection, shall not exceed 1/4 inch per foot nor shall the total displacement from plan location exceed 2 inches at any point. At the Contractor's option, a bracing system or other means may be employed to restrain the casing within the specified tolerances. Except where shown on the plans, restraints shall not pass through the columns. The grout shall harden prior to placing the next lift of grout, unless a bracing system is used.

In addition to the above grout lift restrictions, the height of grout lifts for portions of column casings containing polyethylene shall not exceed 10 feet.

Suitable external grout injection valves shall be installed for filling of the casings. The filling operation shall begin at the bottom of the casing. Spacing of the valves shall be such that the grout will fill the gap between the casing and the polyethylene or column.

Casings shall be sealed at the bottom. Grout shall be pumped into the casing such that the grout head is maintained uniformly around the column, and no visible evidence of water or air is ejected at the top of the grout. The grout at the casing top shall be covered with mortar and sloped to drain. Mortar shall conform to the provisions in Section 51-1.135, "Mortar," of the Standard Specifications.

Casings shall be positioned with spacers to center the casing around the existing column at the location shown on the plans. Spacers may be welded to the inside of the casing. Spacers shall not be used in areas occupied by the polyethylene.

Grout shall not be permitted to flow across shoulders or lanes occupied by public traffic, or to flow into gutters or other drainage facilities.

Clamps, valves, injection ports, lifting ears and other accessories shall be completely removed not less than 24 hours after placing grout. Voids shall be filled with mortar and finished flush with the exterior surface of the casing.

MEASUREMENT AND PAYMENT

Column casings will be measured and paid for in conformance with the provisions in Section 55-4.01, "Measurement," of the Standard Specifications and these special provisions.

The contract price paid per pound for column casing shall include full compensation for furnishing all labor, materials (including polyethylene and adhesive), tools, equipment, and incidentals, and for doing all the work involved in column casings filled with grout, complete in place, including drainage piping, cleaning and painting of structural steel, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.92 ISOLATION CASINGS

Isolation casings shall consist of cleaned and painted structural steel casings, plates and angles as shown on the plans and conforming to the provisions in Section 55, "Steel Structures," of the Standard Specifications and these special provisions.

Attention is directed to "Welding Quality Control" of these special provisions.

The requirements of the first sentence of paragraph 3.13.2 of AWS D1.5 will not apply for the field welding of isolation casings.

Structural steel for isolation casings shall conform to the requirements in ASTM Designation: A 36/A 36M, or at the Contractor's option, ASTM Designation: A 709/A 709M, Grade 36.

The welds on the steel cover plate shall be ground smooth prior to painting the steel cover plate.

Neoprene strip shall conform to the provisions for strip waterstops in Section 51-1.145, "Strip Waterstops," of the Standard Specifications.

Concrete anchorage devices shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications.

Minor concrete shall conform to the provisions in Section 90-10, "Minor Concrete," of the Standard Specifications.

CLEAN AND PAINT STRUCTURAL STEEL

New metal surfaces, except where galvanized, shall be cleaned and painted in conformance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and these special provisions.

Prior to performing any painting or paint removal, 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 Painting Quality Work Plan (PQWP) for each item of work for which painting or paint removal is to be performed. As a minimum, each PQWP shall include the following:

A. The name of each Contractor or subcontractor to be used.
B. One copy each of all current "SSPC: The Society for Protective Coatings" specifications or qualification procedures which are applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
C. Proposed methods and equipment to be used for any paint application.
D. Proof of each of any required certifications, SSPC-QP 1 or SSPC-QP 3.

    1. In lieu of certification in conformance with the requirements in SSPC-QP 1, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 1.

The Engineer shall have 10 working days to review the PQWP submittal after a complete plan has been received. No painting or paint removal shall be performed until the PQWP for that work is reviewed by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the PQWP, 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.

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

Isolation casing surfaces to be painted with waterborne inorganic zinc coating shall be blast cleaned and painted with the single undercoat prior to shipment to the job-site.

Cleaning

The surfaces to be cleaned and painted shall be dry blast cleaned in conformance with the requirements of Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of no less than 1 1/2 mils nor more than 3 1/4 mils as measured in conformance with the requirements of ASTM Designation: D 4417.

Mineral and slag abrasives used for blast cleaning steel shall conform to the requirements of Abrasive Specification No. 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings," and shall not contain hazardous material. Mineral and slag abrasives shall comply with the requirements for Class A, Grade 2 to 3 as defined therein.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material for steel.

Painting

Blast cleaned surfaces shall receive a single undercoat, and a final coat where specified, consisting of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation: M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

The color of the final coat of inorganic zinc coating shall match Federal Standard 595B No. 36373.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to the provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F. or more than 100° F., nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

The total dry film thickness of all applications of the single undercoat of inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

Damaged areas and areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the rinsing and testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass the following tests:

Adhesion

The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured at no more than 6 locations on each casing using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Cure

The inorganic zinc coating, when properly cured, shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

Except as approved by the Engineer, a minimum curing time of 72 hours shall be allowed between application of inorganic zinc coating and water rinsing.

Exposed areas of inorganic zinc coating where finish coats are specified shall be thoroughly water rinsed.

The final coat of inorganic zinc coating shall be applied after testing for adhesion, testing for cure, and completion of all operations that may damage or discolor the steel surface, including correction of runs, sags, thin and excessively thick areas in the paint film, skips and holidays, dry spray, or areas of non-uniform appearance.

The area to receive the final coat of inorganic zinc coating shall be lightly roughened by abrasive blasting using an abrasive no larger than 25 mil mesh. Abrasive blasting shall remove no more than 0.5 mil of inorganic zinc. The surface to be lightly roughened shall be free from moisture, dust, grease or any deleterious material. The undercoated areas of isolation casing surfaces not receiving a final coat shall be protected from abrasive blast cleaning operations.

The final coat of inorganic zinc coating shall be applied to the required dry film thickness in one uniform application within 24 hours after light roughening. The dry film thickness of the final coat of inorganic zinc coating shall be not less than 1 mil nor more than 3 mils.

The total dry film thickness of all applications of the single undercoat and final coat of inorganic zinc coating shall be not less than 5 mils nor more than 11 mils.

Finish coats will not be required.

MEASUREMENT AND PAYMENT

Isolation casings will be measured and paid for in conformance with the provisions in Section 55-4.01, "Measurement," of the Standard Specifications and these special provisions.

The contract price paid per pound for isolation casing shall include full compensation for furnishing all labor, materials (including neoprene strip), tools, equipment, and incidentals, and for doing all the work involved in isolation casings, complete in place, including minor concrete and cleaning and painting of structural steel, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.93 SIGN STRUCTURES

Sign structures and foundations for overhead signs shall conform to the provisions in Section 56-1, "Overhead Sign Structures," of the Standard Specifications and these special provisions.

Section 56-1.02C, "Bolts, Nuts and Washers," of the Standard Specifications is amended to read:

Bolts, nuts and washers for use in sign structures shall conform to the provisions in Section 55-2, "Materials."

The seventh and eleventh paragraphs in Section 56-1.03, "Fabrication," of the Standard Specifications are amended to read:

One washer-type direct tension indicator conforming to the requirements of ASTM Designation: F 959 or F 959M shall be installed with each bolt. Washer-type direct tension indicators shall be mechanically galvanized and shall be installed so that the protrusions bear against the bolt head. After snugging up all bolts of the joint, tightening shall progress from the most rigid part of the joint to the free edges. Bolts shall be tightened until the gap between indicator washer and bolt head is 0.005 inch or less, except that the gap shall not be completely closed. Washer-type indicators shall not be reused.

Ribbed sheet metal panels for box beam-closed truss sign structures shall be fastened to the truss members by bolts as shown on the plans, or by 3/16 inch stainless steel blind rivets conforming to Industrial Fasteners Institute, Standard IFI-114, Grade 51. The outside diameter of the rivet body shall be domed and shall be not less than 5/8 inch in diameter. Web splices in ribbed sheet metal panels may be made with similar type blind rivets of a size suitable for the thickness of material being connected.

Section 56-1.04, "Welding," of the Standard Specifications is amended to read:

Welding, nondestructive testing of welds, and acceptance and repair criteria for nondestructive testing of welds on steel overhead sign structure members shall conform to the requirements of AWS D1.1 and the special provisions.

Amendments to Section 55-2, "Materials," of the Standard Specifications are found in "Steel Structures" of these special provisions.

Before commencing fabrication of sign structures, the Contractor shall submit 2 sets of working drawings to the Engineer in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. The working drawings shall include sign panel dimensions, span lengths, post heights, anchorage layouts, proposed splice locations, a snugging and tensioning pattern for anchor bolts and high strength bolted connections, and details for permanent steel anchor bolt templates. The working drawings shall be supplemented with a written quality control program that includes methods, equipment, and personnel necessary to satisfy the requirements specified herein and in the special provisions.

Working drawings shall be 22 inches x 34 inches or 11 inches x 17 inches in size and each drawing and calculation sheet shall include the State assigned designations for the contract number, sign structure type and reference as shown on the contract plans, District-County-Route-Post Mile , and contract number.

The Engineer shall have 20 working days to review the sign structure working drawings after a complete submittal has been received. No fabrication or installation of sign structures shall be performed until the working drawings are approved in writing by the Engineer.

Should the Engineer fail to complete the review within the time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the sign structure working drawings, the delay will be considered a right of way delay in conformance with the provisions in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

A permanent steel template shall be used to maintain the proper anchor bolt spacing.

One top nut, one leveling nut, and 2 washers shall be provided for the upper threaded portion of each anchor bolt.

Surfaces of base plates which are to come in contact with concrete, grout, or washers and leveling nuts shall be flat to within 0.12 inch tolerance in 12 inches, and to within 0.2 inch tolerance overall. Faying surfaces of plates in high-strength bolted connections including flange surfaces of field splices, chord joints, and frame junctures, and contact surfaces of plates used for breakaway slip base assemblies shall be flat to within 0.08 inch tolerance in 12 inches, and within 0.12 inch tolerance overall.

Thermally cut holes made in tubular members of sign supports, other than holes in base and flange plates, shall initially be made a minimum of 0.08 inch undersized, and then be mechanically enlarged by reaming or grinding to the final required size and shape. All edges shall have a surface roughness of not greater than 0.00025 inch. Round holes may be drilled to the

exact final diameter. No holes shall be made in members unless the holes are shown on the plans or are approved in writing by the Engineer.

Steel members used for overhead sign structures shall receive nondestructive testing (NDT) in conformance with AWS D1.1 and the following:

A.

Weld Location	Weld Type	Minimum Required NDT
Welds for butt joint welds in tubular sections, nontubular sections, and posts	CJP groove weld with backing ring	100% UT or RT
Longitudinal seam welds*	PJP groove weld	25% MT
	CJP groove weld	100% UT or RT
Welds for base plate, flange plate, or end cap to post or mast arm	CJP groove weld	25% UT or RT
	Fillet weld	25% MT
* Longitudinal seam welds shall have 60% minimum penetration, except that within 6 inches of any circumferential weld, longitudinal seam welds shall be CJP groove welds.		

B. A written procedure approved by the engineer shall be used when performing UT on material less than 0.3 inch thick. Contoured shoes shall be used when performing UT on round tubular sections under 50 inches in diameter.

C. When less than 100 percent of a weld is specified for NDT, and if defects are found during this inspection, additional NDT shall be performed. This additional NDT shall be performed on 25 percent of the total weld for all similar welds, as determined by the Engineer, produced for sign structures in the project. If any portion of the additional weld inspected is found defective, 100 percent of all similar welds produced for sign structures in the project, as determined by the Engineer, shall be tested.

Circumferential welds and base plate to post welds may be repaired only one time without written permission from the Engineer.

Full compensation for furnishing anchor bolt templates and for testing of welds shall be considered as included in the contract price paid per pound for furnish sign structure and no additional compensation will be allowed therefor.

10-1.94 ROADSIDE SIGNS

Roadside signs shall be installed at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-2, "Roadside Signs," of the Standard Specifications and these special provisions.

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

Wood posts shall be of the following grades and species. The grades and species allowed for wood posts, 4" x 4" nominal size, are select heart redwood; No. 1 heart structural redwood (1050f); No. 2 heart structural redwood (900f); No. 1 structural light framing Douglas fir, free of heart center; No. 1 structural light framing Hem-Fir, free of heart center; and No. 1 structural light framing Southern yellow pine, free of heart center. The grades and species allowed for wood posts, 4" x 6" nominal size, are select heart grade redwood; select heart structural grade redwood (1100f); No. 1 heart structural redwood (950f); No. 2 structural joists and planks, Douglas fir, free of heart center; No. 1 structural joists and planks Hem-Fir, free of heart center; and No. 2 structural joists and planks Southern yellow pine. The grades and species allowed for wood posts larger than 4" x 6" nominal size are select heart redwood; No. 1 heart structural redwood (950f); No. 1 posts and timbers (also known as No. 1 structural) Douglas fir, free of heart center; select structural posts and timbers Hem-Fir, free of heart center; and No. 1 timbers Southern yellow pine, free of heart center. The sizes shown are minimum, dressed dry sizes.

Posts shall be graded in conformance with the provisions in Section 57-2, "Structural Timber." Sweep shall not exceed 0.08-foot in 10 feet.

Before preservative treatment, the moisture content of Douglas fir, Hem-Fir, and Southern yellow pine posts shall be not more than 25 percent as measured at the midpoint of the post in the outer inch, using an approved type of moisture meter, in conformance with the requirements of ASTM Designation: D 4444.

At the time of delivery to the jobsite, treated posts shall have a moisture content of not more than 25 percent when tested as described above. The posts shall conform in all respects to the specified grading requirements at the time of delivery to the job site.

Douglas fir and Hem-Fir posts shall be treated with either ammoniacal copper arsenate, ammoniacal copper zinc arsenate, copper naphthenate or pentachlorophenol in hydrocarbon solvent in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling." Posts shall be incised and the minimum retention of preservative shall be as specified in AWPA Standards.

The cutting of the ends of wood posts in the field will be permitted. Where field cutting or boring of wood posts is performed after treatment, all cuts and holes shall be thoroughly swabbed, sprayed or brushed with 2 applications of the same type of preservative as initially used or copper naphthenate. Application of preservative in the field shall conform to the provisions in the last paragraph in Section 58-1.04, "Wood Preservative for Manual Treatment."

Wood block spacers, inserted between the post and the sign panel on single post installations as shown on the plans, shall be treated with preservative in the same manner as specified for wood posts.

Unless specified in the special provisions or shown on the plans, wood posts and blocks shall not be painted.

Section 57-2, "Structural Timber," of the Standard Specifications is amended to read:

57-2.01 Description

Douglas fir timber shall be the species "Pseudotsuga menziesii"; redwood shall be the species "Sequoia sempervirens"; Hem-Fir shall be one of the species "Abies magnifica," "Abies grandis," "Abies procera," "Abies amabillis," "Abies concolor," or "Tsuga heterophylla"; and Southern yellow pine shall be one of the several species recognized by the Southern Pine Inspection Bureau.

57-2.02 Grading Rules and Requirements

Lumber and timber shall be of the stress grade shown on the plans or as specified in these specifications, or in the special provisions.

Douglas fir and Hem-Fir shall be graded in conformance with the requirements of the current standard grading and dressing rules of the West Coast Lumber Inspection Bureau, or the current standard grading rules of the Western Wood Products Association.

Redwood shall be graded in conformance with the current standard specifications for structural grades of California redwood approved by the Board of Review, American Lumber Standards Committee and published by the Redwood Inspection Service.

Southern yellow pine shall be graded in conformance with the current grading rules adopted by the Southern Pine Inspection Bureau.

The following general provisions apply to all stress-grades:

All material shall be well manufactured. Only pieces consisting of sound wood, free from decay, will be accepted.

All sizes shown on the plans or specified in the special provisions applying to lumber and timber refer to minimum sizes, and the American Lumber Standards rough and dressed sizes will be accepted as conforming thereto.

Green timber shall be adequately protected from uneven seasoning during transit. Stress-grades of Douglas fir shall be end coated with a protective coating at the time of manufacture to retard checking.

Wood posts shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 10.6 pounds per cubic yard, and need not be incised.

10-1.95 INSTALL SIGN PANEL ON EXISTING STRUCTURE

Sign panels shall be installed on existing structure at the locations shown on the plans or where designated by the Engineer and in conformance with the provisions in Section 56-1.06, "Sign Panels and Fastening Hardware," of the Standard Specifications and these special provisions. Existing sign panels, as shown on the plans, shall be removed and disposed of as provided in Section 15, "Existing Highway Facilities," of the Standard Specifications.

Installing sign panels on existing structure will be measured by the square foot and the quantity to be paid for will be the total area, in square feet, of sign panels installed in place.

The contract price paid per square foot for install sign panel on existing structure shall include full compensation for furnishing all labor, materials (except State-furnished sign panels and mounting bolts), tools, equipment, and incidentals, and for doing all the work involved in installing sign panels on existing structure, complete in place (including removing and disposing of existing sign panels), as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.96 INSTALL SELF ADHESIVE SIGN PANEL

Self-adhesive sign panels shall be installed as shown on the plans and in conformance with these special provisions.

A copy of the manufacturer's information regarding the self-adhesive sign panels and primer (High Intensity Grade Retroreflective Sheeting and Primer 4448) is available for review at the Office of the Toll Bridge Duty Senior at the District 4 Office, 111 Grand Avenue, Oakland, CA 94612, email; duty_senior_tollbridge_district04@dot.ca.gov, telephone number (510) 286-5549, fax number; (510) 286-4563. Requests to review the manufacturer's information must be made with the duty senior at least 24 hours in advance.

Signs shall be centered over the lane or ramp.

The surface of the structure where the sign is to be located shall be cleaned of dust, dirt and loose material using wire brushes, scrapers and dust rags.

Mark surface of structure with chalk line to level sign.

Two coats of primer shall be applied per manufacturer's instructions, allowing 5-10 minutes between coats, followed by placement of the sign panel.

The contract unit price paid for install self-adhesive sign panel shall include full compensation for furnishing all labor, tools, equipment, incidentals, and materials, and for doing all the work involved in installing self-adhesive sign panels, complete in place, as shown on the plans, as specified in these special provisions, and as directed by the Engineer.

10-1.97 TREATED TIMBER

Treated timber shall be preservative treated, Douglas fir or Hem-Fir timber conforming to the details shown on the plans and the provisions in Sections 57, "Timber Structures," and 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications and these special provisions.

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

- Structural timber and lumber shall be of the following species: Douglas fir, Hem-Fir, redwood or Southern yellow pine, as shown on the plans or as specified in the specifications.

The first paragraph of Section 57-2.01, "Description," of the Standard Specifications is amended to read:

- Douglas fir timber shall be the species "Pseudotsuga menziesii"; redwood shall be the species "Sequoia sempervirens"; Hem-Fir shall be one of the species "Abies magnifica," "Abies grandis," "Abies procera," "Abies amabillis," "Abies concolor," or "Tsuga heterophylla"; and Southern yellow pine shall be one of the several species recognized by the Southern Pine Inspection Bureau.

The second paragraph of Section 57-2.02, "Grading Rules and Requirements," of the Standard Specifications is amended to read:

- Douglas fir and Hem-Fir shall be graded in conformance with the requirements of the current standard grading and dressing rules of the West Coast Lumber Inspection Bureau, or the current standard grading rules of the Western Wood Products Association.

The fifth paragraph of Section 57-2.02, "Grading Rules and Requirements," of the Standard Specifications is amended to read:

- All material shall be well manufactured. Only pieces consisting of sound wood, free from decay, will be accepted.
- All sizes shown on the plans or specified in the special provisions applying to lumber and timber refer to minimum sizes, and the American Lumber Standards rough and dressed sizes will be accepted as conforming thereto.
- Green timber shall be adequately protected from uneven seasoning during transit. Stress-grades of Douglas fir shall be end coated with a protective coating at the time of manufacture to retard checking.

Treated timber consists of members required for the cross over as shown on the plans.

Hem-Fir shall be of the species recognized by the Western Wood Products Association and shall be graded as specified for grading Douglas fir.

Solid stock lumber and timber shall be of the grades shown on the plans.

The treatment shall be with both creosote and waterborne preservative. Treatment shall conform to the requirements for dual treatment of structural lumber and timbers in salt water use in the American Wood Preservers Association Standard C-14, "Wood for Highway Construction--Preservative Treatment."

Bolt holes in lumber that is treated with ammoniacal copper arsenate, ammoniacal copper zinc arsenate, or chromated copper arsenate shall be filled with grease before the bolts are inserted. The grease shall be recommended by the manufacturer for corrosion protection and shall not melt or run at a temperature of 151° F.

Steel brackets and other fittings attached to the treated timber will be paid for as provided in "Miscellaneous Metal" of these special provisions.

Timber elements that are split, broken, or otherwise damaged by the Contractor's operations or misfitting timber elements in the new installation shall be replaced at the Contractor's expense.

10-1.98 CLEAN AND PAINT STRUCTURAL STEEL

Exposed new metal surfaces and connections to existing steel, except where galvanized, shall be cleaned and painted in accordance with the provisions in Sections 59-2, "Painting Structural Steel," and 91, "Paint," of the Standard Specifications and these special provisions.

Contact surfaces of high strength bolted connections shall be cleaned and painted before assembly in accordance with the requirements for bolted connections in "Steel Structures," of these special provisions.

The fifth paragraph in Section 59-1.03, "Application," of the Standard Specifications is amended to read:

Unless otherwise specified, should 7 days elapse between paint applications, the painted surface shall be water rinsed prior to the next paint application. Water rinsing shall be defined as a pressurized water rinse with a minimum nozzle pressure of 300 psi. During rinsing, the tip of the pressure nozzle shall be placed between 12 and 18 inches from the surface to be rinsed. The nozzle shall have a maximum fan tip angle of 30˚.

Section 59-1.03, "Application," of the Standard Specifications is amended by adding the following paragraph after the eighth paragraph:

Runs, sags, thin and excessively thick areas in the paint film, skips and holidays, or areas of non-uniform appearance shall be considered as evidence that the work is unsatisfactory, and the Contractor may be required to blast clean the areas and reapply the paint.

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

- Attention is directed to Section 7-1.11, "Preservation of Property," and to "Idemnification and Insurance" of these special provisions. The Contractor shall provide protective devices, such as tarps, screens or covers, as necessary to prevent damage to the work and to other property or persons from all cleaning and painting operations.

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 1.4 mils as measured in conformance with the requirements in ASTM Designation: D 4417.

Section 59-2.04, "Pre-Treatment," of the Standard Specs is deleted.
The first paragraph of Section 59-2.05, "Steam Cleaning," of the Standard Specifications is amended to read:

All dirt, grease, loose chalky paint or other foreign material which has accumulated on the previously painted or galvanized surfaces shall be removed with a steam cleaning apparatus which shall precede all other phases of cleaning. The temperature of the steam produced by the steam cleaning apparatus shall be between 270° F. and 375° F. at the nozzle. Gloss on the existing paint shall be removed without removing sound paint. Areas of gloss on the existing paint that are not removable by steam cleaning and rinsing shall be lightly roughened by sanding with 100- to 200-grit sandpaper. Any paint which becomes loose, curled or lifted or loses its bond with the preceding coat or coats after steam cleaning, shall be removed to sound paint or metal surface by the Contractor at the Contractor's expense.

The third paragraph of Section 59-2.05, "Steam Cleaning," of the Standard Specifications is amended to read:

Steam cleaned surfaces shall be rinsed clean with fresh water to remove any residue, detergent or other foreign material.

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 first subparagraph of the first paragraph in Section 59-2.12, "Painting," of the Standard Specifications is amended to read:

Structures, other than sign structures, shall be blast cleaned and painted with the total thickness of undercoats before erection. Finish coats and final coats shall be applied after erection. If concrete deck is to be placed on a steel member to be painted, finish coats and final coats shall be applied after concrete deck placement. After erection and deck placement, and before applying subsequent paint, all areas where paint has been damaged or has deteriorated and all exposed unpainted surfaces shall be thoroughly cleaned, all foreign substances shall be removed, and surfaces shall be spot painted with undercoats to the specified thickness. Damaged areas of undercoat paint shall be blast cleaned and painted as specified in the special provisions.

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

Contact surfaces of stiffeners, railings, built up members or open seam exceeding 6 mils in width that would retain moisture shall be caulked with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II, or other approved material. The sealing compound shall be applied no sooner than 72 hours after the last application of undercoat unless otherwise revised in writing by the Engineer. The sealing compound shall be allowed to cure as recommended by the manufacturer prior to the pressure rinsing with fresh water and the application of first finish coat. When no finish coats are applied, the sealing compound shall be gray in color.

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

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

Section 59-2.15, "Machinery," of the Standard Specifications is amended to read:

Prior to installation, all surfaces of machinery exposed to the atmosphere shall be painted with 2 applications of unthinned zinc-rich primer (organic vehicle type) conforming to the provisions in Section 91, "Paint." Unless otherwise specified in the special provisions, the exposed surfaces shall be painted after installation with 2 finish applications of commercial quality gray gloss enamel. Aerosol cans shall not be used.

Section 59-3.03, "Painting," of the Standard Specifications is amended to read:

Galvanized surfaces shall be covered with 2 separate applications of finish coats as specified in the special provisions. Paint for the first application shall be tinted by the manufacturer to slightly contrast with the color of the second application.

Prior to performing any painting or paint removal, 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 Painting Quality Work Plan (PQWP) for each item of work for which painting or paint removal is to be performed. As a minimum, each PQWP shall include the following:

A. The name of each Contractor or subcontractor to be used.
B. One copy each of all current "SSPC: The Society for Protective Coatings" specifications or qualification procedures which are applicable to the painting or paint removal to be performed. These documents shall become the permanent property of the Department.
C. Proposed methods and equipment to be used for any paint application.
D. Proof of each of any required certifications, SSPC-QP 1, SSPC-QP 2, SSPC-QP 3.

    1. In lieu of certification in conformance with the requirements in SSPC-QP 1, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 1.

The Engineer shall have 10 working days to review the PQWP submittal after a complete plan has been received. No painting or paint removal shall be performed until the PQWP for that work is reviewed by the Engineer. Should the Engineer fail to complete the review within this time allowance and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in reviewing the PQWP, 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.

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

The existing paint systems consist of materials listed in "Existing Highway Facilities" of these special provisions.

CLEANING.-- Exposed new metal surfaces and areas of connections to existing steel, except where galvanized, shall be dry blast cleaned and dry spot blast cleaned, respectively, in conformance with the requirements in Surface Preparation Specification No. 10, "Near White Blast Cleaning," of the "SSPC: The Society for Protective Coatings." Blast cleaning shall leave surfaces with a dense, uniform, angular anchor pattern of no less than 1 1/2 mils nor more than 3 1/2 mils as measured in accordance with ASTM Designation: D 4417.

The areas of connections to existing steel to be dry spot blast cleaned shall consist of, as a minimum: (1) new and existing contact surfaces and member surfaces under bolt heads, nuts or washers of all high-strength bolted connections to existing steel, (2) exposed bare surfaces of existing steel remaining after trimming, cutting, drilling or reaming and (3) all areas of existing steel within a 4-inch radius measured in any direction from the of point of application of heat for welding or flame cutting.

Mineral and slag abrasives used for blast cleaning steel shall conform to the requirements in Abrasive Specification No. 1, "Mineral and Slag Abrasives," of the "SSPC: The Society for Protective Coatings" and shall not contain hazardous material. Mineral and slag abrasives shall comply with the requirements for Class A, Grade 2 to 3 as defined therein.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications and a Material Safety Data Sheet shall be furnished prior to use for each shipment of blast cleaning material for existing steel.

The inside surfaces of bolt holes shall be cleaned in conformance with the requirements in Surface Preparation Specification No. 1, "Solvent Cleaning," of the "SSPC: The Society for Protective Coatings," and visible rust shall be removed.

Existing contact surfaces of high strength bolted connections, including the inside surfaces of new and existing bolt holes when required, shall be cleaned in conformance with the requirements in Surface Preparation Specification No. 1, "Solvent Cleaning," of the "SSPC: The Society for Protective Coatings."

PAINTING.-- Blast cleaned surfaces shall receive a single undercoat consisting of a waterborne inorganic zinc coating conforming to the requirements in AASHTO Designation: M 300, Type II, except that: 1) the first 3 sentences of Section 4.7, "Primer Field Performance Requirements," and the entire Section 4.7.1 shall not apply, and 2) zinc dust shall be Type II in conformance with the requirements in ASTM Designation: D 520. The inorganic zinc coating shall be listed on the qualified products list which may be obtained from the Transportation Laboratory.

The inside surfaces of bolt holes shall be painted with one application of a zinc-rich primer (organic vehicle type) after the application of the undercoat of inorganic zinc on adjacent steel. The steel surfaces adjacent to the bolt holes shall be kept clean and protected from drippings during the application of the primer.

Inorganic zinc coating shall be used within 12 hours of initial mixing.

Application of inorganic zinc coating shall conform to provisions for applying zinc-rich coating in Section 59-2.13, "Application of Zinc-Rich Primer," of the Standard Specifications.

Inorganic zinc coating shall not be applied when the atmospheric or surface temperature is less than 45° F. nor more than 100° F nor when the relative humidity exceeds 85 percent.

The single undercoat of inorganic zinc coating shall be applied to the required dry film thickness in 2 or more applications within 4 hours after blast cleaning.

The total dry film thickness of all applications of the inorganic zinc undercoat, including the surfaces of outside existing members within the grip under bolt heads, nuts and washers, shall be not less than 4 mils nor more than 8 mils, except that the total dry film thickness on each faying (contact) surface of high strength bolted connections shall be between 1 mil and the maximum allowable dry film thickness for Class B coatings as determined by certified testing in conformance with Appendix A of the "Specification for Structural Joints Using ASTM A325 or A490 Bolts" of the Research Council on Structural Connections (RCSC Specification). Unless otherwise stated, all inorganic zinc coatings used on faying surfaces shall meet the slip coefficient requirements for a Class B coating on blast-cleaned steel, as specified in the RCSC Specification. The Contractor shall provide results of certified testing showing the maximum allowable dry film thickness for the Class B coating from the qualifying tests for the coating he has chosen, and shall maintain the coating thickness on actual faying surfaces of the structure at or below this maximum allowable coating thickness.

The total dry film thickness of all applications of inorganic zinc coating shall be not less than 4 mils nor more than 8 mils.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

Except as approved by the Engineer, a minimum curing time of 72 hours shall be allowed between application of inorganic zinc coating and water rinsing .

All exposed area of inorganic zinc coating shall be thoroughly rinsed with a pressure system using fresh water and a minimum nozzle pressure of 300 psi. During rinsing, the tip of the pressure nozzle shall be placed between 12 and 18 inches from the surface to be rinsed.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to locate the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass both of the following tests:

Adhesion -- The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured at no more than 6 locations per span on each girder, and no more than 6 locations per bearing, and no more than 6 locations at each joint seal assembly location, or as directed by the Engineer in accordance with ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Cure -- The inorganic zinc coating cure will be checked by the Engineer. The inorganic zinc coating shall exhibit a solid, hard and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.

The surface pH of the inorganic zinc primer shall be checked in conformance with ASTM Designation: D4262 by wetting the surface with deionized water and applying pH paper with a capability of measuring in increments of 0.5 pH units. Application of finish coats will not be permitted until the surface pH is less than 8.

All exposed area of inorganic zinc coating shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating.

The first finish coat shall be applied within 48 hours following the pressure rinsing with fresh water.

The finish coat paint shall be formulated for application to inorganic zinc coating and shall conform to the following:

Property	Value	ASTM Designation
Pigment content, percent	24 max.	D 3723
Nonvolatile content, mass percent	49 min.	D 2369
Consistency, KU	75 min. to 90 max.	D 562
Fineness of dispersion, Hegman	6 min.	D 1210
Drying time at 77° F, 50% RH, 4 mil wet film Set to touch, minutes Dry through, hours	 30 max. 1 max.	D 1640
Adhesion	4A	D 3359, Procedure A

No visible color change in the finish coats shall occur when tested according to the requirements of ASTM Designation: G 53 using FS 40 UV-B bulbs for a minimum of 38 cycles. The cycle shall be 4 hours of ultraviolet (UV) exposure at 140° F and 4 hours of condensate exposure at 104° F.

The vehicle shall be an acrylic or modified acrylic copolymer with a minimum of necessary additives.

The first finish coat shall be applied in 2 applications. The first application shall consist of a spray applied mist application. The second application shall be applied after the mist application has dried to a set to touch condition as determined by the procedure described in Section 7 of ASTM Designation: D1640. The first finish coat color shall match Federal Standard 595B No. 34272. The total dry film thickness of both applications of the first finish coat shall be not less than 2 mils.

Except as approved by the Engineer, a minimum drying time of 12 hours shall be allowed between finish coats.

The second finish coat color shall match the existing paint color. The total dry film thickness of all applications of the second finish coat shall be not less than 2 mils.

The 2 finish coats shall be applied in 3 or more applications to a total dry film thickness of not less than 4 mils nor more than 8 mils.

The total dry film thickness of all applications of inorganic zinc coating and finish coat paint shall be not less than 8 mils nor more than 14 mils.

Finish coats will not be required on structural steel for interim structures.

MEASUREMENT AND PAYMENT.--Dry spot blast cleaning and undercoat painting of blast cleaned areas of existing surfaces will be measured by the square foot of spot blast cleaned areas, and will be paid for as spot blast clean and paint undercoat.

The contract price paid per square foot for spot blast clean and paint undercoat shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in spot blast cleaning and painting undercoat on the existing surfaces complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for clean and paint structural steel shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in cleaning and painting the exposed surfaces of the new structural steel and finish coat on undercoated areas of existing metal, complete in place, including water rinsing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.99 ALTERNATIVE PIPE

Alternative pipe culverts shall conform to the provisions in Section 62, "Alternative Culverts," of the Standard Specifications and these special provisions.

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 type 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.

10-1.100 PLASTIC PIPE

Plastic pipe shall conform to the provisions in Section 64, "Plastic Pipe," of the Standard Specifications and these special provisions.

Plastic pipe shall be of the smooth interior wall type.

10-1.101 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 Details, Excavation and Backfill, Concrete Pipe Culverts of the project plans. Where the pipe is to be placed under the traveled way, a relative compaction of not less than 90 percent shall be required unless the minimum distance between the top of the pipe and the pavement surface is the greater of 50 inches 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 Details, Excavation and Backfill, Concrete Pipe Culverts of the project plans, the fifth paragraph of Section 19-3.04, "Water Control and Foundation Treatment," of the Standard Specifications shall not apply.

When solid rock or other unyielding material is encountered at the planned elevation of the bottom of the bedding, the material below the bottom of the bedding shall be removed to a depth of 1/50 of the height of the embankment over the top of the culvert, but not less than 6 inches nor more than 12 inches. The resulting trench below the bottom of the bedding shall be backfilled with structure backfill material in conformance with the provisions in Section 19-3.06, "Structure Backfill," of the Standard Specifications.

The excavation and backfill below the planned elevation of the bottom of the bedding will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

The Outer Bedding as shown in the plans, shall not be compacted prior to placement of the pipe.

Portland cement for concrete backfill shall be Type III conforming to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. A Type C accelerating admixture conforming to the requirements in ASTM Designation: C 494 shall be added to the concrete mix for concrete backfill. The admixture shall be used at the rate recommended by the manufacturer of the admixture. The admixture shall not contain chlorides as Cl in excess of one percent by mass as determined by California Test 415.

Timber bulkheads shall be constructed and placed across the ends of unconnected reinforced concrete pipe as shown on the plans. Wood for timber bulkheads shall be construction heart grade redwood at least one inch thick. Full compensation for constructing and placing timber bulkheads shall be considered as included in the contract price paid per linear foot for the reinforced concrete pipe involved and no separate payment will be made therefor.

Reinforced concrete pipe shall be either cast or spun. Cast reinforced concrete pipe shall be manufactured by placing the concrete into stationary, vertical, cylindrical metal forms. Spun reinforced concrete pipe shall be manufactured by introducing the concrete into a rotating, horizontal, cylindrical metal form.

Special reinforced concrete pipe, having concrete cover over the steel reinforcement greater than the cover specified in AASHTO Designation: M 170M, shall conform to the provisions in Section 65-1.02, "Materials," and Section 65-1.02A, "Circular Reinforced Concrete Pipe," of the Standard Specifications, except the width of crack produced by the D-load test specified in AASHTO Designation: M 170M shall be the width determined by the following formula:

$$b = \frac{t - 3 / 8d}{t - 3 / 8d - C} \times 0.01\text{-inch}$$

Where:

b = Width of crack to be produced in lieu of the 0.01-inch crack specified in AASHTO Designation: M 170M
t = Wall thickness of pipe, inch
d = Effective depth of the section to be tested, ft.
C = Concrete cover over steel reinforcement in excess of cover specified in AASHTO Designation: M 170M

Reinforced concrete pipe that is to be hydrostatically tested shall be strength tested by the 3-edge bearing method to a maximum D-load of 10 percent greater than the 0.01-inch cracking D-load specified in AASHTO Designation: M 170M or to the actual D-load required to produce a 0.01-inch crack, whichever is the lesser.

Special oval shaped reinforced concrete pipe, having concrete cover over the steel reinforcement greater than the cover specified in AASHTO Designation: M 207M, shall conform to the provisions in Section 65-1.02, "Materials," and Section 65-1.02B, "Oval Shaped Reinforced Concrete Pipe," of the Standard Specifications, except the width of crack produced by the D-load test specified in AASHTO Designation: M 207M shall be the width determined by the following formula:

$$b = \frac{t - 3 / 8d}{t - 3 / 8d - C} \times 0.01\text{-inch}$$

Where:

b = Width of crack to be produced in lieu of the 0.01-inch crack specified in AASHTO Designation: M 207M
t = Wall thickness of pipe, inch
d = Effective depth of the section to be tested, ft.
C = Concrete cover over steel reinforcement in excess of cover specified in AASHTO Designation: M 207

Oval shaped reinforced concrete pipe that is to be hydrostatically tested shall be strength tested by the 3-edge bearing method to a maximum D-load of 10 percent greater than the 0.01-inch cracking D-load specified in AASHTO Designation: M 207M or to the actual D-load required to produce a 0.01-inch crack, whichever is the lesser.

10-1.102 CORRUGATED METAL PIPE

Corrugated steel pipe culverts shall conform to the provisions in Section 66, "Corrugated Metal Pipe," of the Standard Specifications and these special provisions.

Asphaltic mastic coating or polymeric sheet coating substituted for bituminous coating shall be placed on the outside and inside surfaces of the pipe.

Corrugated steel pipe shall be fabricated from zinc-coated steel sheet.

Portland cement for concrete backfill shall be Type III conforming to the provisions in Section 90-2.01, "Portland Cement," of the Standard Specifications. A Type C accelerating admixture conforming to the requirements in ASTM Designation: C 494 shall be added to the concrete mix for concrete backfill. The admixture shall be used at the rate recommended by the manufacturer of the admixture. The admixture shall not contain chlorides as Cl in excess of one percent by mass as determined by California Test 415.

10-1.103 CORRUGATED STEEL PIPE DOWNDRAIN

Corrugated steel pipe downdrains shall conform to the provisions in Section 69, "Overside Drains," of the Standard Specifications.

10-1.104 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, Psi	C 307	1450 min.
Compressive Strength, Psi	C 579	11600 min.
Bending Strength, Psi	C 580	2900 min.
Moisture Absorption, %	C 140	0.5 max.
Chemical Resistance	C 267	Pass
Freeze/Thaw, number of cycles w/o weight loss	C 666	1600 min.

The manufacturer of the grated line drain shall furnish the Engineer a Certificate of Compliance in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

Grated line drain frames and grates shall be manufactured of ductile iron conforming to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications. The frames and grates need not be galvanized or coated with asphalt paint. Bolts, nuts, frame anchors, and other connecting hardware shall conform to the provisions in Section 75-1.02, "Miscellaneous Iron and Steel," of the Standard Specifications.

Frames and grates, when installed in conformance with the manufacturer's recommendations and these special provisions, shall withstand load testing conforming to the requirements in Federal Specification RR-F-621E for "Frames, Covers, Gratings, Steps, Manhole Sump and Catch Basin." Grates shall fit into the frames without rocking.

Frames shall be secured to the surrounding concrete backfill with steel anchoring rods as shown on the plans. Other methods may be used to secure the frame to the concrete backfill or grated line drain wall provided that a minimum pullout resistance of 0.7 Kips per foot 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 0.35 Kips per foot 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 2 inches 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 A concrete conforming to the provisions in Section 90, "Portland Cement Concrete," of the Standard Specifications and these special provisions, except that minor concrete shall contain not less than 510 lbs. of cement per cubic yard.

Concrete backfill shall be placed in the trench as shown on the plans. Concrete backfill shall be placed against undisturbed material at the sides and bottom of the trench and in a manner that will prevent floating or shifting of the grated line drain and voids in, or segregation of, the concrete. Foreign material which falls into the trench, prior to or during placement of the concrete, shall be immediately removed. Where necessary, earth plugs shall be constructed and compacted at the ends of the planned concrete backfill to contain the concrete within the trench.

Concrete backfill shall be finished flush with the adjacent surfacing.

The surface of the concrete shall be textured with a broom or burlap drag to produce a durable skid-resistant surface.

The length the grated line drain to be paid for will be the length measured by the linear foot 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 linear foot 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.

10-1.105 WELDED STEEL PIPE

Welded steel pipe shall conform to the provisions in Section 70, "Miscellaneous Facilities," of the Standard Specifications and these special provisions.

Wrapping will not be required.

10-1.106 WELDED STEEL PIPE CLEANOUT

Welded steel pipe cleanout shall be constructed in accordance with the details shown on the plans, as specified in Section 70-1.02B, "Welded Steel Pipe," of the Standard Specifications and these special provisions.

The quantity of the welded steel pipe cleanout will be determined as units from actual count.

The contract unit price paid for welded steel pipe cleanout shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing welded steel pipe cleanout, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.107 VITRIFIED CLAY PIPE

Vitrified clay pipe (VCP) shall conform to the ASTM "Standard Specification for Extra Strength Clay Pipe," Designation C700, except as modified by the plans and these special provisions. The minimum thickness of the pipe barrel shall conform to the Regional Western Standard of the Clay Pipe Institute.

Joints shall be made up in the field in accordance with the manufacturer's recommendations. All joints shall be tight fitting, watertight, and without imperfections. Only factory recommended lubricants shall be used. Joints connecting pipes to manhole structures shall be made with a short stub. The straight segment of stub barrel may not exceed 6 inches maximum from face of structure. Joints for VCP plain-end pipe may be rubber compression couplings with stainless steel bands and shall be in accordance with the requirements of ASTM Designation: C425.

The Contractor shall furnish to the Engineer for approval six copies of the certified report of actual test results meeting ASTM C700. The pipes shall be handled and stored so as to prevent damage thereto, or to existing improvements. Pipe, when stored, shall be secured to prevent rolling.

VCP shall be so constructed and the sections so installed that the sections of pipe laid together form a continuous uniform line of pipe with a smooth regular interior surface. Pipe shall be laid uphill from structure to structure with the bell end upgrade. Each pipe shall be laid in the proper position, on a firm 4 inch deep sand bed. and shall have uniform support and bearing for its entire length. Bells shall be cleaned before the spigot of the succeeding pipe is inserted. A bell hole shall be dug at the end of each pipe to accommodate the bell and facilitate the making of joint.

Pipe shall be laid in conformity to the prescribed lines and grades, which shall be obtained for each pipe by measuring from a tightly stretched line running parallel with the grade and supported over the center line of the pipe by bars placed across the trench. The pipe sections shall be tightly fitted together. All adjustments of pipe to line and grade shall be made by scraping away or filling in and tamping the earth under the body of the pipe, not by blocking or wedging up. Supporting blocks shall not be under the pipe. Pipe shall not be laid within 4 inches of any rock or other rigid object.

The Contractor shall not lay pipe in water and shall use permeable material, subdrains, or some other method approved by the Engineer to maintain an appropriately dry trench. Permeable material bedding shall be Class 3 and shall conform to the following grading:

Sieve Sizes	Percentage Passing
1 1/2 "	100
1 "	90-100
3/4 "	40-100
3/8 "	0-50
No. 4	0-15
No. 8	0-5

Class 3 permeable material shall have a durability index of not less than 40. Compaction shall be obtained by shovel slicing, using care not to disturb pipe. Jetting will not be allowed to get proper compaction of the permeable material bedding.

Sand for structure backfill as shown on the plans shall conform to the provisions in Section 19-3.02B, "Sand Bedding," of the Standard Specifications.

In the parking lots where the cover on vitrified clay pipe is less then 2 feet, as shown on the plans, backfill shall be minor concrete backfill.

Excavation and backfill shall conform to the provisions in Section 19-3, "Structure Excavation and Backfill" of the Standard Specifications.

All excavated material for vitrified clay pipe shall conform to the provisions in "Hazardous and Non-Hazardous Material Excavation," elsewhere in these special provisions.

The length of VCP will be the slope length designated by the Engineer.

Vitrified clay pipe will be measured in the same manner specified in Section 65-1.09, "Measurement," of the Standard Specifications. No payment will be made for vitrified clay pipe placed in excess of the designated length.

The contract price paid per linear foot for vitrified clay pipe shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in installing vitrified clay pipe, complete in place, including excavation and backfill, connecting vitrified clay pipe 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.

Full compensation for removing a portion of the abandon culvert in order to construct the vitrified clay pipe and sand or Class 3 permeable material for pipe bedding shall be considered as included in the contract price paid per linear foot for vitrified clay pipe and no separate payment will be made therefor.

10-1.108 MINOR CONCRETE (DITCH LINING)

Minor concrete (ditch lining) shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications.

10-1.109 MISCELLANEOUS CONCRETE CONSTRUCTION

Driveways, curbs and gutters, gutter linings, concrete aprons, gutter depressions, sidewalks, curb ramps and parking strips shall conform to the provisions in Section 73, "Concrete Curbs and Sidewalks," of the Standard Specifications and these special provisions.

Curb ramp detectable warning surface shall conform to the details shown on the plans and shall not be constructed or installed on curb ramps with a slope that exceeds 6.67 percent. The finished surfaces of the detectable warning surface shall be free from blemishes.

Curb ramp detectable warning surface shall consist of raised truncated domes constructed or installed on curb ramps. Detectable warning surface, at the option of the Contractor, shall be either cast-in-place or stamped into the surface of the curb ramp, or shall be a prefabricated surface installed on the curb ramp. The color of the detectable warning surface shall be yellow conforming to Federal Standard No. 595B, Color No. 33538. Detectable warning surface, either cast-in-place or stamped into the surface of the curb ramp, shall be painted yellow in conformance with the provisions in Section 59-6, "Painting Concrete," of the Standard Specifications.

Prior to constructing curb ramps with a cast-in-place or stamped detectable warning surface, a test panel shall be constructed on the project site and shall be of a size not less than 2 feet by 2 feet. The test panel shall be constructed, finished and cured with the same materials, tools, equipment, and methods to be used in constructing the proposed permanent work. Additional test panels shall be constructed as necessary until a panel is produced which demonstrates, to the satisfaction of the Engineer, the ability of the selected procedure to produce a detectable warning surface that meets all of the specified requirements.

Full compensation for constructing or installing a curb ramp detectable warning surface shall be considered as included in the contract price paid per cubic yard for minor concrete (miscellaneous construction) and no separate payment will be made therefor.

10-1.110 MISCELLANEOUS IRON AND STEEL

Miscellaneous iron and steel shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

The second paragraph in Section 75-1.06, "Measurement," of the Standard Specification is amended to read:

Scale weights will not be required when miscellaneous iron and steel, miscellaneous bridge metal, miscellaneous metal (restrainer), or pumping plant metal work are designated as final pay items in the Engineer's Estimate.

10-1.111 MISCELLANEOUS METAL (BRIDGE)

Miscellaneous metal (bridge) shall conform to the provisions for miscellaneous bridge metal in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

Attention is directed to "Welding" elsewhere in these special provisions.

Miscellaneous metal (bridge) shall consist of the miscellaneous bridge metal items listed in Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications, and the following:

Pipe pins and stud connectors on pipe pins
Angles and threaded rods at the upper deck cross over
6" diameter pipes
High-strength rods, nuts and anchor plates
Plates, nuts, threaded rods, bolts, nuts and washers for the joint seal plate expansion joint assembly, traction bars, non-skid studs, and cover plate
Steel plate, pipe rail and gate ladder at the anchorage housing.
anchor bolts at the interim supports of SFOBB San Francisco Approach-Mainline
bolts, nuts, washers and bearing plates shown on the plans to be galvanized

The Section 75-1.03, "Miscellaneous Bridge Metal," of the Standard Specifications is amended by adding the following paragraphs:

High-strength bolted connections shall conform to the provisions for high-strength steel fasteners and bolted connections in Section 55, "Steel Structures."

An approved thread locking system, consisting of a cleaner, primer and anaerobic adhesive, shall be applied where shown on the plans. Lubricants and foreign materials shall be removed from the threaded areas of both parts using the cleaner and small wire brush. The primer shall be applied to cover the threaded areas of both parts. The anaerobic adhesive shall be applied to fill the male threads in the area of the final position of the nut. The nut shall be installed at the location or to the torque shown on the plans, and an additional fillet of anaerobic adhesive shall be applied completely around the exposed junctions of the nut and male part. Full compensation for furnishing and applying the thread locking system shall be considered as included in the contract price paid for the item of work requiring the system and no separate payment will be made therefor.

Self-tapping screws shall be hex-head, stainless steel or monel metal, installed in holes drilled to fit the self-tapping screws.

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

3. Manhole frames and covers, frames and grates, ladder rungs, guard posts, and access door assemblies.

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

Concrete anchorage devices shall be mechanical expansion or resin capsule types installed in drilled holes or cast-in-place insert types. The anchorage devices shall be a complete system, including threaded studs, hex nuts and cut washers. Thread dimensions for externally threaded concrete anchorage devices prior to zinc coating, shall conform to the requirements in ANSI Standard: B1.1 having Class 2A tolerances or ANSI Standard: B 1.13M having Grade 6g tolerances. Thread dimensions for internally threaded concrete anchorage devices shall conform to the requirements in ASTM Designation: A 563 or A 563M.

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

Cast-in-place inserts shall be the ferrule loop type.

All metal parts of anchorage devices shall be fabricated from stainless steel conforming to the requirements of ASTM Designation: A 276, Type 304 or 316.

The second paragraph in Section 75-1.06, "Measurement," of the Standards Specifications is amended to read:

Scale weights will not be required when miscellaneous iron and steel, miscellaneous bridge metal, miscellaneous metal (restrainer), or pumping plant metal work are designated as final pay items in the Engineer's Estimate.

Spring rubber tubes shown with the expansion joint assemblies shall conform to the provisions in Section 51-1.12H(2), "Steel Reinforced Elastomeric Bearings," of the Standard Specifications. The hardness of the elastomer, as determined by ASTM Designation: A2240, shall be a minimum of 50.

Drilling and bonding threaded rods shall conform to the provisions in "Drill and Bond Dowels" of these special provisions.

Non-shrink grout shall conform to the requirements of either ASTM Designation: C 1107, Grade B, or ASTM Designation: C 845, Type K, and shall provide a minimum compressive strength of 5000 pounds per square inch at 28 days when tested by California Test 551. The grout shall be mixed in accordance with the manufacturer's recommendations. Water shall comply with the provisions for water for prestressed concrete work as specified in Section 90-2.03, "Water," of the Standard Specifications.

Admixtures shall not contain more than 500 parts per million of chlorides as Cl, when tested by California Test 422, and shall not contain more than 2500 parts per million of sulfates as SO_4, when tested by California Test 417.

Non-skid studs and stud connectors shall conform to the requirements of ASTM: A 108 and ANSI/AASHTO/AWS D1.5."

Extra strong and double extra strong steel pipe shall conform to the requirements of ASTM Designation: A53, Grade B.

Full compensation for filling pipes with concrete shall be considered as included in the contract price paid per pound for miscellaneous metal (bridge) and no additional compensation will be allowed therefor.

Full compensation for spring rubber tubes, drilling and bonding threaded rods and grout shall be considered as included in the contract price paid per pound for miscellaneous metal (bridge) and no additional compensation will be allowed therefor.

10-1.112 BRIDGE DECK DRAINAGE SYSTEM

Bridge deck drainage system, consisting of drainage piping, pipe hangers and expansion couplings, shall conform to the provisions for miscellaneous bridge metal in Section 75, "Miscellaneous Metal," of the Standard Specifications and these special provisions.

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 30 ksi. The adhesive type recommended by the manufacturer shall be used for joining pipe and fittings. Fiberglass pipe not enclosed in a box girder cell or encased in concrete shall be manufactured from ultraviolet-resistant resin pigmented with concrete-gray color, or be coated with a concrete-gray resin-rich exterior coating. Paint shall not be used. Fiberglass pipe treated with ultraviolet protection shall withstand a minimum of 2500 hours of accelerated weathering when tested in conformance with the requirements in ASTM Designation: G 154. Lamps shall be UV-B (313 nm wavelength). The resting cycle shall be 4 hours of ultraviolet (UV) exposure at 140° F., and then 4 hour of condensate exposure at 122° F. 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 1 1/2 inches.

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 8 inches in diameter or less, which is: (1) enclosed in a box girder cell and exposed for a length not greater than 20 feet 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 support spacing for PVC plastic pipe shall be 8 feet, maximum. The polyvinyl chloride (PVC) plastic pipe shall be Schedule 40 conforming to the requirements of ASTM Designation: D 1785.

Couplings used to connect PVC plastic pipe or fiberglass pipe to steel shall be threaded or flanged. The sleeve connections shown on the plans shall not be used for either PVC plastic pipe or fiberglass pipe.

If PVC plastic pipe or fiberglass pipe is substituted for welded steel pipe, the quantity of drainage piping will be computed on the basis of the dimensions and details shown on the plans, and no change in the quantities to be paid for will be made because of the use of PVC plastic pipe or fiberglass pipe.

The bridge deck drainage system will be measured and paid for as bridge deck drainage system by the pound in the same manner specified for miscellaneous metal (bridge) in Section 75, "Miscellaneous Metal," of the Standard Specifications.

10-1.113 MISCELLANEOUS METAL (RESTRAINER-CABLE TYPE)

Miscellaneous metal (restrainer-cable type) shall conform to the provisions for bridge joint restrainer units in Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications and these special provisions.

New concrete adjacent to restrainers shall be placed prior to installing restrainers.

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

Cable assemblies shall consist of cables, swaged fittings, studs, nuts, cable yield indicators, disk springs and when shown on the plans, turnbuckles and shall conform to the following requirements:

The swaged fitting shall be machined from hot-rolled bars of steel conforming to the requirements in AISI Designation: C1035, and shall be annealed, suitable for cold swaging. A lock pin hole to accommodate a 1/4-inch plated spring steel pin shall be drilled through the head of the swaged fitting to retain the stud in proper position. The manufacturer's identifying mark shall be stamped on the body of the swaged fitting.

The one-inch diameter stud shall conform to the requirements in ASTM Designation: A 449 after galvanizing. Prior to galvanizing, a 3/8-inch slot for the locking pin shall be milled in the stud end.

Nuts shall conform to the requirements in ASTM Designation: A 563 or A 563M including Appendix X1, except lubrication is not required.

The cable yield indicator shall be machined from hot-rolled bars of steel conforming to the requirements in AISI Designation: C 1035 and shall be annealed, suitable for cold swaging. The heat number and manufacturer's identifying mark shall be stamped on the end surface of each cable yield indicator. The wall thickness of the reduced section of the cable yield indicator shall be machined by the Contractor so that the indicator yields at a load between 36.0 kips and 37.0 kips when tested in compression along the major axis at a test speed not to exceed one half inch per minute. Two certified copies of the mill test and heat treating reports of each heat of bars used for cable yield indicators shall be furnished to the Engineer.

The disc springs shall be made from steel conforming to the requirements in ASTM Designation: A 684/A 684M, Grade 1075. Galvanizing of the disc springs will not be required. The disc springs shall be cleaned and painted with a paint recommended by the manufacturer and color coded as shown on the plans.

Turnbuckles shall be the steel pipe type. Pulls for the turnbuckles shall consist of a swaged fitting and stud assembly.

The swaged fittings, turnbuckles, stud and nut assembly shall develop the specified breaking strength of the cable.

The cable assemblies shall be shipped as a complete unit including cable yield indicator, disk springs, stud and nut and, when required, turnbuckle.

The Contractor shall be responsible for determining the required lengths of the cable assemblies.

The Contractor shall notify the Engineer, in writing, at least 2 days prior to tightening and setting of cable restrainer units.

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

The following materials shall be furnished to the Engineer at the manufacturer's plant:

1. One sample cable assembly, consisting of a cable properly fitted with swaged fitting and right hand thread stud at both ends, 3 feet in total length, for each 200 cable assemblies or fraction thereof produced.
2. One turnbuckle fitted with an 8-inch stud at each end for each 200 turnbuckles or fraction thereof produced.
3. One percent of the cable yield indicators, but no fewer than 8, produced from each mill heat.
4. Two disc springs of each size produced from each mill heat.

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

Bolts, thread locking system and concrete anchorage devices shall conform to the provisions in Section 75-1.03, "Miscellaneous Bridge Metal."

Miscellaneous metal (restrainer-cable type) will be measured and paid for by the pound in the same manner specified for miscellaneous metal (restrainer) in Sections 75-1.06, "Measurement," and 75-1.07, "Payment," of the Standard Specifications.

10-1.114 MISCELLANEOUS METAL (RESTRAINER-PIPE TYPE)

Miscellaneous metal (restrainer-pipe type) shall consist of bridge joint pipe restrainers with double extra strong steel pipe and associated hardware as shown on the plans and in conformance with the provisions in Section 75-1.035, "Bridge Joint Restrainer Units," of the Standard Specifications and in these special provisions.

The Contractor shall submit working drawings with the method of grouting the pipe restrainers in conformance with the provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications.

Double extra strong steel pipe shall conform to the requirements of ASTM Designation: A53, Grade B.

Pipe restrainers shall be bonded to the existing concrete by completely filling the entire void between the pipe restrainer and the cored hole with grout within the limits shown on the plans. Grout shall conform to the provisions in Section 50-1.09, "Bonding and Grouting," of the Standard Specifications. Filler material and seals shall be provided along the sides of the pipe to be grouted, to prevent grout from entering the bridge hinge joints. The filler material and seals shall not restrict joint movement.

Miscellaneous metal (restrainer-pipe type) will be measured and paid for by the pound in the same manner specified for miscellaneous metal (restrainer) in Sections 75-1.06, "Measurement," and 75-1.07, "Payment," of the Standard Specifications.

Full compensation for bonding pipe restrainers to existing concrete shall be considered as included in the contract price paid per pound for miscellaneous metal (restrainer-pipe type) and no additional compensation will be allowed therefor.

10-1.115 CLOCK TOWER SCREEN

Clock tower screen shall conform to the provisions for wire mesh fences in Section 80, "Fences," of the Standard Specifications and these special provisions.

Anchor bolts and steel plates and shapes shall conform to the provisions in Section 75, "Miscellaneous Metal," of the Standard Specifications.

Bolts, except for anchor bolts, and nuts shall conform to the provisions for galvanized bolts and nuts for attaching braces and straps to metal posts in Section 80, "Fences," of the Standard Specifications.

Bolt holes shall be painted with a zinc-rich paint conforming to the specifications for painting damaged galvanized surfaces as specified in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Clock tower screen will be measured and paid for by the linear foot in the same manner specified for wire mesh fence in Section 80, "Fences," of the Standard Specifications.

Full compensation for anchor bolts and steel plates and shapes shall be considered as included in the contract price paid per linear foot for clock tower screen and no separate payment will be allowed therefor.

10-1.116 CHAIN LINK FENCE AND CHAIN LINK GATE

Chain link fence shall be Type CL-6 and chain link gate shall be Type CL-6 and shall conform to the provisions in Section 80, "Fences," of the Standard Specifications and these special provisions.

Fences that are to remain in place and which have been damaged by the Contractor shall be replaced by the Contractor at the Contractor's expense.

The first paragraph in Section 80-3.01B(1), "Untreated Wood Posts and Braces," of the Standard Specifications is amended to read:

Untreated wood posts and braces shall be redwood, cedar, Douglas fir or Southern Yellow Pine, shall be cut from sound timber, and shall be straight and free from loose or unsound knots, shakes in excess of one third the thickness of the post, splits longer than the thickness of the post, or other defects which would render them unfit structurally for the purpose intended. Knots in posts shall be sound, tight, well spaced, and shall not exceed 2 inches in size on any face. Sweep shall not exceed 0.08 foot in 6 feet.

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

Treated wood posts and braces shall be sawed rectangular, free of heart center, Douglas fir, Hem-Fir, Southern yellow pine, round fir or pine. Sawed Douglas fir, Hem-Fir and Southern yellow pine posts and braces shall be graded in conformance with the provisions in Section 57-2, "Structural Timber." The minimum grades and species allowed for sawed 4 inch x 4 inch size treated posts and braces shall be construction light framing Douglas fir, No. 1 structural light framing Hem-Fir or No. 2 structural light framing Southern yellow pine. The minimum grades and species allowed for sawed 6 inch x 6 inch size or larger treated posts and braces shall be select structural posts and timbers No. 1 (also known as No. 1 structural) Douglas fir, select structural posts and timbers Hem-Fir or No. 1 timbers Southern yellow pine. The timber for round posts shall be sound and free from decay, shakes exceeding one third the diameter of the post, splits longer than the thickness or diameter of the post, loose or unsound knots, multiple crooks, or any other defects which would weaken the posts and braces or otherwise cause them to be structurally unsuitable for the purpose intended. Sweep in all posts shall not exceed 1 inch in 6 feet.

Posts and braces to be treated shall be pressure treated with creosote, creosote-coal tar solution, creosote-petroleum solution (50-50), pentachlorophenol in hydrocarbon solution, ammoniacal copper zinc arsenate, copper naphthenate or ammoniacal copper arsenate in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling.

10-1.117 DELINEATORS

Delineators shall conform to the provisions in Section 82, "Markers and Delineators," of the Standard Specifications and these special provisions.

The first and second paragraphs in Section 82-1.02D, "Target Plates," of the Standard Specifications are amended to read:

Target plates for highway post markers and Type L object markers installed on a metal post, shall be manufactured from zinc-coated steel sheet or aluminum sheet.

Target plates for Type K object markers shall be of the same color and material as the flexible post.

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

Standard reflex reflectors conforming to the Department of Transportation current specifications for reflex reflectors for traffic signs, delineators and warning devices shall be attached directly to metal target plates on Type K and Type L object markers, and to the back of Class 2 delineator posts with Type E or Type I reflectorization. Copies of the current specifications are available at the Transportation Laboratory. The reflectors shall be of the type, size and color designated on the plans.

Reflectors for flexible target plates on Type K object markers and target plates on Class 2 delineators, and reflectors for Class 1 delineators shall be made from impact resistant retroreflective sheeting as specified in the special provisions. The color of the retroreflective sheeting shall conform to the color designated on the plans and the Chromaticity Coordinates specified in Federal Highway Administration Specification FP-85, or the PR color number specified by the Federal Highway Administration's Color Tolerance Chart.

Reflex reflectors or retroreflective sheeting may be used for object markers and delineators with rigid posts. Retroreflective sheeting shall be used for object markers and delineators with flexible posts.

The instrumental method of determining color shall conform to the requirements specified in Federal Highway Administration Specification FP-85. In the event of any dispute concerning the test results of instrumental testing, the visual test shall prevail.

A significant difference between day and night reflective color shall be grounds for rejection.

Section 82-1.04, "Marker Information," of the Standard Specifications is amended to read:

Stenciled information for highway post markers shown on the plans or directed by the Engineer shall be painted or at the Contractor's option, the information may be applied with black cutout letters and numerals.

The black cutout letters and numerals shall be die-cut from material conforming to the Department of Transportation current specifications for retroreflective sheeting for use on aluminum signs, except that the material shall be black and opaque. Copies of the current specifications are available at the Transportation Laboratory, Sacramento, California.

Paint for stenciled information shall be commercial quality exterior black paint.

The first paragraph in Section 82-1.06, "Payment," of the Standard Specifications is amended to read:

Items of work, measured as specified in Section 82-1.05, "Measurement," will be paid for at the contract unit price for highway post markers and object markers of the type designated in the contract item, or at the single contract unit price for object markers or markers; and the contract unit price for delineators of the class designated in the contract item.

Delineators on flexible posts shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Flexible posts shall be made from a flexible white plastic which shall be resistant to impact, ultraviolet light, ozone, and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks or defects which affect appearance or serviceability.

Retroreflective sheeting for metal and flexible target plates shall be the retroreflective sheeting designated for channelizers, markers, and delineators conforming to the requirements in ASTM Designation: D 4956-95 and in conformance with the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions.

10-1.118 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.

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

The rail elements, backup plates, terminal, end and return sections, bolts, nuts and other fittings shall conform to the requirements in AASHTO Designation: M 180, except as modified in this Section 83-1.02B and as specified in Section 83-1.02. The rail elements, backup plates, terminal, end and return sections 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 12 inches and bolted. The rail metal, in addition to conforming to the requirements in AASHTO Designation: M 180, shall withstand a cold bend, without cracking, of 180 degrees around a mandrel of a diameter equal to 2.5 times the thickness of the plate.

The seventh through twelfth paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications are amended to read:

At the option of the Contractor, metal beam guard railing shall be constructed using either steel posts or wood posts, both with wood blocks, for line posts. Only one type of line post shall be used for any one continuous length of guard railing.

Steel posts shall be fabricated from steel conforming to the requirements in ASTM Designation: A 36/A 36M, unless otherwise specified. Two certified copies of mill test reports of each heat of steel from which steel posts are formed or fabricated shall be furnished to the Engineer.

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

Wood posts and blocks shall be rough or S4S, at the option of the Contractor. Only one type of post and block shall be used for any one continuous length of guard railing. The size tolerance of rough sawn blocks in the direction of the bolt holes shall be not more than ±1/4 inch.

Wood posts and blocks shall be pressure treated after fabrication as provided in Section 58, "Preservative Treatment of Lumber, Timber and Piling," with creosote, creosote-coal tar solution, creosote-petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, ammoniacal copper zinc arsenate or chromated copper arsenate (Southern yellow pine only), except that when other than one of the creosote processes is used, blocks shall have a minimum retention of 0.40 pound per cubic foot and need not be incised.

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

Before the bolts are inserted, bolt holes shall be filled with a grease, recommended by the manufacturer for corrosion protection, which will not melt or run at a temperature of 150° F.

Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications is amended by adding the following paragraph after the sixteenth paragraph:

At the Contractor's option, steel foundation tubes with soil plates attached, shall be either driven, with or without pilot holes, or placed in drilled holes. Any space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer shall be moistened and thoroughly compacted. Wood terminal posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 150° F. or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

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

Terminal anchor assemblies for metal beam guard railing shall be constructed as shown on the plans and shall conform to the following provisions:

A terminal anchor assembly (Type SFT) for metal beam guard railing shall consist of an anchor cable, an anchor plate, a wood post, a steel foundation tube, a steel soil plate and hardware.

A terminal anchor assembly (Type CA) for metal beam guard railing shall consist of an anchor cable, an anchor plate, a single anchor rod or double anchor rods, hardware and one concrete anchor.

The anchor plate, metal plates, steel foundation tubes and steel soil plate shall be fabricated of steel conforming to the requirements in ASTM Designation: A 36/A 36M.

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 1600° F. during the forming operation or with eyes that have been closed by welding shall be thermally stress relieved prior to galvanizing. The completed anchor rod, after galvanizing, shall develop a strength of 50,000 pounds.

In lieu of built-up fabrication of anchor plates as shown on the plans, anchor plates may be press-formed from steel plate, with or without welded seams.

All bolts and nuts shall conform to the requirements in ASTM Designation: A 307, unless otherwise specified in the special provisions or shown on the plans.

Anchor cable shall be 3/4 inch preformed, 6 x 19, wire strand core or independent wire rope core (IWRC), galvanized in conformance with the requirements in Federal Specification RR-W-410D, right regular lay, manufactured of improved plow steel with a minimum breaking strength of 23 tons. Two certified copies of mill test reports of each manufactured length of cable used shall be furnished to the Engineer. The overall length of each cable anchor assembly shall be as shown on the plans, but shall be a minimum of 6 feet 6 inches.

Where shown on the plans, cable clips and a cable thimble shall be used to attach cable to the anchor rod. Thimbles shall be commercial quality, galvanized steel. Cable clips shall be commercial quality drop forged galvanized steel.

The swaged fitting shall be machined from hot-rolled bars of steel conforming to AISI Designation: C 1035, and shall be annealed suitable for cold swaging. The swaged fitting shall be galvanized before swaging. A lock pin hole to accommodate a 1/4 inch, plated, spring steel pin shall be drilled through the head of the swage fitting to retain the stud in proper position. The manufacturer's identifying mark shall be stamped on the body of the swage fitting.

The one inch nominal diameter stud shall conform to the requirements in ASTM Designation: A 449 after galvanizing. Prior to galvanizing, a 3/8 inch slot for the locking pin shall be milled in the stud end.

The swaged fittings, stud and nut assembly shall develop the specified breaking strength of the cable.

The cable assemblies shall be shipped as a complete unit including stud and nut.

Clevises shall be drop forged galvanized steel and shall develop the specified breaking strength of the cable.

One sample of cable properly fitted with swaged fitting and right hand thread stud at both ends as specified above, including a clevis when shown on the plans, 3 feet in total length, shall be furnished the Engineer for testing.

The portion of the anchor rod to be buried in earth shall be coated with a minimum 20-mil thickness of coal tar enamel conforming to AWWA Standard: C203 or a coal tar epoxy conforming to the requirements in Steel Structures Painting Council Paint Specification No. 16, Coal-Tar Epoxy-Polymide Black Paint or Corps of Engineers Specification, Formula C-200a, Coal-Tar Epoxy Paint.

Metal components of the anchor assembly shall be fabricated in conformance with good shop practice and shall be hot-dip galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing."

Anchor cables shall be tightened after the concrete anchor has cured for at least 5 days.

Concrete used to construct anchors for terminal anchor assemblies shall be Class 3 or minor concrete conforming to the provisions in Section 90, "Portland Cement Concrete."

Concrete shall be placed against undisturbed material of the excavated holes for terminal anchors. The top 12 inches of holes shall be formed, if required by the Engineer.

Reinforcing steel in concrete anchors for terminal anchor assemblies shall conform to the provisions in Section 52, "Reinforcement."

Section 83-1.03, "Measurement," of the Standard Specifications is amended to read:

Concrete railing will be measured by the cubic yard of concrete as provided in Section 51, "Concrete Structures."

Except for metal beam guard railing within the pay limits of a terminal system end treatment, metal beam guard railing will be measured by the linear foot along the face of the rail element from end post to end post of the completed railing at each installation. The point of measurement at each end post will be the center of the bolt attaching the rail element to the end post.

All other railing will be measured by the linear foot from end to end along the face of the railing, including end and intermediate posts, and with no deductions for gaps in railing for lighting and sign supports.

When metal beam guard railing is connected to structures, barriers, walls or abutments, the structure, barrier, wall or abutment will be considered the end post and the point used for measuring the rail length shall be the midpoint between the 2 bolts attaching the rail element to the structure, barrier, wall or abutment.

The measurement shall be made along the face of the rail elements without allowance for overlap at rail splices.

The quantity of the various types of terminal systems end treatments for metal beam guard railing will be measured as units determined from actual count in place in the completed work.

The quantity of terminal anchor assemblies (Type SFT or Type CA) will be measured as units determined from actual count. A terminal anchor assembly (Type CA)with 2 cables attached to one concrete anchor will be counted as one terminal anchor assembly (Type CA)for measurement and payment.

The quantities of return and end sections and the various types of terminal sections for metal beam guard railing will be determined as units from actual count.

Section 83-1.04, "Payment," of the Standard Specifications is amended to read:

The contract prices paid per linear foot for railings of the types shown in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in constructing the railings, complete in place, including, but not limited to, excavation, backfill and disposal of surplus material, concrete and reinforcing steel, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The contract unit price paid for the various types of terminal system end treatments for metal beam guard railing shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all work involved in furnishing and installing terminal system end treatments, complete in place, including excavation, backfill and disposal of surplus material and connecting the terminal system to new or existing metal beam guard railing, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The contract unit prices paid for terminal anchor assembly (Type SFT) and terminal anchor assembly (Type CA) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in constructing the terminal anchor assemblies, complete in place, including drilling anchor plate bolt holes in rail elements, driving steel foundation tubes, excavating for concrete anchor holes and disposing of surplus material, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The contract unit prices paid for return sections, end sections, 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 return, end, and terminal sections complete in place, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Concrete in concrete railing will be paid for as provided in Section 51, "Concrete Structures." Bar reinforcing steel in concrete railing will be paid for as provided in Section 52, "Reinforcement."

Full compensation for connecting metal beam guard railing to bridge sidewalks and curbs, bridge railing, barriers, retaining walls, abutments and other flat concrete surfaces, and constructing guard rail layout flares (including special size and spacing of posts) shall be considered as included in the prices paid for the various items of metal beam guard railing work and no additional compensation will be allowed therefor.

Full compensation for furnishing connections on metal railing for steel picket railing, chain link railing and other classes of metal railing designated on the plans, drilling anchor bolt holes and anchoring bolts for railings shall be considered as included in the prices paid for the various items of railing work involved and no additional compensation will be allowed therefor.

Full compensation for buried post anchors shall be considered as included in the contract price paid per linear foot for metal beam guard railing and no separate payment will be made therefor.

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

Line posts and blocks shall be wood.

Delete the ninth and eleventh paragraphs in Section 83-1.02B, "Metal Beam Guard Railing," of the Standard Specifications.

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

Wood posts and blocks shall be pressure treated after fabrication in conformance with the provisions in Section 58, "Preservative Treatment of Lumber, Timber and Piling," of the Standard Specifications with creosote, creosote coal tar solution, creosote petroleum solution (50-50), pentachlorophenol in hydrocarbon solvent, copper naphthenate, ammoniacal copper arsenate, or ammoniacal copper zinc arsenate. In addition to the preservatives listed above, Southern yellow pine may also be pressure treated with chromated copper arsenate. When other than one of the creosote processes is used, blocks shall have a minimum retention of 0.40 pound per cubic foot, and need not be incised.

Metal beam guard railing elements and required backup plates, terminal sections, end sections, and return sections shall conform to the requirements of Type 2 W-Beam as shown in AASHTO Designation: M 180.

TERMINAL SYSTEM (TYPE ET)

Terminal system (Type ET) shall be furnished and installed as shown on the plans and in conformance with these special provisions.

Terminal system (Type ET) shall be an ET-2000 PLUS (4-tube system) extruder terminal as manufactured by Trinity Industries, Inc., and shall include all the items detailed for terminal system (Type ET) shown on the plans.

Arrangements have been made to insure that any successful bidder can obtain the ET-2000 PLUS (4-tube system) extruder 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 ET-2000 PLUS (4-tube system) extruder terminal, FOB Centerville, Utah is $1,305.00, not including sales tax.

The above price will be firm for orders placed on or before July 31, 2003, provided delivery is accepted within 90 days after the order is placed.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that the terminal systems (Type ET) conform to the contract plans and specifications, conform to the prequalified design and material requirements, and were manufactured in conformance with the approved quality control program.

The terminal system (Type ET) 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 4 inches 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 150° F. or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system (Type ET) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

TERMINAL SYSTEM (TYPE SRT)

Terminal system (Type SRT) shall be furnished and installed as shown on the plans and in conformance with these special provisions.

Terminal system (Type SRT) shall be a SRT-350 Slotted Rail Terminal (8 post system) as manufactured by Trinity Industries, Inc., and shall include all the items detailed for terminal system (Type SRT) shown on the plans.

The 3/16 inch x 1-3/4 inch x 3 inch plate washer shown on the elevation view and in Section D-D at Wood Post No. 1 shall be omitted.

Arrangements have been made to insure that any successful bidder can obtain the SRT-350 Slotted Rail Terminal (8 post system) from the manufacturer, Trinity Industries, Inc., P.O. Box 99, 950 West 400S, Centerville, UT 84014, Telephone 1-800-772-7976. The price quoted by the manufacturer for the SRT-350 Slotted Rail Terminal (8 post system), FOB Centerville, Utah is $845.00, not including sales tax.

The above price will be firm for orders placed on or before July 31, 2003, provided delivery is accepted within 90 days after the order is placed.

The Contractor shall provide the Engineer with a Certificate of Compliance from the manufacturer in conformance with the provisions in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications. The Certificate of Compliance shall certify that terminal systems (Type SRT) conform to the contract plans and specifications, conform to the prequalified design and material requirements and were manufactured in conformance with the approved quality control program.

The terminal system (Type SRT) shall be installed in conformance with the manufacturer's installation instructions and these requirements. The steel foundation tubes with soil plates attached, shall be, at the Contractor's option, either driven, with or without pilot holes, or placed in drilled holes. Space around the steel foundation tubes shall be backfilled with selected earth, free of rock, placed in layers approximately 4 inches thick and each layer shall be moistened and thoroughly compacted. Wood terminal posts shall be inserted into the steel foundation tubes by hand. Before the wood terminal posts are inserted, the inside surfaces of the steel foundation tubes to receive the wood posts shall be coated with a grease which will not melt or run at a temperature of 150° F. or less. The edges of the wood terminal posts may be slightly rounded to facilitate insertion of the post into the steel foundation tubes.

Surplus excavated material remaining after the terminal system (Type SRT) has been constructed shall be disposed of in a uniform manner along the adjacent roadway where designated by the Engineer.

10-1.119 CABLE RAILING

Cable railing shall conform to the provisions in Section 83-1, "Railings," of the Standard Specifications and amendments to Section 83-l, "Railings," under "Metal Beam Guard Railing" of these special provisions.

10-1.120 CONCRETE BARRIER

Concrete barriers shall conform to the provisions in Section 83-2, "Barriers," of the Standard Specifications and these special provisions.

The formlines of exposed new concrete surfaces shall match the formlines of exposed existing concrete surfaces.

The transition barrier between the existing barrier and concrete barrier (type 732 modified) will be measured and paid for as concrete barrier (type 732 modified).

The subparagraphs of the second paragraph of Section 83-2.02D(1), "General," of the Standard Specifications are amended to read:

a. For concrete barriers Type 60 series, the top shall not vary more than 0.02-foot from the edge of the straightedge and the faces shall not vary more than 0.04-foot from the edge of the straightedge.
b. For concrete barriers other than Type 60 series, both the top and faces shall not vary more than 0.02-foot from the edge of the straightedge.

The eighth paragraph of Section 83-2.02D(1), "General," of the Standard Specifications is amended to read:

Granular material for backfill between the 2 walls of concrete barrier (Types 60E, 60GE and 60SE), as shown on the plans, shall be placed without compaction.

The first paragraph of Section 83-2.02D(2), "Materials," of the Standard Specifications is amended to read:

Type 60 series concrete barriers shall be constructed of minor concrete conforming to the provisions in Section 90-10, "Minor Concrete," except as follows:

a. The maximum size of aggregate used for extruded or slip-formed concrete barriers shall be at the option of the Contractor, but in no case shall the maximum size be larger than $1^1/_2$ inches nor smaller than $^3/_8$ inch.
b. If the $^3/_8$ inch maximum size aggregate grading is used to construct extruded or slip-formed concrete barriers, the cement content of the minor concrete shall be not less than 658 pounds per cubic yard.

The second paragraph of Section 83-2.02D(2), "Materials," of the Standard Specifications is amended to read:

Concrete barriers other than Type 60 series shall be constructed of Class A concrete conforming to the provisions in Section 90, "Portland Cement Concrete."

The third paragraph of 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 60E, 60GE and 60SE) and the optional concrete slab at the base between the 2 walls of concrete barrier (Types 60E, 60GE and 60SE) shall be constructed of minor concrete conforming to the provisions of Section 90-10, except that the minor concrete shall contain not less than 470 pounds of cement per cubic yard.

The last subparagraph of the seventh paragraph of Section 83-2.02D(2), "Materials," of the Standard Specifications is amended to read:

Grease shall conform to the requirements of Military Specification: MIL-S-8660.

The eighth paragraph of Section 83-2.02D(2), "Materials," of the Standard Specifications is amended to read:

Granular material for backfill between the 2 walls of concrete barrier (Types 50E, 60E, 60GE and 60SE) shall be earthy material suitable for the purpose intended, having no rocks, lumps or clods exceeding 1 1/2 inches in greatest dimension.

The first paragraph of Section 83-2.02D(3), "Construction Methods," of the Standard Specifications is amended to read:

Type 50 and Type 60 series concrete barriers shall be constructed by either the "cast-in-place with fixed forms" method or the "extrusion or slip form" method or a combination thereof, at the Contractor's option.

The second paragraph, not including the subparagraphs, of Section 83-2.02D(3), "Construction Methods," of the Standard Specifications is amended to read:

Concrete barriers other than Type 50 and Type 60 series shall be constructed by the "cast-in-place with fixed forms" method.

Section 83-2.02D(4), "Finishing," of the Standard Specifications is amended to read:

83-2.02D(4) Finishing.—The surface finish of concrete barriers Type 50 and Type 60 series, prior to the application of the curing compound, shall be free from surface pits larger than one inch in diameter and shall be given a final soft brush finish with strokes parallel to the line of the barriers. Finishing with a brush application of grout will not be permitted.

To facilitate finishing, fixed forms for cast-in-place concrete barriers Type 50 and Type 60 series, shall be removed as soon as possible after the concrete has set enough to maintain the shape of the barrier without support.

Not less than 7 days after placing, exposed surfaces of concrete barriers, Type 50 and Type 60 series, shall receive a light abrasive blast finish so that a uniform appearance is achieved.

The final surface finish of concrete barriers other than Type 50 and Type 60 series shall be Class 1 Surface Finish conforming to the provisions in Section 51-1.18B, "Class 1 Surface Finish." Alternative final surface finish methods proposed by the Contractor shall be submitted in writing and shall not be used unless approved by the Engineer.

Section 83-2.02D(5), "Curing," of the Standard Specifications is amended to read:

83-2.02D(5) Curing.—Exposed surfaces of concrete barriers shall be cured with the non-pigmented curing compound (6) conforming to the provisions in Section 90-7.01B, "Curing Compound Method." At the Contractor's option, the formed surfaces of concrete barriers, which are on bridges or walls but which do not support soundwalls, may be cured as provided in Section 90-7.01D, "Forms-In-Place Method," except the forms shall be retained in place for a minimum period of 12 hours after the concrete has been placed. When curing Type 50 and Type 60 series concrete barrier, curing compound shall be applied by a mechanical sprayer capable of applying the curing compound to at least one entire side and the top of the concrete barrier in one application at a uniform rate of coverage. The spray shall be adequately protected against wind.

The ninth and tenth paragraphs of Section 83-2.03, "Measurement," of the Standard Specifications are amended to read:

Concrete barriers, except Type 50E, Type 60E, Type 60GE, and Type 60SE will be measured along the top of the barrier.

Concrete barriers Type 50E, Type 60E, Type 60GE, and Type 60SE will be measured once along the centerline between the 2 walls of the barrier.

The fourth paragraph of Section 83-2.04, "Payment," of the Standard Specifications is amended to read:

The contract prices paid per linear foot for concrete barrier of the type or types listed in the Engineer's Estimate shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in constructing the concrete barriers, complete in place, including bar reinforcing steel, steel dowels and drilling and bonding dowels in structures, hardware for steel plate barrier, miscellaneous metal, excavation, backfill (including concrete paving for, and granular material or concrete slab used as backfill in Type 50E, Type 60E, Type 60GE, and Type 60SE concrete barrier), and disposing of surplus material and for furnishing, placing, removing and disposing of the temporary railing for closing the gap between existing barrier and the concrete barrier being constructed, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Concrete barrier markers shall conform to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions. Concrete barrier markers shall be cemented to the barrier in conformance with the manufacturer's recommendations.

Full compensation for furnishing and installing concrete barrier markers in place shall be considered as included in the contract price paid per linear foot for the various types of concrete barrier and no additional compensation will be allowed therefor.

If reinforcement is encountered during drilling, before the specified depth is attained, the Engineer shall be notified. Unless the Engineer approves coring through the reinforcement, the hole will be rejected and a new hole, in which reinforcement is not encountered, shall be drilled adjacent to the rejected hole to the depth shown on the plans.

10-1.121 CRASH CUSHION (ADIEM)

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.

Crash cushion shall be an ADIEM II-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 II-350, FOB Centerville, Utah is $12,000.00, not including sales tax.

The above price will be firm for orders placed on or before July 31, 2003, provided delivery is accepted within 90 days after the order is placed.

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.

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.

Crash cushion (ADIEM) will be measured by the unit as determined from actual count in place in the completed work.

The contract unit price paid for 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 crash cushion, complete in place, including structure excavation, structure backfill, and disposing of surplus material, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

10-1.122 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.

Section 84-2.02, "Materials," of the Standard Specifications is amended to read:

The thermoplastic material shall conform to either State Specification 8010-01A or 8010-19A. Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of State Specification 8010-004 (Type II).

State Specifications for thermoplastic material and glass beads may be obtained from the Transportation Laboratory.

Where striping joins existing striping, as shown on the plans, the Contractor shall begin and end the transition from the existing striping pattern into or from the new striping pattern a sufficient distance to ensure continuity of the striping pattern.

Thermoplastic material for traffic stripes shall be applied at a minimum thickness of 2.0 mm.

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 linear foot as thermoplastic traffic stripe and by the square foot as thermoplastic pavement marking.

10-1.123 PAINT TRAFFIC STRIPE AND PAVEMENT MARKING

Painted traffic stripes (traffic lines) and pavement markings shall be applied in conformance with the provisions in Section 84, "Traffic Stripes and Pavement Markings," of the Standard Specifications and these special provisions.

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.
Solvent-Borne Traffic Line	White, Yellow and Black	PT-170A
Waterborne Traffic Line	White, Yellow and Black	8010-20B
Acetone-Based	White, Yellow and Black	PT-150VOC
Waterborne Traffic Line	Blue (Federal Standard 595b, Color No. 35180)	Federal Specification No. TT-P-1952D

Glass beads shall conform to State Specification No. 8010-004 (Type II).

Copies of State Specifications for traffic paint and glass beads may be obtained from the Transportation Laboratory.

The kind of paint to be used (solvent borne, water borne or acetone-based) shall be determined by the Contractor based on the time of year the paint is applied and local air pollution control regulations.

Thinning of paint will not be allowed.

Paint shall be tested prior to use or the manufacturer shall provide the Engineer with a Certificate of Compliance in conformance with the provisions of Section 6-1.07, "Certificates of Compliance." The certificate shall certify that the paint complies with the specifications and that paint manufactured to the same formulation and process has previously passed State testing. A list of manufacturers that have produced paint meeting State specifications is available from the Transportation Laboratory. (Material supplied by manufacturers other than those that have manufactured approved paint will require complete testing.)

The tenth paragraph in 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 Feet Coverage Per Cubic Feet	
	First Coat	Second Coat
Solvent Borne Paint	3050	1525
Water Borne Paint	1830	1830
Acetone-Based Paint	3050	1525

At the option of the Contractor, permanent traffic striping and pavement marking tape conforming to the provisions in "Prequalified and Tested Signing and Delineation Materials" of these special provisions may be placed instead of the painted traffic stripes and pavement markings specified herein. Permanent tape, if used, shall be installed in conformance with the manufacturer's specifications. If permanent tape is placed instead of painted traffic stripes and pavement markings, the tape

will be measured and paid for by the linear foot as paint traffic stripe and by the square foot as paint pavement marking of the number of coats designated in the Engineer's Estimate.

10-1.124 PAVEMENT MARKERS

Pavement markers shall be placed in conformance with the provisions in Section 85, "Pavement Markers," of the Standard Specifications and these special provisions.

The fourth paragraph in Section 85-1.01, "Description," of the Standard Specifications is amended to read:

Pavement recesses shall be Type 1 or Type 2 as required by the plans and shall be constructed to the shape and dimensions shown on the plans.

Section 85-1.02, "Type of Markers," of the Standard Specifications is amended to read:

Pavement markers shall conform to one or more of the following types:

Type A— Non-Reflective White Markers
Type AY— Non-Reflective Yellow Markers
Type C— Red-Clear Retroreflective Markers
Type D— 2-Way Yellow Retroreflective Markers
Type G— One-Way Clear Retroreflective Markers
Type H— One-Way Yellow Retroreflective Markers

Certificates of Compliance shall be furnished for pavement markers as specified in the special provisions.

The second paragraph of the "Tolerances" subsection in Section 85-1.03, "Sampling, Tolerances and Packaging," of the Standard Specifications is amended to read:

The entire sample of retroreflective pavement markers shall be tested for reflectance. The failure of 10 percent or more of the original sampling shall be cause for rejection.

Section 85-1.04B, "Non-Reflective Pavement Markers (Plastic)," of the Standard Specifications is amended to read:

Plastic non-reflective pavement markers Types A and AY shall be, at the option of the Contractor, either polypropylene or acrylonitrile-butadiene-styrene (ABS) plastic type.

Polypropylene non-reflective pavement markers shall consist of polyester resin binder, inert organic filler material and colorant pigments and shall conform to the provisions of the third paragraph in Section 85-1.04A, "Non-Reflective Pavement Markers (Ceramic)," except the requirement for adhesive bond strength in Test a shall be 500 pounds per square inch, minimum, and Tests b, c, g and i shall not apply.

ABS non-reflective pavement markers shall consist of ABS plastic conforming to the requirements in ASTM Designation: D 4673, Designation ABS 1-2-2, and shall conform to the provisions of the third paragraph in Section 85-1.04A, except Tests a, b, c, g and i shall not apply. The bottom of ABS plastic pavement markers shall have areas of integrally formed protrusions projecting from the surface to increase the effective bonding surface area and produce a structural bond with the pavement.

Section 85-1.05, "Reflective Pavement Markers," of the Standard Specifications is renamed "Retroreflective Pavement Markers" and the first through the fourth paragraphs (of the 1992 Standard Specifications) are amended to read:

The exterior surface of the shell shall be smooth and contain one or 2 retroreflective faces of the color specified.

The infrared curves of the plastic resins shall match approved curves on file in the Transportation Laboratory.

The sixth paragraph in renamed Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications is amended to read:

Retroreflective pavement markers shall conform to the following color and testing requirements:

The second subsection, "Tests," under the sixth paragraph in renamed Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications is renamed "Testing" and is amended to read:

Testing

Tests shall be performed in conformance with the requirements in California Test 669.

Test	Requirement		
Adhesive bond strength[a] to bottom surface of the marker using adhesives specified in Sections 95-2.05, "Standard Set Epoxy Adhesive for Pavement Markers," and 95-2.04, "Rapid Set Epoxy Adhesive for Pavement Markers"	500 psi min.		
Strength[b]	2000 lbs. min.		
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 500 psi shall constitute a failing bond strength test.

b Deformation of the marker of more than 1/8 inch at a load of less than 2000 pounds or delamination of the shell and the filler material of more than 1/8 inch regardless of the load required to break the marker shall be cause for rejection of the markers as specified in Section 85-1.03, "Sampling, Tolerances and Packaging."

Pavement markers to be placed in pavement recesses shall conform to the above requirements for retroreflective pavement markers except that the strength requirement shall be 1200 pounds, minimum, and the specific intensity requirements for reflectance of clear and yellow reflectors shall apply after abrading the lens surface in conformance with the "Steel Wool Abrasion Procedure" as follows:

Steel Wool Abrasion Procedure - Form a one inch diameter flat pad using No. 3 coarse steel wool conforming to Federal Specification FF-W-1825. Place the steel wool pad on the reflector lens. Apply a load of 50 pounds and rub the entire lens surface 100 times.

The first and second paragraphs in Section 85-1.06, "Placement," of the Standard Specifications are amended to read:

Except as otherwise provided in this Section 85-1.06, pavement markers shall be cemented to the pavement with hot melt bituminous adhesive or Rapid Set Type epoxy adhesive in conformance with the manufacturer's instructions.

In areas of new construction where the markers are protected from all traffic, including the Contractor's vehicles, Standard Set Type adhesive conforming the provisions in Section 95-2.05 may be used. The protection from all traffic shall be for at least 3 hours after marker placement when the pavement surface temperature is 56° F. or above, at least 24 hours when the temperature is between 41° F. and 56° F., and at least 48 hours when the temperature is 41° F. or below.

The first paragraph in Section 85-1.07, "Pavement Recesses," of the Standard Specifications is amended to read:

Pavement recesses shall be located along the line or lines of new or existing stripes.

Section 85-1.08, "Measurement," of the Standard Specifications is amended to read:

The quantity of retroreflective and non-reflective pavement markers will be measured as units determined from actual count in place.

Retroreflective pavement markers placed in pavement recesses will be measured and paid for as pavement marker (reflective-recessed).

Section 85-1.09, "Payment," of the Standard Specifications is amended to read:

The contract unit prices paid for pavement marker (retroreflective) and pavement marker (non-reflective) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing pavement markers, complete in place, including adhesives, and establishing alignment for pavement markers, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

The contract unit price paid for pavement marker (retroreflective-recessed) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and placing retroreflective pavement markers in pavement recesses, complete in place, including adhesives, constructing the recesses regardless of the type of recess required, and removing and disposing of residue from recess construction, as shown on the plans, as specified in these specifications and the special provisions, and as directed by the Engineer.

Attention is directed to "Traffic Control System For Lane Closure" of these special provisions regarding the use of moving lane closures during placement of pavement markers with bituminous adhesive.

Retroreflective pavement markers shall comply with the specific intensity provisions for reflectance after abrading the lens surface in conformance with the "Steel Wool Abrasion Procedure" specified for pavement markers placed in pavement recesses in Section 85-1.05, "Retroreflective Pavement Markers," of the Standard Specifications and as amended in "Pavement Markers" in these special provisions.

SECTION 10-2. (BLANK)

SECTION 10-3. LIGHTING AND ELECTRICAL SYSTEMS

10-3.01 DESCRIPTION

Signals and lighting (city street) modify, lighting (parking lot), lighting (city street), lighting and sign illumination, traffic operations system, lighting and sign illumination (stage construction), electrical service (irrigation), microwave vehicle detection sensor Type A and Type B, camera unit, pan and tilt unit, and traffic operations system (stage construction) shall conform to the provisions in Section 86, "Signals, Lighting and Electrical Systems," of the Standard Specifications and these special provisions.

Traffic operations system shall consist of:

1. Microwave vehicle detector sensor system.
2. Magnetometer detector system.
3. Closed circuit television (CCTV) station.
4. Call box system.
5. Supervisory control and data acquisition (SCADA) system.
6. Remote terminal units (RTU) and low voltage control center (LVCC).
7. 12 kV cable system.

Work to be performed within the City of San Francisco's right of way shall conform to the special provisions described under "City of San Francisco Electrical Special Provisions". In the event the special provisions for the City or the Standard Specifications Department of Public Works San Francisco do not cover a particular item the Standard Specifications and these special provisions shall be applicable.

Traffic operations system (stage construction) shall consist of relocating, removing and reinstalling traffic operations system field elements, temporary conduits and cables, temporary mountings as shown on the plans as directed by the Engineer to maintain all the elements of the traffic operations system during the various construction stages. Field elements for traffic operations system (stage construction) shall include:

1. Microwave vehicle detector sensor system.
2. Magnetometer detector system.
3. Closed circuit television (CCTV) station.
4. Call box system.
5. Supervisory control and data acquisition (SCADA) system.
6. Remote terminal units (RTU) and low voltage control center (LVCC).

Traffic signal work is to be performed at the following locations:

Essex Street and Harrison Street (Location 1)
Fremont Street and Folsom Street (Location 2)

10-3.02 COST BREAK-DOWN

The Contractor shall furnish to the Engineer a cost break-down for each contract lump sum item of work described in this Section 10-3.

The Contractor shall determine the quantities required to complete the work shown on the plans. The quantities and values shall be included in the cost break-down submitted to the Engineer for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-down submitted for approval.

No adjustment in compensation will be made in the contract lump sum prices paid for the various electrical work items due to any differences between the quantities shown in the cost break-down furnished by the Contractor and the quantities required to complete the work as shown on the plans and as specified in these special provisions.

The sum of the amounts for the units of work listed in the cost break-down for electrical work shall be equal to the contract lump sum price bid for the work. Overhead and profit shall be included in each individual unit listed in the cost break-down, however, costs for traffic control system shall not be included. Bond premium, temporary construction facilities, plant and other items will not be paid for under the various electrical work items and shall be included in the mobilization bid item for the entire project.

The cost break-down shall be submitted to the Engineer for approval within 30 days after the contract has been approved. The cost break-down shall be approved, in writing, by the Engineer before any partial payment for the items of electrical work will be made.

At the Engineer's discretion the approved cost break-down may be used to determine partial payments during the progress of the work and as the basis of calculating the adjustment in compensation for the item or items of electrical work due to changes ordered by the Engineer. When an ordered change increases or decreases the quantities of an approved cost break-down, the adjustment in compensation may be determined at the Engineer's discretion in the same manner specified for increases and decreases in the quantity of a contract item of work in accordance with Section 4-1.03B, "Increased or Decreased Quantities," of the Standard Specifications.

The cost breakdown shall, as a minimum, include the following items:

foundations - each type
standards and poles - list by each type
conduit - list by each size and installation method
pull boxes, junction boxes and splice boxes - each type
conductors and cables - each size and type
service equipment enclosures
telephone demarcation box
luminaires - each type

10-3.03 ABBREVIATIONS

CTSS Caltrans Standard Specifications (July 1992)

The following applicable City Standard Plans are contained in the project plans:

File Number and Change Number	Sheet Title
43,665, Ch.2	Typical: Details of Splicing of 600-Volt Multi-Conductor Cable; Details of Splicing of 600-Volt and 5,000-Volt Thermoplastic Insulated Single Conductor Wiring
49,093	Pull Box Details
STR-7025	Signal Head Mountings
L-24,364.1, Ch.2	Typical Number Arrangement for Street Light
49,092	Street Light Service and Circuit Requirements

The City Standard Plans listed above are also contained in the Standard Plans Book of the City and County of San Francisco, Department of Public Works, Bureau of Engineering, dated September 1987.

Additional copies of the City of San Francisco's Standard Plans may be obtained at the office of the City Engineer, Room 420, 875 Stevenson St., San Francisco, California 94102, telephone (415) 554-6229, on payment of the prescribed purchase price.

10-3.04 EQUIPMENT LIST AND DRAWINGS

The Contractor shall submit within 60 calendar days after approval of the contract, a complete list of equipment to be installed, manufacturer's catalog, shop drawings of custom fabricated units and such other data as required by the Engineer.

Drawings submitted by the Contractor shall be approximately the same size as the contract plans (24" x 36").

The list shall include all items identified on the plans or in these special provisions by the manufacturer's designation. The list shall be complete as to the manufacturer's name, catalog number, address and phone number. The catalog information shall contain information such as physical size, weight, rating, and such additional data as may be required by the Engineer. All data submitted shall be clearly identified by the name of the project and shall be made in quadruplicate.

The list of equipment to be submitted by the Contractor shall include but not limited to the following:

1. Communication cable , 4 AV(Armor Video) cables, 15 kV cable, cables, conductors cable connector splice and terminations.
2. Conduits, liquid type conduit and conduit fittings, conduit bodies, clamps, hangers and fittings.
3. Junction boxes, splice boxes, enclosures, covers and doors.
4. Lighting luminaires, hanger, control equipment, fuses and splices.
5. Hardware, fasteners, screws, bolts, nuts and washers.
6. CCTV system.
7. MVDS system.
8. Electrical components.

10-3.05 MAINTAINING EXISTING AND TEMPORARY ELECTRICAL SYSTEMS

These provisions will not relieve the Contractor in any manner of the Contractor's responsibilities as provided in Section 7-1.12, "Idemnification and Insurance," of these special provisions and Section 7-1.16, "Contractor's Responsibility for the Work and Materials."

10-3.06 EXCAVATING AND BACKFILLING

The excavations shall be backfilled in conformance with the provisions in Section 19-3, "Structure Excavation and Backfill." Backfill placed in conduit trenches which are outside of slope lines and not under pavement shall be compacted to a relative compaction of not less than 90 percent. Backfill on slopes and in areas where pavement is to be constructed shall be compacted to a relative compaction of not less than 95 percent.

10-3.07 FOUNDATIONS

Portland cement concrete shall conform to Section 90-10, "Minor Concrete," except concrete for reinforced pile foundations shall contain not less than 590 pounds of cement per cubic yard. Placement of concrete shall conform to the provisions of Section 51, "Concrete Structures."

Except when located on structures, foundations for posts, standards and pedestals shall be placed "in the solid" and monolithic except for the top 2 inches which shall be placed after the post, standard or pedestal is in proper position.

After each post, standard and pedestal on structures is in proper position, mortar shall be placed under the base plate as shown on the plans. The exposed portions shall be formed to present a neat appearance. Mortar shall consist of one part by volume of portland cement and 3 parts of clean sand, shall contain only sufficient moisture to permit packing and shall be cured by keeping it damp for 3 days.

Anchor bars or studs and nuts, except for Type 30 and Type 31 lighting standards, shall conform to ASTM Designation: A 307. Headed anchor bolts for foundations shall conform to the specifications of ASTM Designation: A 307, Grade B with S1 supplementary requirements. At the option of the Contractor, nonheaded anchor bolts for foundations shall conform either to the specifications of ASTM Designation: A 307, Grade C or to the provisions in AASHTO Designation: M 314, Grade 36 or 55 with S1 supplementary requirements. When nonheaded anchor bolts conforming to the specifications of ASTM Designation: A 307, Grade C are furnished, the end of each fabricated anchor bolt shall be either coded by end stamping as required in ASTM Designation: A 307 or the end that projects from the concrete shall be permanently coded with a green color by the manufacturer. High strength anchor bolts, bars, or studs for Type 30 and Type 31 lighting standards shall conform to ASTM Designation: A 325, A 325M or A 449 and shall comply with the mechanical requirements of ASTM Designation: A 325 or A 325M after galvanizing. Nuts and washers for high strength anchor bolts shall conform to ASTM Designations: A 563 or A 563M, and F 476 or F 476M, respectively. In addition to the requirements of ASTM Designation: A 449, studs shall be marked on either end as required for bolt heads."

Foundation for lighting standards shall be cast-in-drilled hole pile.

Sleeve nuts shall be used on Type 1-B standard. Foundations for Type 1-B standards shall conform to the details on E-133, "Anchor Bolts With Sleeve Nuts", except that the bottom of the base plate shall be flush with the finished grade.

10-3.08 STANDARDS, STEEL PEDESTALS AND POSTS

Type 30 and 31 standards shall have slip bases, unless otherwise shown on the plans.

On Standard Plan E-132, in the Luminaire Arm Data table, the "P" Mounting Height data listed under the No Barrier column shall apply to Type 22 lighting standards and the data listed under the 32-inch barrier column shall apply to Type 21 lighting standards.

Standards with an outside diameter of 12 inches or less shall be round. Standards with an outside diameter greater than 12 inches shall be round or multisided. Multisided standards shall have a minimum of 12 sides which shall be convex and shall have a minimum bend radius of 4 inches.

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.

All ferrous metal parts of tubular sign structures shall be galvanized and shall not be painted.

10-3.09 CONDUIT

Conduit to be installed underground shall be the rigid steel or rigid non-metallic type unless otherwise specified.

The conduit in a foundation and between a foundation and the nearest pull box shall be the rigid steel type.

When a standard coupling cannot be used for coupling metal type conduit, a UL listed threaded union coupling, as specified in the third paragraph in Section 86-2.05C, "Installation," of the Standard Specifications, or a concrete-tight split coupling or concrete-tight set screw coupling shall be used.

Conduit runs shown on the plans to be located behind curbs may be installed in the street, within 3 feet of and parallel to the face of the curb, by the "Trenching in Pavement Method" described in Section 86-2.05C, "Installation," of the Standard Specifications. Pull boxes shall be located behind the curb or at the locations shown on the plans.

After conductors have been installed, the ends of conduits terminating in pull boxes, and in service and controller cabinets shall be sealed with an approved type of sealing compound.

At locations where conduit is required to be installed under pavement and if delay to any vehicle will not exceed 5 minutes, conduit may be installed by the "Trenching in Pavement Method."

Pull ropes for use when installing cables in rigid non-metallic conduit shall consist of a flat, woven, lubricated, soft-fiber polyester tape with a minimum tensile strength of 1,800 pounds and shall have printed sequential measurement markings at least every 3 feet.

A No. 12 copper pull wire or a pull rope shall be installed in conduits which are to receive future conductors. The pull rope shall consist of a flat, woven, lubricated, soft-fiber polyester tape with a minimum tensile strength of 1800 pounds and shall have printed sequential measurement markings at least every three feet. At least 2 feet of pull wire or rope shall be doubled back into the conduit at each termination.

All excavated areas in the pavement shall be backfilled, except for the top 1.2 inches, by the end of each work period. The top 1.2 inches shall be placed within 3 calendar days after trenching.

Liquid Tight Flexible Conduit (LTF)

Use of LTF is permitted where shown on the plans only, the LTF conduit shall be non-metallic. The conduit shall meet the requirements of UL non-metallic conduit. The conduit shall conform to the provision of Article 351 of the NEC under "Non-metallic LTF conduit" the PVC jacket shall be UL approved sunlight resistant.

10-3.10 PULL BOXES

Grout shall not be placed in bottom of new or existing pull boxes.

10-3.11 CONDUCTORS AND WIRING

Splices shall be insulated by "Method B".

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

The minimum insulation thickness, at any point, for Type USE, RHH or RHW wire shall be 0.039 inches for conductor sizes No. 14 to No. 10, inclusive, and 0.051 inches for No. 8 to No. 2, inclusive. The minimum insulation thickness, at any point, for Type THW and TW wires shall be 0.027 inches for conductor sizes No. 14 to No. 10, inclusive, 0.040 inches for No. 8, and 0.054 inches for No. 6 to No. 2, inclusive.

The insulation for No. 2 and larger conductors shall be one of the types listed above or shall be Type THWN.

In addition to the requirements for splices in detector circuits, the open end of cable jackets or tubing shall be sealed in a manner similar to the splicing requirements to prevent the entrance of water.

Section 86-2.09D, "Splicing," of the Standard Specifications is amended by retitling as "Splicing and Terminations," and the last paragraph is amended to read: "All splices and terminal lugs for conductor sizes No. 8 and smaller shall be soldered by the hot iron, pouring or dipping method. Open flame soldering will not be permitted."

For conductor sizes No. 2 and larger, the insulation may be black and the ends of the conductors shall be taped with electrical insulating tape of the required color for a minimum of 20 inches.

Add the following note to the conductor table shown on Section 86-2.08A of the Standard Specifications:

10. Black acceptable for size No. 2 and larger. Tape ends for 20 inches with indicated color.

Conductors for multiple circuits shall be UL or ETL listed and rated for 600-V operation. The insulation for No. 14 through No. 4 conductors shall be one of the following:

1. Type TW polyvinyl chloride conforming to the requirements in ASTM Designation: D 2219.
2. Type THW polyvinyl chloride.
3. Type USE, Type RHH or Type RHW cross-linked polyethylene.

Conductors for wiring wall luminaires and soffits shall be stranded copper, with insulation rated for use at temperatures up to 257° F.

Overhead lighting conductors shall be No. 8, or larger, medium hard drawn copper with weatherproof covering.

Conductors shall run in conduit, except overhead and temporary installations and where conductors are run inside poles.

When new conductors are to be added or existing conductors are to be removed from existing conduit, all conductors shall be removed; the conduit shall be cleaned as provided in Section 86-2.05C, "Installation"; and both old and new conductors, as shown on the plans, shall be pulled into the conduit as a unit.

Connectors and terminal lugs for conductor sizes No. 8 and smaller shall be soldered by the hot iron, pouring or dipping method. Open flame soldering will not be permitted.

The Contractor may, at the Contractor's option, use either of the following splice insulation methods:

1. "Method B" as shown on the plans. A minimum of 2 thicknesses of electrical insulating pad shall be used. Pads shall be applied to the splice in accordance with the manufacturer's recommendations.
2. Heat-shrink tubing as provided above.

Bonding jumpers shall be copper wire or copper braid of the same cross sectional area as No. 6 for series lighting systems and No. 8 or larger for all other systems. The jumper size shall be increased to match the load or the circuit breaker size, or shall be as shown on the plans.

The bonding jumper in standards with handholes and traffic pull box lid cover shall be attached by a 3/16 inch or larger brass bolt and shall be run to the conduit or bonding wire in the adjacent pull box. Standards without handholes shall be bonded by a jumper attached to all anchor bolts, and shall be run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after the cap has been placed on foundation.

For equipment grounding purposes in rigid non-metallic conduit, a No. 6 copper wire shall be run continuously in circuits used for series lighting, and a No. 8, minimum, copper wire shall be run continuously in all other circuits. The bonding wire size shall be increased to match the circuit breaker size, or shall be as shown on the plans. Where rigid non-metallic conduit is to be installed for future conductors, the copper wire may be omitted. Equipment bonding and grounding conductors are not required in conduits which contain only loop lead-in cable or signal interconnect cable or both.

Ground electrodes shall be one-piece, 10 feet , minimum, lengths of galvanized steel rod or pipe not less than 3/4 inch in diameter, or of copper clad steel rod not less than 0.60 inch in diameter. Ground electrodes shall be installed in conformance with the provisions of the Code. The service equipment shall be bonded to the ground electrode by use of a ground clamp or exothermic weld and No. 6 or larger copper wire enclosed in a 1/2 inch or larger diameter conduit.

Fifty-Twisted Pair Cable

The 50-twisted pair cable shall have No. 20 conductors made from solid annealed copper. Insulation of the conductors shall be polyolefin with standard telephone color coding. Pairs shall be arranged in groups and wrapped with distinctively colored binder threads for distinction between groups. A non-hygroscopic wrap shall be applied over cable core. A 1.75 mil copper synthetic polymer back tape, overlapped to provide 100 percent coverage and a stranded No. 20 copper drain wire shall be provided for each group. All group shields shall be completely isolated from each other. The outer jacket shall be black polyethylene. The cable shall be rated for 300 volts and be suitable for wet or dry locations and for installation in conduit.

Six-Conductor Cable

The 6-conductor cable shall have No. 16 stranded copper conductors rated for 600 volts, suitable for uses in wet or dry locations and for installation in conduit. The insulation of the conductors shall be Type THWN and colored coded. The cables shall be assembled with non-hydroscopic fillers and binder tape. The outer jacket shall be black polyethylene.

Forty-Conductor Cable

The 40-conductor cable shall be as specified for the 6 conductor cable, except that it shall meet the NEMA Standards for 40 conductor cable construction.

Field Testing Conductors and Cables

The 300-volt and 600-volt conductors shall be tested for continuity, ground and insulation resistance in accordance with Section 86-2.14B, "Field Testing," of the Standard Specifications.

The telephone cables shall be tested in accordance with REA Standard PE-22 for voice transmission, insulation resistance, loop resistance and cross-talk.

Field-testing shall be performed before connections to equipment and in the presence of the Engineer. Tabulated test data by the Contractor shall be submitted to the Engineer for review.

CLOSED CIRCUIT TELEVISION CABLES

Television control (TVC) cable shall consist of 15 No. 18 conductors, unshielded and with an outer jacket. Each conductor shall have a minimum of 16 tinned copper stands with a minimum of 15 mils insulation. Individual conductor insulation shall be chrome PVC with a nominal thickness of 40 mils. The outside diameter of the jacket shall not exceed 0.55 inch.

Color code for TVC cable shall be:

1. Black
2. White
3. Red
4. Green
5. Orange
6. Blue
7. White/ Black
8. Red/ Black
9. Green/ Black
10. Orange/ Black
11. Blue/ Black
12. Black/ White
13. Red/ White
14. Green/ White
15. Blue/ White

Television power (TVP) conductors shall be 3 No. 14 (120 V(ac), AC-, equipment ground) individually insulated, stranded copper conductors in conformance with Section 86-2.08, "Conductors," of the Standard Specifications. The conductors shall be color coded black, white, and green respectively.

Television control power (TVCP) cable shall consist of 12 No. 18 conductors, unshielded and with an outer jacket. Each conductor shall have a minimum of 16 tinned copper strands with a minimum of 15 mils insulation. Individual conductor insulation shall be polyvinyl chloride (PVC), rated for 300 V (see color code below). The jacket shall be chrome PVC with a nominal thickness of 40 mils. T he outside diameter of the jacket shall not exceed 0.45 inch.

Color code for TVCP cable shall be:

1. Black
2. White
3. Red
4. Green
5. Orange
6. Blue
7. White/ Black
8. Red/ Black

9. Green/ Black
10. Orange/ Black
11. Blue/ Black
12. Black/ White

Television video (TVL) cable shall consist of an RG-6/U coaxial cable. Each cable shall be provided with a solid No. 18 copper clad steel center conductor and shall conform to the following requirements:

Electrical	TVL
Capacitance (picofarads/ft nominal)	16.5
Impedance (ohms-nominal)	75
Velocity of propagation (nominal)	84%
D.C. loop resistance (ohms/1000 ft)	35.7

Attenuation at 68° F:

Frequency (MHz)	TVL (Nominal dB/100 ft)
5.0	0.60
30	1.11
108	1.95

Physical Specifications	TVL Nominal O.D. (inches)
Copper-clad steel center conductor	0.040
Foam polyethylene dielectric	0.180
Sealed APA tape with 1/16-inch overlap	0.187
Woven aluminum braid	0.212
Sealed APA tape with 1/16-inch overlap	0.216
Woven aluminum braid	0.241
Flooding compound	
PVC outer jacket	0.297

(APA = Aluminum polyolefin and aluminum with adhesive)

TVL cable shall be terminated with BNC plug connector at both ends.

Coaxial Cable Connectors (TVL Coaxial Cables).--Coaxial cable connectors for attaching Type TVL coaxial cable shall meet the following requirements:

1. Electrical:

Impedance	75 ohms nominal
Return loss	30 dB minimum , from 5 MHz to 300 MHz
Rated working voltage	500 V (rms)

2. Mechanical:

Type of construction	Integral sleeve BNC
Method of attachment	Crimp-crimp
Composition	Bodies - alloy Finish - chromate conversion, silver plating, or other corrosion resistant metal

3. Environmental:

Temperature	-50° F. to +122° F.
Moisture	Weather resistance design

The mating connector for TVL cable in junction box shall be provided. The center contact of this jack shall be beryllium copper.

Testing.--Testing of TVL cables and connectors shall be performed in accordance with provisions in Section 86-2.14B, "Field Testing" of the Standard Specifications and these Special Provisions.

Cable lengths found to have faults shall be replaced and retested. The removed faulty cable shall be disposed of by the Contractor.

Prior to the beginning of work, each length of coaxial cable shall be tested for attenuation and faults to ensure compliance with specifications contained herein using a time domain reflectometer (TDR). For the purpose of these Special Provisions, a fault in a long length of cable is defined by one or more of the following:

a. Return loss measurements indicating that attenuation exceeds 3 dB at 5 MHz to 30 MHz in a portion of cable less than 3 meters long.
b. A return loss measurement indicating that there is a short in the cable.
c. A return loss measurement indicating a cut or open circuit in the cable.
d. A visual inspection which reveals exposure of or damage to the cable shielding.

TELEPHONE CABLE

The telephone cable (TC) shall consist of 6 pairs of No. 19 solid copper conductors. Conductors shall be twisted in pairs. Each conductor shall be insulated with a high molecular weight, heat stabilized, color coded polyethylene material. The insulation shall be 18 mils nominal.

Color code for TC cable shall be as follows:

1. White/Blue
2. White/Orange
3. White/Green
4. White/Brown
5. White/Gray
6. Red/Blue

The core shall be protected by a non-hygroscopic polyester film with a single longitudinally applied 5-mil thick corrugated copper shield (or 8-mil thick plastic coated aluminum shield). A moisture barrier of petrolatum-polyethylene compound shall be applied over the core tape and over and under the cable shield to fill all cable interstices.

The cable shall be provided with an outer jacket of extruded, black, high molecular weight, heat stabilized polyethylene material. The outer jacket shall have a thickness of 60-mils nominal. The outer diameter of the cable shall be 0.60-inch maximum.

Splices will not be allowed, except where shown on the plans.

15 kV POWER CABLE

All 15 kV power cables shall be of the same gauge and manufacturer, and installed per the plans. The 15 kV power cables shall run continuously, separately, grouped and without splices except where shown on the plans.

Cable Requirements.--If the ambient temperature of where the cables are stored drops below -54° F. The 15 kV power cables shall remain in an ambient temperature of least 61° F. for 24 hours prior to installation.

The components of the 15 kV power cable shall have the following characteristics:

A. Cables shall be shielded rated for 15 kV by the manufacturer and be UL listed Type MV-90 or MV-105. The cable shall have a performance record demonstration a minimum of 20 years successful operation experience in utility and industrial power cable applications.
B. Conductors shall be Class "B" Copper Stranding sized per the plans. Conductors shall be encased with a material which reduces conductor-insulation stress.
C. The insulation shall be a corona immune material, made from a ethylene-Popylene rubber (EPR) base, and rated at 133 percent. The insulation shall be compounded by the cable manufacturer in its own facility and not contain polyethylene. The discharge of the insulation shall be demonstrated by withstanding 21 kV voltage for 250 hours without failure when tested in accordance with the method described in ASTM D2275-89. The insulation shall be encased with and insulation or semi-conduction shield. The shield shall be covered with a 0.005 inch copper tape shield with 20 percent overlap.

D. The jacket shall be PVC or polyethylene, of at least 0.080 inches thickness. The jacket surface shall be printed as required by UL 1072.

The Contractor shall submit to the Engineer for approval the manufacturer and manufacturer's specifications of all power cables.

Cable Pulling.--The Contractor shall submit in writing to the Engineer for approval, a schedule of pulls prior to cable installation. The Contractor shall certify in writing that the cable installation meets the requirements of the cable manufacturer and these special provisions concerning pulling tensions, allowable sidewall pressures, and installed radius limitations.

All conduits and ducts to be used, new and existing shall be swabbed or brushed prior to installing any cable. All conduits or ducts over 200 feet in length shall be pre-lubricated prior to installing any cable.

The Contractor shall schedule with the Engineer a time in which the pulling process can be monitored by the Engineer. The Contractor shall not be compensated for the installation of any power cables which are installed in the Engineer's absence.

The cables and armored cable shall be installed using the pulling eve method. The pulling eye(s) shall be a system manufactured specifically for attaching a pull eye directly on to the conductors of shielded power cables. The single or multiple type may be employed. If not factory installed, the appropriate installation tools and kits shall be used. The eye(s) shall be sized to specifically to fit the shielded power cable being installed.

All quadrant blocks and radius cable sheaves shall have a minimum radius of 24 inches and at least five equally spaced sheaves or a minimum radius of 36 inches and at least three equally spaced sheaves. All sheaves shall be at least 2.7 inches in width.

The maximum pulling force that may be exerted on the combined cables is 1,650 pound-force. The maximum pulling force that may be exerted on the armored cable is 2,500 pound-force.

All pulls totaling more than 200 feet or incorporation bends totaling more than 80 degrees must incorporate the use of dynamometer, force gauge, tension measuring or limiting device. The dynamometer or force gauge shall be adjustable to limit or stop the pulling force of the machine, or the display shall be marked prominently enough that the force can be read from a distance of 10 feet by the Engineer.

The pulling compound to be used shall be of the non-petroleum type. It may be factory prepared, or field mixed according to the manufacturer's specifications. The pulling compound shall be one of the ready-to-use types listed below, or the manufacturer's equivalent for field mixing:

American Cable Colloid Co. – Sli X-300
Cable Associates, Inc. – Gel-Lube 7/5
Generam Machine Products Co. – No. 7437-pc
Ideal Industries, Inc. – Aqua-Gel II or CW
Mac Products, Inc. – MacLube No. CA-51
Minerallac Electric Co. – Minerallac H-2B
Plymouth Rubber Co. – No. 45 Cable Pulling Lubricant
Polywater Corp. – "A", "G", "J", or "WJ"

Terminating.--All terminations and splices shall be done by personnel certified in Medium Voltage Cable Splicing. Certification shall be by a company that manufactures high or medium voltage cables splices, or union certification. The Contractor shall submit to Engineer for approval the qualification of any and all personnel that will be involved in termination or splicing the medium voltage cables.

The cables shall be terminated in the substation using equipment and devices specifically designed for use with shielded power cable. The cables shall be installed onto the existing terminal lugs of the switchgear after removing the existing cables from the terminal lugs. All bolts, washers, and torque values shall be submitted to the Engineer for approval.

The cables shall be spliced onto the armored cable inside the new 15 kV junction box at the San Francisco Anchorage. The cables shall be spliced to the armored cable using equipment and devices specifically designed for use on the cables being installed.

All terminations and splices shall employ the no-stress cone hand-applied taped method.

All proposed termination and splice methods and equipment shall be submitted to the Engineer for approval 15 working days before work may begin. Do not order or fabricate any materials or devices unless approved by the Engineer.

C**onduct of work**.--The Engineer will make all arrangements with the Utilities and State forces for de-energizing or all switching operations on State equipment on which the Contractor may need to work. The Contractor shall submit a schedule of working days before any of these services are required.

All work shall be performed during the hours specified elsewhere in these special provisions. All State electrical facilities shall be fully operational prior to 14:00 each work day. The Contractor shall be financially responsible for any accident that may occur because of the Contractor's failure to restore a facility to full operation prior to 14:00 of any day.

The Contractor shall be responsible for any and all damage to equipment or material due to improper handling, testing, or servicing procedures. The Contractor shall replace or restore to its original condition any equipment or material so damaged during the course of work at Contractor's expense.

The new medium voltage system shall be installed, tested, and fully operational before the existing medium voltage system is to be removed, abandoned, or modified. The Contractor is responsible for coordination this work with all other Contractors so that no part of the construction is delayed for the installation of the new medium voltage system. The Contractor shall be financially liable for any and all delays that are a result of failure to install the new medium voltage system.

Safety.--In general, all work, testing, servicing, and cleaning should be performed on apparatus de-energized and disconnected from the power source. Power circuits shall have conductors shorted to ground by a hot line grounding device. All safety equipment deemed necessary to prevent potential injury to personnel or damage to equipment shall be provided by the Contractor.

10-3.12 BONDING AND GROUNDING

Metallic cable sheaths, metal pull box cover, metal conduit, grounding conductors, ballast and transformer cases, service equipment, sign switches, and metal poles and pedestals shall be made mechanically and electrically secure to form a continuous systems, and shall be effectively grounded . Bonding jumpers shall be copper wire or copper braid of the same cross sectional area as No. 6 for series lighting systems and No. 8 or larger for all other systems. The jumper size shall be increased to match the load or the circuit breaker size, or shall be as shown on the plans. Equipment grounding conductors shall be color coded to Code requirements or shall be bare.

The bonding jumper in standards with handholes and traffic pull box lid covers shall be attached by a UL listed lug using a 0.18" or larger brass bolt and shall be run to the conduit or bonding wire in the adjacent pull box. Standards without handholes shall be bonded by a jumper attached to a UL listed ground clamp on all anchor bolts, and shall be run to the conduit or bonding wire in the adjacent pull box. The grounding jumper shall be visible after the standard has been installed.

Where slip base standards or slip base inserts are installed, the bonding jumper shall not intrude into the slip plane. Bonding shall be accomplished by a jumper attached to a UL listed ground clamp on all anchor bolts or a UL listed lug attached to the bottom slip base plate with a 0.18 inch or larger brass bolt.

For equipment grounding purposes in all conduit types, a No. 6 bare copper wire shall be run continuously in circuits used for series lighting, and a No. 8 bare, minimum, copper wire shall be run continuously in all other circuits. The bonding wire size shall be increased to match the circuit breaker size in accordance with the code, or shall be as shown on the plans. Where conduit is to be installed for future conductors, the copper wire may be omitted. Equipment bonding and grounding conductors are not required in conduits which contain only loop lead-in cable, fiber optic or signal interconnect cable or combination thereof.

Ground electrodes shall be one-piece 10-foot minimum, length of galvanized steel rod or pipe not less than 3/4 inch in diameter . or of copper clad steel rod not less than 0.6 inch in diameter. Ground electrodes shall be installed in conformance with the provisions of the Code. the service equipment shall be bonded to the ground electrode by use of a of a ground clamp or exothermic weld and No. 6 or larger copper wire enclosed in a size 1/2 inch or larger diameter conduit.

Bonding of metallic conduit in metal pull boxes shall be by means of bonding bushings and bonding jumpers connected to the bonding wire running in the conduit system.

10-3.13 SERVICE

Type III service equipment enclosures shall be the aluminum type.

Overlapping exterior seams and doors shall meet the requirements for Type 3R enclosures specified in the NEMA Enclosure Standards.

Multiple pole circuit breakers shall be the internal trip type.

Dead front panel or panels, and corresponding exterior door, shall be hinged on one side and shall be openable without the use of tools.

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.

The neutral conductor shall run from the service equipment enclosure to the controller cabinet without splicing to any other neutral conductor.

The clearance between the bottom of the lowest circuit breaker and the bottom of the service equipment enclosure for a Type III-A series shall be 24 inches minimum.

Installation of a barrier type terminal block in service equipment enclosures is not required.

10-3.14 SIGN DISCONNECTS

Sign disconnects shall be fused switches.

10-3.15 TESTING

Materials Testing

Material and equipment to be tested shall be delivered to either the Transportation Laboratory or a testing location designated by the Engineer. Acceptance testing will be performed by the State.

The Contractor shall allow 30 calendar days for State testing from the time the material or equipment is delivered to the State test site. All shipping, handling, and related transportation costs associated with testing shall be borne by the Contractor. When equipment being tested has been rejected for failure to comply with the specifications, the Contractor shall allow 30 calendar days for State retesting. The retesting period shall begin when the corrected equipment is made available at the test site.

The Contractor will be notified when testing of the equipment has been completed and it shall be the Contractor's responsibility to pick-up the equipment at the test site and deliver the equipment to the site of the work.

Testing and quality control procedures for Model 170 and Model 2070 controller assemblies shall conform to the requirements in "Transportation Electrical Equipment Specifications," and "Traffic Signal Control Equipment Specifications," issued by the State of California, Department of Transportation, and to all addenda thereto current at the time of project advertising.

Testing and quality control procedures for all other traffic signal controller assemblies shall conform to the requirements in the NEMA TS Standards for Traffic Control Systems.

Functional Testing

Acceptance of new or modified traffic signals shall be made only after all traffic signal circuits have been thoroughly tested.

The functional test for each new or modified system shall consist of not less than 5 days of continuous, satisfactory operation. If unsatisfactory performance of the system develops, the condition shall be corrected and the test shall be repeated until the 5 days of continuous, satisfactory operation is obtained.

Except for new or modified portions of existing lighting circuits and sign illumination systems, the State or local agency will maintain the system or systems during the test period and will pay the cost of electrical energy for the operation of all of the facilities that are undergoing testing. The cost of any necessary maintenance performed by the State or local agency on new circuits or on the portions of existing circuits modified under the contract, except electrical energy, shall be at the Contractor's expense and will be deducted from any moneys due, or to become due, the Contractor.

10-3.16 PAINTING

Existing equipment to be painted in the field, including State-furnished equipment shall be washed with a stiff bristle brush using a solution of water containing 2 tablespoonfuls of heavy duty detergent powder per gallon. After rinsing , all surface shall be wire brushed with a coarse, cup shaped, power-driven brush to remove all poorly bonded paint, rust, scale, corrosion, grease or dirt. Any dust or residue remaining after wire brushing shall also be removed prior to priming.

10-3.17 NUMBERING ELECTRICAL EQUIPMENT

The placement of numbers on electrical equipment will be done by others.

10-3.18 TELEPHONE DEMARCATION CABINET

The Contractor shall furnish and install all cable assemblies, punch block, and connecting blocks inside the TDC, except those that are provided by the telephone company (TELCO), as shown on the plans and as directed by the Engineer.

Ground rod shall meet the requirements of NEC Article 250-84.

Padlockable drawer latch shall be padlock hasp.

Backboard C shall be secured by a retaining screw.

Duplex outlet and GFCI duplex outlet shall be separately connected to the main circuit breaker.

The bottom plate for TDC shall be 1/8 inch aluminum.

10-3.19 STATE-FURNISHED CONTROLLER ASSEMBLIES

The Model 170 controller assembly or assemblies, including controller unit, completely wired controller cabinet and inductive loop detector sensor units, but without anchor bolts, will be State-furnished as provided under "Materials" of these special provisions.

The Contractor shall construct each controller cabinet foundation as shown on Standard Plan E-106 for Model 332 and 334 cabinets (including furnishing and installing anchor bolts), shall install the controller cabinet on said foundation, and shall make all field wiring connections to the terminal blocks in the controller cabinet.

A listing of field conductor terminations, 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 all controller assemblies. The Contractor's responsibility shall be limited to that provided for in Section 6-1.02, "State-Furnished Materials," of the Standard Specifications.

10-3.20 CITY OF SAN FRANCISCO ELECTRICAL SPECIAL PROVISIONS

MAINTAINING EXISTING CITY TRAFFIC SIGNAL AND STREET LIGHTING SYSTEMS

The Contractor shall notify the Bureau of Light, Heat and Power of the City and County of San Francisco, Phone (415) 554-0730, at least five days prior to performing any work on their existing street lighting system. All splicing of new to existing conductors or disconnection of existing conductors shall be done in the presence of the Engineer and as directed.

Disconnection of any existing or temporary street lighting will not be permitted except as directed by the Engineer.

The Contractor shall notify the Engineer and the Traffic Signal Division, 901 Rankin Street, San Francisco, (415) 550-2736, at least 24 hours in advance of removing, disconnecting or doing any work on any existing traffic signal equipment, wiring or conduit, or placing in service any traffic signal equipment installed under this contract. In this contract, the Contractor shall install all new traffic signal conductors but the City personnel shall splice and connect new traffic signal conductors to the existing phase conductors from the controller in pull box shown on the plans.

The Contractor shall notify the Engineer and the Bureau of Light, Heat and Power, (415) 554-0730, at least one day prior to performing any work on the existing lighting. Prior to starting work for foundation for the electrolier the Contractor shall contact the City Engineer at (415) 554-1688 and verify that the base plate of the City-furnished electrolier is compatible with the foundation anchor-bolt dimensions shown in the plan. The Contractor shall make arrangements to purchase anchor bolts and to pick up the City-furnished electrolier from the Yard on 69 Bryant Street to the construction site when needed.

Traffic signal system shutdowns shall be limited to periods between the hours of 9:00 a.m. and 4:00 p.m. In the event it is foreseen that the Contractor cannot complete the work to restore any existing traffic signal to normal service before 4:00 p.m., the Contractor shall install or reinstall temporary wiring, at his own expense, to put such equipment in service by that time. Street lighting system shall be in continuous service from 4:00 p.m. of each day to 9:00 a.m. of the following day.

The Contractor shall furnish and install whatever temporary or permanent conduit, overhead and other wiring and equipment, as necessary, shall make all connections and do other work necessary to maintain normal signal and street lighting operation and at the conclusion of the need therefor, shall remove all temporary facilities from the site.

The Contractor shall be completely responsible for the maintenance and continuity of operation of any temporary electrical facility installed by him.

Lamps in traffic signal heads installed or relocated by the Contractor that burn out during the life of contract will be replaced by the City.

Lamps in street lighting luminaries installed, relocated or worked on by the Contractor that burn out during the life of the contract shall be replaced at the Contractor's expense with new, approved equal lamps.

The cost of electrical energy for any temporary facility will be borne by the City but the Contractor shall bear all costs of any temporary service connections.

Vehicular and pedestrian signals shall be covered until the time they are activated for operation.

Full compensation for maintaining existing traffic signal and street lighting in operation shall be considered as included in the contract lump sum price paid for signal and lighting (city street) modify at the various locations and no additional compensation will be allowed therefor.

FOUNDATIONS

Sleeve nuts shall be used on Type 1-A standard. Foundations for Type 1-A standards shall conform to the details on plan Sheet E-133, "Anchor Bolts With Sleeve Nuts", except that the bottom of the base plate shall be flush with the finished grade.

Concrete for foundations for city street signal and light poles shall conform to 10-3.??R, "Classes of Concrete," of these special provisions. No pre-cast foundations shall be allowed.

Concrete for foundations shall conform to CTSS Section 90-10, "Minor Concrete" and these special provisions, shall contain not less than 564 pounds of cement per cubic yard, unless noted otherwise on contract drawings.

CONDUIT

Unless otherwise specified on the plans, the conduit for city street lighting and traffic signal work shall be of rigid steel hot dip galvanized after fabrication. The conduit shall comply with these special provisions and shall meet the requirements ANSI C80, NEMA FBI, UL and NEC.

Zinc primer paint on conduit threads and damaged conduit surfaces shall conform to section 86-2.05C, "Installation," of CTSS, except that the use of spray cans will be permitted.

Installing conduit by jacking conduit or pulling and pushing conduit in the ground shall not be allowed.

Conduits shall not be installed at a depth greater than 36 inches below pavement surface, nor 30 inches below ground surface in unpaved areas; and minimum depth of conduit shall be 24 inches in roadway areas and 18 inches in sidewalk and unpaved areas.

Rigid Steel Conduit, Galvanized

General.--The Contractor shall furnish and install galvanized rigid steel conduit complete with fittings and appurtenances, where and as shown on the plans or where required, including all excavating, backfilling, restoring pavement, and other incidental work necessary or required for a complete, legal and satisfactory installation.

Material.--Rigid steel conduit, including couplings, elbows, and nipples, shall be new, first quality, standard weight, wrought steel, galvanized on the exterior and interior surfaces and furnished with plastic thread protectors. Galvanizing shall be by hot-dipping, electroplating, sherardizing, or metallizing process, and shall meet the latest requirements of the National Electric Code. Each length shall bear the label of the Underwriters' Laboratories, Inc., and the name of the manufacturer.

All surfaces of conduit and fittings shall be free of obstructions, projections, roughness, blisters, scale, sharp edges and rust.

All conduit fittings, such as couplings, elbows, outlet boxes, junction boxes, caps and locknuts, shall be threaded fittings, and, together with covers there for, shall be galvanized ferrous material.

Covers shall be furnished with neoprene gaskets cemented thereto and stainless steel screws. Gasket cement shall be of the type approved for automotive engine application. Non-cemented surfaces of gaskets shall be coated with a lubricant containing silicon and of the type approved for application on rubber-like materials.

Hot-dipped galvanized rigid steel conduit shall be used for all installation outdoors above ground, and cast in concrete.

Rigid steel conduit for above ground use in buildings, except conduit buried in concrete, may have sherardized or equivalent coating.

Installation.--Rigid steel conduit shall not be cut with pipe cutters but shall in all cases be cut with a hack saw. Both ends of every length and piece of conduit shall be carefully reamed open to the full diameter, and all burrs and sharp edges shall be removed. Threads shall be cut clean and true with sharp dies. No connections shall be made with defective threads. No pipe fittings, except caps, shall be used. Three piece union couplings shall be used at each point of conduit union. All conduit and screwed fittings shall be securely tightened and installation made in a workmanlike manner.

Except for indoor work in dry locations, the external threads only of all steel conduit and fittings, except at grounding bushings, shall be well painted with conductive pipe joint compound before assembly, so that the compound will not be forced into the conduit in tightening the joints. The heating of any metallic conduits for the purpose of bending is prohibited.

All conduit, including existing conduit intended for reuse, damaged on the job, before and during installation, shall not be used in the work, and shall be removed from the job site immediately.

Conduit shall be brought into pull boxes and junction boxes in such a manner that sufficient space is allowed for proper bonding of the conduits. All conduit shall be installed so that the cable or wire will not be damaged in pulling.

After installation, the Contractor shall clean out all new and reused conduits by pulling a mandrel or steel brush, approved by the Engineer, through each run. At all stages of the work, everything possible shall be done to prevent foreign material from entering conduits.

All ends of conduit not immediately connected or used shall be capped. After conductors have been installed, the ends of conduits terminating in pull boxes and control enclosures shall be sealed with an approved type of sealing compound.

Conduit fittings shall be installed with the cover facing the installer and so that the cover screws are accessible and not obstructed. The Contractor shall furnish and install all necessary fittings for attaching the conduit entrance to equipment enclosures.

Where metallic conduits enter panel boxes, pull boxes or outlet boxes, except where entering concrete pull boxes, the conduits shall be secured in place by galvanized locknuts and bushings, one locknut inside and one locknut outside the box, and a bushing on the conduit end, all drawn tight to insure perfect electrical and mechanical contact. The locknuts shall be tightened against the box without deforming the box. Insulating bushings shall be installed as required by code. Insulating bushings shall have the insulating material permanently fastened to the fittings.

Where existing conduits are shown on the plans to be reused and any portions thereof are damaged or the ends and terminal elbows thereof are rusted or lack threads, the Contractor shall furnish and install conduit, elbows and nipples to replace the existing conduit. Such conduit replacement will be paid for as Extra Work. Such Extra Work will be approved only if, in the opinion of the Engineer, the Contractor has made every reasonable effort, including the use of compressed air and approved lubricants and solvents, to use the existing conduits. The Extra Work will be subject to the limitation that work to the extent specified to be alterations shall be done as incidental work.

Underground.--The Contractor shall lay underground conduit in open trench.

Except as hereinafter specified, conduit shall not be installed at a depth greater than 36 inches below pavement surface, nor 30 inches below ground surface in unpaved areas; and minimum depth of conduit shall be 24 inches in roadway areas and 18 inches in sidewalk and unpaved areas.

If an existing pipe or duct is in the path of, or obstructs, the laying of underground conduit at normal depth, and if such pipe or duct extends to a depth greater than 3 feet, the conduit shall cross over the pipe or duct. If such pipe or duct extends only to a depth of 3 feet or less, the conduit shall cross one foot below the pipe or duct.

Where parallel runs of conduits are installed in a common trench, such conduits shall have a minimum separation of two inches.

Where underground conduit changes direction, long radius sweeps shall be used instead of short bends, and in no case, except at foundations or where otherwise specified, shall a bend radius of less than 30 inches be used. Bends at foundations or other underground structures shall be of maximum possible radius, in no case less than 12 times the internal diameter of the conduit. Conduit shall not be flattened in bending, and shall be free of kinks and indentations. In addition, unless otherwise directed, the maximum number of bends in any conduit run shall be as follows: a run of conduit between the bases of standards and controller pedestals shall not contain more than the equivalent of two 90 degree and one 45 degree bends; a run of conduit between pull or junction boxes shall not contain more than the equivalent of three 45 degree bends; a run of conduit between the base of a standard or controller pedestal and pull or junction box shall not contain more than the equivalent of one 90 degree and one 45 degree bend.

PULL BOXES

Pull boxes and covers for city street lighting and signals shall be precast reinforced concrete. All details and dimensions shall be per plan Sheet E-134 as shown on the plans. Crushed rock pad and grout in the bottom of the pull boxes shall not be allowed. Fuse and fuse holder shall be installed in the lighting circuit as per plan Sheet E-135.

Pull boxes shall not be more than 250 feet apart on long runs.

Pull boxes shall not be placed where they will be subject to vehicular traffic.

All pull box covers shall be inscribed with first line, "STREET LIGHTING", and the second line, "120/240 VOLT". Letters shall be 1-inch and made with 1/4-inch wide strokes. Letters inscribed in concrete lids covers shall be made with 1/8-inch (minimum) deep imprints. Legends in steel covers shall be made with weld bead letters.

CONDUCTORS AND WIRING

Conductors for city street traffic signal shall be Type UF. Conductors for street lighting shall be Type THW insulated for 600 volts. No. 8 or larger shall be stranded copper; No. 14 through No. 10 shall be solid copper. Wiring from the base of the pole to luminaire shall be the same size as to the nearest pull box.

Traffic signal wires for city street signal shall be color coded and tagged in accordance with the following schedule:

CIRCUIT	PHASE	BASE COLOR	STRIPE	LABEL
Vehicle Signals	2, 6 (A) 4, 8 (B) 1, 5 (C) 3, 7 (D)	Red, Yellow, Brown Red, Yellow, Brown Red, Yellow, Brown Red, Yellow, Brown	None White Black White	Head # Head # Head # Head #
Pedestrian Signals	2p, 6p 2p, 6p 4p, 8p 4p, 8p 1p, 5p 1p, 5p 3p, 7p 3p, 7p	"DON'T WALK" Red "WALK" Brown "DON'T WALK" Red "WALK" Brown "DON'T WALK" Red "WALK" Brown "DON'T WALK" Red "WALK" Brown	None None White White Black Black White White	Head # Head # Head # Head # Head # Head # Head # Head #
Pedestrian Push Buttons	2p, 6p 4p, 8p 1p, 5p 3p, 7p	Blue Blue Blue Blue	None White Black White	Ped. Head # on same corner and same phase as button
Trolley & preempt Switches	N/A	Blue	Black	TS # or PE #
12-Conductor Cable	N/A	Black (jacket)	None	* see below
Detector Cable	1 thru 7	Black (jacket)	None	Per plans

* Install labels on 12-Conductor cable near each conduit end. For example, a single cable in a pull box requires two labels – one label near each conduit end. 12-Conductor cable labels shall identify where cable is headed, i.e. north, south, east, west, controller, etc.

Grounded and common wires shall be color-coded and labeled in accordance with the following schedule:

CIRCUIT	BASE COLOR	STRIPE	LABEL
Pedestrian Push Button	White	Black	PB
Signal Common	White	None	None
Service Neutral	White	None	None
Trolley Switch	White	None	None
Service	White	None	None
Spare	Black	None	None

In all pull boxes and the controller cabinets, all traffic signal conductors shall be grouped by signal head with electrical tape and labeled by signal head number as designated on plan sheets.

In all pull boxes, all conductors running between the same two conduits shall be further grouped and wrapped in at least one location with electrical tape near the center of the slack.

In the controller cabinet, all conductors shall be further grouped and labeled by phase in an orderly manner.

Installation 12-Conductor cable shall be as follows:

1. Traffic signal multi-conductor cable shall be jacketed with twelve 600-volt insulated, No. 14 AWG, solid, copper conductors.
2. The function of each conductor and corresponding insulation color code shall be as follows:

Insulation Color	Function
Black	Dial 2
Black w/ white stripe	Spare
White	Common
White w/ black stripe	Spare
Red	Split 2
Red w/ black stripe	Spare
Orange	Split 3
Orange w/ black stripe	Flash
Green	Offset 1
Green w/ black stripe	Offset 3
Blue	Dial 3
Blue w/ black stripe	Offset 2

All field wires shall be grouped according to phase and labeled according to signal location and movement. The labels shall be weather resistant nylon type.

Installation.--The installation of any wiring in the conduit shall not take place until the Contractor has demonstrated to the Engineer's satisfaction and received approval that the Contractor employed all means necessary to clean and prepare the conduits for the installation of wiring therein.

If the existing strapping or lacing of wiring is disturbed in the course of work, the Contractor shall replace or restrap as applicable.

Splicing.--All splicing devices shall be UL approved. All splicing devices of the correct size range for the wire being used. All splices shall be wrapped with one wrap of rubber splicing tape (Scotch 130C or equal), taped with four wraps of plastic electrical tape(Scotch 33+ or equal), and coated with a waterproofing coating (Scotchkote or equal). Splicing shall conform to the details per plan Sheet E-135.

The Contractor shall install the specified wiring in the through the conduit without splicing in the adjacent pull box and as noted on the plans. The wiring once connected to the relative signal head, shall form a continuous run from the signal head to the splicing pull box. The Contractor shall pull new wiring, at the Contractors expense, when it is determined that the unnecessary splicing has occurred.

In all pull boxes all conductor running between the same two conduits shall be further grouped and wrapped in at least with electrical tape near the center of the slack.

In the controller cabinet, all conductors shall be further grouped and labeled in an orderly manner.

BONDING AND GROUNDING

Steel standards with hand holes providing access to the conduit ends shall be bonded to the conduit with a grounding conductor terminated in a screw-type copper box-shaped terminal.

The bonding and grounding jumpers shall be a continuous length of No 6 AWG bare stranded copper wire.

In multiface signal heads bonding conductor shall be run to one face only.

The bonding conductor shall be attached the bottom section of the signal face, using screw-type copper box-shaped terminal, secured to the housing of the signal face with round head stainless steel machine screw, a stainless steel internal tooth lock washer and stainless steel nut.

PAINTING

Paint for signal mounting assemblies shall be traffic signal dark olive green enamel.

Steel signal standards and signal arms shall not be painted.

All electrical equipment furnished and installed by the Contractor shall be painted unless it is factory painted. Existing equipment worked on by the Contractor shall be touch up painted.

Equipment cabinets, switchboards, and enclosures for which factory paint is available shall be factory painted. Factory paint shall be by electodiposition process or equal. It shall consist of one prime coat and two coats of finish at the minimum. The finish shall have a dry film thickness of at least 3 mils. The finish outside color shall be ANSI 61 light gray and the finish inside color shall be ANSI 70 off-white.

All exposed conduits shall be painted to blend in with the background.

For street lighting and traffic signal work, all metal surfaces except luminaires and stainless steel screws shall be painted as follows:

Prime Painting

First Coat: One application of a zinc dust-zinc oxide paint conforming to the requirements of Federal Specification TT-P641, Type II, applied immediately following the completion of all prepainted preparations.

Second Coat: One application of a pretreatment vinyl wash primer conforming to the requirements of CTSS Section 91-2.07. The vinyl wash primer shall be applied by spraying or brushing to produce a uniform wet surface.

City-furnished traffic signal standards shall be primed with one coat of the zinc dust-zinc oxide paint specified above.

Finish Painting

Two separate and complete applications of finish paint shall be applied. Paint for the first application shall be tinted with a compatible coloring agent to slightly contrast with the color of the final application.

The paint used for the finish coats shall be one of the following:

Stainless Steel Beige Enamel	Federal Specification TT-E-1593
Alkyd Gloss Medium Gray Enamel	Federal Specification TT-E-489f
Traffic Signal Dark Olive Green Enamel	Caltrans Standard Specifications (Section 91-4.02)
White Enamel	MIL-E-1115A
Aluminum Paint	Caltrans Standard Specifications (Section 91-2-2.08)
Stenciling Paint	Federal Specification TT-P-98B

The total thickness of applied paint at all points shall be not less than 5 mils.

General

Painting shall include proper preparing of the surfaces to be painted, furnishing, mixing, and applying the painting materials, drying and protecting the paint coatings, and furnishing, maintaining and removing scaffolding and other equipment and appurtenances required for the work, together with all proper facilities for the storing and moving of materials, equipment and appurtenances and the protection of the public and the work from damage and nuisance resulting from the painting operations. Painting shall be carefully, neatly and expertly done in accordance with the best practices of the trade by skilled and competent painters who are thoroughly familiar with the type of work they are performing.

The Contractor shall notify the Engineer forty-eight hours prior to the time he intends to commence painting and also shall notify the Engineer immediately after each coat has been completed. All work and materials will be subject to continuous inspection during the progress of the work, and upon completion.

Unsatisfactory work, and defects, caused by improper conditioning of surfaces for painting, faulty materials or workmanship, or completed painted surfaces not in accordance with the specifications, shall be satisfactorily corrected by the Contractor at his sole expense, to the extent required by the Engineer, including removal of unsatisfactory paint coatings and subsequent repainting.

The Contractor shall furnish, maintain, and remove as his property upon completion of the work, all scaffolding, planking and other equipment and appurtenances which he may required for the proper execution and completion of the work.

The Contractor shall set aside a shed, room or other satisfactory space in which to store and mix materials and shall provide suitable vessels in which all paint mixing shall be done. The Contractor shall not allow discarded paint materials, cans, oily rags, waste, and combustible or flammable materials to accumulate, but shall remove them from the work each night, and shall exercise all other reasonable precautions to prevent fire.

In areas where painting is in progress, the Contractor shall provide and properly locate sufficient drop cloths to protect the work and other property from paint splashes or damage. Special care shall be taken to protect hardware, light fixtures, glassware, finished brickwork, finished floor and wall surfaces, sidewalks, and parked automobiles.

The color of each coat of primer and paint shall be as specified, or as designated by the Engineer, and samples of the colors and shades to be used shall be submitted by the Contractor, for selection and approval by the Engineer, sufficiently in advance to cause no delay in the work.

If the paint the Contractor proposes to use is not the usually used product and factory color for the application involved and exactly as specified, the Contractor shall not commence painting any surface therewith prior to approval by the Engineer of actual samples of each color and shade prepared by the Contractor from the paint intended for use in the work. The samples shall be of adequate size to allow the Engineer to reasonably pass judgment on color, shade, texture and gloss. All paint shall be factory mixed to its final color whenever practicable.

When equipment to be painted by the manufacturer is not manufactured locally, the Contractor shall secure and submit to the Engineer the equipment manufacturer's certification that the preparation of surfaces and application of the prime coats have been made in accordance with the recommendations of the paint manufacturer.

No prime coat will be required on work which has been shop coated or previously painted, except that damaged areas of such primer or paint shall be suitably touched up with primer, to the satisfaction of the Engineer, before application of a subsequent coat of paint.

The metal surfaces of pipe to be insulated shall not be primed or finish painted unless otherwise specified.

Other metalwork not to be painted unless specified, shall be that metal embedded in concrete, piping buried in the ground, brass, bronze, other non-ferrous metal, stainless steel, and certain equipment and parts thereof designated by the Engineer.

Paint shall be applied only on thoroughly dry surfaces during periods of favorable weather, and unless otherwise specified, in accordance with the manufacturer's recommendations. Painting shall not be permitted in rainy, damp, misty, or frosty weather; when freshly painted surfaces may become damaged by rain, fog, condensation, or frost; or when otherwise unsatisfactory. The temperature shall be that which will not materially alter the characteristics of the paint.

Where necessary, the Contractor shall take adequate steps to eliminate dust before painting.

Materials

All painting materials shall be pure, unadulterated, of first quality, of the type expressly designed for the surface and condition for which its use is required, and shall be delivered to the work in original unbroken containers, bearing the manufacturer's name and other information necessary for identification. Materials shall be delivered not less than one week before they are intended to be used, to permit required sampling and testing, and containers shall be opened and materials mixed at the site of the work in the presence of the Engineer. Materials whose containers are not originally opened in the presence of the Engineer, or materials which are not in accordance with the specified requirements, will be rejected and immediately shall be removed from the work by the Contractor.

Specification of materials by manufacturers' trade names and designations is not intended to imply or suggest that products of these manufacturers are preferred or need to be used, but only to designate a standard of quality and type of material required.

If the Contractor elects to furnish substitute paint materials in lieu of those specified, the Contractor shall furnish to the Engineer upon request a certificate from the manufacturer that the substitute materials comply with the specifications, accompanied by a certified formula of constituents for each of the substitute materials.

Paints, stains, primers and sealers shall not be thinned by any material not specifically recommended or approved for such purpose by the manufacturer of the paint, stain, primer or sealer, as applicable, and then not in excess of the amounts recommended or approved by such manufacturer.

No primer or sealer shall be used unless that type of primer or sealer is specifically recommended or approved by the manufacturer of the paint or stain which will be applied over the primer or sealer, as applicable.

Aluminum Paint.--Aluminum paint shall consist of aluminum pigment paste mixed in a vehicle, in the proportion of not less than 2 pounds of paste per gallon of vehicle. The aluminum pigment paste shall comply with ASTM "Standard Specifications for Aluminum Pigments, Powder and Paste, for Paints," Designation D 962.

Linseed Oil.--Raw and boiled linseed oil shall be in accordance with the requirements respectively, of ASTM "Standard Specifications for Raw Linseed Oil," Designation D 234, and "Standard Specifications for Boiled Linseed Oil," Designation D 260.

Turpentine.--Turpentine shall be pure, either gum or steam distilled spirits, in accordance with the requirements of ASTM "Standard Specifications for Spirits of Turpentine," Designation D 13.

Mineral Spirits.--Mineral spirits shall be in accordance with the requirements of ASTM "Standard Specifications for Petroleum Spirits (Mineral Spirits)," Designation D235.

Driers.--Driers shall be in accordance with the requirements of ASTM "Standard Specifications for Liquid Paint Driers, " Designation D 600.

Denatured Alcohol.--Denatured alcohol shall be United States Internal Revenue Formula No. 5.

Preparation of Surfaces

The Contractor shall not commence the painting of any surface until that surface has been satisfactorily prepared and subsequently examined and approved for painting by the Engineer. Paint coatings applied to surfaces that have not been approved by the Engineer will be considered unsatisfactory coatings and, as herein before specified, will be subject to removal.

All surfaces to be painted shall be thoroughly cleaned of all rust, corrosion, loose mill scale, welding flux, dirt, dust, mud, oil, grease, wax, old paint that is loose, blistered, cracked or otherwise unsatisfactory, loose surface materials, moisture, acids, alkalies, or other foreign matter.

Metal Surfaces.--Metal surfaces shall be thoroughly cleaned by wire brushing, scraping, chiseling, hammering, blast cleaning, or other approved means, and the surface wiped clean. Exposed metal surfaces coated with dirt and grease only, may be washed with benzene. No larger area of metal shall be cleaned in advance of painting than can be completely painted before further corrosion, oxidation or dirt accumulation begins. If previously cleaned surfaces are not painted prior to further corrosion, oxidation or dirt accumulation, they shall be recleaned as necessary.

Prime coated surfaces showing signs of rust or other defects, prior to field painting, shall be thoroughly cleaned and reprimed.

Galvanized metal surfaces shall be prepared for painting using Wyandotte Chemical Company, Phosit, or E. I. Dupont de Nemours and Company, No. 5717, or equal, applied in the presence of the Engineer and in accordance with the manufacturer's instruction, and shall be primed with one coat of Subox, Inc., SUBALOX No. lllFD, or Dupont, No. 67-Y-744, or equal primer.

Where solder fluids have been used, metallic surfaces shall be thoroughly cleaned with lacquer thinner before any paint is applied.

Wood Surfaces.--Unless otherwise specified, all wood surfaces, except exterior wood surfaces, shall be sandpapered before any finish is applied, and, where necessary, further sandpapered between coats. All knotholes, pitch pockets or sappy portions shall be sealed with shellac or approved resin sealer under natural finishes, and aluminum paint under paint finishes. Shellac shall not be used on surfaces exposed to the weather. After priming or sealing, all nail holes shall be carefully filled with putty colored to match the finish. All wood to be painted shall be dry before paint is applied.

Plaster Surfaces.--All plaster surfaces shall be properly sized and sealed as necessary to prevent stains and burns, overcome excessive suction, seal air checks and fine cracks and otherwise provide a suitable surface. Sizing shall be such that no peeling, flaking, or popping will result from the use thereof. The sealer shall be capable of bridging air checks and fine cracks.

Concrete Surfaces.--All concrete surfaces shall be wire brushed, blast cleaned or power sanded to remove all traces of form oil and glaze, after which they shall be treated with a solution of 3 pounds of zinc sulphate to one gallon of warm water. The solution shall be brushed on warm and allowed to dry thoroughly, or for not less than twenty-four hours, after which the surface shall be thoroughly flushed with clean water or wiped with damp burlap and allowed to dry, then further prepared by the application of an approved sealer-primer.

Application

All paint and related products not obtainable factory mixed shall be mixed, thinned if required for proper workability, and applied in strict accordance with the recommendations of the manufacturer.

Priming and painting shall be commenced immediately after the surfaces have been approved therefor, except that it shall be the responsibility of the Contractor not to commence work or to halt work, if weather or other conditions that will affect the work become unfavorable.

Care shall be exercised to maintain surfaces in the specified condition until the paint is applied; adequate provision shall be made to protect and maintain the newly painted work.

Prior to application, paint shall be mixed a sufficient length of time to thoroughly mix the pigment and vehicle together and during application, paint shall be kept thoroughly mixed to keep the pigments in suspension. Paint shall be stored on the job in sealed containers.

All paint shall be applied at the proper viscosity. In cool weather, paint shall be heated to reduce its viscosity and facilitate its use. Such heating shall be accomplished by immersing the paint containers in hot water, or heating by other approved means.

Paint materials shall be applied, either by brush or spray, or roller, or any combination of these methods. The coats shall be uniform and free of runs, sags, thin areas, skips or holidays.

Paint brushes shall be of the best quality, of the proper size, and shall have sufficient body and length of bristle to spread the paint in a uniform coat. In general, the primary movement of the brush shall describe a series of small circles, to fill all irregularities in the surface, after which the coating shall be smoothed by a series of parallel strokes. Paint shall be evenly spread and thoroughly brushed out. If a considerable amount of brush marks appear, it will be considered that the paint has been improperly applied. For painting structural steel, round or oval brushes, or approved flat brushes not over 4 inches in width, shall be used. On all surfaces which are inaccessible for painting by regular means, the paint shall be applied by sheepskin daubers, bottle brushes, or by any other means necessary to obtain the proper thickness of paint.

Power spray equipment, if used, shall be modern, in good order, shall include approved water traps, and shall apply the paint in a fine, even spray. When spray methods are used, the operator shall be thoroughly experienced. Runs, sags, thin areas in the paint coat, or skips and holidays shall be considered as evidence that the work is unsatisfactory and the Contractor may be required to apply the remainder of the paint by brush. In any event, uniform coverage, free of wrinkles, blisters or air holes shall be obtained with each coat of paint.

Rollers, when used, shall be of a type which do not leave a stippled texture in the paint film and shall be compatible with the paint type and surface condition as specified by the manufacturer.

When more than one coat of paint is specified, each undercoat shall be a near match in color to the finish coat, but enough difference in color shall exist to distinguish between separate coats. Each coat of paint shall be slightly darker than the preceding coat, unless otherwise directed by the Engineer. The final coat shall be of the color selected by the Engineer from samples as herein before specified.

The first field coat on metalwork shall be applied immediately after installation. The last field coat shall be applied after final cleaning up of the work and final testing of equipment.

The paint for each coat shall be both mixed and applied so that the painting shall be smooth, uniform, and spread so that no excess paint shall collect at any point.

The thickness of each coat shall not exceed that which will result in uniform drying throughout the paint film. In certain critical cases, the thickness of each coat shall be specified on the plans or in the special provisions.

No intermediate or final coat of paint shall be applied until the preceding coat is dry and hard, except in the case of exterior cement-type paint. Time allowed for drying shall in all cases be ample to secure the best possible results.

Sufficient paint shall be applied, in successive coats, to provide a satisfactory cover when the work is completed, but the quantity used for any individual coat or portion thereof shall not be excessive or such as to result in a thicker application than will properly set within a reasonable period, forming a hard, firm and uniformly smooth coating free of blisters, flat spots and similar defects.

The finish work shall show no cloudiness, spotting, holidays, laps, brush marks, runs, curtains, sags, ropiness, or other surface defects not consistent with first class workmanship.

Identification and rating plates of equipment shall be painted with three coats of clear varnish only.

Final Cleanup.--The Contractor shall remove all dropped and splattered paint and other stains and blemishes. If such stains or blemishes cannot be satisfactorily removed from surfaces painted, or from existing finished surfaces, such surfaces shall be satisfactorily repainted or otherwise refinished in such manner that all stains and blemishes shall be obliterated and the finished surface shall be as specified, or in the case of existing surfaces, shall match satisfactorily the adjacent surfaces in color and texture.

Deterioration of Painted Surfaces.--Painted surfaces that, within one year after painting, are found to be non-uniform in color or texture or show evidence of excessive deterioration such as cracking, crazing, blistering, running, peeling, scaling, checking, alligatoring, streaking or staining, will be considered the result of faulty materials or workmanship and shall be satisfactorily refinished by the Contractor in accordance with the requirements of Sub-section titled "Correction of Defects After Acceptance." All painted surfaces shall be capable of withstanding the chemical and physical action of washing with alkali-free soap and water to remove surface dirt without causing the aforementioned deterioration.

Payment

Full compensation for painting shall be considered as included in the contract lump sum price paid for signal and lighting (city street) modify at various locations and no separate payment will be made therefor.

SIGNAL MOUNTING ASSEMBLIES

Signal mounting shall be constructed as per applicable details shown on the Plan STR-7025 and plans Sheets E-136, E-137, E-138 and E-139, as applicable; except as superseded by other contract plans or as needed to accommodate special mounting configurations. All signal frames shall consist of 1-1/2 inch GRC standard steel pipe and fittings, shall be hot-dip galvanized before assembly, with the exception of bronze terminal compartment, bronze slip fitter, and bronze pole clamps, and shall be watertight and free of sharp edges or protrusions which might damage conductor insulation. Before assembly any cut pipe threads shall be coated with zinc primer paint as specified in Section 86-2.05C, "Installation," of CTSS.

Each U-bolt type pole clamp shall consist of a cast bronze pole plate drilled and tapped for 1-1/2 inch GRC pipe thread, a galvanized half inch U-bolt to fit the perimeter of the pole and stainless steel nuts and shake proof washers. Portions of the pole plate shall be hinged for adapting the plate to various pole contours and shall be equipped with bolt openings through which the ends of the U-bolt shall be installed.

Elbows, trees, crosses and slip fitters at the bottom of signal faces shall have 72 equally spaced serrations on the upward facing outlet to match serrations on the bottom of the signal housing. A galvanized steel washer (2-1/2 inch O.D., 2 inch I.D., 18 GA.) and a neoprene washer (2-1/2 inch O.D., 2 inch I.D., 1/8 inch thick) shall be furnished and installed at the top of each signal. The neoprene washer shall be next to the signal housing with the galvanized steel washer above. Signal housings shall be attached to fittings by use of hex head lock nipples. When tops of signal housings are not attached to framework, the hole shall be closed with an ornamental cap, locknut, metal washer and neoprene washer. After all adjustments have been made and all connections are fully tightened, duct sealing compound shall be applied externally to all joints at the top of the signal to make it watertight.

The Contractor shall drill a wiring entry hole on pole to the bottom clamp of each side-mounted signal bracket and to each pedestrian push button station for all internal wired poles without such suitable entry holes. Core drill shall be used for all hole drilling on concrete poles. Care shall be taken not to damage or cut the existing reinforcing steel inside the concrete standard. Part of reinforcing steel exposed during drilling shall be painted with corrosion resistant paint as soon as possible and on the same day. The height for pedestrian signal is 7 feet and for traffic signal is 10 feet, 6 inches from the bottom of framework to grade unless otherwise noted. The vertical axis of each signal shall be truly vertical when installation is complete. The Contractor's attention is directed to the need for different length horizontal 1-1/2 inch pipe nipples top and bottom on poles that are tapered, raked or are otherwise non-vertical at the signal mounting places. It is expected that one horizontal nipple, top or as appropriate, shall be, in the field, shortened and rethreaded as needed to get a tight rigid vertical installation.

Set screws in slip fitters shall have square heads.

SIGNAL POLES

The traffic signal poles shall be installed as per CTSS Section 86-2.04 and plans Sheets E-133 and E-111 as applicable.

STREET LIGHTING

The lamps for the luminaires shall be clear high pressure sodium vapor with mogul bases manufactured by General Electric, Philips, Sylavania, or equal. Align, mount and level lighting fixtures uniformly.

Install lighting fixture at location indicated and in accordance with manufacturer's instructions, complete with lamps, hangers, brackets, fittings, and accessories, ready for operation as indicated. Each street light shall have a fuse holder in its base and shall conform to plan Sheet E-155. The wiring for the street light shall conform to the requirements of plan Sheet E-155. Align, mount, and level lighting fixtures uniformly. All splices for street lighting shall be made in accordance with plan Sheet E-135.

Inspect luminaires, lamps, and associated hardware before and after installation to ensure that they are of the quality and type specified herein and indicated on the Drawings, and are free of defects and damage. Install new lamps not earlier than 48 hours before the date of final inspection and replace lamps within 90 days after final acceptance at no extra cost to the City. Test lighting fixtures for continuity to the grounding system.

Provide street light pole numbers as shown on plan Sheet E-154.

DELIVERY OF SALVAGED EQUIPMENT TO CITY YARDS

Removing, reinstalling or salvaging electrical equipment shall be in accordance with Section 86-7, "Removing, Reinstalling or Salvaging Electrical Equipment," of CTSS and these special provisions.

The Contractor shall deliver the street lighting pole specified to be salvaged as City property to the Bureau of Light, Heat and Power, 639 Bryant Street, San Francisco.

The Contractor shall deliver all existing traffic signal equipment specified to be salvaged as City property to the Traffic Signal Shop Yard a 901 Rankin Street, San Francisco.

The Contractor shall furnish the Engineer with a receipt dated and signed by the City Yard personnel stating the number, description and condition of materials delivered.

Appointments for the delivery of salvaged equipment shall be made twenty-four (24) hours in advance:

Traffic Equipment -The Traffic Signal Division
Tel. No. (415) 550-2736

Street Lighting Equipment
Tel. No. (415) 554-0730

If existing equipment, required to be salvaged, is damaged by the Contractor or by others when such equipment is within the Contractor's control, repairs shall be made in accordance with "Damage to Work or Property" of these special provisions.

If repairs, required to be made by this Section of these special provisions, are not to the satisfaction of the Engineer, the respective equipment shall be considered as lost. Deduction from final contract payment shall be made as determined by the Engineer.

The listing of the above equipment and payment adjustments does not prelude the City from making claims or adjustments for other existing equipment which may be lost or damaged by the Contractor.

DAMAGE TO WORK OR PROPERTY

The Contractor shall be responsible for the safekeeping of, and shall protect, the work and materials from damage due to the nature of the work, the action of the elements, the carelessness of other contractors, or from any other cause whatsoever, until acceptance of the work. Should any such damage occur, the Contractor shall repair and leave the work in a condition satisfactory to the Engineer in every particular at the Contractor's expense.

Neither the City nor any of its officers, employees or agent assumes any responsibility for collecting indemnity from the person or persons causing damage to the work of the Contractor.

Any damage, arising from or in consequence of the performance of the contract, to tracks, pavements, curbs, landscaping, sidewalks, footings, walls, stairs, fences, sewerage and drainage structures, mains, pipes, valves, conduits, poles, wires, transformers, to adjoining work, or to any other improvement or property above or below the surface of the ground, whether private or public, shall be repaired at once at the Contractor's expense, or upon the occurrence of such damage the Contractor shall obtain from the owner of the damaged property a release from his liability for such damage. If the Engineer requires such repair to be made prior to the execution of any part of the work included in the contract, the Engineer will so notify the Contractor who shall delay or discontinue the performance of that part of the work until the necessary repair has been made. Such delay shall not be considered unavoidable, and no extension of time for completion of the contract will be granted there for. When ordered by the Engineer to make any such repair, the Contractor shall start work thereon within forty-eight hours and shall prosecute the same with diligence to completion. Upon failure of the Contractor to comply with such order, or upon his failure to make immediate emergency repairs which are necessary in the best interest of the City or of the public, the Engineer shall have authority to cause such repair to be made and to deduct the cost thereof from any money due, or which may become due, to the Contractor.

Repair or replacement of damaged work or property by the Contractor shall return such work or property to at least the condition before the damage, with respect to quality, strength, appearance, serviceability for use intended, and finish.

The Contractor shall promptly report to the Engineer and to the Contractor's Insurance Carrier with copies to the Engineer, all claims submitted by third parties for damages to property alleged to have been caused by project work, and shall submit monthly status reports listing all of these claims until all claims are settled or withdrawn.

The Contractor shall take immediate action to mitigate or correct any damages when in the opinion of the Engineer these damages present a hazard to persons or property. When no emergency exists, corrections shall be made as soon as the Engineer has determined that progress of the work will not cause further damage.

The Engineer may withhold sufficient funds to cover 125 percent of the estimate of the cost of repairs. These funds will be released after receipt of a statement signed by the claimant indicating that the damage has been repaired or other settlement made to the satisfaction of the property owner.

CORRECTION OF DEFECTS AFTER ACCEPTANCE

The Contractor shall at his own expense make all necessary repairs and replacements to remedy in a satisfactory manner any and all defects in the work, or damages resulting from such defects, due to faulty materials or workmanship, or due to disturbance of or damage to City improvements by the Contractor's operations under the contract and contrary to the specifications, or due to other failure to comply with the specifications, when such defects occur:

A. In any part of the surface work done under the contract, or in surface improvements of the City such as pavements, curbs, walks, tracks, walls, stairways, poles, mechanical and electrical equipment, materials, appurtenances and accessories, or other surface structures provided that such defect or defects be detected within one year following the date of acceptance of the work;
B. In any part of the subsurface work done under the contract, or in subsurface improvements of the City not included in the work under the contract, such as sewers, side sewers, culverts, other drainage structures, pipes, valves, conduits, conductors, or other subsurface structures, provided that such defects in such subsurface work, or disturbance of or damage to, said other improvements be detected within two years following the date of acceptance of the work.

Should the Contractor, after written notification by the Engineer, fail to remedy promptly any such defect occurring as set forth herein before under A or B, or should the best interest of the City require an immediate remedy without the delay incident to such notification, the Engineer may cause such repairs, replacements or other remedy to be made, and the expenses so incurred, limited in case B as provided herein after, shall be chargeable to, and shall be paid by, the Contractor, provided that such expense so incurred by the Contractor, or incurred by the City and paid by the Contractor, on account of disturbance of or damage to City improvements occurring as set forth under B next herein before, shall not exceed an amount equal to 50 percent of the contract cost of all work to be done under the terms of the specifications, or such other amount as may be set forth in the special provisions, and further provided that the liability of the surety on the faithful performance bond, on account of such disturbance of or damage to City improvements occurring as set forth under B next herein before,

shall likewise not exceed 50 percent of the contract cost of all work to be done under the terms of the specifications, or such other amount as may be set forth in the special provisions.

Nothing in this section shall be construed as a waiver, or impairment of any of the City's rights under the contract, or of any other recourse provided by law.

PROGRESS SCHEDULE

Prior to starting the work, the Contractor shall submit to the Engineer one copy and the City Engineer two copies of a progress schedule showing his proposed sequence of operations in the performance of the work, and the estimated dates of starting and finishing the various major parts of the work. The progress schedule shall conform to "Progress Schedule (Critical Path)," elsewhere in these special provision in addition to the following requirements for the City of San Francisco. If a conflict occur in the Contractor meeting the requirements of the two progress schedules, the Engineer will direct the Contractor which to follow. The progress schedule shall conform to the specified time for the completion of the work; shall show a reasonable and orderly work sequence that will preclude excessive times for completion of any part thereof; shall show and be in accordance with the order and delivery dates for equipment and materials requiring special fabrication or otherwise not readily available for purchase and affecting, or critical with respect to, such time of completion; and shall be subject to the approval of, and modification by, the Engineer.

The submission of an amended schedule shall not relieve the Contractor of the responsibility for the notification required by Section 6.8 of the San Francisco Administrative Code which section is included in "Extensions of Time Allowed for Completion of Work," elsewhere in these special provisions.

Format for Progress Schedule.--The format to be used for the submission of progress schedules shall be the applicable of the following:

A. IF THE TIME ALLOWED FOR COMPLETION IS LESS THAN 41 WORKING DAYS, THE FOLLOWING IS APPLICABLE.--The progress schedule and any subsequent revised schedule may be submitted in the form of a written statement outlining the proposed operations.

B. IF THE TIME ALLOWED FOR COMPLETION IS MORE THAN 40 AND LESS THAN 201 WORKING DAYS, THE FOLLOWING IS APPLICABLE.--Within 10 calendar days after the official commencement date, the Contractor shall submit to the Engineer for approval 3 copies of his proposed progress schedule prepared on a City-furnished standard form. Copies of this form are available from the Construction Management Division.

The progress schedule shall show the order in which the Contractor proposes to carry out the work, and the dates on which the Contractor shall start and complete the salient features thereof, including procurement of materials, plant, and equipment.

A revised schedule shall be submitted when one or more of the following conditions occur:

A. Progress falls behind schedule and the Engineer requests in writing, a revised schedule;
B. A Change Order significantly affects the contract completion date or the sequence of activities;
C. The Contractor requests an extension of time of 15 working days or more.

EXTENSIONS OF TIME ALLOWED FOR COMPLETION OF WORK

Extensions of the time allowed in these special provisions for completion of the work shall be in accordance with and pursuant to the provisions of Section 6.8 of the San Francisco Administrative Code as follows:

"SECTION 6.8. CONTRACTOR TO GIVE NOTICE OF DELAY; NOTICE TO CONSTITUTE APPLICATION FOR EXTENSION.--The Contractor shall promptly notify the awarding officer, board or commission in writing of all anticipated delays in the prosecution of the work and, in any event, promptly upon the occurrence of a delay, the notice shall constitute an application for an extension of time only if the notice requests such extension and sets forth the Contractor's estimate of the additional time required together with a full recital of the causes of unavoidable delays relied upon. The awarding officer, board or commission may take steps to prevent the occurrence or continuance of the delay, may classify the delay as avoidable or unavoidable, and may determine to what extent the completion of the work is delayed thereby."

WORK AT UTILITY FACILITIES

The Contractor shall conduct work in manholes, vaults, handholes, and pull boxes of the Pacific Bell Company, the Pacific Gas and Electric Company, the Public Utilities Commission of the City and County of San Francisco, the Department of Electricity, and in all other such facilities not owned by the Department of Public Works, in strict accordance with the

requirements of the owners thereof. The Contractor shall notify the owners of manholes, vaults, handholes, and pull boxes at least 48 hours before commencing work therein.

The Contractor shall not commence the installation of conduit into any manhole, vault, handhole, or pull box until an authorized representative of the owner thereof has designated the point of entry of the conduit. The Contractor shall install the conduit where designated.

Conduit installed to utility company manholes or handholes shall terminate within the wall thereof at a point 3/4-inch from the inside face of wall. The manhole or handhole wall shall be refinished and rounded off with Class B mortar to conform to the interior surface.

The Contractor shall not connect or disconnect any wire or cable, except that exclusively for traffic signal control, in any such manhole or vault.

All persons entering or leaving manholes or vaults shall do so only by ladders, so as to avoid damage to cables and other facilities.

Suitable barricades shall be placed around each open manhole, handhole, or pull box, and a flagman shall be stationed at the manhole during the entire time the manhole cover is off, in accordance with the applicable requirements in "Flagman," elsewhere in these special provisions.

FLAGMAN

In order to avoid danger and delay to the public, the Contractor shall, during the entire time of any approved temporary use of any part of the roadway specified to remain open for traffic, provide competent flagmen, whose sole duty shall be to direct and control the movement of traffic through or past the work, as applicable.

The flagmen shall be provided with appropriate apparel and equipment and shall use hand signals and equipment in accordance with the California Department of Transportation "Manual of Traffic Controls, Warning Signs, Lights and Devices for Use in Performance of Work Upon Highways."

CLASSES OF CONCRETE

Portland cement concrete shall be composed of Portland cement, fine aggregate, coarse aggregate, admixtures if used, and water, proportioned and mixed as specified, and the various classes of concrete shall conform to the following limiting requirements:

Class	Min. no. of sacks of cement per cubic yard of concrete	Min. strength in lbs per sq. inch at 28 days (f'c)	Max. size of coarse aggregates in inches	Slump in inches
7-4000- 1 1/2	7	4000	1 1/2	4 max.
7-4000-3/4	7	4000	3/4	4 max.
6.5-3500-3/4	6.5	3500	3/4	4 max.
6-3500- 1 1/2	6	3500	1 1/2	4 max.
6-3000- 3/4	6	3000	3/4	4 max.
5.5-3000 -1 1/2	5.5	3000	1 1/2	3 max.
5.5-2500-3/4	5.5	2500	3/4	4 max.
5-2500- 1 1/2	5	2500	1 1/2	4 max.
4-2000- 1 1/2	4	2000	1 1/2	4 max.

The class of concrete used shall be as specified. If the concrete class is not specified, Class 6-3000-3/4 shall be used.

Where concrete containing 11-inch maximum size aggregate is specified, but reinforcement clearances or structural dimensions will not permit the use of 11-inch aggregate, the Contractor, with the approval of the Engineer, may substitute concrete of like strength with 3/4-inch maximum size aggregate. Any additional cost there for will be paid for by the City as Extra Work.

The weigh master's certificate, delivered to the Engineer with each load of concrete, shall state the number of sacks of cement per cubic yard of concrete.

Should the quantities of ingredients designed to produce a cubic yard of concrete result in a volume (yield) greater or less than one cubic yard, the amounts of fine and coarse aggregate shall be changed as necessary to maintain the required quantity of Portland cement in each cubic yard of concrete.

The slump of concrete shall be determined in accordance with the requirements of the ASTM "Standard Method of Test for Slump of Portland Cement Concrete, " Designation C 143, which is a slump cone test, or by the "Kelly Ball" method of test. For any batch of concrete, the results of the "Kelly Ball" method of test will be approved equivalent of the required

slump. Any concrete not meeting the slump requirements tabulated in the table set forth herein before shall be immediately removed from the site of the work.

10-3.21 HIGH MAST LIGHTING ASSEMBLY

The high mast lighting assembly shall include the foundation, pole, luminaire lowering device system, luminaires and a control pedestal, as shown on the plans and in conformance with these special provisions.

GENERAL

Installation of the lowering device on each pole shall be made under the supervision of a trained representative of the lowering device manufacturer. Prior to acceptance of the contract, a trained representative of the lowering device manufacturer shall demonstrate that each high mast lighting assembly operates properly. The demonstration shall consist of a minimum of 3 complete cycles of raising and lowering the luminaire ring (complete with luminaires) the full length of the ring's travel, as designed, within one working day, prior to acceptance of the project.

All portions of the high mast lighting assembly shall have a minimum design wind velocity rating of 80 mph.

The lowering device system shall be submitted for inspection and testing. Inspection and testing shall be performed at a site in California approved by the Engineer. The lowering device system shall be demonstrated at the Contractor's expense. Notification shall be given to the Engineer at least 7 days prior to demonstration.

After the high mast lighting system is in operation, an instructional video tape (VHS), complete written instructions and a demonstration to State Maintenance personnel on the maintenance of the high mast lighting assembly, including leveling of the luminaire ring and the procedures for the safe raising and lowering of the luminaire ring, shall be provided.

Spare parts, part lists and the operating, maintenance and service instructions, packaged with or accompanying the equipment installed on the project, shall be delivered to the Engineer prior to acceptance of the project.

SUBMITTALS

Submittals for the high mast lighting assembly shall conform to the provisions in Section 86-1.04, "Equipment List and Drawings," of the Standard Specifications and these special provisions. Submittals shall be delivered to the Engineer at least 45 days prior to erection of the high mast lighting assembly. The Engineer shall be allowed 45 days for the review of submittals. Review areas will include structural, welding, electrical and other areas as determined by the Engineer.

A. Descriptive data, design working drawings, erection working drawings (including aiming directions for each luminaire if the luminaire has an asymmetrical light distribution), isolux diagram for each type of luminaire, calculations, and a list of the material used for the high mast lighting assembly shall be submitted to the Engineer. The material list shall be complete with the name of manufacturer, catalog number, size, capacity, finish, pertinent ratings and identification symbols used on the plans or in the special provisions for each unit.
B. Each submittal shall consist of 5 copies.
C. Plans and detailed drawings shall be not larger than 22 inch x 34 inch.
D. Each separate item submitted shall bear a descriptive title and the State contract number.

Two copies of the submittals shall be forwarded to the Office of Structure Design. The Engineer shall be given a copy of the cover letter or other notification, and date, that the copies were sent to the Office of Structure Design.

INSPECTION

The high mast light poles will be inspected at the fabrication site. The Engineer shall be notified when materials have been delivered to the fabrication site. After delivery, the Engineer shall be given at least 10 days notice before fabrication of the light poles commences.

If all or a portion of the high mast poles are fabricated more than 480 air line kilometers from both Sacramento and Los Angeles, additional shop inspection expenses will be sustained by the State. Whereas it is and will be impracticable and extremely difficult to ascertain and determine the actual increase in such expenses, it is agreed that payment to the Contractor for furnishing said High Mast Light Poles will be reduced by $2500 for each fabrication site located more than 480 air line kilometers from both Sacramento and Los Angeles and an additional $2500 ($5000 total) for each fabrication site located more than 4800 air line kilometers from both Sacramento and Los Angeles.

CONTROL PEDESTAL

A control pedestal shall be installed in conjunction with each high mast lighting pole as shown on the plans. Unless otherwise indicated, the control pedestal shall include the following control equipment:

A. Applicable circuit breakers (ratings as indicated on the plans) for:

1. Main breaker
2. Branch circuits (lighting)
3. Motor and control
4. Receptacle
5. Photoelectric control

B. A remote control reversing switch for winch motor control.
C. A step-down transformer (properly sized to provide voltage and current necessary for winch motor and receptacle).
D. Interlock apparatus (winch motor interlocked to the high mast lighting power cable connector).
E. Photoelectric control (Type V as specified for Service Equipment Enclosure, unless otherwise indicated).
F. Duplex receptacle (120 V(ac), GFCI protected).

Construction and installation of the control pedestal and circuit breakers shall conform to the provisions for a Type III service equipment enclosure in Section 86-2.11, "Service," of the Standard Specifications and to the plans.

Electrical connections and terminations shall be behind dead front panels. Live connections shall not be exposed.

Unless otherwise shown, the pedestal shall be installed a minimum of 16 feet from the high mast lighting pole with doors opening away from the pole.

CORROSION RESISTANCE

Corrosion resistance shall be provided. Methods shall include the following:

A. Avoidance of contact between stainless steel and carbon steel, between different types of stainless steel (including welding material), and between aluminum and ferrous materials.
B. Utilizing continuous welding to eliminate crevices which retain moisture.
C. Minimizing welding of stainless steel.
D. Use of adequate sections and suitable materials to limit stress related corrosion.

POLE

The pole shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications, and these special provisions.

The pole shall include shaft, access hole, access hole cover, support plate and anchor base.

The shaft shall consist of sections of a round or multisided (16 sides) tapered steel tube with a uniform taper of approximately 0.144-inch per foot. Segments of multisided poles shall be convex and shall have a minimum bend radius of 4 inches. The pole shall be hot-dip galvanized after fabrication in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications. Steel used in fabricating the pole shall be a weldable quality steel. No field welding shall be performed in the assembly of the pole.

The pole shall have a reinforced access hole to allow adequate clearance for maintaining and servicing the lowering device. Access hole reinforcement shall provide a bending strength equal to that of the pole without an opening. Other hardware inside the pole shall accommodate the lowering device.

The access door shall be hinged to the pole, open horizontally 180 degrees, and when in the open position shall not interfere with access to the interior of the pole.

Unless otherwise shown on the plans, the pole shall be installed with the access door towards the control pedestal.

The pole shall be erected plumb. The vertical axis of the erected pole shall be within 3 inches of the theoretical vertical axis when measured without the action of sunlight or wind.

The pole shall conform to the requirements of the latest edition and interim revisions of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals." The maximum allowable wind deflection shall not exceed 14 percent of the pole height.

An embossed aluminum plate shall be attached with rivets to the outside of each pole approximately 2 inches above the access hole. The nameplate shall indicate the name of the pole manufacturer and the height of the pole.

A plastic laminated data sheet shall be secured on the inside of the access hole door. The data sheet shall include the names, addresses and telephone numbers of the manufacturers of the pole, luminaire lowering device and luminaires, and the design parameters, including wind velocity, luminaires (number, wattage, model number, mass, projected area and coefficient of drag), and the mass, projected area and coefficient of drag for the pole top lowering mechanism.

LUMINAIRE LOWERING DEVICE

The luminaire lowering device shall consist of a head frame, a luminaire ring and an internal power drive winch unit.

The maximum effective projected area of the total assembly at the top of the pole, exclusive of the luminaires, shall not exceed 5.4 square feet.

The mass of the head frame, luminaire ring and cover shall not exceed 750 pounds.

The head frame shall be hot rolled steel conforming to the requirements in ASTM Designation: A 36. The head frame shall be attached to the pole by means of a steel slip fitter and secured by a minimum of 4 stainless steel setscrews conforming to the requirements in ASTM Designation: F 880, Type 304. The head frame shall be hot-dip galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

The head frame shall be fitted with at least 6 hoisting cable sheaves, of either galvanized or stainless steel, or aluminum, with a minimum 5-inch pitch diameter. The head frame shall be fitted with electrical power cable sheaves or rollers configured to provide a minimum bending radius as specified by the power cable manufacturer.

The hoisting cable sheaves and electrical power cable sheaves or rollers shall be fitted with suitable keepers to keep the cables in their tracks during pole erection and operation. The sheaves shall be supported by stainless steel shafts and shall be fitted with oil-impregnated sintered bronze bushings or roller bearings.

At least 3 hoisting cables shall be supplied. The cables shall be 3/16 inch, minimum diameter, 7x19 strand, stainless steel aircraft cable, manufactured in conformance with the requirements in Military Specification MIL-8320B.

The head frame shall be provided with a cover designed for that device and securely attached with stainless steel machine screws conforming to the requirements in ASTM Designation: F 593, Type 304 and self-locking nuts conforming to the chemical requirements of ASTM Designation: F 594, Type 304, or a stainless steel clamp band. The shape of the lowering device and cover shall be symmetrical about a vertical axis.

The head frame shall also include a minimum of 3 latches which support the luminaire ring when the lowering device is not in operation. Latching shall be accomplished by the alternate raising and lowering of the luminaire ring by the winch and hoisting assembly. When the luminaire ring is raised to the top of the pole, the ring shall automatically latch and be secure in a locked position. Automatic signaling devices shall be visible to indicate that each latch of the luminaire ring is safely locked in place.

No moving latch parts or springs shall be attached to the head frame. Moving parts of the latching mechanism shall be attached to the luminaire ring and serviceable from the ground.

The luminaire ring shall be fabricated of a 6" x 2" x 7-gage , minimum, steel channel or a member of equal strength, with the appropriate number of 50-mm nominal steel tube or pipe mounting arms to accommodate the number of luminaires shown on the plans. The pipe shall conform to the requirements of ASTM Designation: A 53. The ring shall be galvanized in conformance with the provisions in Section 75-1.05, "Galvanizing," of the Standard Specifications.

Roller-contact, spring loaded, centering arms shall be provided which shall center the luminaire ring while ascending and descending the full length of designed travel on the pole. The arm system shall keep the ring concentric with the pole in winds up to 30 mph. The rollers for the centering arms shall be a water resistant, non-marking material. Axle shafts for arms and rollers shall be stainless steel conforming to the requirements in ASTM Designation: A 276, Type 304. The arms system shall not allow the pole to be inadvertently wedged between the rollers and the luminaire ring. Ultimate support of the luminaire ring shall not be lost by individual or total spring failure.

Provisions shall be made for leveling the luminaire ring while in the lowered position. The luminaire support ring shall be level upon installation and again before completion of the contract.

A prewired 600-V(ac) terminal block in a NEMA Type 3R enclosure and a weatherproof power receptacle shall be mounted on the luminaire ring raceway. When the luminaire ring is lowered to ground level, the receptacle shall enable the luminaires to be energized and tested.

An electrical cable of sufficient length to power the luminaire ring, and with appropriate electrical connections, shall be provided to test the luminaires while in the lowered position. A circuit breaker of the rating shown on the plans and an outlet box shall be provided in the pole base.

Electrical cords shall be attached to a weather tight wiring chamber through weather tight cable connections. The main power cord shall support its full weight when installed. A positive connection between cord segments shall be provided across cord joints to prevent stress on the joints.

Power cable shall be Type SO, rated for 600 V(ac) with the number and size of conductors as required. Luminaire ring distribution cord shall be Type ST with insulation suitable for 221° F. Twist-lock receptacles (male and female) shall be provided and shall be rated at a minimum of 30-A, 480-V(ac).

The internal drive mechanism shall raise or lower the luminaire ring at an approximate speed of 11 feet per minute. The winch shall be furnished with 1/4 inch minimum diameter 7x19 strand stainless steel aircraft cable, conforming to the requirements in Military Specification MIL-8320B and of sufficient length to maintain at least 4 wraps around the drum with the luminaire ring in its fully lowered position. Winch cable shall wind uniformly.

The internal power drive winch unit shall include:

A. A heavy duty, totally enclosed, fan cooled, reversible universal type motor, rated at 1/2 horsepower, minimum, for continuous duty, and provided with over current protection.
B. An adjustable torque limiter with ball or roller bearings on all rotating shafts.
C. A remote control reversing switch (labeled "UP" and "DOWN") with minimum 20-foot cord.
D. Worm-gear driven winch.
E. Mounting frame.
F. Weatherproof step-down transformer, if necessary, of sufficient power to supply the motor and provided with over current protection. The transformer, when installed inside the pole, shall be removable without removing other components.
G. Other equipment as necessary.

Internal power drive winch unit components, including transformer, shall be removable through the access hole for repair or replacement.

LUMINAIRES

Each luminaire shall consist of a housing, a reflector, a refractor or lens, a ballast, a lamp socket and a lamp.

Housings shall be fabricated of aluminum. Housings that are painted shall withstand a 1000-hour salt spray test in conformance with the requirements in ASTM Designation: B 117. Metal component parts of the housing shall be fabricated from material at least equal in corrosion resistance and finish to the metal in the housing.

The optical system, consisting of the reflector, refractor or lens, lamp socket and lamp, shall be in a sealed chamber. Sealing shall be provided by a gasket between the reflector and refractor or lens, and a gasket between the reflector and lamp socket. The chamber shall have provision for filtered flow of air in and out of the chamber due to lamp heat. Filtering shall be accomplished by either a separate filter or a filtering gasket.

The adjustable component (refractor or reflector) controlling the orientation of the light distribution of asymmetrical luminaires shall be rotatable 360 degrees around a vertical axis.

Each luminaire shall be provided with a slip fitter for mounting on a 2-inch horizontal pipe tenon and shall be adjustable to plus or minus 3 degrees from the axis of the tenon.

The surface of each reflector shall be specular and shall be silvered glass or aluminum protected by either an anodized finish or a silicate film. The reflector shall be shaped so that a minimum of light is reflected through the arc tube of the lamp.

Each refractor or lens shall be made of heat resistant glass.

Each lamp socket shall be a porcelain enclosed mogul-multiple type. The shell shall contain integral lamp grips to assure electrical contact under conditions of normal vibrations. The socket shall be rated for 1500-W, 600-V(ac), and 4000-V(ac) pulse (400-W lamp), or 5000-V(ac) pulse (1000-W lamp).

Metal halide lamps shall be vertical burning, protected from undue vibration and prevented from backing out of the socket by a stainless steel clamp attached to the luminaire.

Each luminaire shall enclose a dual fuse holder and 2 fuses rated at 5 A at 480 V(ac). Each fuse shall be the standard midget ferrule type, with "Non-Time-Delay" feature, shall be ETL or UL listed, and shall be 13/32" x 1 1/2".

The minimum light distribution for each luminaire shall be as shown on the plans.

BALLASTS

The ballast for each high mast luminaire shall consist of components (core and coils, capacitors and starting aid, if required) mounted within a weatherproof housing which integrally attaches to the top of a luminaire support bracket and lamp support assembly. The ballast shall be readily removable without removing the luminaire from the bracket arm.

Ballasts shall be electrically connected to the optical assembly by means of a prewired quick disconnect.

Ballasts shall be the regulator type.

Other details of ballasts for metal halide luminaires shall be as specified by the luminaire manufacturer.

HIGH PRESSURE SODIUM LAMPS

High pressure sodium lamps shall conform to the provisions in Section 86-6.01B, "High Pressure Sodium Lamps," of the Standard Specifications and these special provisions. Four hundred-watt high pressure sodium lamps shall have an initial output of 50 000 lumens. One thousand-watt high pressure sodium lamps shall have an initial output of 140 000 lumens.

10-3.22 LUMINAIRES, LAMPS, TESTING, LIGHTING CONTROL EQUIPMENT (OTHER THAN HIGH MAST LIGHTING LUMINAIRE)

LUMINAIRES

All luminaires shall comply with Section 86-6.01 "High Pressure Sodium Luminaires" of the Standard Specifications with the following changes and additions:

All lighting fixtures shall be complete with ballasts and lamps and operate from a nominal 480 V, 60 Hz power source and shall be capable of starting and operation the specified lamp within the limits specified by the lamp manufacturer. The luminaries shall be suitable for wet locations per UL 1572, listed for 40°C Ambient, and meet the requirements of UL 595 marine.

Materials.--Materials within the luminaire shall be supplied in accordance with the following requirements:

A. The housing and door shall be die cast copper free aluminum Alloy 360.1 with a minimum thickness of 0.10 inch. Door assembly shall have mechanical stops to limit gasket compression to 25 percent and prevent permanent distortion.
B. The reflector assembly shall consist of high purity aluminum of minimum 0.03 inch thick sheet. Aluminum used for the reflector shall be No. 3002 alloy.
C. All lighting fixtures shall be painted. Painted finishes of fixtures and accessories shall be applied such that the entire assembly is rendered completely corrosion resistant.
D. Where aluminum parts come in contact with bronze or stainless steel parts, apply to both surfaces a coating of corrosion protection material.
E. Components, fasteners and hangers required shall be Type 16 stainless steel.
F. Lampholders and lamp sockets shall hold lamps securely.
G. Gasketing shall be hollow core extruded Silicone Rubber. All shapes used shall be completely cover flange to which gasket is affixed.

Finish.--The luminaire housing shall be alkaline cleaned and covered with zinc phosphate to provide a nonconduction bond between the base metal and paint. A sealing layer of non-chrome material shall cover the zinc phosphate to maximize corrosion resistance. After a deionizing water rinse, polyester powder paint shall be electrostatically applied and cured a 424° F. Final finish thickness shall be 2 to 4 mils.

The luminaire housing shall have a painted polyester finish to withstand a 1,000- hour salt spray test as specified in ASTM Designation: B 117 with no more than 1/8-inch creep from a substrate scribe mark on material of a type identical to that used in fixture construction.

A flexure test per ASTM D522 of the paint finish shall be performed on a .040-inch thick 1100 aluminum test panel and no cracking shall be evident at the 1/8-inch bend radius.

The aluminum reflector shall be treated to provide the necessary light reflectance compatible with the optical design requirements.

Lampholders. --The lamp holders shall be porcelain keyless medium or mogul construction, as required by lamp size, wired with high temperature 16 gauge wiring. The sockets shall be pulse rated at 4 kV. The screw shell shall be nickel-plated brass and shall incorporate anti-vibration grips. The center contact shall be spring loaded.

Ballasts.--The ballast operation characteristics shall comply with the recommendations of the lamp manufacturer with regard to lamp electrical characteristics. The ballast shall be suitable for line voltage (+/- 10 percent) with a 0.9 power factor, and maximum current crest factor of 1.8. The ballast shall provide reliable lamp starting at 104° F. The ballasts shall conform to the applicable requirements of UL 1029.

The ballasts and all related electrical components shall be removable and replaceable as a single unit without disturbing the aiming.

Wiring.-- The fixture wires shall be stranded tinned-copper construction, not smaller than No. 16 AWG. The insulation shall be crosslinked polyolefin (UL Style 331) and 300° F. rated. Wireways and wiring channels shall have rounded edges or bushed holes wherever conductors pass through. Insulated bushings shall be installed at points of entrance and exit of wiring. Each luminaire shall be fused internally with a fast-acting type fuse to disconnect the luminaire from the branch circuit in case of ballast failure or other electrical problem within the luminaire.

Fixture hardware.--Screws, bolts, or other assembly and mounting parts, shall be Type 316 stainless steel.

Welding.--Locate weld inside assemblies to be anodized to conceal visible discoloration in the heat-affected zone. Where weld metal will be exposed after anodizing, select a filler alloy to closely match composition of the base metal. Comply with parent metal manufacturer's recommendations for such filler alloys.

Lens assembly.--The optical assembly shall be fully enclosed and gasketed. It shall include an anodized reflector. The reflector shall have transverse elliptical fluting to minimize re-direction of light energy through the arc tube and to provide even illumination on the lighted surface, free from streaks or striations. The lens shall be 0.175 inch minimum thickness tempered glass.

Optical control and photometric performance.--The luminaries shall have a symmetrical photometric distribution. The Isolux curve of the luminaires shall match those in the plans.

Mounting brackets for fixture supports.--Mounting brackets shall be integral to a bolted metal framing system, and constructed according to the plans. The fixture shall fit the mounting bracket without modification.

Ignitors.--The device(s) which interface the ballast with the tube, sometimes called the "starter" or "ignitor' shall be called the ignitor for the purposes of these special provisions. The ignitor shall be designed to eliminate stress on the ballast due to a missing or burned out tube by directing the high voltage spike directly to the lamp without being directed to the lamp through the ballast windings, or by stopping the starting cycle. The ignitor shall be capable of being used with the type of ballasts used in this project. The ignitor shall be designed so that a cycling or extinguishing lamp shall not adversely affect the igniter or ballast. The ignitor shall be UL listed. The ignitor shall be warranted against defective materials and workmanship by the manufacturer.

Installation.--The luminaire shall be mounted over the outside lane, but closest to the adjacent lane. It shall be possible to replace the luminaire from the outside lane without closing the adjacent lane. The installation of the luminaires shall be according to the plans, the manufacturer's instructions, and adjusted per field conditions with the Engineers approval. The luminaire shall be adjusted such that the light illumination the floor beam within the cutoff region is minimized.

LUMINAIRE LAMPS

All luminaires on this contract shall have a lamp installed. The type of lamp shall be high pressure sodium, wattage corresponding to what is shown on the plans. All lamps shall be manufactured specifically for the type of luminaire selected, modification of the lamp or luminaire is prohibited.

All lamps shall be the dual element, instant restrike type.

LIGHTING CURRENT TESTING

After all of the luminaires on a circuit have been installed, the Contractor shall make and record true RMS current measurements in the presence of the Engineer with all luminaires illuminated. The Contractor shall provide a typed or computer generated form on which the measurements are to be recorded. The Contractor shall provide a true RMS current meter for this purpose.

The measurements shall be taken on all phased of each branch at fifteen and thirty luminaires from the end of the circuit and at the lighting control enclosure. The current measurements shall demonstrate that the loads are nearly balanced.

10-3.23 HIGH PRESSURE SODIUM LUMINAIRES

The following subparagraph is added to the sixth paragraph in Section 86-6.01:

C. a vertical plane at minimum peak acceleration level of 1.0 G peak-to-peak sinusoidal loading (same as 0.5 G peak) with the internal ballast installed, for a minimum of 2 million cycles without failure of any luminaire parts.

10-3.24 CITY LUMINAIRE (TYPE A)

The city luminaire (Type A) shall be a CUTOFF OPTICS roadway luminaire, shall operate one 150 watt high pressure sodium (HPS) lamp from 120 V, 60 Hz and shall be capable of starting and operating the specified lamp within the limits specified by the lamp manufacturer. The luminaire shall contain a completely prewired integral ballast and an optical assembly that shall provide an IES Distribution Type II. Labeling shall be in accordance with ANSI standards.

The luminaire shall include a precision die-cast aluminum upper and lower housing with an electrocoat gray paint finish. Lower housing shall be hinged and separable and shall hold the lamp in place. The internal slip fitter shall contain two bolts which do not pass through the housing but tighten from below with lower housing in dropped position. The one-piece serrated pipe clamp shall be capable of adapting to 1 5/8-inch through 2 3/8-inch pipe without rearrangement of clamp or bolts, and shall allow positive leveling ±4 degree from horizontal in 2 degree increments using stair step notches.

There shall be a prewired no-tool photoelectric control receptacle.

There shall be a metal or polymer bird guard, shipped installed and an external quick-release stainless steel bail latch requiring no tools and operable with lineman's gloves.

The luminaire shall contain a ballast in full compliance with lamp-ballast specifications available to the fixture manufacturer from the lamp manufacturers at the time of fixture manufacture. The ballast shall be prewired to the lamp socket and dead-back terminal board, requiring connection of power supply leads to the terminal board only. The plug-in ignitor for HPS lamps shall be removable without the use of tools.

The ballast shall reliably start and operate the lamp in ambient temperatures down to -40° F. for HPS.

The luminaire and ballast shall be from the same manufacturer.

The cutoff optical assembly shall include a precision formed aluminum reflector with a chemically-bonded lightweight non-breakable glass finish on both inside and outside surfaces providing corrosion resistance, durability and ease of cleaning, and an impact-resistant tempered flat glass lens. The cutoff optical assembly shall allow no light above 90 degrees with use of flat glass lens.

The cutoff optical assembly shall have non-wicking felt gasket which acts as filter by excluding particulate contamination when the luminaire is closed, or an elastomer gasket, around the edge of the reflector.

The optical assembly shall contain an adjustable mogul base socket with superior lamp gripping. The socket shall have added insulation, giving it the ability to handle the higher pulse rating of new HID systems.

Prior to ordering the city luminaire (Type A), the luminaire shall be approved by the Engineer and the Bureau of Light, Heat and Power of City San Francisco.

10-3.25 SIGN LIGHTING FIXTURES-MERCURY

The last two items of "Autotransformer Regulator Ballasts" of subparagraph F "Ballast" of Section 86-6.05 are revised to read:

(3) The lamp current crest factor shall not exceed 2.0 at rated input voltage.
(4) Ballast losses shall not exceed 45 W.

10-3.26 PAVEMENT ILLUMINATION

The third subparagraph of the first paragraph in Section 86-6.11B "Pavement Illumination" is revised to read:

Lamps shall be medium-base 120 V(ac), 120 W (minimum), PAR-38 quartz-halogen floodlamps.

10-3.27 JUNCTION BOXES

Junction boxes shall conform to the detail shown on plans and as specified in these special provisions.

All junction boxes to be installed in wet or outdoor locations shall meet NEMA Standard for Type 3R enclosures and those for indoor locations shall conform to NEMA Standard for Type 12 enclosures. Junction boxes shall also conform to JIC Standard for pull boxes. Junction boxes shall be fastened with stainless steel screws.

All junction boxes shall be provided with removable front covers secured with non-corrosive screw or screws held latches. Provision for drainage of water caused by condensation shall be provided for each junction box install outdoors.

Junction boxes shall be standard commercial products specifically manufactured for use in electrical installations.

After installation, the junction boxes shall be completely painted with the same type and color of paint being used on structure. The name plate shall not be painted.

Miscellaneous Metal

Miscellaneous metal shall consist of clamp fasteners, support channels and other metal products required to connect or fasten cable, conduit and equipment as shown on the plans in conformance with these special provisions.

Items shown on the plans to be used outdoors for this project shall be galvanized in accordance with the provisions in Section 75-1.05, "Galvanizing", of the Standard Specifications.

Other items used indoors, unless otherwise specified, shall be standard commercial installations and shall be galvanized.

Conduit Support

All conduits shall be supported with hangers, brackets, conduit straps and supports which shall be secured to surfaces by means of expansion shields and bolts suited for purpose.

For single conduit run, single hole malleable iron clamps shall be used.

10-3.28 WIRELESS RADIO MODEM ENCLOSURE, POWER SUPPLY AND POWER ADAPTER

Enclosure.--A NEMA 3R enclosure with size not to exceed 12" x 12" x 6".

Power Supply.--The power supply shall have the following requirements:

Input	115 V(ac)
Output	+12 VDC at 3 amperes
Regulation	2% line, 2% load with 50 mV peak-to-peak ripple maximum

Input shall be fuse protected. Output shall be short circuit protected. A power "ON" LED shall be used to indicate that the power supply is on.

Power Adapter.--The power adapter shall have the following requirements:

Input	115 V(ac)
Output	+12 VDC at 1 ampere
Regulation	2% line, 2% load with 50 mV peak-to-peak ripple maximum

10-3.29 WIRELESS RADIO MODEM

Acceptable wireless radio modem shall meet all qualifying specifications identified herein, and is at least equivalent in functionality to Metricom Ricochet ICR-900 modem, and has the adaptability to the Metricom Ricochet wide-area wireless network.

The wireless radio modem shall utilize spread-spectrum, packet switching data technology. The modem shall operate within the FCC license-free Radio Frequency (RF) range from 902 MHz to 928 MHz.

Each radio modem shall work with wide-area wireless network which employs frequency-hopping spreading technique using 162 channels, with each channel having a bandwidth of 160 kHz. The hopping shall be asynchronous and pseudo-random. Raw RF data rate shall be 100 kbps, minimum.

The communication protocol shall emulate existing State specified point-to-multipoint communication polling scheme. Each modem shall be polled by a front-end processor (FEP) every 30 seconds and the maximum latency shall be 4 seconds.

Each modem and software shall be designed to provide a migration path to an upgrade communication protocol in conjunction with an IP gateway.

Radio Modem.--Each radio modem shall meet the following specifications:

Receiver:	
Type	Double Conversion Superheterodyne
Dynamic range	-98 dBm to 0 dBm
Packet error rate	$1x10^{-1}$ ($1x10^{-6}$ BER)
Frequency stability	(5 ppm

Transmitter	
RF output minimum (at antenna connection)	+27 dBm
RF output typical	+30 dBm (1.0 Watt)
Out-of-band spurious radiation	FCC 15.205
Deviation	37.5 kHz
Modulation bandwidth	160 kHz
Modulation type	Gaussian frequency-shift keying (GFSK)
Output impedance	50 ohms
Frequency stability	5 ppm

Processing	
CPU	SH1-RISC
Clock speed	16 MHz minimum
Memory DRAM FLASH ROM	 2 MB minimum 512 kB minimum

Data Port	
Serial interface	EIA-232
Data rate	1200 bps to 115 kbps asynchronous
Parity	Odd, Even or None
Data bits	7 or 8
Stop bits	1 or 2
Duplex	full duplex

Electrical	
Voltage	12.0 VDC (10.0 - 24.0 VDC operating range)
Rx input current @ 12 VDC (average)	400 mA
Tx input current @ 12 VDC	1 A
Fuse	Internal thermal resettable
Voltage line protection	Reverse polarity

Mechanical	
Interface connections: Power Data port Antenna	 2-pin ampere Mate-N-Lock DB-9, female, DCE N-type, female
Status indicator	LED
Case	sheet metal
Weight	1.1 lb
Size	5.44" (W) x 8.08" (D) x 2" (H)

Environmental	
Operating range	-40˚C to 60˚C
Operating vibration	FCC part 68D paragraph 302 modified
Operating shock	20 G, 11 ms, half sine per Military Standard 802
Humidity	Military Standard 202F, Method 106 Modified, 10 days

Agency approval	
FCC	Certified Part 15.247

EMI and power/control susceptibility	
Electromagnetic radiation	FCC Class B, Part 15.247
Electromagnetic susceptibility	ANSI C37.90.2 Modified
Surge withstanding capability	ANSI C37.90.1, FT and SWC
Electrostatic Discharge	IEC 801.2

Serial Cable Assembly.--A serial cable assembly shall be provided to terminate the radio modem to the terminal blocks in the controller cabinet. All connector pins shall be crimp-type.

Communication Protocol.--The radio modem shall be compatible with State specified serial communication protocol via EIA-232 interface. The EIA-232 serial interface shall be the standard three-wire interface consisting of transmit, receive and signal ground. No handshaking shall be required.

Antenna.--Each radio modem shall be provided with low-profile radome antenna including cable, connectors and mounting accessories. The antenna shall have the following requirements:

Electronic	
WSWR at resonant point	1.5:1 or less
Nominal impedance	50 ohms
Gain	3 dB minimum
Radiation pattern	omni-directional
Polarization	vertical
Maximum power input	125 watts
Frequency	890-950 MHz

Mechanical	
Height	0.64 inch
Top diameter	3 inch
Base diameter	4.32 inch
Radome	Rugged, high-impact plastic with black finish

Antenna cable.--The antenna shall come with 1.64 foot length of RG58/U coax cable with Type N, male connector on the end. The antenna cable shall be routed through a waterproof cord-grip box (CGB) connector into the metallic enclosure.

Installation.--The antenna shall be mounted on the top of a metallic enclosure with a waterproof adhesive. The adhesive shall be resistant to exposure in the temperature range from -35° F. to 300° F. The adhesive shall not degrade with minor temporary exposure to gasoline, JP-4, mineral spirits, motor oil, acetone, or methyl ethyl acetone.

Warranty.--The wireless radio modem shall have a minimum one-year warranty during which the manufacturer shall replace or repair any units that proven to be defective at no additional cost to the State. The warranty period starts on the date the modem is registered with network name server after its installation has been accepted in the field.

10-3.30 MICROWAVE VEHICLE DETECTION SENSOR (MVDS) SYSTEM- TYPE B

The microwave vehicle detection sensor (MVDS) system shall include all microwave detector units, enclosures, connectors, cables, junction box, mounting equipment, software, firmware, power supply units and all other support equipment.

Functional Requirements.—The MVDS signal shall emulate the response of an inductive loop detector. The MVDS units shall be tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. Each MVDS unit shall operate independently and not interfere with other MVDS units.

The microwave sensor unit shall operate in the frequency band of 10.525 GHz ± 25 MHz. The transmitter power shall be a maximum of 10 mW.

The MVDS field of view shall be covered by a maximum detection range defined as follows:

Elevation beam-width	45 degrees
Azimuth beam-width	15 degrees
Range	10 feet to 196 feet

Each MVDS unit shall have the capability of providing a minimum of 8 detection zones within each beam footprint. The size of each zone shall be user definable with a maximum range resolution of 6.6 feet. The minimum footprint shall be greater than or equal to 6 feet).

The time of events shall be measured in a maximum of 10 millisecond resolution.

Measurement accuracy shall be better than 95 percent certainty for vehicle presence.

Each MVDS unit shall be supplied with a connectorized MVDS cable harness with appropriate cable length for each installation. The MVDS cable shall consist of 15 unshielded twisted pairs of No. 20 conductors with an overall shield. Each conductor shall have a minimum of 19 tinned copper strands with a minimum of 0.064 inches of PVC insulation rated for 300 V at 221˚ F. The outer jacket shall be chrome PVC with minimum thickness of 0.064 inches. The outside diameter of the cable shall not exceed 0.768 inches. A minimum of 13 feet of slack of MVDS cable is required in each controller cabinet.

The connector shall be MS3476W18-32S or equivalent. This connector shall include contacts for powering the sensor unit, RS-232 serial data communications and contact pairs for each detection zone. The connector pinout is as follows:

No.	Pin No.	Designation	Signal	Remark
1	A	Contact Closure	Opto 1	
2	B	Contact Closure	Opto 1 Return	
3	C	Contact Closure	Opto 2	
4	D	Contact Closure	Opto 2 Return	
5	E	Contact Closure	Opto 3	
6	F	Contact Closure	Opto 3 Return	
7	G	Contact Closure	Opto 4	
8	H	Contact Closure	Opto 4 Return	
9	J	Contact Closure	Opto 5	
10	K	Contact Closure	Opto 5 Return	
11	L	Contact Closure	Opto 6	
12	M	Contact Closure	Opto 6 Return	
13	N	Contact Closure	Opto 7	
14	P	Contact Closure	Opto 7 Return	
15	R	Contact Closure	Opto 8	
16	S	Contact Closure	Opto 8 Return	
17	d	Contact Closure	Opto 9	
18	e	Contact Closure	Opto 9 Return	
19	f	DC Power	12-24 VDC +	
20	g	DC Power	12-24 VDC -	
21	h	AC Power	115 V(ac) +	Not Used
22	j	AC Power	115 V(ac) -	Not Used
23	V	RS-232 p2	Tx	
24	T	RS-232 p3	Rx	
25	U, W	RS-232 p5	Signal Ground	
26	b	Auxiliary	+5VDC Out	Not Used
27	c	Auxiliary	+5VDC Out Return	Not Used
28-32				Spares

The Contractor shall wire the MVDS cable harness and power conductors to the 10 position din rail mounted terminal blocks in the controller cabinet as directed by the Engineer. The RS-232 serial data communication output conductors shall be terminated at the service panel terminal block, TB-0. The contact pair output conductors shall be terminated at the input panel terminal block, TB-2. The ends of all unused and spare conductors shall be taped to prevent accidental contact to other circuits.

All software for testing and set-up procedures shall be supplied with the MVDS unit. The software shall test the MVDS unit performance and provide diagnostic information.

Operational Requirements.—The Contractor shall provide a certification from the manufacturer that the MVDS unit shall interface and operate with a Model 170 controller. In addition, the MVDS unit shall meet the following requirements:

a. Electrical.—The unit shall operate with either 12 or 24 VDC at 0.5 A power source. The unit shall have a feature of automatic recovery after a power failure.
b. Physical.—The unit shall be encased in a weatherproof NEMA-3R enclosure. The unit shall not exceed 6.4" x 9.6" x10" in size and shall not weigh more than 10 lbs . The unit shall operate over a temperature range from –35°F. to 165°F., up to 95 percent relative humidity.
c. Installation and Testing.—Prior to installing any MVDS units, the Contractor shall perform functional tests to verify that all MVDS units comply with these specifications. The MVDS units shall be installed as shown on the plans and in accordance with the manufacturer's recommended installation procedures. The Contractor shall confirm equipment placement with the Engineer before installing any equipment. The Contractor shall test the MVDS units for the following functions:

i. Presence and passage at all ramp and connector metering locations.
ii. Speed, volume and occupancy for all mainline monitoring locations.
iii. Correct speed and count readings of mainline traffic with a portable detection equipment.

The Contractor shall make sure that the MVDS system will not cause harmful interference to radio communication. If the operation of the MVDS system in a residential area is to cause harmful interference, the Contractor will be required to correct the interference at the Contractor's expense.

10-3.31 MICROWAVE VEHICLE DETECTION SENSOR (MVDS) SYSTEM -TYPE A

The microwave vehicle detection sensor (MVDS) system shall include all microwave detector units, wireless radio modems, enclosures, connectors, cables, junction box, mounting equipment, software, firmware, power supply units and all other support equipment.

Functional Requirements.—The MVDS signal shall emulate the response of an inductive loop detector. The MVDS units shall be tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. Each MVDS unit shall operate independently and not interfere with other MVDS units.

The microwave sensor unit shall operate in the frequency band of 10.525 GHz ± 25 MHz. The transmitter power shall be a maximum of 10 mW.

The MVDS field of view shall be covered by a maximum detection range defined as follows:

Elevation beam-width	45 degrees
Azimuth beam-width	15 degrees
Range	10 feet to 196 feet

Each MVDS unit shall have the capability of providing a minimum of 8 detection zones within each beam footprint. The size of each zone shall be user definable with a maximum range resolution of 6.6 feet. The minimum footprint shall be greater than or equal to 6 feet.

The time of events shall be measured in a maximum of 10 millisecond resolution.

Measurement accuracy shall be better than 95 percent certainty for vehicle presence.

Each MVDS unit shall be supplied with a connectorized MVDS cable harness with appropriate cable length for each installation. The MVDS cable shall consist of 15 unshielded twisted pairs of No. 20 conductors with an overall shield. Each conductor shall have a minimum of 19 tinned copper strands with a minimum of 0.064 inches of PVC insulation rated for 300 V at 221˚ F. The outer jacket shall be chrome PVC with minimum thickness of 0.064 inches. The outside diameter of the cable shall not exceed 0.768 inches. A minimum of 13 feet slack of MVDS cable is required in each controller cabinet.

The connector shall be MS3476W18-32S or equivalent. This connector shall include contacts for powering the sensor unit, RS-232 serial data communications and contact pairs for each detection zone. The connector pinout is as follows:

No.	Pin No.	Designation	Signal	Remark
1	A	Contact Closure	Opto 1	Not Used
2	B	Contact Closure	Opto 1 Return	Not Used
3	C	Contact Closure	Opto 2	Not Used
4	D	Contact Closure	Opto 2 Return	Not Used
5	E	Contact Closure	Opto 3	Not Used
6	F	Contact Closure	Opto 3 Return	Not Used
7	G	Contact Closure	Opto 4	Not Used
8	H	Contact Closure	Opto 4 Return	Not Used
9	J	Contact Closure	Opto 5	Not Used
10	K	Contact Closure	Opto 5 Return	Not Used
11	L	Contact Closure	Opto 6	Not Used
12	M	Contact Closure	Opto 6 Return	Not Used
13	N	Contact Closure	Opto 7	Not Used
14	P	Contact Closure	Opto 7 Return	Not Used
15	R	Contact Closure	Opto 8	Not Used
16	S	Contact Closure	Opto 8 Return	Not Used
17	d	Contact Closure	Opto 9	Not Used
18	e	Contact Closure	Opto 9 Return	Not Used
19	f	DC Power	12-24 VDC +	
20	g	DC Power	12-24 VDC -	
21	h	AC Power	115 V(ac) +	Not Used
22	j	AC Power	115 V(ac) -	Not Used
23	V	RS-232 p2	Tx	
24	T	RS-232 p3	Rx	
25	U, W	RS-232 p5	Signal Ground	
26	b	Auxiliary	+5VDC Out	Not Used
27	c	Auxiliary	+5VDC Out Return	Not Used
28-32				Spares

The Contractor shall wire the MVDS cable harness to the terminal blocks in the wireless radio modem enclosure as shown on the plans. The ends of all unused and spare conductors shall be taped to prevent accidental contact to other circuits.

All software for testing and set-up procedures shall be supplied with the MVDS unit. The software shall test the MVDS unit performance and provide diagnostic information.

Operational Requirements.—The Contractor shall provide a certification from the manufacturer that the MVDS unit will interface and operate with a Model 170 controller. In addition, the MVDS unit shall meet the following requirements:

a. Electrical.—The unit shall operate with either 12 or 24 VDC at 0.5 A power source. The unit shall have a feature of automatic recovery after a power failure.
b. Physical.—The unit shall be encased in a weatherproof NEMA-3R enclosure. The unit shall not exceed 6.4" x 9.6" x 10" in size and shall not weigh more than 10 lbs. The unit shall operate over a temperature range from –35° F. to 165° F., up to 95 percent relative humidity.
c. Installation and Testing.—Prior to installing any MVDS units, the Contractor shall perform functional tests to verify that all MVDS units comply with these specifications. The MVDS units shall be installed as shown on the plans and in accordance with the manufacturer's recommended installation procedures. The Contractor shall confirm equipment placement with the Engineer before installing any equipment. The Contractor shall test the MVDS units for the following functions:

    1. Presence and passage at all ramp and connector metering locations.
    2. Speed, volume and occupancy for all mainline monitoring locations.
    3. Correct speed and count readings of mainline traffic with a portable detection equipment.

The Contractor shall make sure that the MVDS system will not cause harmful interference to radio communication. If the operation of the MVDS system in a residential area is to cause harmful interference, the Contractor will be required to correct the interference at the Contractor's expense.

10-3.32 CAMERA UNIT

Each camera unit shall consist of a camera, lens, environmental housing and camera unit cable assembly. The camera, lens and environmental housing, combined, shall not weigh more than 15 pounds. Each camera unit shall be interchangeable with the existing camera units already installed on various traffic operations system (TOS) projects without changes or adjustments to either the system or the camera unit.

Each camera unit shall be assembled, inspected, and tested in accordance with these special provisions prior to delivery to the job site. Installation, operations and maintenance manuals shall also be submitted at the time of delivery.

Applicable Documents - The following documents of the U.S. Military Specification (MIL-SPEC), Underwriters' Laboratory, Inc. (UL), Electronics Industries Association (EIA) Standards, and other Standards form parts of the specification to the extent specified in these standards. In the event of a conflict between the content of this section and the content of the specification, the standards defined in this section shall supersede.

Military Specification Documents	
MIL-I-45208A	Inspection System Requirements, Dec. 16, 1963
MIL-C-45662	Calibration System Requirements, June 10, 1980
MIL-STD-416A	Electromagnetic Interface Characteristics Requirements for Equipment, Subsystems & Systems, Aug. 1, 1968
MIL-E-5400T	Electronic Equipment, Airborne General Specification
MIL-STD-810	Environmental Test Methods, 19 July 1983
MIL-C-5541	Chemical Conversion Coatings on Aluminum Alloys, June 3, 1970

Underwriters' Laboratory, Inc. and other documents	
UL-796	Printed Circuit Boards
EIA-170A	Electrical Performance Standards Color Television Studio Facilities
EIA RS-330	Electrical Performance Standards for Closed Circuit Television (CCTV) Camera 525/60 Interlaced

CAMERA

Approved Camera - The cameras listed below have been approved by the Engineer. Further information such as the source of the cameras can be provided upon demand. Any camera submitted by the Contractor that is not one of the approved cameras listed below shall be stringently compared to the specifications set forth in these special provisions before it is approved by the Engineer.

Approved Cameras:

Cohu 8240
Sony SSC-C374
Burle/Philips TC293C-Z0P2X596

1. General -

a. Each camera shall be self-contained and designed for continuous unattended 24-hour operation.
b. Camera performance shall meet or exceed EIA-170A standards.
c. Each camera shall have automatic sensitivity and black level control so that it operates without further adjustment when illumination ranges from the minimum specified herein to that of full daylight.
d. Each active electronic device within the camera shall be solid-state.
e. Each camera shall have a switch selectable electronic shutter. The shutter speed shall range from 1/60 of a second (off) to 1/10,000 of a second in 8 steps. The control of the electronic shutter rate shall be accessible through a side panel opening. Remote on/off control of the shutter shall be accomplished via an output connector on the rear of the environmental housing.

2. Light sensitivity - At a scene with 50 percent light reflectivity and with light level on the scene measured to be 1.0 footcandle and greater, each camera with its 10:1 zoom lens shall generate a picture on the monitor specified in these special provisions which resolves all 10 shades of gray on the EIA Television Test Chart. Not every camera shall be required to resolve the same gray scale when the light level on the same scene is measured to be less than one lux.

3. Electrical Power - Each camera shall operate when the applied voltage is between 95 to 130 V(ac), 60 Hz ±0.3 Hz, single phase. The power consumption of camera shall not exceed 10 W. All camera circuitry shall be powered by a regulated, over-voltage protected DC power supply contained in the camera.

4. Synchronization -
a. Each camera shall generate synchronization signals by means of a single integrated circuit.
b. Each camera shall operate with the internal EIA-170A crystal as the sync reference source with the field rate of 59.94 Hz.
c. Each camera shall have the capability of synchronizing to an external input source.
d. The synchronization signal at the video output shall conform to EIA-170A.

5. Scanning - Each camera's mode of scanning shall be two-to-one interlaced at 525 lines, 60 fields per second, as specified by EIA-170A.

6. Video Processing -
a. The video output level shall be maintained to within 3 dB for changes in scene brightness of 0.05 to 32,000 foot-lamberts using a motorized iris lens having a transmission range of F/1.2 to F/1200.
b. Each camera shall have a black-level control system.
c. Each camera shall have an automatic white (color) balance control to maintain proper color rendition by automatically referencing to white areas of the scene. Manual control of the white balance shall be accessible through side panel or remotely controlled via the rear connector on the environmental enclosure.
d. Automatic gain control (AGC). The switch selectable fixed gain response shall maintain the output video level to 90 percent video when the light level on the image sensor falls too low to maintain full video output. The video out will be maintained at 90 percent peak-average setting to optimize video output under varying lighting conditions. The controls for the on/off and peak average adjustments shall be accessible through the side panel of the camera.
e. One 75 Ω (±1 percent) source-terminated, single-ended video output jack shall be provided.
f. An adjustable white clipper shall be provided to limit highlight brightness.
g. The video output level shall be 1.0 V peak-to-peak composite (0.7 V video, 0.3 V sync) signal, polarity black negative, across a 75 Ω load impedance.
h. The minimum signal-to-noise ratio shall be 50 dB at 77° F.

7. Imager -
a. Each camera shall be designed to use a 1/2 inch or 2/3 inch format solid-state, color, interline transfer charged-coupled device (CCD) imager.
b. The imager shall have a minimum resolution of 768 horizontal by 493 vertical active picture elements.
c. When provided with 0.5 footcandle of highlight illumination on the environmental housing window, the camera shall provide the following resolution with AGC off:

   i. Horizontal center resolution shall be 460 TV lines minimum.
   ii. Vertical resolution shall be 350 TV lines minimum in the center and all corners simultaneously.

8. Mechanical -
a. All camera circuitry shall be on a printed circuit board which shall be removable and replaceable using no more than common hand tools.
b. Test points and adjustment identifications shall be etched or silk-screened on the boards.
c. Each camera shall be self-supporting and operable when removed from the environmental housing and shall have a lens adapter ring which accommodates a standard 16 mm C-mount. A back focal distance adjustment shall be provided.
d. Each camera shall utilize the rigidity of the environmental housing for strength against shock and vibration.

9. Environmental Operation -Each camera within its environmental housing shall withstand the following requirements -
a. Operate over an ambient temperature range from 14° F. to 122° F. with the use of heaters.
b. Peak random vibration of 5 G from 60 Hz to 1000 Hz, with camera in operation.
c. Shock up to 15 G in all axes under non-operating conditions.
d. Exposure to sand, dust, fungus, and salt atmosphere as per MIL-E-5400T paragraphs 3.2.24.7, 3.2.24.8, 3.2.24.9, and 3.2.24.10.
e. Up to 100 percent relative humidity as per MIL-E-5400T, paragraph 3.2.24.2.

10. Picture Quality -

a. The quality of the picture shall be such that most objects in low light levels can be distinguished without excess interference from undesirable picture attributes.

b. Undesirable picture attributes include blooming, transfer smear, vertical register shifting.

LENS

1. General -

a. Each lens shall be fully compatible with the camera provided.

b. Each lens shall have a maximum aperture of no less than F/1.2, and a minimum range of F/1.2 to F/1200.

c. Each lens shall be a 16 mm C-mount.

d. Each lens shall have a minimum zoom range of 10 to 1. The lens focal length for a 16.9-mm CCD camera shall be shall be 10-100 mm, 10.5-105 mm or 11-110 mm. The lens focal length for a 12.7 mm CCD camera shall be shall be 8-80 mm. A 1.5-X extender shall be included with the lens.

e. Each lens shall be equipped with a motorized zoom and focus control.

f. Each lens shall have an automatic, motor-driven iris with manual override. The iris shall be controlled directly through the camera in automatic mode and from the camera control unit in the manual mode. The automatic iris shall provide continuous aperture adjustments of the lens as determined by the amount of light reaching the camera imager. The power supply and electronics for iris motor shall be contained within the environmental housing.

g. Each lens shall be fitted with an intra-spot neutral density filter.

h. Each lens must be able to respond to the following inputs from camera control unit (CCU) for lens control:

Focus near	+9.0VDC @ 100 mA
Focus far	-9.0VDC @ 100 mA
Zoom in	+9.0VDC @ 100 mA
Zoom out	-9.0VDC @ 100 mA
Iris closed	+9.0VDC @ 100 mA
Iris open	-9.0VDC @ 100 mA

i. The travel time for the upper limit stop to the lower limit stop for zoom and focus shall be from 5 seconds minimum to 10 seconds maximum.

j. Each lens shall have the capability of at least 10 pre-positioning positions.

2. Environmental Operation -

a. Each lens within its pressurized environmental enclosure shall withstand the following requirements:

   i. Operate over an ambient temperature range on -50° F. to +122° F. with the use of heaters.
   ii. Peak random vibration of 5 G from 60 to 1000 Hz, with lens in operation.
   iii. Shock up to 15 G in all axes under non-operating conditions.
   iv. Exposure to sand, dust, fungus, and salt atmosphere as per MIL-E-5400T paragraphs 3.2.24.7, 3.2.24.8, 3.2.24.9, and 3.2.24.10.
   v. Up to 100 percent relative humidity as per MIL-E-5400T, paragraph 2.24.2.

ENVIRONMENTAL HOUSING

1. General -

a. Each camera and lens shall be mounted in a sealed, cylindrical, environmental housing which shall not exceed 6-1/2 inches in diameter and 31 inches in length.

b. The housing shall be fabricated of seamless aluminum tubing Type 6061-T6 and shall be finished with heat reflecting, weather resisting enamel. The rear plate shall be fabricated of Type 6061-T6 aluminum.

c. The front of the housing shall be closed with a clear optically flat glass or Lexan window.

d. The housing shall include a sun shroud which shall be strapped to the housing bindings in such a manner as to minimize heat conduction by maintaining air space between shroud and housing. The shroud shall shield the entire top portion of the housing from the sun, and shall extend a minimum of 76 mm in front of the housing's glass plate.

e. The housing shall not interfere with the widest viewing angle of the lens.

f. The housing shall include a thermostatically controlled heating pad rated at 115 V(ac), 100 W maximum.

g. The backplate, which is an integral part of the housing, shall have a nameplate attached bearing the manufacturer's camera assembly model number and serial number.

h. Camera connector -

i. The camera connector shall be designed to MIL-C-28462 Series 1 specifications with solder contacts. It shall be PT-07C-20-39 P, the male counterpart to PT-06A-20-39 S SR.

   ii. The connector shall be made of the same shell material and pin arrangement as the PT-06A-20-39 S SR connector on the end of the wiring harness.

   iii. The pin out of the connector shall be as shown on the plans.

   iv. Each camera connector shall be mounted on the rear plate with an airtight connection and a watertight seal for each conductor on its connecting cable.

i. Each camera shall be designed for operating with the housing purged of air and filled with dry nitrogen to 5 psi.

j. Valves -

   i. The housing shall have two valves, both on the rear end plate of the housing.

   ii. One valve shall be a standard Schrader valve. It shall have a tube running from the valve to the front end of the housing.

   iii. The other valve shall be an air escape/pressure relief valve preset to 20 ±1 psi.

   iv. The two valves shall be arranged such that filling with dry nitrogen from the Schrader valve will force gas to flow from front end of the housing to the rear end and vent through the air escape valve.

   v. The leakage rate with both valves closed and the housing pressurized to 10 psi., shall leak less than 1 psi per year, and less than 0.1 psi. per month.

k. The enclosure shall be factory pressurized to 5 psi. with dry nitrogen.

l. The notation "CAUTION PRESSURIZED" shall be printed on the rear plate of the enclosed.

m. A safety pressure release bolt shall be incorporated such that the enclosure may not be opened without first releasing the internal pressure.

n. A low-pressure (LP) sensor with related circuitry shall be provided to send an LP alarm (dry contact closure) via the camera connector. The LP sensor threshold shall be preset to activate the LP alarm at 2 psi.

o. Two units of desiccant shall be placed inside the housing but will not obstruct the camera view or operation.

p. A humidity level indicator strip with discrete indications for 10, 20 and 30 percent humidity, shall be installed inside the housing in a position that allows inspection, while facing directly, through the window without obstructing the view of the camera at the widest viewing angle of the lens.

2. Mounting Base -

a. A mounting base shall surround the enclosure to provide a tamper-resistant attachment of the environmental housing to the pan/tilt unit and securely hold the housing in either an upright or inverted position. The combined height of camera housing and mounting base shall be less than 10 inches. The mounting base attachment shall be as shown on the plans.

b. All fasteners and nuts used in attaching the mounting base to the environmental housing shall be of grade 18-8 stainless steel.

c. Each camera unit shall be provided with three stainless steel hex head bolts to secure the camera unit to the pan/tilt unit.

CAMERA UNIT CABLE ASSEMBLY

1. General - Each camera unit cable assembly shall consist of box mounting socket connector and a wiring harness.

2. Box Mounting Socket Connector -

a. Each box mounting socket connector shall be MS-3102E-28-21S-F80.

b. One full set of crimp contacts shall be provided with each box mounting socket connector.

c. The pinout of the connector shall be as shown on the plans.

3. Wiring Harness -

a. The camera unit cable assembly wiring harness shall be 10 feet long and shall be COHU AC27E or other cable approved by the Engineer. The coaxial cables' impedance shall be 75 Ω. One end of each wiring harness shall be type PT06A-20-39S (SR) and shall mate with the camera connector. It shall have a 90-degree end bell, Bendix 10-25997-203 or equal, for strain relief. The end bell shall be positioned such that the opening is 180 degrees from the main key on the connector. The other end of each wiring harness shall be type MS-3106E-28-21P and shall mate with the box mounting socket connector.

b. All connectors shall be potted with an appropriate potting compound for environmental sealing.

c. All connectors' pin out shall be as shown on the plans.

10-3.33 PAN AND TILT UNIT

Each pan/tilt unit, with camera unit attached, shall pan 355 degrees minimum in either direction, and tilt 60 degrees minimum from horizontal position to either up or down positions.

Each pan/tilt unit shall be capable of minimum ten preset positions for each pan and tilt operation.

Electrical

a. Each pan/tilt unit shall operate with input voltage of 115 V(ac), 60 Hz ±0.3 Hz.
b. Each pan/tilt unit shall not exceed 200 W power consumption.
c. The motors shall be impedance overload protected, two phase induction type, rated for continuous duty and shall be instantaneous reversing.
d. The limit switches shall be rated 5 A, 10 million cycles and with external adjustments.
e. Each pan/tilt unit shall be provided with box-mounting type connector.
f. One mating connector with full set of crimp contacts and strain relief shall be provided with the box-mounting connector.

Mechanical

a. The maximum load shall be 100 pounds at 5 inches from tilt table to center of gravity in both upright and inverted position.
b. Each pan/tilt unit shall have maximum dimensions of 11 inches high, 11 inches wide and 7 inches deep.
c. Each pan/tilt unit shall not exceed the maximum weight of 60 pounds.
d. Each pan/tilt unit shall be constructed in aluminum casting and plate. All internal parts shall be corrosion protected.
e. Each pan/tilt shall have textured semi-gloss beige enamel finish.
f. All bearings shall be heavy duty ball or roller bearing.
g. All gears shall be hardened steel.
h. All gasket seals shall be designed for all weather protection.
i. Each pan/tilt unit shall have a mounting hole pattern as shown on the plans.
j. Each pan/tilt unit shall have a minimum pan torque rating of 25 ft-lb and an instantaneous minimum tilt torque of 50 ft-lb.
k. The pan speed at no load shall be 6 to 8 degrees per second, nominal.
l. The tilt speed at no load shall be 3 to 4 degrees per second, nominal.

Environmental

a. Ambient operating temperature shall be from 14° F. to 122° F.
b. It shall be able to withstand vibration of 0.03 inch total excursion from 5 Hz to 30 Hz and a peak random vibration of 5 G from 30 to 1000 Hz.
c. It shall be able to withstand shock up to 15 G in all axes under non-operating conditions, conforming to MIL-E-5400R, Para. 3.2.24.6.
d. It shall be able to operate in atmospheres up to 95 percent relative humidity, conforming to MIL-E-5400R, Para 3.2.24.4.
e. It shall be able to withstand exposure to sand, dust, fungus, and salt atmosphere, conforming to MIL-E-5400R, Para 3.2.24.7, 3.2.24.8 and 3.2.24.9.

Pan and tilt unit mounting

The nuts and bolts securing the pan and tilt unit to the camera platform shall be hex head and made of stainless steel. Before each bolt is fastened, a locking type coating shall be applied to the threads. The coating shall lock the bolts and nuts in place making it impossible to turn bolt or nut without tools. This coating shall last and be effective through at least 10 insertions and withdrawals of the bolt or nut.

10-3.34 CAMERA JUNCTION BOX

The camera junction box (JCB) shall be constructed as shown on the plans and described in these special provisions. All seams shall be continuously welded. All JCB mounting nuts and bolts shall be 1/4 inch-20 x 1 inch Hex head stainless steel. Steel surfaces on which JCB is to be mounted shall be drilled and tapped 1/4 inch-20 thread. Each JCB shall be fabricated from 14 gauge sheet steel. Two 8-32 threaded studs for terminal strip mounting shall be welded on the bottom of the box as shown on the plans. After fabrication the JCB shall be hot-dip galvanized.

A twenty position terminal block (No. 8 lugs) with cover shall be mounted on the bottom of the box. Permanent terminal position markings shall be used. A laminated wiring schematic shall be permanently attached to the inside of box cover showing wiring from the camera unit box mounting connector to the terminal block.

10-3.35 CAMERA POLES

Camera poles shall conform to the provisions in Section 86-2.04, "Standards, Steel Pedestals and Posts," of the Standard Specifications.

10-3.36 CAMERA STATION

The Contractor shall furnish and install the following closed circuit television (CCTV) equipment at each camera station as described in these special provisions and as shown on the plans:

1. One camera unit.
2. One pan/tilt unit.
3. One pole and foundation.
4. One camera junction box (JCB).
5. One camera control unit (CCU) - existing
6. One video encoder unit (VEU) - existing
7. One integrated services digital network terminal adapter (ISDN TA) - existing
8. Connectors and fittings as required.
9. Cable and conductors as required.

CABLES AND CONNECTORS

The camera unit cable assembly box mounting connector shall be mounted on one side of the JCB and shall be prewired to the 20 position terminal block as shown on the plans. The video signal pins of the camera unit cable assembly box mounting connector shall be terminated to a Bayonet Nut Connector (BNC) jack connector via Type RG-59/U coaxial cable stub.

The television control cable (TVC) and television power conductors (TVP) shall be wired to the 20 position terminal block as shown on the plans. The television control power cable (TVCP) cable shall go through but does not terminate inside the JCB. A watertight strain-relief box connector shall installed at the JCB hole for the TVCP cable.

INSTALLATION OF CAMERA STATION

The work to be done at each camera station, as shown on the plans, as a minimum, shall consist of the following:

1. Attach pan/tilt unit to the mounting plate.
2. Attach camera unit to the pan/tilt unit.
3. Install JCB junction box.
4. Terminate TVC and TVP inside JCB junction box.
5. Terminate television video cable (TVL) inside JCB junction box with a BNC plug connector.
6. Install camera unit cable assembly wiring harness (Type JC).
7. Terminate TVCP with pan/tilt mating connector.
8. Connect TVCP to the pan/tilt unit.
9. Terminate TVL inside controller cabinet with BNC plug connector.
10. Terminate TVP, TVCP and TVC with CCU mating connectors C1, C2 and C3, respectively.
11. Adjust limit stops of the pan/tilt unit as directed by the Engineer.
12. Adjust camera unit to provide the optimum picture for the full range of daylight and night time conditions as directed by the Engineer.

CAMERA UNIT MOUNTING

The camera unit shall be secured to the pan/tilt unit using the stainless steel bolts provided with the camera unit. Before each bolt is fastened, a locking type coating shall be applied to the threads. The coating shall lock the bolt and nut in place, making it impossible to turn the bolt or nut without tools. This coating shall last through and be effective through at least ten insertions and withdrawals of the bolt or nut.

The work to be done between the camera mount and the controller cabinet, as shown on the plans, as a minimum, shall consist of the following:

1. Install conduits and pull boxes as required up to the controller cabinet.
2. Install and terminate TVL, TVC, TVCP, and TVP as shown on the plans.

The work to be done at each CCTV controller cabinet, as shown on the plans, as a minimum, shall consist of the following:

1. Connect TVC, TVCP, TVP and TVL to existing CCU via their respective connectors.
2. Connect CCU to existing VEU.

The Contractor shall furnish all materials necessary to provide a complete and functional camera station in accordance with this section of these special provisions. Miscellaneous equipment, and materials not mentioned but necessary to provide a complete and fully operational camera station shall be furnished by the Contractor as incidental to the work for which no separate payment will be made.

All items furnished shall be new and shall be the latest version.

The Contractor shall be responsible for demonstrating proper operation of the camera station using test software and diagnostics which shall be provided to the Engineer as incidental items at no additional cost. Testing procedures are described elsewhere in these special provisions.

CAMERA STATION TESTING

Prior to removal or relocation of existing CCTV equipment including cables, pole, camera, pan and tilt unit, controller cabinet, the camera station will be tested in the field by the Engineer in the presence of the Contractor. Existing equipment that fail during this test period will be replaced or repaired by the State or, if directed by the Engineer, by the Contractor, and such work will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications. The Contractor shall notify the Engineer in writing fifteen days prior to the scheduled testing.

Upon completion of work, each camera station shall be subjected to post-installation tests as outlined herein. All testing shall be performed by the District Electrical Systems Branch personnel, arranged by the Engineer and in the presence of the Contractor. The Contractor shall notify the Engineer in writing fifteen days prior to the scheduled testing. Upon receipt of the notification, the Engineer shall contact the Electrical Systems Branch at (510) 286-6142. The Contractor shall provide all necessary equipment required to access the CCTV equipment for testing.

The testing shall consist of five consecutive days of continuous satisfactory operation of each camera station. If any material and equipment furnished and installed by the Contractor in this project is found defective or otherwise unsuitable, or the workmanship does not conform with the accepted standards, the Contractor shall replace such defective material and equipment at no cost to the State.

Rejected material or equipment may be offered again by the Contractor for consideration provided all non-compliance has been corrected and pre-tested by the Contractor. After all defects have been corrected, the camera station shall be re-tested until five consecutive days of continuous satisfactory operation is obtained.

The post-installation tests shall consist of, but not be limited to, inspection and functional testing in accordance with these special provisions.

Inspection shall consist of, but not be limited to, verification of correct wiring terminations, correct cable interconnections, good workmanship and compliance with these special provisions.

Functional testing shall include, but not be limited to, the following:

a. Verification of all local mode CCTV operations using the CCU front panel controls.
b. Verify video signal output from CCU with a National Television Systems Committee (NTSC) monitor.
c. Verify the correct operation of the auto/manual iris and power zoom .
d. Verify the correct operation of the pan/tilt unit. The pan/tilt unit shall be functionally tested over 355 degrees in the horizontal plane and ±60 degrees in the vertical plane. The pan/tilt unit limit stops shall then be adjusted to optimize the camera viewing coverage of the freeway as directed by the Engineer.
e. Verify the correct operation of the preset positions.

10-3.37 TRAFFIC OPERATIONS SYSTEM EQUIPMENT TESTING

Prior to shipping to the project, the Contractor shall submit the following items to the State of California, Department of Transportation Laboratory, 5900 Folsom Blvd., Sacramento, CA 95819 for acceptance testing:

1. Camera unit
2. Pan/tilt unit

Approximately 30 days will be required for the testing. The Contractor will be notified upon completion of the testing and shall arrange for delivery of the equipment to a storage location designated by the Contractor. The costs of such testing and the transportation to and from the Laboratory shall be borne by the Contractor.

10-3.38 REINSTALLED REMOVED ELECTRICAL EQUIPMENT

The fourth paragraph in Section 86-7.02 "Reinstalling Removed Electrical Equipment" is revised to read:

Existing materials required to be reused and found to be unsatisfactory by the Engineer shall be replaced by new material and the cost therefor will be paid for as extra work as provided in Section 4-1.03D.

10-3.39 REMOVING, REINSTALLING OR SALVAGING ELECTRICAL EQUIPMENT

Salvaged electrical materials shall be hauled to Caltrans Electrical Maintenance Station, 30 Richard Street, San Francisco, CA 94134, (415) 330-6509, and stockpiled.

The Contractor shall provide equipment, as necessary, to safely unload and stockpile the material. A minimum of two working days notice shall be given prior to delivery.

10-3.40 DISPOSING OF ELECTRICAL EQUIPMENT

All ballasts and transformers and all fluorescent and mercury lamps shall be disposed of in accordance with California Department of Health Services Regulations set forth in Title 22, Division 4, Chapter 30, of the California Code of Regulations (CCR).

Ballasts and transformers which contain polychlorinated biphenyl (PCB) are designated extremely hazardous wastes, and fluorescent tubing and mercury lamps are designated hazardous wastes under Article 9, Section 66680 of Title 22, Chapter 30 (CCR).

The following electrical material on the project is known to contain PCB:

Fluorescent tubing lamps

When there are 25 or more fluorescent lamps and/or mercury lamps, in combination on the project, to be disposed of, they shall be treated as recyclable hazardous waste and shall be recycled within the State of California in conformance with Article 12, Chapter 30 of Title 22 (CCR) by a currently certified recycler such as but not limited to:

1. Exceltrans Inc.,
   P.O. Box 866
   Benicia, CA 94510
   Telephone No. (707) 745-8907

2. Roberts Enterprises
   2021 South Myrtle Avenue
   Monrovia, CA 91016
   Telephone No. (818) 303-2053

The Contractor shall package and ship recyclable hazardous waste via a currently certified hauler in conformance with Article 12, Chapter 30 of Title 22 CCR and all other applicable local, State, and Federal regulations.

The Contractor shall furnish the Engineer with a statement as to which certified hauler and which certified recycler he proposes to utilize, together with a copy of the recycler's interim status document and/or a copy of the variance letter from the Department of Health Services. Said statement shall be furnished within 15 calendar days after the contract has been approved by the Attorney General.

The State assumes generator responsibility for these wastes. The Engineer will prepare the Hazardous Waste Manifest for Shipment.

Full compensation for hauling, stockpiling, and disposal of fluorescent tubing and mercury lamps shall be considered as included in the contract price paid for the electrical item involved and no additional compensation will be allowed therefor.

Handling and disposing of electrical material containing PCB, after removal, will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-3.41 PAYMENT

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 combination thereof; for modifying or removing those systems; for temporary systems; or the lump sum or unit prices paid for various units of those system; or the lump sum or linear foot prices paid for conduit of various sizes; types and installation methods listed in the Engineer's Estimate shall include full compensation for doing all work involved in the furnishing and installing, modifying, or removing the systems, combination or units thereof, as shown on the plans, as specified in these 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; furnishing and installing illuminate street name signs; installing State-furnished sign panels on flashing beacon standards and on traffic signal mast arm; restoring sidewalk, pavement and appurtenances damaged or destroyed during construction; salvaging existing materials; and making all required tests.

Full compensation for hauling and stockpiling electrical materials shall be considered as included in the contract price paid for the item requiring the material to be salvaged, and no additional compensation will be allowed therefor.

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

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

The contract lump sum price paid for lighting and sign illumination (stage construction) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in lighting and sign illumination (stage construction), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

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

The contract lump sum price paid for traffic operations system shall include full compensation for furnishing all labor, materials (except items covered by other bid items), tools, equipment, and incidentals, and for doing all the work involved in installing traffic operations system, complete in place, including all the foundations, poles, manuals and testing, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for traffic operations system (stage construction) shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in traffic operations system (stage construction), complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract lump sum price paid for signal and lighting (city street) modify at various locations shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in signal and lighting (city street) modify at various locations, complete in place, as shown on the plans, as specified in the Standard Specifications and these special provisions, and as directed by the Engineer.

The contract unit price paid for each of the following items shall include full compensation for furnishing all materials, tools, equipment, and incidentals, as shown on the plans, as specified in these special provisions, and as directed by the Engineer:

1. Camera unit.
2. Pan and tilt unit.
3. Microwave vehicle detection sensor -Type A.
4. Microwave vehicle detection sensor -Type B.

SECTION 11. MODIFIED STANDARD SPECIFICATION SECTIONS

SECTION 11-1. (BLANK)

SECTION 11-2. PORTLAND CEMENT CONCRETE

11-2.01 GENERAL

Portland cement concrete shall conform to the provisions in this Section 11-2, "Portland Cement Concrete," and the section entitled "Portland Cement Concrete" in Section 8, "Materials," of these special provisions. Section 90, "Portland Cement Concrete," of the Standard Specifications is deleted. Section 90, "Portland Cement Concrete," of the Standard Specifications is amended to read as follows.

SECTION 90: PORTLAND CEMENT CONCRETE
90-1 GENERAL

90-1.01 DESCRIPTION

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

1. "Type IP (MS) Modified" cement; or
2. A combination of "Type II Modified" portland cement and mineral admixture; or
3. A combination of Type V portland cement and mineral admixture.

- Type III portland cement shall be used only as allowed in the special provisions or with the approval of the Engineer.
- Class D concrete shall contain not less than 675 pounds of cementitious material per cubic yard.
- Class A concrete shall contain not less than 590 pounds of cementitious material per cubic yard.
- Class B concrete shall contain not less than 505 pounds of cementitious material per cubic yard.
- Class C concrete shall contain not less than 422 pounds of cementitious material per cubic yard.
- Minor concrete shall contain not less than 548 pounds of cementitious material per cubic yard unless otherwise specified in these specifications or the special provisions.
- Unless otherwise designated on the plans or specified in these specifications or the special provisions, the amount of cementitious material used per cubic yard of concrete in structures or portions of structures shall conform to the following:

Use	Cementitious Material Content (lb/yd3)
Concrete designated by compressive strength:	
Deck slabs and slab spans of bridges	675 min., 801 max.
Roof sections of exposed top box culverts	675 min., 801 max.
Other portions of structures	590 min., 801 max.
Concrete not designated by compressive strength:	
Deck slabs and slab spans of bridges	675 min.
Roof sections of exposed top box culverts	675 min.
Prestressed members	675 min.
Seal courses	675 min.
Other portions of structures	590 min.
Concrete for precast members	590 min., 927 max.

- Whenever the 28-day compressive strength shown on the plans is greater than 3626 pounds per square inch, the concrete shall be designated by compressive strength. If the plans show a 28-day compressive strength that is 4061 pounds per square inch 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 3626 pounds per square inch or less are shown for design information only and are not a requirement for acceptance of the concrete.
- Concrete designated by compressive strength shall be proportioned such that the concrete will attain the strength shown on the plans or specified in the special provisions.
- Before using concrete for which the mix proportions have been determined by the Contractor, or in advance of revising those mix proportions, the Contractor shall submit in writing to the Engineer a copy of the mix design.
- Compliance with cementitious material content requirements will be verified in conformance with procedures described in California Test 518 for cement content. For testing purposes, mineral admixture shall be considered to be cement. Batch proportions shall be adjusted as necessary to produce concrete having the specified cementitious material content.

- If any concrete has a cementitious material, portland cement, or mineral admixture content that is less than the minimum required, the concrete shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place and the Contractor shall pay to the State $0.25 for each pound of cementitious material, portland cement, or mineral admixture that is less than the minimum required. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract. The deductions will not be made unless the difference between the contents required and those actually provided exceeds the batching tolerances permitted by Section 90-5, "Proportioning." No deductions will be made based on the results of California Test 518.
- The requirements of the preceding paragraph shall not apply to minor concrete or commercial quality concrete.

90-2 MATERIALS

90-2.01 CEMENT

- Unless otherwise specified, cement shall be either "Type IP (MS) Modified" cement, "Type II Modified" portland cement or Type V portland cement.
- "Type IP (MS) Modified" cement shall conform to the requirements for Type IP (MS) cement in ASTM Designation: C 595, and shall be comprised of an intimate and uniform blend of Type II cement and not more than 35 percent by weight of mineral admixture. The type and minimum amount of mineral admixture used in the manufacture of "Type IP (MS) Modified" cement shall be in conformance with the provisions in Section 90-4.08, "Required Use of Mineral Admixtures."
- "Type II Modified" portland cement shall conform to the requirements for Type II portland cement in ASTM Designation: C 150.
- In addition, "Type IP (MS) Modified" cement and "Type II Modified" portland cement shall conform to the following requirements:

A. The cement shall not contain more than 0.60 percent by weight of alkalies, calculated as the percentage of Na_2O plus 0.658 times the percentage of K_2O, when determined by either direct intensity flame photometry or by the atomic absorption method. The instrument and procedure used shall be qualified as to precision and accuracy in conformance with the requirements in ASTM Designation: C 114;
B. The autoclave expansion shall not exceed 0.50 percent; and
C. Mortar, containing the cement to be used and Ottawa sand, when tested in conformance with California Test 527, shall not expand in water more than 0.010 percent and shall not contract in air more than 0.048 percent, except that when cement is to be used for precast prestressed concrete piling, precast prestressed concrete members, or steam cured concrete products, the mortar shall not contract in air more than 0.053 percent.

- Type III and Type V portland cements shall conform to the requirements in ASTM Designation: C 150 and the additional requirements listed above for "Type II Modified" portland cement, except that when tested in conformance with California Test 527, mortar containing Type III portland cement shall not contract in air more than 0.075 percent.
- Cement used in the manufacture of cast-in-place concrete for exposed surfaces of like elements of a structure shall be from the same cement mill.
- Cement shall be protected from exposure to moisture until used. Sacked cement shall be piled to permit access for tally, inspection, and identification of each shipment.
- Adequate facilities shall be provided to assure that cement meeting the provisions specified in this Section 90-2.01 shall be kept separate from other cement in order to prevent any but the specified cement from entering the work. Safe and suitable facilities for sampling cement shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper, in conformance with California Test 125.
- If cement is used prior to sampling and testing as provided in Section 6-1.07, "Certificates of Compliance," and the cement is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the cement manufacturer or supplier of the cement. If the cement is used in ready-mixed concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.
- Cement furnished without a Certificate of Compliance shall not be used in the work until the Engineer has had sufficient time to make appropriate tests and has approved the cement for use.

90-2.02 AGGREGATES

- Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, rags, and other extraneous material.
- Natural aggregates shall be thoroughly and uniformly washed before use.
- The Contractor, at the Contractor's expense, shall provide safe and suitable facilities, including necessary splitting devices for obtaining samples of aggregates, in conformance with California Test 125.

- Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of water content provided in Section 90-6.06, "Amount of Water and Penetration."
- Aggregates shall have not more than 10 percent loss when tested for soundness in conformance with the requirements in California Test 214. The soundness requirement for fine aggregate will be waived, provided that the durability index, D_f, of the fine aggregate is 60, or greater, when tested for durability in conformance with California Test 229.
- If the results of any one or more of the Cleanness Value, Sand Equivalent, or aggregate grading tests do not meet the requirements specified for "Operating Range" but all meet the "Contract Compliance" requirements, the placement of concrete shall be suspended at the completion of the current pour until tests or other information indicate that the next material to be used in the work will comply with the requirements specified for "Operating Range."
- If the results of either or both the Cleanness Value and coarse aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete that is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $2.09 per cubic yard for paving concrete and $3.27 per cubic yard for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.
- If the results of either or both the Sand Equivalent and fine aggregate grading tests do not meet the requirements specified for "Contract Compliance," the concrete which is represented by the tests shall be removed. However, if the Engineer determines that the concrete is structurally adequate, the concrete may remain in place, and the Contractor shall pay to the State $2.09 per cubic yard for paving concrete and $3.27 per cubic yard for all other concrete for the concrete represented by these tests and left in place. The Department may deduct the amount from any moneys due, or that may become due, the Contractor under the contract.
- The 2 preceding paragraphs apply individually to the "Contract Compliance" requirements for coarse aggregate and fine aggregate. When both coarse aggregate and fine aggregate do not conform to the "Contract Compliance" requirements, both paragraphs shall apply. The payments specified in those paragraphs shall be in addition to any payments made in conformance with the provisions in Section 90-1.01, "Description."
- No single Cleanness Value, Sand Equivalent or aggregate grading test shall represent more than 327 cubic yards of concrete or one day's pour, whichever is smaller.
- Aggregates specified for freeze-thaw resistance shall pass the freezing and thawing test, California Test 528.
- The Contractor shall notify the Engineer of the proposed source of freeze-thaw resistant concrete aggregates at least 4 months before intended use. Should the Contractor later propose a different source of concrete aggregates, the Contractor shall again notify the Engineer at least 4 months before intended use. Blending of fine or coarse aggregates from untested sources with acceptable aggregates will not be permitted. Provisions for the time of submission of samples as provided in Section 40-1.015, "Cement Content," are superseded by the foregoing.
- Concurrently with notification of proposed sources of freeze-thaw resistant concrete aggregates, the Contractor shall furnish samples in the quantity ordered by the Engineer. The samples shall be secured under the direct supervision of the Engineer. Samples from existing stockpiles of processed aggregate shall be taken from washed materials and shall be visibly damp. Samples from materials in place in a material source shall be taken at depths from the existing surface that will ensure the presence of the full quantity of ground water. Excavations for the purpose of securing samples shall be made to the full depth of intended source operations. Samples shall be protected against loss of contained water until they are delivered to the Engineer.
- The Engineer will waive the above freeze-thaw test and the 4-month advance notice, required in this Section, provided aggregates are to be obtained from sources that have previously passed this test and test results are currently applicable.
- No extension of contract time will be allowed for the time required to perform the freezing and thawing test.
- When the source of an aggregate is changed, except for pavement concrete, the Contractor shall adjust the mix proportions and submit in writing to the Engineer a copy of the mix design before using the aggregates. When the source of an aggregate is changed for pavement concrete, the Engineer shall be allowed sufficient time to adjust the mix, and the aggregates shall not be used until necessary adjustments are made.

90-2.02A Coarse Aggregate

- Coarse aggregate shall consist of gravel, crushed gravel, crushed rock, crushed air-cooled iron blast furnace slag or combinations thereof. Crushed air-cooled blast furnace slag shall not be used in reinforced or prestressed concrete.
- Coarse aggregate shall conform to the following quality requirements:

Tests	California Test	Requirements
Loss in Los Angeles Rattler (after 500 revolutions)	211	45% max.
Cleanness Value		
Operating Range	227	75 min.
Contract Compliance	227	71 min.

- In lieu of the above Cleanness Value requirements, a Cleanness Value "Operating Range" limit of 71, minimum, and a Cleanness Value "Contract Compliance" limit of 68, minimum, will be used to determine the acceptability of the coarse aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:

1. coarse aggregate sampled at the completion of processing at the aggregate production plant had a Cleanness Value of not less than 82 when tested by California Test 227; and
2. prequalification tests performed in conformance with the requirements in California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

90-2.02B Fine Aggregate

- Fine aggregate shall consist of natural sand, manufactured sand produced from larger aggregate or a combination thereof. Manufactured sand shall be well graded.
- Fine aggregate shall conform to the following quality requirements:

Test	California Test	Requirements
Organic Impurities	213	Satisfactory[a]
Mortar Strengths Relative to Ottawa Sand	515	95%, min.
Sand Equivalent:		
Operating Range	217	75, min.
Contract Compliance	217	71, min.

a Fine aggregate developing a color darker than the reference standard color solution may be accepted if it is determined by the Engineer, from mortar strength tests, that a darker color is acceptable.

- In lieu of the above Sand Equivalent requirements, a Sand Equivalent "Operating Range" limit of 71 minimum and a Sand Equivalent "Contract Compliance" limit of 68 minimum will be used to determine the acceptability of the fine aggregate if the Contractor furnishes a Certificate of Compliance, as provided in Section 6-1.07, "Certificates of Compliance," certifying that:

1. fine aggregate sampled at the completion of processing at the aggregate production plant had a Sand Equivalent value of not less than 82 when tested by California Test 217; and
2. prequalification tests performed in conformance with California Test 549 indicated that the aggregate would develop a relative strength of not less than 95 percent and would have a relative shrinkage not greater than 105 percent, based on concrete.

90-2.03 WATER

- In conventionally reinforced concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 1000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as SO_4, when tested in conformance with California Test 417. In prestressed concrete work, the water for curing, for washing aggregates, and for mixing shall be free from oil and shall not contain more than 650 parts per million of chlorides as Cl, when tested in conformance with California Test 422, nor more than 1300 parts per million of sulfates as SO_4, when tested in conformance with California Test 417. In no case shall the water contain an amount of impurities that will cause either: 1) a change in the setting time of cement of more than 25 percent when tested in conformance with the requirements in ASTM Designation: C 191 or ASTM Designation: C 266 or 2) a reduction in the compressive strength of mortar at 14 days of more than 5 percent, when tested in

conformance with the requirements in ASTM Designation: C 109, when compared to the results obtained with distilled water or deionized water, tested in conformance with the requirements in ASTM Designation: C 109.

- In non-reinforced concrete work, the water for curing, for washing aggregates and for mixing shall be free from oil and shall not contain more than 2000 parts per million of chlorides as Cl, when tested in conformance with California Test 422, or more than 1500 parts per million of sulfates as SO_4, when tested in conformance with California Test 417.
- In addition to the above provisions, water for curing concrete shall not contain impurities in a sufficient amount to cause discoloration of the concrete or produce etching of the surface.
- Water reclaimed from mixer wash-out operations may be used in mixing concrete. The water shall not contain coloring agents or more than 300 parts per million of alkalis (Na_2O + 0.658 K_2O) as determined on the filtrate. The specific gravity of the water shall not exceed 1.03 and shall not vary more than ±0.010 during a day's operations.

90-2.04 ADMIXTURE MATERIALS

- Admixture materials shall conform to the requirements in the following ASTM Designations:

A. Chemical Admixtures—ASTM Designation: C 494.
B. Air-entraining Admixtures—ASTM Designation: C 260.
C. Calcium Chloride—ASTM Designation: D 98.
D. Mineral Admixtures—Coal fly ash; raw or calcined natural pozzolan as specified in ASTM Designation: C618; silica fume conforming to the requirements in ASTM Designation: C1240, with reduction of mortar expansion of 80 percent, minimum, using the cement from the proposed mix design.

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

90-3 AGGREGATE GRADINGS

90-3.01 GENERAL

- Before beginning concrete work, the Contractor shall submit in writing to the Engineer the gradation of the primary aggregate nominal sizes that the Contractor proposes to furnish. If a primary coarse aggregate or the fine aggregate is separated into 2 or more sizes, the proposed gradation shall consist of the gradation for each individual size, and the proposed proportions of each individual size, combined mathematically to indicate one proposed gradation. The proposed gradation shall meet the grading requirements shown in the table in this section, and shall show the percentage passing each of the sieve sizes used in determining the end result.
- The Engineer may waive, in writing, the gradation requirements in this Section 90-3.01 and in Sections 90-3.02, "Coarse Aggregate Grading," 90-3.03, "Fine Aggregate Grading," and 90-3.04, "Combined Aggregate Gradings," if, in the Engineer's opinion, furnishing the gradation is not necessary for the type or amount of concrete work to be constructed.
- Gradations proposed by the Contractor shall be within the following percentage passing limits:

Primary Aggregate Nominal Size	Sieve Size	Limits of Proposed Gradation
1 1/2" x 3/4"	1"	19 - 41
1" x No. 4	3/4"	52 - 85
1" x No. 4	3/8"	15 - 38
1/2" x No. 4	3/8"	40 - 78
3/8" x No. 8	3/8"	50 - 85
Fine Aggregate	No. 16	55 - 75
Fine Aggregate	No. 30	34 - 46
Fine Aggregate	No. 50	16 - 29

- Should the Contractor change the source of supply, the Contractor shall submit in writing to the Engineer the new gradations before their intended use.

90-3.02 COARSE AGGREGATE GRADING

- The grading requirements for coarse aggregates are shown in the following table for each size of coarse aggregate:

Sieve Sizes	Percentage Passing Primary Aggregate Nominal Sizes							
	1 1/2" x 3/4"		1" x No. 4		1/2" x No. 4		3/8" x No. 8	
	Operating Range	Contract Compliance	Operating Range	Contract Compliance	Operating Range	Contract Compliance	Operating Range	Contract Compliance
2"	100	100	—	—	—	—	—	—
1 1/2"	88-100	85-100	100	100	—	—	—	—
1"	x ± 18	X ± 25	88-100	86-100	—	—	—	—
3/4"	0-17	0-20	X ± 15	X ± 22	100	100	—	—
1/2"	—	—	—	—	82-100	80-100	100	100
3/8"	0-7	0-9	X ± 15	X ± 22	X ± 15	X ± 22	X ± 15	X ± 20
No. 4	—	—	0-16	0-18	0-15	0-18	0-25	0-28
No. 8	—	—	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 1 1/2", 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 1", 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 1" x No. 4 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
3/8"	100	100
No. 4	95-100	93-100
No. 8	65-95	61-99
No. 16	X ± 10	X ± 13
No. 30	X ± 9	X ± 12
No. 50	X ± 6	X ± 9
No. 100	2-12	1-15
No. 200	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 No. 16 sieve and the total percentage passing the No. 30 sieve shall be between 10 and 40, and the difference between the percentage passing the No. 30 and No. 50 sieves shall be between 10 and 40.
- Fine aggregate may be separated into 2 or more sizes and stored separately, provided that the combined material conforms to the grading requirements specified in this Section 90-3.03.

90-3.04 COMBINED AGGREGATE GRADINGS

- Combined aggregate grading limits shall be used only for the design of concrete mixes. Concrete mixes shall be designed so that aggregates are combined in proportions that shall produce a mixture within the grading limits for combined aggregates as specified herein. Within these limitations, the relative proportions shall be as ordered by the Engineer, except as otherwise provided in Section 90-1.01, "Description."
- The combined aggregate grading used in portland cement concrete pavement shall be the 37.5-mm, maximum grading.

- The combined aggregate grading used in concrete for structures and other concrete items, except when specified otherwise in these specifications or the special provisions, shall be either the 1 1/2", maximum grading, or the 1", maximum grading, at the option of the Contractor.

Grading Limits of Combined Aggregates

Sieve Sizes	Percentage Passing			
	1 1/2" Max.	1" Max.	1/2" Max.	3/8" Max.
2"	100	—	—	—
1 1/2"	90-100	100	—	—
1"	50-86	90-100	—	—
3/4"	45-75	55-100	100	—
1/2"	—	—	90-100	100
3/8"	38-55	45-75	55-86	50 - 100
No. 4	30-45	35-60	45-63	45 - 63
No. 8	23-38	27-45	35-49	35 - 49
No. 16	17-33	20-35	25-37	25 - 37
No. 30	10-22	12-25	15-25	15 - 25
No. 50	4-10	5-15	5-15	5 - 15
No. 100	1-6	1-8	1-8	1 - 8
No. 200	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 weight of admixture, as determined by California Test 415, shall not be used in prestressed or reinforced concrete.
- Calcium chloride shall not be used in concrete containing steel reinforcement or other embedded metals.
- Mineral admixture used in concrete for exposed surfaces of like elements of a structure shall be from the same source and of the same percentage.
- Admixtures shall be uniform in properties throughout their use in the work. Should it be found that an admixture as furnished is not uniform in properties, its use shall be discontinued.
- If more than one admixture is used, the admixtures shall be compatible with each other so that the desirable effects of all admixtures used will be realized.

90-4.02 MATERIALS

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

90-4.03 ADMIXTURE APPROVAL

- No admixture brand shall be used in the work unless it is on the Department's current list of approved brands for the type of admixture involved.
- Admixture brands will be considered for addition to the approved list if the manufacturer of the admixture submits to the Transportation Laboratory a sample of the admixture accompanied by certified test results demonstrating that the admixture complies with the requirements in the appropriate ASTM Designation and these specifications. The sample shall be sufficient to permit performance of all required tests. Approval of admixture brands will be dependent upon a determination as to compliance with the requirements, based on the certified test results submitted, together with tests the Department may elect to perform.
- When the Contractor proposes to use an admixture of a brand and type on the current list of approved admixture brands, the Contractor shall furnish a Certificate of Compliance from the manufacturer, as provided in Section 6-1.07, "Certificates of Compliance," certifying that the admixture furnished is the same as that previously approved. If a previously approved admixture is not accompanied by a Certificate of Compliance, the admixture shall not be used in the work until the

Engineer has had sufficient time to make the appropriate tests and has approved the admixture for use. The Engineer may take samples for testing at any time, whether or not the admixture has been accompanied by a Certificate of Compliance.

- If a mineral admixture is delivered directly to the site of the work, the Certificate of Compliance shall be signed by the manufacturer or supplier of the mineral admixture. If the mineral admixture is used in ready-mix concrete or in precast concrete products purchased as such by the Contractor, the Certificate of Compliance shall be signed by the manufacturer of the concrete or product.

90-4.04 REQUIRED USE OF CHEMICAL ADMIXTURES AND CALCIUM CHLORIDE

- When the use of a chemical admixture or calcium chloride is specified or ordered by the Engineer, the admixture shall be used at the dosage specified or ordered, except that if no dosage is specified or ordered, the admixture shall be used at the dosage normally recommended by the manufacturer of the admixture.
- Calcium chloride shall be dispensed in liquid, flake, or pellet form. Calcium chloride dispensed in liquid form shall conform to the provisions for dispensing liquid admixtures in Section 90-4.10, "Proportioning and Dispensing Liquid Admixtures."

90-4.05 OPTIONAL USE OF CHEMICAL ADMIXTURES

- The Contractor will be permitted to use Type A or F, water-reducing; Type B, retarding; or Type D or G, water-reducing and retarding admixtures as described in ASTM Designation: C 494 to conserve cementitious material or to facilitate any concrete construction application subject to the following conditions:

A. When a water-reducing admixture or a water-reducing and retarding admixture is used, the cementitious material content specified or ordered may be reduced by a maximum of 5 percent by weight, except that the resultant cementitious material content shall be not less than 506 pounds per cubic yard; and
B. When a reduction in cementitious material content is made, the dosage of admixture used shall be the dosage used in determining approval of the admixture.

- Unless otherwise specified, a Type C accelerating chemical admixture conforming to the requirements in ASTM Designation: C 494, may be used in portland cement concrete. Inclusion in the mix design submitted for approval will not be required provided that the admixture is added to counteract changing conditions that contribute to delayed setting of the portland cement concrete, and the use or change in dosage of the admixture is approved in writing by the Engineer.

90-4.06 REQUIRED USE OF AIR-ENTRAINING ADMIXTURES

- When air-entrainment is specified or ordered by the Engineer, the air-entraining admixture shall be used in amounts to produce a concrete having the specified air content as determined by California Test 504.

90-4.07 OPTIONAL USE OF AIR-ENTRAINING ADMIXTURES

- When air-entrainment has not been specified or ordered by the Engineer, the Contractor will be permitted to use an air-entraining admixture to facilitate the use of any construction procedure or equipment provided that the average air content, as determined by California Test 504, of 3 successive tests does not exceed 4 percent, and no single test value exceeds 5.5 percent. If the Contractor elects to use an air-entraining admixture in concrete for pavement, the Contractor shall so indicate at the time the Contractor designates the source of aggregate as provided in Section 40-1.015, "Cement Content."

90-4.08 REQUIRED USE OF MINERAL ADMIXTURES

- Unless otherwise specified, mineral admixture shall be combined with cement to make cementitious material.
- The calcium oxide content of mineral admixtures shall not exceed 10 percent and the available alkali, as sodium oxide equivalent, shall not exceed 1.5 percent when determined in conformance with the requirements in ASTM Designation: C 618.
- The amounts of cement and mineral admixture used in cementitious material shall be sufficient to satisfy the minimum cementitious material content requirements specified in Section 90-1.01, "Description," or Section 90-4.05, "Optional Use of Chemical Admixtures," and shall conform to the following:

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

1. When the calcium oxide content of a mineral admixture is equal to or less than 2 percent by weight, the amount of mineral admixture shall not be less than 15 percent by weight of the total amount of cementitious material to be used in the mix;
2. When the calcium oxide content of a mineral admixture is greater than 2 percent, the amount of mineral admixture shall not be less than 25 percent by weight of the total amount of cementitious material to be used in the mix;
3. When a mineral admixture that conforms to the provisions for silica fume in Section 90-2.04, "Admixture Materials," is used, the amount of mineral admixture shall not be less than 10 percent by weight of the total amount of cementitious material to be used in the mix

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

90-4.09 BLANK

90-4.10 PROPORTIONING AND DISPENSING LIQUID ADMIXTURES

- Chemical admixtures and air-entraining admixtures shall be dispensed in liquid form. Dispensers for liquid admixtures shall have sufficient capacity to measure at one time the prescribed quantity required for each batch of concrete. Each dispenser shall include a graduated measuring unit into which liquid admixtures are measured to within ±5 percent of the prescribed quantity for each batch. Dispensers shall be located and maintained so that the graduations can be accurately read from the point at which proportioning operations are controlled to permit a visual check of batching accuracy prior to discharge. Each measuring unit shall be clearly marked for the type and quantity of admixture.
- Each liquid admixture dispensing system shall be equipped with a sampling device consisting of a valve located in a safe and readily accessible position such that a sample of the admixture may be withdrawn slowly by the Engineer.
- If more than one liquid admixture is used in the concrete mix, each liquid admixture shall have a separate measuring unit and shall be dispensed by injecting equipment located in such a manner that the admixtures are not mixed at high concentrations and do not interfere with the effectiveness of each other. When air-entraining admixtures are used in conjunction with other liquid admixtures, the air-entraining admixture shall be the first to be incorporated into the mix.
- When automatic proportioning devices are required for concrete pavement, dispensers for liquid admixtures shall operate automatically with the batching control equipment. The dispensers shall be equipped with an automatic warning system in good operating condition that will provide a visible or audible signal at the point at which proportioning operations are controlled when the quantity of admixture measured for each batch of concrete varies from the preselected dosage by more than 5 percent, or when the entire contents of the measuring unit are not emptied from the dispenser into each batch of concrete.
- Unless liquid admixtures are added to premeasured water for the batch, their discharge into the batch shall be arranged to flow into the stream of water so that the admixtures are well dispersed throughout the batch, except that air-entraining admixtures may be dispensed directly into moist sand in the batching bins provided that adequate control of the air content of the concrete can be maintained.
- Liquid admixtures requiring dosages greater than 2 quarts/yd^3 shall be considered to be water when determining the total amount of free water as specified in Section 90-6.06, "Amount of Water and Penetration."
- Special admixtures, such as "high range" water reducers that may contribute to a high rate of slump loss, shall be measured and dispensed as recommended by the admixture manufacturer and as approved by the Engineer.

90-4.11 STORAGE, PROPORTIONING, AND DISPENSING OF MINERAL ADMIXTURES

- Mineral admixtures shall be protected from exposure to moisture until used. Sacked material shall be piled to permit access for tally, inspection and identification for each shipment.
- Adequate facilities shall be provided to assure that mineral admixtures meeting the specified requirements are kept separate from other mineral admixtures in order to prevent any but the specified mineral admixtures from entering the work. Safe and suitable facilities for sampling mineral admixtures shall be provided at the weigh hopper or in the feed line immediately in advance of the hopper.
- Mineral admixtures shall be incorporated into concrete using equipment conforming to the requirements for cement weigh hoppers, and charging and discharging mechanisms in ASTM Designation: C 94, in Section 90-5.03, "Proportioning," and in this Section 90-4.11.

- When concrete is completely mixed in stationary paving mixers, the mineral admixture shall be weighed in a separate weigh hopper conforming to the provisions for cement weigh hoppers and charging and discharging mechanisms in Section 90-5.03A, "Proportioning for Pavement," and the mineral admixture and cement shall be introduced simultaneously into the mixer proportionately with the aggregate. If the mineral admixture is not weighed in a separate weigh hopper, the Contractor shall provide certification that the stationary mixer is capable of mixing the cement, admixture, aggregates and water uniformly prior to discharge. Certification shall contain the following:

A. Test results for 2 compressive strength test cylinders of concrete taken within the first one-third and 2 compressive strength test cylinders of concrete taken within the last one-third of the concrete discharged from a single batch from the stationary paving mixer. Strength tests and cylinder preparation will be in conformance with the provisions of Section 90-9, "Compressive Strength;"
B. Calculations demonstrating that the difference in the averages of 2 compressive strengths taken in the first one-third is no greater than 7.5 percent different than the averages of 2 compressive strengths taken in the last one-third of the concrete discharged from a single batch from the stationary paving mixer. Strength tests and cylinder preparation will be in conformance with the provisions of Section 90-9, "Compressive Strength;" and
C. The mixer rotation speed and time of mixing prior to discharge that are required to produce a mix that meets the requirements above.

90-5 PROPORTIONING

90-5.01 STORAGE OF AGGREGATES

- Aggregates shall be stored or stockpiled in such a manner that separation of coarse and fine particles of each size shall be avoided and also that the various sizes shall not become intermixed before proportioning.
- Aggregates shall be stored or stockpiled and handled in a manner that shall prevent contamination by foreign materials. In addition, storage of aggregates at batching or mixing facilities that are erected subsequent to the award of the contract and that furnish concrete to the project shall conform to the following:

A. Intermingling of the different sizes of aggregates shall be positively prevented. The Contractor shall take the necessary measures to prevent intermingling. The preventive measures may include, but are not necessarily limited to, physical separation of stockpiles or construction of bulkheads of adequate length and height; and
B. Contamination of aggregates by contact with the ground shall be positively prevented. The Contractor shall take the necessary measures to prevent contamination. The preventive measures shall include, but are not necessarily limited to, placing aggregates on wooden platforms or on hardened surfaces consisting of portland cement concrete, asphalt concrete, or cement treated material.

- In placing aggregates in storage or in moving the aggregates from storage to the weigh hopper of the batching plant, any method that may cause segregation, degradation, or the combining of materials of different gradings that will result in any size of aggregate at the weigh hopper failing to meet the grading requirements, shall be discontinued. Any method of handling aggregates that results in excessive breakage of particles shall be discontinued. The use of suitable devices to reduce impact of falling aggregates may be required by the Engineer.

90-5.02 PROPORTIONING DEVICES

- Weighing, measuring, or metering devices used for proportioning materials shall conform to the requirements in Section 9-1.01, "Measurement of Quantities," and this Section 90-5.02. In addition, automatic weighing systems shall comply with the requirements for automatic proportioning devices in Section 90-5.03A, "Proportioning for Pavement." Automatic devices shall be automatic to the extent that the only manual operation required for proportioning the aggregates, cement, and mineral admixture for one batch of concrete is a single operation of a switch or starter.
- Proportioning devices shall be tested at the expense of the Contractor as frequently as the Engineer may deem necessary to ensure their accuracy.
- Weighing equipment shall be insulated against vibration or movement of other operating equipment in the plant. When the plant is in operation, the weight of each batch of material shall not vary from the weight designated by the Engineer by more than the tolerances specified herein.
- Equipment for cumulative weighing of aggregate shall have a zero tolerance of ±0.5 percent of the designated total batch weight of the aggregate. For systems with individual weigh hoppers for the various sizes of aggregate, the zero tolerance shall be ±0.5 percent of the individual batch weight designated for each size of aggregate. Equipment for cumulative weighing of cement and mineral admixtures shall have a zero tolerance of ±0.5 percent of the designated total batch weight of the cement and mineral admixture. Equipment for weighing cement or mineral admixture separately shall

have a zero tolerance of ±0.5 percent of their designated individual batch weights. Equipment for measuring water shall have a zero tolerance of ±0.5 percent of its designated weight or volume.

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

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

- Each scale graduation shall be approximately 0.001 of the total capacity of the scale. The capacity of scales for weighing cement, mineral admixture, or cement plus mineral admixture and aggregates shall not exceed that of commercially available scales having single graduations indicating a weight not exceeding the maximum permissible weight variation above, except that no scale shall be required having a capacity of less than 1102 pounds, with one pound graduations.

90-5.03 PROPORTIONING

- Proportioning shall consist of dividing the aggregates into the specified sizes, each stored in a separate bin, and combining them with cement, mineral admixture, and water as provided in these specifications. Aggregates shall be proportioned by weight.
- At the time of batching, aggregates shall have been dried or drained sufficiently to result in a stable moisture content such that no visible separation of water from aggregate will take place during transportation from the proportioning plant to the point of mixing. In no event shall the free moisture content of the fine aggregate at the time of batching exceed 8 percent of its saturated, surface-dry weight.
- Should separate supplies of aggregate material of the same size group, but of different moisture content or specific gravity or surface characteristics affecting workability, be available at the proportioning plant, withdrawals shall be made from one supply exclusively and the materials therein completely exhausted before starting upon another.
- Bulk "Type IP (MS) Modified" cement shall be weighed in an individual hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer.
- Bulk cement and mineral admixture may be weighed in separate, individual weigh hoppers or may be weighed in the same weigh hopper and shall be kept separate from the aggregates until the ingredients are released for discharge into the mixer. If the cement and mineral admixture are weighed cumulatively, the cement shall be weighed first.
- When cement and mineral admixtures are weighed in separate weigh hoppers**,** the weigh systems for the proportioning of the aggregate, the cement, and the mineral admixture shall be individual and distinct from all other weigh systems. Each weigh system shall be equipped with a hopper, a lever system, and an indicator to constitute an individual and independent material weighing device. The cement and the mineral admixture shall be discharged into the mixer simultaneously with the aggregate.
- The scales and weigh hoppers for bulk weighing cement, mineral admixture, or cement plus mineral admixture shall be separate and distinct from the aggregate weighing equipment.
- For batches with a volume of 1.3 cubic yards or more, the batching equipment shall conform to one of the following combinations:

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

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

90-5.03A Proportioning for Pavement

- Aggregates and bulk cement, mineral admixture, and cement plus mineral admixture for use in pavement shall be proportioned by weight by means of automatic proportioning devices of approved type conforming to 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 weight of the fine aggregate.
- The batching of cement, mineral admixture, or cement plus mineral admixture and aggregate shall be interlocked so that a new batch cannot be started until all weigh hoppers are empty, the proportioning devices are within zero tolerance, and the discharge gates are closed. The interlock shall permit no part of the batch to be discharged until all aggregate hoppers and the cement and mineral admixture hoppers or the cement plus mineral admixture hopper are charged with weights that are within the tolerances specified in Section 90-5.02, "Proportioning Devices."
- When interlocks are required for cement and mineral admixture charging mechanisms and cement and mineral admixtures are weighed cumulatively, their charging mechanisms shall be interlocked to prevent the introduction of mineral admixture until the weight of cement in the cement weigh hopper is within the tolerances specified in Section 90-5.02, "Proportioning Devices."
- The discharge gate on the cement and mineral admixture hoppers or the cement plus mineral admixture hopper shall be designed to permit regulating the flow of cement, mineral admixture, or cement plus mineral admixture into the aggregate as directed by the Engineer.
- When separate weigh boxes are used for each size of aggregate, the discharge gates shall permit regulating the flow of each size of aggregate as directed by the Engineer.
- Material discharged from the several bins shall be controlled by gates or by mechanical conveyors. The means of withdrawal from the several bins, and of discharge from the weigh box, shall be interlocked so that not more than one bin can discharge at a time, and so that the weigh box cannot be tripped until the required quantity from each of the several bins has been deposited therein. Should a separate weigh box be used for each size of aggregate, all may be operated and discharged simultaneously.
- When the discharge from the several bins is controlled by gates, each gate shall be actuated automatically so that the required weight is discharged into the weigh box, after which the gate shall automatically close and lock.
- The automatic weighing system shall be designed so that all proportions required may be set on the weighing controller at the same time.

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 0.33 yd^3 may be mixed by hand methods in conformance with the provisions in Section 90-6.05, "Hand-Mixing."
- Equipment having components made of aluminum or magnesium alloys that would have contact with plastic concrete during mixing, transporting, or pumping of portland cement concrete shall not be used.
- Concrete shall be homogeneous and thoroughly mixed, and there shall be no lumps or evidence of undispersed cement, mineral admixture, or cement plus mineral admixture.
- Uniformity of concrete mixtures will be determined by differences in penetration as determined by California Test 533, or slump as determined by ASTM Designation: C 143, and by variations in the proportion of coarse aggregate as determined by California Test 529.
- When the mix design specifies a penetration value, the difference in penetration, determined by comparing penetration tests on 2 samples of mixed concrete from the same batch or truck mixer load, shall not exceed 3/8". 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 169 pounds per cubic yard of concrete.

Average Slump	Maximum Permissible Difference
Less than 4"	1"
4" to 6"	1 1/2"
Greater than 6" to 9"	2"

- The Contractor, at the Contractor's expense, shall furnish samples of the freshly mixed concrete and provide satisfactory facilities for obtaining the samples.

90-6.02 MACHINE MIXING

- Concrete mixers may be of the revolving drum or the revolving blade type, and the mixing drum or blades shall be operated uniformly at the mixing speed recommended by the manufacturer. Mixers and agitators that have an accumulation of hard concrete or mortar shall not be used.
- The temperature of mixed concrete, immediately before placing, shall be not less than 50° F. or more than 90° F. 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 149° F. If ice is used to cool the concrete, discharge of the mixer will not be permitted until all ice is melted.
- The batch shall be so charged into the mixer that some water will enter in advance of cementitious materials and aggregates. All water shall be in the drum by the end of the first one - fourth of the specified mixing time.
- Cementitious materials shall be batched and charged into the mixer by means that will not result either in loss of cementitious materials due to the effect of wind, in accumulation of cementitious materials on surfaces of conveyors or hoppers, or in other conditions that reduce or vary the required quantity of cementitious material in the concrete mixture.
- Paving and stationary mixers shall be operated with an automatic timing device. The timing device and discharge mechanism shall be interlocked so that during normal operation no part of the batch will be discharged until the specified mixing time has elapsed.
- The total elapsed time between the intermingling of damp aggregates and all cementitious materials and the start of mixing shall not exceed 30 minutes.
- The size of batch shall not exceed the manufacturer's guaranteed capacity.
- When producing concrete for pavement or base, suitable batch counters shall be installed and maintained in good operating condition at jobsite batching plants and stationary mixers. The batch counters shall indicate the exact number of batches proportioned and mixed.
- Concrete shall be mixed and delivered to the jobsite by means of one of the following combinations of operations:

A. Mixed completely in a stationary mixer and the mixed concrete transported to the point of delivery in truck agitators or in non-agitating hauling equipment (central-mixed concrete).
B. Mixed partially in a stationary mixer, and the mixing completed in a truck mixer (shrink-mixed concrete).
C. Mixed completely in a truck mixer (transit-mixed concrete).
D. Mixed completely in a paving mixer.

- Agitators may be truck mixers operating at agitating speed or truck agitators. Each mixer and agitator shall have attached thereto in a prominent place a metal plate or plates on which is plainly marked the various uses for which the equipment is designed, the manufacturer's guaranteed capacity of the drum or container in terms of the volume of mixed concrete and the speed of rotation of the mixing drum or blades.
- Truck mixers shall be equipped with electrically or mechanically actuated revolution counters by which the number of revolutions of the drum or blades may readily be verified.
- When shrink-mixed concrete is furnished, concrete that has been partially mixed at a central plant shall be transferred to a truck mixer and all requirements for transit-mixed concrete shall apply. No credit in the number of revolutions at mixing speed shall be allowed for partial mixing in a central plant.

90-6.03 TRANSPORTING MIXED CONCRETE

- Mixed concrete may be transported to the delivery point in truck agitators or truck mixers operating at the speed designated by the manufacturer of the equipment as agitating speed, or in non-agitating hauling equipment, provided the consistency and workability of the mixed concrete upon discharge at the delivery point is suitable for adequate placement and consolidation in place, and provided the mixed concrete after hauling to the delivery point conforms to the provisions in Section 90-6.01, "General."
- Truck agitators shall be loaded not to exceed the manufacturer's guaranteed capacity and shall maintain the mixed concrete in a thoroughly mixed and uniform mass during hauling.
- Bodies of non-agitating hauling equipment shall be constructed so that leakage of the concrete mix, or any part thereof, will not occur at any time.
- Concrete hauled in open-top vehicles shall be protected during hauling against rain or against exposure to the sun for more than 20 minutes when the ambient temperature exceeds 75° F.
- No additional mixing water shall be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer. If the Engineer authorizes additional water to be incorporated into the concrete, the drum shall be revolved not less than 30 revolutions at mixing speed after the water is added and before discharge is commenced.

- The rate of discharge of mixed concrete from truck mixer-agitators shall be controlled by the speed of rotation of the drum in the discharge direction with the discharge gate fully open.
- When a truck mixer or agitator is used for transporting concrete to the delivery point, discharge shall be completed within 1.5 hours or before 250 revolutions of the drum or blades, whichever occurs first, after the introduction of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 86° F. or above, the time allowed may be less than 1.5 hours.
- When non-agitating hauling equipment is used for transporting concrete to the delivery point, discharge shall be completed within one hour after the addition of the cement to the aggregates. Under conditions contributing to quick stiffening of the concrete, or when the temperature of the concrete is 86° F. or above, the time between the introduction of cement to the aggregates and discharge shall not exceed 45 minutes.
- Each load of concrete delivered at the jobsite shall be accompanied by a weighmaster certificate showing the mix identification number, non-repeating load number, date and time at which the materials were batched, the total amount of water added to the load, and for transit-mixed concrete, the reading of the revolution counter at the time the truck mixer is charged with cement. This weighmaster certificate shall also show the actual scale weights (pounds) for the ingredients batched. Theoretical or target batch weights shall not be used as a substitute for actual scale weights.
- 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 weights or measurements for a load of concrete provided that both certificates are imprinted with the same non-repeating load number that is unique to the contract and delivered to the jobsite with the load.
- Weighmaster certificates furnished by the Contractor shall conform to the provisions in Section 9-1.01, "Measurement of Quantities."

90-6.04 TIME OR AMOUNT OF MIXING

- Mixing of concrete in paving or stationary mixers shall continue for the required mixing time after all ingredients, except water and admixture, if added with the water, are in the mixing compartment of the mixer before any part of the batch is released. Transfer time in multiple drum mixers shall not be counted as part of the required mixing time.
- The required mixing time, in paving or stationary mixers, of concrete used for concrete structures, except minor structures, shall be not less than 90 seconds or more than 5 minutes, except that when directed by the Engineer in writing, the requirements of the following paragraph shall apply.
- The required mixing time, in paving or stationary mixers, except as provided in the preceding paragraph, shall be not less than 50 seconds or more than 5 minutes.
- The minimum required revolutions at the mixing speed for transit-mixed concrete shall not be less than that recommended by the mixer manufacturer, but in no case shall the number of revolutions be less than that required to consistently produce concrete conforming to the provisions for uniformity in Section 90-6.01, "General."

90-6.05 HAND-MIXING

- Hand-mixed concrete shall be made in batches of not more than 0.33 yd^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 one foot in total depth. On this mixture shall be spread the dry cement and mineral admixture and the whole mass turned no fewer than 2 times dry; then sufficient clean water shall be added, evenly distributed, and the whole mass again turned no fewer than 3 times, not including placing in the carriers or forms.

90-6.06 AMOUNT OF WATER AND PENETRATION

- The amount of water used in concrete mixes shall be regulated so that the penetration of the concrete as determined by California Test 533 or the slump of the concrete as determined by ASTM Designation: C 143 is within the "Nominal" values shown in the following table. When the penetration or slump of the concrete is found to exceed the nominal values listed, the mixture of subsequent batches shall be adjusted to reduce the penetration or slump to a value within the nominal range shown. Batches of concrete with a penetration or slump exceeding the maximum values listed shall not be used in the work. When Type F or Type G chemical admixtures are added to the mix, the penetration requirements shall not apply and the slump shall not exceed 9" after the chemical admixtures are added.

Type of Work	Nominal		Maximum	
	Penetration (in)	Slump (in)	Penetration (in)	Slump (in)
Concrete Pavement	0-1	—	1.57	—
Non-reinforced concrete facilities	0-1 /3/8	—	2	—
Reinforced concrete structures				
Sections over 300-mm thick	0-1 3/8	—	2.56	—
Sections 300-mm thick or less	0-2	—	3	—
Concrete placed under water	—	6"-8	—	9
Cast-in-place concrete piles	2.56-3.54	5.12-7.09	4	8

- The amount of free water used in concrete shall not exceed 308 pounds/yd^3, plus 20 pounds for each required 100 pounds of cementitious material in excess of 548 pounds/yd^3.• The term free water is defined as the total water in the mixture minus the water absorbed by the aggregates in reaching a saturated surface-dry condition.
- Where there are adverse or difficult conditions that affect the placing of concrete, the above specified penetration and free water content limitations may be exceeded providing the Contractor is granted permission by the Engineer in writing to increase the cementitious material content per cubic yard of concrete. The increase in water and cementitious material shall be at a ratio not to exceed 30 pounds of water per added 100 pounds of cementitious material per cubic yard. The cost of additional cementitious material and water added under these conditions shall be at the Contractor's expense and no additional compensation will be allowed therefor.
- The equipment for supplying water to the mixer shall be constructed and arranged so that the amount of water added can be measured accurately. Any method of discharging water into the mixer for a batch shall be accurate within 1.5 percent of the quantity of water required to be added to the mix for any position of the mixer. Tanks used to measure water shall be designed so that water cannot enter while water is being discharged into the mixer and discharge into the mixer shall be made rapidly in one operation without dribbling. All equipment shall be arranged so as to permit checking the amount of water delivered by discharging into measured containers.

90-7 CURING CONCRETE

90-7.01 METHODS OF CURING

- Newly placed concrete shall be cured by the methods specified in this Section 90-7.01 and the special provisions.

90-7.01A Water Method

- The concrete shall be kept continuously wet by the application of water for a minimum curing period of 7 days after the concrete has been placed.
- When a curing medium consisting of cotton mats, rugs, carpets, or earth or sand blankets is to be used to retain the moisture, the entire surface of the concrete shall be kept damp by applying water with a nozzle that so atomizes the flow that a mist and not a spray is formed, until the surface of the concrete is covered with the curing medium. The moisture from the nozzle shall not be applied under pressure directly upon the concrete and shall not be allowed to accumulate on the concrete in a quantity sufficient to cause a flow or wash the surface. At the expiration of the curing period, the concrete surfaces shall be cleared of all curing mediums.
- When concrete bridge decks and flat slabs are to be cured without the use of a curing medium, the entire surface of the bridge deck or slab shall be kept damp by the application of water with an atomizing nozzle as specified in the preceding paragraph, until the concrete has set, after which the entire surface of the concrete shall be sprinkled continuously with water for a period of not less than 7 days.

90-7.01B Curing Compound Method

- Surfaces of the concrete that are exposed to the air shall be sprayed uniformly with a curing compound.
- Curing compounds to be used shall be as follows:

1. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B, except the resin type shall be poly-alpha-methylstyrene.
2. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class B.
3. Pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 2, Class A.
4. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class B.
5. Non-pigmented curing compound conforming to the requirements in ASTM Designation: C 309, Type 1, Class A.

6. Non-pigmented curing compound with fugitive dye conforming to the requirements in ASTM Designation: C 309, Type 1-D, Class A.

- The infrared scan for the dried vehicle from curing compound (1) shall match the infrared scan on file at the Transportation Laboratory.
- The loss of water for each type of curing compound, when tested in conformance with the requirements in California Test 534, shall not be more than 0.28-pound/yd^2 in 24 hours or more than 0.83-pound/yd^2 in 72 hours.
- The curing compound to be used will be specified elsewhere in these specifications or in the special provisions.
- When the use of curing compound is required or permitted elsewhere in these specifications or in the special provisions and no specific kind is specified, any of the curing compounds listed above may be used.
- Curing compound shall be applied at a nominal rate of 4.2 yd^2/quart, unless otherwise specified.
- At any point, the application rate shall be within ±1.4 yd^2/quart of the nominal rate specified, and the average application rate shall be within ±0.6 yd^2/quart 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 39°F and shall not be diluted or altered after manufacture.
- The curing compound shall be packaged in clean 22.6 gallon barrels or round 5 gallon containers or shall be supplied from a suitable storage tank located at the jobsite. The containers shall comply with "Title 49, Code of Federal Regulations, Hazardous Materials Regulations." The 22.6 gallon barrels shall have removable lids and airtight fasteners. The 5 gallon containers shall be round and have standard full open head and bail. Lids with bungholes shall not be permitted. On-site storage tanks shall be kept clean and free of contaminants. Each tank shall have a permanent system designed to completely redisperse settled material without introducing air or other foreign substances.
- Steel containers and lids shall be lined with a coating that will prevent destructive action by the compound or chemical agents in the air space above the compound. The coating shall not come off the container or lid as skins. Containers shall be filled in a manner that will prevent skinning. Plastic containers shall not react with the compound.
- Each container shall be labeled with the manufacturer's name, kind of curing compound, batch number, volume, date of manufacture, and volatile organic compound (VOC) content. The label shall also warn that the curing compound containing pigment shall be well stirred before use. Precautions concerning the handling and the application of curing compound shall be shown on the label of the curing compound containers in conformance with the Construction Safety Orders and General Industry Safety Orders of the State of California.
- Containers of curing compound shall be labeled to indicate that the contents fully comply with the rules and regulations concerning air pollution control in the State of California.
- When the curing compound is shipped in tanks or tank trucks, a shipping invoice shall accompany each load. The invoice shall contain the same information as that required herein for container labels.

- Curing compound will be sampled by the Engineer at the source of supply or at the jobsite or at both locations.
- Curing compound shall be formulated so as to maintain the specified properties for a minimum of one year. The Engineer may require additional testing before use to determine compliance with these specifications if the compound has not been used within one year or whenever the Engineer has reason to believe the compound is no longer satisfactory.
- Tests will be conducted in conformance with the latest ASTM test methods and methods in use by the Transportation Laboratory.

90-7.01C Waterproof Membrane Method

- The exposed finished surfaces of concrete shall be sprayed with water, using a nozzle that so atomizes the flow that a mist and not a spray is formed, until the concrete has set, after which the curing membrane shall be placed. The curing membrane shall remain in place for a period of not less than 72 hours.
- Sheeting material for curing concrete shall conform to the requirements in AASHTO Designation: M 171 for white reflective materials.
- The sheeting material shall be fabricated into sheets of such width as to provide a complete cover for the entire concrete surface. Joints in the sheets shall be securely cemented together in such a manner as to provide a waterproof joint. The joint seams shall have a minimum lap of 4".
- 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 1.64 feet 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 59° F., the Contractor shall fog the surface of the concrete with a fine spray of water as specified in Section 90-7.01A, "Water Method." The surface of the pavement shall be kept moist between the hours of 10:00 a.m. and 4:30 p.m. on the day the concrete is placed. However, the fogging done after the curing compound has been applied shall not begin until the compound has set sufficiently to prevent displacement. Fogging shall be discontinued if ordered in writing by the Engineer.

90-7.03 CURING STRUCTURES

- Newly placed concrete for cast-in-place structures, other than highway bridge decks, shall be cured by the water method, the forms-in-place method, or, as permitted herein, by the curing compound method, in conformance with the provisions in Section 90-7.01, "Methods of Curing."
- The curing compound method using a pigmented curing compound may be used on concrete surfaces of construction joints, surfaces that are to be buried underground, and surfaces where only Ordinary Surface Finish is to be

applied and on which a uniform color is not required and that will not be visible from a public traveled way. If the Contractor elects to use the curing compound method on the bottom slab of box girder spans, the curing compound shall be curing compound (1).

- The top surface of highway bridge decks shall be cured by both the curing compound method and the water method. The curing compound shall be curing compound (1). The curing compound shall be applied progressively during the deck finishing operations immediately after finishing operations are completed on each individual portion of the deck. The water cure shall be applied not later than 4 hours after completion of deck finishing or, for portions of the decks on which finishing is completed after normal working hours, the water cure shall be applied not later than the following morning.
- Concrete surfaces of minor structures, as defined in Section 51-1.02, "Minor Structures," shall be cured by the water method, the forms-in-place method or the curing compound method.
- When deemed necessary by the Engineer during periods of hot weather, water shall be applied to concrete surfaces being cured by the curing compound method or by the forms-in-place method, until the Engineer determines that a cooling effect is no longer required. Application of water for this purpose will be paid for as extra work as provided in Section 4-1.03D, "Extra Work."

90-7.04 CURING PRECAST CONCRETE MEMBERS

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

A. After placement of the concrete, members shall be held for a minimum 4-hour presteaming period. If the ambient air temperature is below 10°C, steam shall be applied during the presteaming period to hold the air surrounding the member at a temperature between 50°F and 90° F.
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 72° F. per hour. The curing temperature throughout the enclosure shall not exceed 149° F. 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 197 feet 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 59° F. until the stress is transferred to the concrete.
G. Curing of precast concrete will be considered completed after termination of the steam curing cycle.

90-7.05 CURING PRECAST PRESTRESSED CONCRETE PILES

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

A. Piles shall be either steam cured or water cured. If water curing is used, the piles shall be kept continuously wet by the application of water in conformance with the provisions in Section 90-7.01A, "Water Method."
B. If steam curing is used, the steam curing provisions in Section 90-7.04, "Curing Precast Concrete Members," shall apply except that the piles shall be kept continuously wet for their entire length for a period of not less than 3 days, including the holding and steam curing periods.

90-7.06 CURING SLOPE PROTECTION

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

90-7.07 CURING MISCELLANEOUS CONCRETE WORK

- Exposed surfaces of curbs shall be cured by pigmented curing compounds as specified in Section 90-7.01B, "Curing Compound Method."
- Concrete sidewalks, gutter depressions, island paving, curb ramps, driveways, and other miscellaneous concrete areas shall be cured in conformance with any of the methods specified in Section 90-7.01, "Methods of Curing."
- Shotcrete shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."
- Mortar and grout shall be cured by keeping the surface damp for 3 days.
- After placing, the exposed surfaces of sign structure foundations, including pedestal portions, if constructed, shall be cured for at least 72 hours by spraying with water, or by a moist earth blanket, or by any of the methods provided in Section 90-7.01, "Methods of Curing."

90-8 PROTECTING CONCRETE

90-8.01 GENERAL

- In addition to the provisions in Section 7-1.16, "Contractor's Responsibility for the Work and Materials," the Contractor shall protect concrete as provided in this Section 90-8.
- Concrete shall not be placed on frozen or ice-coated ground or subgrade nor on ice-coated forms, reinforcing steel, structural steel, conduits, precast members, or construction joints.
- Under rainy conditions, placing of concrete shall be stopped before the quantity of surface water is sufficient to damage surface mortar or cause a flow or wash of the concrete surface, unless the Contractor provides adequate protection against damage.
- Concrete that has been frozen or damaged by other causes, as determined by the Engineer, shall be removed and replaced by the Contractor at the Contractor's expense.

90-8.02 PROTECTING CONCRETE STRUCTURES

- Structure concrete and shotcrete used as structure concrete shall be maintained at a temperature of not less than 45° F. for 72 hours after placing and at not less than 39° F. for an additional 4 days. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.

90-8.03 PROTECTING CONCRETE PAVEMENT

- Pavement concrete shall be maintained at a temperature of not less than 39° F. for 72 hours. When required by the Engineer, the Contractor shall submit a written outline of the proposed methods for protecting the concrete.
- Except as provided in Section 7-1.08, "Public Convenience," the Contractor shall protect concrete pavement against construction and other activities that abrade, scar, discolor, reduce texture depth, lower coefficient of friction, or otherwise damage the surface. Stockpiling, drifting, or excessive spillage of soil, gravel, petroleum products, and concrete or asphalt mixes on the surface of concrete pavement is prohibited unless otherwise specified in these specifications, the special provisions or permitted by the Engineer.
- When ordered by the Engineer or shown on the plans or specified in the special provisions, pavement crossings shall be constructed for the convenience of public traffic. The material and work necessary for the construction of the crossings, and their subsequent removal and disposal, will be paid for at the contract unit prices for the items of work involved and if there are no contract items for the work involved, payment for pavement crossings will be made by extra work as provided in Section 4-1.03D, "Extra Work.". Where public traffic will be required to cross over the new pavement, Type III portland cement may be used in concrete, if permitted in writing by the Engineer. The pavement may be opened to traffic as soon as the concrete has developed a modulus of rupture of 551 psi. 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 551 psi. Concrete that fails to attain a modulus of rupture of 551 psi 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 348i psi has been attained, provided that:

A. Unit pressure exerted on the pavement by the paver shall not exceed 19.6 psi;
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 one foot from the edge of pavement.

- In case of visible cracking of, or other damage to the pavement, operation of the paving equipment on the pavement shall be immediately discontinued.
- Damage to the pavement resulting from early use of pavement by the Contractor's equipment as provided above shall be repaired by the Contractor at the Contractor's expense.
- The State will furnish the molds and machines for testing the concrete for modulus of rupture, and the Contractor, at the Contractor's expense, shall furnish the material and whatever labor the Engineer may require.

90-9 COMPRESSIVE STRENGTH

90-9.01 GENERAL

- Concrete compressive strength requirements consist of a minimum strength that shall be attained before various loads or stresses are applied to the concrete and, for concrete designated by strength, a minimum strength at the age of 28 days or at the age otherwise allowed in Section 90-1.01, "Description." The various strengths required are specified in these specifications or the special provisions or are shown on the plans.
- The compressive strength of concrete will be determined from test cylinders that have been fabricated from concrete sampled in conformance with the requirements of ASTM Designation: C 172. Test cylinders will be molded and initially field cured in conformance with California Test 540. Test cylinders will be cured and tested after receipt at the testing laboratory in conformance with the requirements of ASTM Designation: C 39. A strength test shall consist of the average strength of 2 cylinders fabricated from material taken from a single load of concrete, except that, if any cylinder should show evidence of improper sampling, molding, or testing, that cylinder shall be discarded and the strength test shall consist of the strength of the remaining cylinder.
- When concrete compressive strength is specified as a prerequisite to applying loads or stresses to a concrete structure or member, test cylinders for other than steam cured concrete will be cured in conformance with Method 1 of California Test 540. The compressive strength of concrete determined for these purposes will be evaluated on the basis of individual tests.
- When concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete strength to be used as a basis for acceptance of other than steam cured concrete will be determined from cylinders cured in conformance with Method 1 of California Test 540. If the result of a single compressive strength test at the maximum age specified or allowed is below the specified strength but is 95 percent or more of the specified strength, the Contractor shall, at the Contractor's expense, make corrective changes, subject to approval of the Engineer, in the mix proportions or in the concrete fabrication procedures, before placing additional concrete, and shall pay to the State $10.70 for each in-place cubic yard of concrete represented by the deficient test. If the result of a single compressive strength test at the maximum age specified or allowed is below 95 percent of the specified strength, but is 85 percent or more of the specified strength, the Contractor shall make the corrective changes specified above, and shall pay to the State $15.29 for each in place cubic yard of concrete represented by the deficient test. In addition, such corrective changes shall be made when the compressive strength of concrete tested at 7 days indicates, in the judgment of the Engineer, that the concrete will not attain the required compressive strength at the maximum age specified or allowed. Concrete represented by a single test 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 327 yd^3.
- When a precast concrete member is steam cured, the compressive strength of the concrete will be determined from test cylinders that have been handled and stored in conformance with Method 3 of California Test 540. The compressive strength of steam cured concrete will be evaluated on the basis of individual tests representing specific portions of production. When the concrete is designated by 28-day compressive strength rather than by cementitious material content, the concrete shall be considered to be acceptable whenever its compressive strength reaches the specified 28-day compressive strength provided that strength is reached in not more than the maximum number of days specified or allowed after the member is cast.
- When concrete is specified by compressive strength, prequalification of materials, mix proportions, mixing equipment, and procedures proposed for use will be required prior to placement of the concrete. Prequalification shall be accomplished by the submission of acceptable certified test data or trial batch reports by the Contractor. Prequalification data shall be based on the use of materials, mix proportions, mixing equipment, procedures, and size of batch proposed for use in the work.
- Certified test data, in order to be acceptable, shall indicate that not less than 90 percent of at least 20 consecutive tests exceed the specified strength at the maximum number of cure days specified or allowed, and none of those tests are less than 95 percent of specified strength. Strength tests included in the data shall be the most recent tests made on concrete of the proposed mix design and all shall have been made within one year of the proposed use of the concrete.
- Trial batch test reports, in order to be acceptable, shall indicate that the average compressive strength of 5 consecutive concrete cylinders, taken from a single batch, at not more than 28 days (or the maximum age allowed) after molding shall be at least 580 psi 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 yard and the weight, type, and source of all ingredients used.
D. Penetration of the concrete.
E. The air content of the concrete if an air-entraining admixture is used.
F. The age at time of testing and strength of all concrete cylinders tested.

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

90-10 MINOR CONCRETE

90-10.01 GENERAL

- Concrete for minor structures, slope paving, curbs, sidewalks and other concrete work, when designated as minor concrete on the plans, in the specifications, or in the contract item, shall conform to the provisions specified herein.

- The Engineer, at the Engineer's discretion, will inspect and test the facilities, materials and methods for producing the concrete to ensure that minor concrete of the quality suitable for use in the work is obtained.

90-10.02 MATERIALS

- Minor concrete shall conform to the following requirements:

90-10.02A Cementitious Material

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

90-10.02B Aggregate

- Aggregate shall be clean and free from deleterious coatings, clay balls, roots, and other extraneous materials.
- The Contractor shall submit to the Engineer for approval, a grading of the combined aggregate proposed for use in the minor concrete. After acceptance of the grading, aggregate furnished for minor concrete shall conform to that grading, unless a change is authorized in writing by the Engineer.
- The Engineer may require the Contractor to furnish periodic test reports of the aggregate grading furnished. The maximum size of aggregate used shall be at the option of the Contractor, but in no case shall the maximum size be larger than 1 1/2" or smaller than 3/4".
- The Engineer may waive, in writing, the gradation requirements in this Section 90-10.02B, if, in the Engineer's opinion, the furnishing of the gradation is not necessary for the type or amount of concrete work to be constructed.

90-10.02C Water

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

90-10.02D Admixtures

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

90-10.03 PRODUCTION

- Cementitious material, water, aggregate, and admixtures shall be stored, proportioned, mixed, transported, and discharged in conformance with recognized standards of good practice that will result in concrete that is thoroughly and uniformly mixed, that is suitable for the use intended, and that conforms to requirements specified herein. Recognized standards of good practice are outlined in various industry publications such as are issued by American Concrete Institute, AASHTO, or the Department.
- The cementitious material content of minor concrete shall conform to the provisions in Section 90-1.01, "Description."
- The amount of water used shall result in a consistency of concrete conforming to the provisions in Section 90-6.06, "Amount of Water and Penetration." Additional mixing water shall not be incorporated into the concrete during hauling or after arrival at the delivery point, unless authorized by the Engineer.
- Discharge of ready-mixed concrete from the transporting vehicle shall be made while the concrete is still plastic and before stiffening occurs. An elapsed time of 1.5 hours (one hour in non-agitating hauling equipment), or more than 250 revolutions of the drum or blades, after the introduction of the cementitious material to the aggregates, or a temperature of concrete of more than 90° F. will be considered conditions contributing to the quick stiffening of concrete. The Contractor shall take whatever action is necessary to eliminate quick stiffening, except that the addition of water will not be permitted.
- The required mixing time in stationary mixers shall be not less than 50 seconds or more than 5 minutes.
- The minimum required revolutions at mixing speed for transit-mixed concrete shall be not less than that recommended by the mixer manufacturer, and shall be increased, if necessary, to produce thoroughly and uniformly mixed concrete.
- Each load of ready-mixed concrete shall be accompanied by a weighmaster certificate that shall be delivered to the Engineer at the discharge location of the concrete, unless otherwise directed by the Engineer. The weighmaster certificate shall be clearly marked with the date and time of day when the load left the batching plant and, if hauled in truck mixers or agitators, the time the mixing cycle started.
- A Certificate of Compliance conforming to the provisions in Section 6–1.07, "Certificates of Compliance," shall be furnished to the Engineer, prior to placing minor concrete from a source not previously used on the contract, stating that minor concrete to be furnished meets contract requirements, including minimum cementitious material content specified.

90-10.04 CURING MINOR CONCRETE

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

90-10.05 PROTECTING MINOR CONCRETE

- Protecting minor concrete shall conform to the provisions in Section 90-8, "Protecting Concrete," except the concrete shall be maintained at a temperature of not less than 39°F for 72 hours after placing.

90-10.06 MEASUREMENT AND PAYMENT

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

90-11 MEASUREMENT AND PAYMENT

90-11.01 MEASUREMENT

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

90-11.02 PAYMENT

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

SECTION 12. (BLANK)

SECTION 13. (BLANK)