STATE OF CALIFORNIA-BUSINESS, TRANSPORTATION AND HOUSING AGENCY GRAY DAVIS, Governor
DEPARTMENT OF TRANSPORTATION
ES-OE MS #43
1727 30TH Street, 2ND Floor
Sacramento, CA 95816

June 28, 2001

04-Ala-80,580-2.3/4.0,45.6/47.0
04-143534

Addendum No. 3

Dear Contractor:

This addendum is being issued to the contract for construction on State highway in ALAMEDA COUNTY IN OAKLAND AT ROUTE 80/580 SEPARATION.

Submit bids for this work with the understanding and full consideration of this addendum. The revisions declared in this addendum are an essential part of the contract.

Bids for this work will be opened on July 10, 2001.

This addendum is being issued to revise the Project Plans, the Notice to Contractors and Special Provisions, and the Proposal and Contract.

Project Plan Sheets 97, 101, 102, 103, 105, 106, 107, 114, 122, 124, 127, 128, 129, 151, 158, 162, 163, 175, 186, 198, 201, 203, 204, 205, 206, 207, 208, 210, 211, 214, 220, 221, 224, 226, 227, 231, 232, 236, 239, 240, 267, 277, 280, 296, 297, 299, 309, 310, and 311 are revised. Half-sized copies of the revised sheets are attached for substitution for the like-numbered sheets.

In the Special Provisions, Section 5-1.23, "HAZARDOUS AND RESTRICTED MATERIALS, GENERAL," after the third paragraph the following paragraph is added:

"Regarding Section 10-1.35, "PILING" of these Special Provisions, the top six feet of soil excavated for piling shall be considered hazardous. All piling excavated material from the ground surface to a depth of six feet shall be treated as California hazardous waste. This material shall be disposed of at a Class I disposal facility. All piling excavated material below a depth of six feet shall have an unrestricted reuse."

In the Special Provisions, Section 10-1.21, "BRIDGE REMOVAL (PORTION)," is revised as attached.

In the Special Provisions, Section 10-1.35, "PILING," is revised as attached.

In the Special Provisions, Section 10-1.38, "CONCRETE STRUCTURES," subsection "FALSEWORK," subsection "51-1.06C Removing Falsework," the fifteenth paragraph which begins "The third paragraph..." and the first subparagraph are deleted.

In the Special Provisions, Section 10-1.48, "REINFORCEMENT," the following paragraphs are added after the first paragraph:

"At the Contractor's option welded headed bar reinforcement can be used at locations shown on the plans.

Welded headed bar reinforcement shall conform to the details shown on the plans, the provisions under "WELDED HEADED BAR REINFORCEMENT," elsewhere in these special provisions."

In the Special Provisions, Section 10-1.49, "WELDED HEADED BAR REINFORCEMENT," subsection "MEASUREMENT AND PAYMENT" is deleted.

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In the Special Provisions, Section 10-1.53, "CLEAN AND PAINT STRUCTURAL STEEL," is revised as attached.

In the Special Provisions, Section 10-1.54, "CLEAN AND PAINT EXISTING STRUCTURAL STEEL," is deleted.

In the Proposal and Contract, the Engineer's Estimate Items 54, 55, 69, and 72 are revised, Item 70 is deleted as attached.

To Proposal and Contract book holders:

Replace pages 5 and 6 of the Engineer's Estimate in the Proposal with the attached revised pages 5 and 6 of the Engineer's Estimate. The revised Engineer's Estimate is to be used in the bid.

Indicate receipt of this addendum by filling in the number of this addendum in the space provided on the signature page of the proposal.

Submit bids in the Proposal and Contract book you now possess. Holders who have already mailed their book will be contacted to arrange for the return of their book.

Inform subcontractors and suppliers as necessary.

This office is sending this addendum by UPS overnight mail to Proposal and Contract book holders to ensure that each receives it.

If you are not a Proposal and Contract book holder, but request a book to bid on this project, you must comply with the requirements of this letter before submitting your bid.

Sincerely,

ORIGINAL SIGNED BY

REBECCA D. HARNAGEL, Chief
Plans, Specifications & Estimates Branch
Office of Office Engineer

Attachments

10-1.21 BRIDGE REMOVAL (PORTION)

Removing portions of bridge shall conform to the requirements in Section 15-4, "Bridge Removal," of the Standard Specifications and these special provisions.

"BM" Line, Location A
"BC" Line, Location B
"MB" Line, Location C
"CB" Line, Location D
"E" Line, Location E
"MBL" Line, Location F

All removed materials that are not to be salvaged or used in the reconstruction shall become the property of the Contractor and shall be disposed of outside the highway right of way in accordance with the provisions in Section 7-1.13 "Disposal of Material Outside the Highway Right of Way," of the Standard Specifications.

The Contractor shall submit bridge removal plan to the Engineer detailing procedures and sequence for removing portions of bridge, including all features necessary to remove the portions of bridge in a safe and controlled manner.

The bridge removal plan shall be furnished and shall include the following:

Equipment locations on the structure during removal operations;
Temporary bracing for reconstructing or relocating existing structural steel;
Locations where work is to be performed over traffic or railroad property; and
Details and locations of protective covers or other measures to assure that people, property, utilities, and improvements will not be endangered.

Temporary bracing, and protective covers as required, shall be designed and constructed in conformance with the provisions in Section 51-1.06, "Falsework," of the Standard Specifications and the following:

The assumed horizontal load to be resisted by the temporary support shoring, and temporary bracing, for removal operations only, shall be the sum of the actual horizontal loads due to equipment, construction sequence or other causes and an allowance for wind, but in no case shall the assumed horizontal load to be resisted in any direction be less than 5 percent of the total dead load of the structure to be removed.

The following additional requirements apply to the removal of portions of bridges that are over or adjacent to roadways that may be closed to public traffic for only brief periods of time:

The closure of roadways to public traffic shall conform to the requirements under "Order of Work" "Maintaining Traffic" of these special provisions.

Prior to closing a roadway to traffic to accommodate bridge removal operations, the Contractor shall have all necessary men, materials and equipment at the site as needed to proceed with the removal work in an expeditious manner. While the roadway is closed to public traffic, work shall be pursued promptly and without interruption until the roadway is reopened to public traffic.

All removal operations shall be performed during periods of time that the roadway is closed to public traffic except as specified herein for preliminary work.

Preliminary work shall be limited to operations that will not reduce the structural strength or stability of the bridge, or any element thereof, to a level 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.

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.

During periods when the roadway is closed to public traffic, debris from bridge removal operations may be allowed to fall directly onto the lower roadway provided adequate protection is furnished for all highway facilities. The minimum protection for paved areas shall be a 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.

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 protective cover supported by falsework or members of the existing structure shall be constructed before beginning bridge removal work.

The construction and removal of the protective cover and the installation and removal of temporary railings shall conform to the provisions in "Order of Work" "Maintaining Traffic" and "Temporary Railings" of these special provisions.

The protective cover shall prevent any materials, equipment or debris from falling onto the public traffic or railroad property. The protective cover shall have a minimum strength equivalent to that provided by good, sound Douglas fir planking having a nominal thickness of 2 inches. Additional layers of material shall be furnished as necessary to prevent fine materials or debris from sifting down upon the traveled way and shoulders.

The protective cover shall extend at least 10 feet beyond the outside face of the bridge railing.

Before removal, the protective cover shall be cleaned of all debris and fine material.

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.

The protective cover shall be in conformance with the guidelines of the railroad company involved and provide the minimum clearances required under "Relations with Railroad Company" of these special provisions for the passage of railroad traffic.

Falsework or supports for protective cover shall not extend below the vertical clearance level nor to the ground line at any location within the roadbed.

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

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

The time to be provided for the Engineer's review of the working drawings for removing specific structures, or portions thereof, shall be as follows:

Structure or Portion of Structure	Review Time - Weeks
Distribution Structure	4

For bridge removal over railroads, approval by the Engineer of the bridge removal plans will be contingent upon the drawings being satisfactory to the railroad company involved.

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

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

The Contractor's registered engineer shall be present at the bridge site where bridge removal plan is required at all times when bridge removal operations are in progress. The Contractor's registered engineer shall inspect the bridge removal operation and report in writing on a daily basis the progress of the operation and the status of the remaining structure. A copy of the daily report shall be available at the site of the work at all times. Should an unplanned event occur, the Contractor's registered engineer shall submit immediately to the Engineer for approval, the procedure of operation proposed to correct or remedy the occurrence.

10-1.35 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 of 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 are 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" of the Standard Specifications and Section 5-1.23 "Hazardous and Restricted Material, General" of these Special Provisions."

At the option of the Contractor, internal drop hammers that strike the tip of closed ended piles, or impact hammers that do not meet the minimum energy requirements, will be allowed to advance the piles to within 3 feet of the specified tip elevation at the locations listed in the following table. The piles shall be driven the remaining 3 feet to specified tip elevation using impact hammers that conform to the requirements of Section 49-1.05, "Driving Equipment" of the Standard Specifications.

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.

$$P = \frac{2E}{s + 0.1}$$

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:

- Steel pipe piles less than 14 inches in diameter shall conform to the requirements in ASTM Designation: A 252, Grade 2 or 3.
- Steel pipe piles 14 inches and greater in diameter shall conform to the requirements in ASTM Designation: A 252, Grade 3.
- Steel pipe piles shall be of the nominal diameter and nominal wall thickness shown on the plans or specified in the special provisions.
- 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.
- The sulfur content of steel for steel pipe piles shall not exceed 0.05 percent.
- 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.

The Contractor shall furnish steel pipe piling that conforms to requirements in addition to ASTM Designation A 252 specifications (including tolerances for diameter, edge alignment, end match marking, roundness and straightness of steel pipe piling) that are required in order to conform with the steel pile splice welding requirements of "Steel Pipe Piling" specified herein.

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 the special provisions. Structural shape steel piling splices shall be complete joint penetration groove welds. Steel pipe pile splices that are made at a permanent manufacture or fabrication facility, and that are made prior to furnishing the Certificate of Compliance shall be complete penetration welds. Steel pipe pile splices that are made in the field shall be complete joint penetration groove welds.

Ends of steel pipe piling to be spliced that have been damaged during driving shall be removed to a sound and uniform section conforming to the tolerances for diameter, edge alignment and roundness required to meet the steel pile splice welding requirements. Pipe ends shall be field cut using automated guided cutting equipment. Manual flame cutting shall not be used.

Difficult pile installation is anticipated due to the presence of soft bay mud overlying dense soils, caving soils, hazardous and contaminated materialstidal flow, high ground water, low overhead clearance, underground utilities, subsurface concrete debris and traffic control.

Note 3 on Standard Plan B2-5 is deleted.

Driving System Submittal--Prior to installing driven piling, the Contractor shall provide a driving system submittal, including driveability analysis, in accordance with provisions in Section 5-1.02, "Plans and Working Drawings," of the Standard Specifications. A submittal shall be made for each control location shown below. All proposed driving systems (i.e., each hammer that may be brought onto the site) shall be included in the submittal.

The driving system submittal shall contain an analysis showing that the proposed driving systems will install piling to the specified tip elevation and specified bearing. Driving systems shall generate sufficient energy to drive the piles with stresses not more than 95 percent of the specified yield strength of the steel pile or unfilled steel shell. Submittals shall include the following:

1. Complete description of soil parameters used, including soil quake and damping coefficients, skin friction distribution, ratio of shaft resistance to nominal compression resistance, any assumptions made regarding the formation of soil plugs, and any assumptions made regarding drilling through the center of open ended steel shells.
2. List of all hammer operation parameters assumed in the analysis, including fuel settings, stroke limitations, and hammer efficiency.
3. Driveability studies that are based on a wave equation analysis using a computer program that has been approved by the Engineer. Driveability studies shall model the Contractor's proposed driving systems, including the hammers, capblocks, and pile cushions, as well as determine driving resistance and pile stresses for assumed site conditions. Separate analyses shall be completed at elevations above the specified tip elevations where difficult driving is anticipated.

   Studies shall include plots for a range of pile compression capacities above and below the nominal compression resistance shown on the plans. Plots shall include the following:

   a. Pile compressive stress versus blows per foot.
   b. Pile tensile stress versus blows per foot.
   c. Nominal compression resistance versus blows per foot.

When the driveability analysis hammers indicate that open ended pipe pile and steel shell penetration rates are less than 1.0 foot per 200 blows and the driving stresses will exceed 80% of the specified yield strength of the pipe and steel shell, the study shall include assumptions for drilling through the center of open ended pipe piles and steel shells.

4. Copies of all test results from any previous pile load tests, dynamic monitoring, and all driving records used in the analyses.
5. Completed "Pile and Driving Data Form," which is shown elsewhere in these special provisions.

The driving system submittal shall be stamped and signed by an engineer who is registered as a Civil Engineer in the State of California. The Contractor shall allow the Engineer 15 working days to review a driving system submittal after a complete set has been received, as determined by the Engineer, and prior to installing piling. Should the Engineer fail to complete his review within the time allowance, and if, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of the delay in the driving system submittal review, the delay will be considered a right of way delay as specified in Section 8-1.07, "Liquidated Damages," in the Standard Specifications.

The Contractor shall use the driving system and installation methods described in the approved driving system submittal for a given control location. Any change in hammers from those submitted and approved by the Engineer shall also be meet the requirements for driving system submittals. Revised and new driving system submittals shall be approved by the Engineer prior to using corresponding driving systems on production piling. The Contractor shall allow the Engineer 15 working days to review each revised and each new driving system submittal after a complete set has been received, as determined by the Engineer.

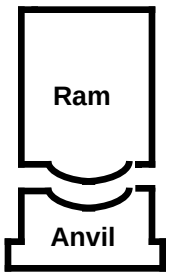
Approval of pile driving equipment shall not relieve the Contractor of his responsibility to drive piling free of damage to the specified penetration.

Full compensation for driving system submittals shall be considered as included in the contract unit price paid for drive pile and no additional compensation will be allowed therefor.

CALIFORNIA DEPARTMENT OF TRANSPORTATION
OFFICE OF TRANSPORTATION LABORATORY

PILE AND DRIVING DATA FORM

Structure Name :_____ Contract No.:_____
_____ Project:_____
Structure No.:_____ Pile Driving Contractor or Subcontractor____
Dist./Co./Rte./P.M.:_____ _____
(Pile Driven By)



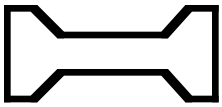
Hammer

Manufacturer:_____ Model:_____
Type:_____Serial No.:_____
Rated Energy:_____ at _____ Length of Stroke

Modifications: _____
_____
_____
_____
_____

Capblock (Hammer Cushion)

Material:_____
Thickness:_____ Area:_____
Modulus of Elasticity - E:_____ (P.S.I.)
Coefficient of Restitution - e:_____

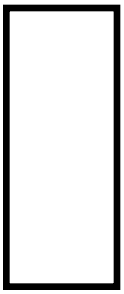


Pile Cap

[Helmet / Bonnet / Anvil Block / Drivehead] Weight:_____

Pile Cushion

Material:_____
Thickness:_____ Area: _____
Modulus of Elasticity - E:_____ (P.S.I.)
Coefficient of Restitution - e:_____



Pile

Pile Type:_____
Length (In Leads):_____
Weight/ft.:_____Taper:_____
Wall Thickness:_____
Cross Sectional Area:_____ sq.in.
Design Pile Capacity:_____ (Tons)
Description of Splice:_____
_____
Tip Treatment Description:_____
_____

DISTRIBUTION
One Copy Each To:

- ☐ Translab Geotechnical Engineering
- ☐ Translab Engineering Geology
- ☐ Resident Engineer

Note: If mandrel is used to drive the pile, attach separate manufacturer's detail sheet(s) including weight and dimensions.

Submitted By:_____ Date:_____

Phone No.:_____

CONTRACT NO. 04-143534
REVISED PER ADDENDUM NO. 3 DATED JUNE 28, 2001

Load Test Piles.—The Contractor shall notify the Engineer in writing not less than 10 days in advance of drilling or driving the piles to be load tested.

Before the remaining piles at the control locations listed in the following table are drilled, cast, cut to length or driven, load testing of each load test pile shown on the plans for the corresponding control locations shall be completed:

Bridge	Load Test Pile Location	Control Locations
Distribution Structure	A, MB-9	Bents BM 10 thru BM 13, Bents MB 7 thru MB17.
Distribution Structure	B, BM-17	Bents BC 4 thru BC 17, Bents CB 11 thru CB 22. Bents BM 14 thru BM 28, Bents MB 18 thru MB 31.
Distribution Structure	C, E-8	Bents BC 18 thru BC 21, Bents BM 29 thru BM 37 Bents MB 32 thru MB 41, Bents MBL 29,30,42&43, Bents E 6 thru E 20

The bottom of footing excavation shall be dewatered and made level before pile load testing. The excavation shall be kept dewatered during load testing.

Unless otherwise specifies or shown on the plans, steel plates welded to the load test and anchor piling shall conform to the requirements in ASTM Designation: A 709/A 709M, Grade 36, and shall be welded to the piling in conformance with the requirements in AWS D1.1.

Pipe, couplings and fittings shall be commercially available materials of the types and ratings shown on the plans.

Extensometer conduit shall be installed on straight alignment and at the location shown on the plans. The conduit shall be blocked and tied to the reinforcement to prevent displacement of the conduit while placing pile concrete. The spacing of conduit blocking and ties shall not exceed 7 feet.

Dynamic Monitoring.—Driven test piles and anchor piles will be monitored during the final 25 feet of driving for dynamic response to the driving equipment. Monitoring will be done by State forces using State furnished dynamic pile analyzer monitoring instruments.

The Engineer will determine which piles will receive dynamic monitoring from each control location. Piles to be dynamically monitored shall be made available to State forces 2 working days prior to driving. They shall be safely supported a minimum of six inches off the ground in a horizontal position on at least 2 support blocks. The pile shall be positioned so that State forces have safe access to the entire pile length and circumference for the installation of anchorages and control marks for monitoring. The Contractor shall rotate the piles on the blocks as directed by the Engineer.

Piles to be dynamically monitored shall be prepared and driven in the following sequence:

1. Prior to driving, the Contractor shall rotate and align the pile in the driving leads as directed by the Engineer
2. The Contractor shall temporarily suspend driving operations for approximately 15 minutes when the pile tip is 25 feet above the elevation to which the tip is required to be finally driven.
3. During the 15 minute suspension, the Contractor shall bolt the one pound instrument package securely to plugs or expansion anchors previously installed in the pile by the State. The Contractor shall also connect electrical cables to the instrument package as directed by the Engineer.
4. Driving operations shall resume as directed by the Engineer. Driving operations shall be suspended approximately one foot above the required tip elevation, as directed by the Engineer.
5. The Contractor shall remove the cables and instrument package from the pile and deliver them to the Engineer.
6. The following work day, the Contractor shall install the instrument package on the pile and attach the cables and resume driving the pile to the required tip elevation, as directed by the Engineer.
7. The Contractor shall remove the cables and instruments from the monitored pile and deliver them to the Engineer.

The Contractor shall be responsible for any damage to the State's cables and instruments caused by the Contractor's operations, and shall replace damaged cables or instruments in kind.

Wave Equation.—The second paragraph of Section 49-1.03, "Determination of Length," Section 49-1.08, "Bearing Value and Penetration," of the Standard Specifications shall not apply to the pile types at the control locations listed herein. The Engineer will conduct a penetration and bearing analysis in conjunction with pile load testing and dynamic monitoring of the piles at these locations and develop bearing acceptance criteria curves for these piles. Penetration and bearing analyses will be based on a wave equation analysis.

The Contractor shall allow the Engineer 30 working days to perform the load test, complete dynamic monitoring, revise specified tip elevations and to provide the bearing acceptance criteria curves for a given control location. Day one of 30 shall be the first day after the load test and anchor piles have been installed at that same control location.

Should the Engineer fail to provide the bearing acceptance criteria curves for production piles 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 providing the bearing acceptance criteria curves, 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 piles, other than load test and anchor piles, shall not be installed until the bearing acceptance criteria curves for piles within the corresponding control location have been provided by the Engineer.

The Contractor shall be responsible for any damage to the State's cables and instruments caused by the Contractor's operations, and shall replace damaged cables or instruments in kind.

Holes shall be predrilled through existing concrete footings for driving of steel piles at the locations shown on the plans.

Drilling through the existing reinforced concrete bridge footings shall be done in a manner which preserves as much as possible of the bottom area of the existing footings in a structurally sound, load supporting condition. Drilling methods and equipment shall be approved by the Engineer before starting the predrilling.

Full compensation for drilling holes, and disposing of material resulting from drilling shall be considered as included in the contract price paid per unit for drive steel pile of the size shown on the plans 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.

Cast-in-drilled-hole concrete piling (rock socket) shall consist of drilling or coring bedrock sockets 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 shall conform to the provisions of Section 49-4.03, "Drilled Holes," of the Standard Specifications.

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:

Steel shells driven permanently to the required bearing value and penetration and filled with concrete.
Steel casings installed permanently to the required penetration and filled with concrete.
Drilled holes filled with concrete.
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 accordance with the provisions in Section 19-2.06, "Surplus Material," of the Standard Specifications and Section 5-1.23 “Hazardous and Restricted Material, General” of these Special Provisions. of the Standard Specifications. Material resulting from placing concrete in piles, including slurry, shall be disposed of in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise permitted in writing by the Engineer.

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 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.

Concrete deposited under slurry shall have a nominal penetration equal to or greater than 3 1/2 inches. Concrete shall be proportioned to prevent excessive bleed water and segregation.

Concrete deposited under slurry shall contain not less than 658 pounds of cement per cubic yard.

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:

	Percentage Passing Primary Aggregate Nominal Sizes					
	1" x No. 4		1/2" x No. 4		3/8" x No. 4	
Sieve Sizes	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 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	0 - 4	0 - 4	0 - 4

Portions of cast-in-drilled-hole concrete piles shown on the plans to be formed shall be formed and finished in conformance with the provisions for concrete structures in Section 51, "Concrete Structures," of the Standard Specifications.

SLURRY.--Slurry shall be commercial quality mineral or synthetic drilling slurry and shall conform the requirements of these special provisions.

Water for slurry shall conform to the requirements in Section 90-2.03, "Water," of the Standard Specifications and these special provisions. Natural ground water in the drilled hole may be used for slurry when approved by the Engineer.

Slurry shall not weaken the bond between the concrete and both the reinforcement and the foundation material at the sides of the excavation.

The Contractor shall sample and test all slurry in the presence of the Engineer, unless otherwise directed. The date, time, names of the persons sampling and testing the slurry, and results of the tests shall be recorded and shall be approved by the Engineer before concrete is placed. A copy of slurry test results shall be delivered to the Engineer at the completion of each pile.

Mineral--Mineral slurry shall be mixed and thoroughly hydrated in slurry tanks, and slurry shall be sampled from the slurry tanks and tested before placement in the drilled hole.

Slurry shall be recirculated or continuously agitated in the drilled hole to maintain the specified properties.

Recirculation shall include removal of drill cuttings from the slurry before discharging the slurry back into the drilled hole. When recirculation is used, the slurry shall be sampled and tested at least every 2 hours after beginning its use until tests show that the samples taken form 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 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 cappedwith 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.

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.

Except for cast-in-place piling for soundwalls and retaining walls, when cast-in-place concrete piling is less than 24 inches in diameter, the Contractor may propose to increase the diameter and revise the pile tip elevation. The Contractor may propose to increase the diameter of cast-in-place piling for soundwalls and retaining walls, but the pile tip elevations shall not be revised. No additional compensation for delays will be allowed for the Contractor's use of increased diameter cast-in-place concrete piling.

The second through seventh paragraphs of Section 49-4.03, "Drilled Holes," of the Standard Specifications are amended to read:

The axis of the hole shall not deviate from plumb more than 1 1/2 inches per 10 feet of length.

Care shall be taken during excavation to prevent disturbing the foundation material surrounding the pile. Equipment or methods used for excavating holes shall not cause quick soil conditions or cause scouring or caving of the hole. After excavation is begun, the pile shall be constructed in a continuous and expeditious manner in order to prevent deterioration of the surrounding foundation material from air slaking or from the presence of water. Deteriorated foundation material, including material that has softened, swollen or degraded, shall be removed from the sides and the bottom of the hole and shall be disposed of. The bottom of the drilled hole shall be cleaned just before placing reinforcement or concrete to remove any loose sand, gravel, dirt, and drill cuttings.

After placing reinforcement and prior to placing concrete in the drilled hole, if caving occurs or deteriorated foundation material accumulates on the bottom of the hole or drill cuttings settle out of slurry, as determined by the Engineer, the reinforcement shall be removed and the bottom of the drilled hole cleaned.

Water that has infiltrated the hole shall be removed before placing concrete therein except when concrete is deposited under slurry. Fluvial or drainage water shall not be permitted to enter the hole.

Temporary steel casings shall be furnished and placed tight in the hole where shown on the plans and where necessary to control water or to prevent quick soil conditions or caving of the hole. Temporary casing shall be watertight and of sufficient strength to withstand the loads from installation, removal, lateral concrete pressures and earth pressures. The casing shall be non-corrugated and the surfaces shall be smooth, clean and free from hardened concrete. The casing shall be removed while the concrete is being placed. In a dewatered hole the concrete in the casing shall be maintained at a level at least 5 feet above the bottom of the casing or at a level above the bottom of the casing adequate to prevent displacement of the concrete by material from outside the casing, whichever is greater. When concrete is placed under slurry, the concrete in the casing shall be maintained at a level at least 5 feet above the bottom of the casing. 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, water, slurry or other materials, or cause segregation of the concrete.

Drill cuttings shall be disposed of in accordance with the provisions in Section 19-2.06, "Surplus Materials," of the Standard Specifications. Material resulting from placing concrete in piles, including slurry, shall be disposed of in accordance with the provisions in Section 7-1.13, "Disposal of Material Outside the Highway Right of Way," unless otherwise permitted in writing by the Engineer.

The second and third paragraphs of Section 49-4.05, "Inspection," of the Standard Specifications are amended to read:

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.

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, $310 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 $310. 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 15 working days 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.

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" 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	0 - 4	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 bottom 8 feet of the pile shall not be cleaned out. 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 'Contaminated and Hazardous Materials' elsewhere in 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.

Placing Concrete.--Water which has infiltrated the open ended steel shell shall be removed before placing concrete therein. Surface water shall not be permitted to enter the steel shell.

The second sentence in paragraph 3 of Section 51-1.09, "Placing Concrete," of the Standard Specifications is amended to read:

Concrete placed in steel shells 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 steel shell using a hopper and not allowed to strike the reinforcement, reinforcement bracing and other objects in the steel shell.

The provisions concerning vibration in Section 51-1.09, "Placing Concrete," of the Standard Specifications shall not apply to open ended cast-in-steel shell concrete piles. Only the upper 15 feet of concrete in open ended cast-in-steel shell concrete piling shall be vibrated.

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 PIPE PILING

General

Steel pipe piling shall consist of unfilled steel pipe piling, steel shells for open and closed 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 one meter 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 5/16 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 19°F, regardless of the pipe pile wall thickness or steel grade. In the event welding is disrupted, preheating to 19°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.

MEASUREMENT AND PAYMENT

Measurement and payment for the various types and classes of piles shall conform to the provisions in Sections 49-6.01, "Measurement," and 49-6.02, "Payment," of the Standard Specifications and these special provisions.

The 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 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.

Payment for cast-in-place concrete piling shall conform to the provisions in Section 49-6.02, "Payment," of the Standard Specifications except that, when the diameter of cast-in-place concrete piling is shown on the plans as 24-inch or larger, reinforcement in the piling will be paid for as bar reinforcing steel (bridge).

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.

Full compensation for cleaning out the open ended steel shells prior to installing reinforcement and filling with concrete, for disposing of materials inside 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.

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.

Full compensation for redriving monitored piles, for providing access for the Engineer, dewatering during monitoring, and for installing and removing the instruments from the pile shall be considered as included in the contract unit price paid for drive pile and no separate payment will be made therefor. The length of piling to be paid as furnish piling of the classes listed in the Engineer's Estimate shall include the lengths that monitored piles are redriven.

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.

Removing existing seal course, where shown on the plans will be paid for as extra work as provided in Section 4-1.03D of the Standard Specifications.

10-1.53 CLEAN AND PAINT STRUCTURAL STEEL

All new metal surfaces, existing metal surfaces where the weather protective cover is removed because of the retrofit work, and connections to existing steel, except where galvanized, shall be cleaned and painted in conformance with the provisions in Section 59-2, "Painting Structural Steel," and Section 91, "Paint," of the Standard Specifications and these special provisions.

Whenever the Standard Specifications refer to "Steel Structures Painting Council," the reference shall be replaced with "SSPC: The Society for Protective Coatings."

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.

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 first subparagraph of the first paragraph in Section 59-2.12, "Painting," of the Standard Specifications is amended to read:

At contact surfaces of stiffeners, railings, or built up members, any open seam exceeding 6 mils in width that would retain moisture shall be caulked with non-silicone type sealing compound conforming to the provisions in Federal Specification TT-S-230, Type II, or other approved material. The sealing compound shall be applied no sooner than 72 hours after the last application of undercoat. The sealing compound shall be allowed to cure as recommended by the manufacturer prior to 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 in Section 59-2.12, "Painting," of the Standard Specifications is amended to read:

The dry film thickness of the paint will be measured in place with a calibrated Type 2 magnetic film thickness gauge according to the Society for Protective Coatings" (formerly the Steel Structures Painting Council) SSPC-PA2.

The existing paint systems consist of materials listed in "Existing Highway Facilities" of 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, SSPC-QP 2, SSPC-QP 3.
    1. In lieu of certification in conformance with the requirements in SSPC-QP 1 for this project, the Contractor may submit written documentation showing conformance with the requirements in Section 3, "General Qualification Requirements," of SSPC-QP 1.
    2. In lieu of certification in conformance with the requirements in SSPC-QP 2 for this project, the Contractor may submit written documentation showing conformance with the requirements in Sections 4.2 through 4.6 of SSPC-QP 2.
    3. In lieu of certification in conformance with the requirements in SSPC-QP 3 for this project, the Contractor may submit written documentation showing conformance with the requirements in Section 3, " General Qualification Requirements," of SSPC-QP 3.

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 40 µm nor more than 86 µm as measured in conformance with the requirements in ASTM Designation: D 4417.

The areas of connections to existing steel to be dry spot blast cleaned shall consist of, as a minimum: (1) new and existing contact surfaces and existing member surfaces under bolt heads, nuts or washers of high-strength bolted connections, (2) exposed bare surfaces of existing steel remaining after trimming, cutting, drilling or reaming, and (3) areas of existing steel within a 4-inch radius measured in any direction from the 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.

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 100F°, 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 facing (contact) surface of high strength bolted connections shall be between 1 mils 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 facing 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 facing surfaces of the structure at or below this maximum allowable coating thickness.

Areas where mudcracking occurs in the inorganic zinc coating shall be blast cleaned and repainted with inorganic zinc coating to the specified thickness.

Dry spray, or overspray, as defined in the Steel Structures Painting Manual, Volume 1, "Good Painting Practice," of the "SSPC: The Society for Protective Coatings," shall be removed prior to application of subsequent coats or final acceptance. Removal of dry spray shall be by screening or other methods that minimize polishing of the inorganic zinc surface. The dry film thickness of the coating after removal of dry spray shall be in conformance with the provisions for applying the single undercoat, as specified herein.

The inorganic zinc coating shall be tested for adhesion and cure. The locations of the tests will be determined by the Engineer. The sequence of the testing operations shall be determined by the Contractor. The testing for adhesion and cure will be performed no sooner than 72 hours after application of the single undercoat of inorganic zinc coating. At the Contractor's expense, satisfactory access shall be provided to allow the Engineer to determine the location of the tests and to test the inorganic zinc coating cure. The inorganic zinc coating shall pass the following tests:

Adhesion

- The inorganic zinc coating shall have a minimum adhesion to steel of 600 psi when measured at no more than 6 locations as determine by the Engineer using a self-aligning adhesion tester in conformance with the requirements in ASTM Designation: D 4541. The Contractor, at the Contractor's expense, shall: (1) verify compliance with the adhesion requirements, (2) furnish test results to the Engineer, and (3) repair the coating after testing.

Cure

- The inorganic zinc coating, when properly cured, shall exhibit a solid, hard, and polished metal surface when firmly scraped with the knurled edge of a quarter. Inorganic zinc coating that is powdery, soft, or does not exhibit a polished metal surface, as determined by the Engineer, shall be repaired by the Contractor, at the Contractor's expense, by blast cleaning and repainting with inorganic zinc coating to the specified thickness.
- The 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 shall be thoroughly water rinsed.

Exposed areas of inorganic zinc coating shall receive a minimum of 2 finish coats of an exterior grade latex paint supplied by the manufacturer of the inorganic zinc coating.

The first finish coat shall be applied within 48 hours following the water rinsing.

The finish coat paint shall be formulated for application to inorganic zinc coating and shall conform to the following provisions:

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. 34272. The total dry film thickness of both applications of the first finish coat shall be not less than 50 µm.

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. 14090. The total dry film thickness of all applications of the second finish coat shall be not less than 50 µm.

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 .

Cost of repair of damage to existing paint caused by the Contractor's operations shall be borne by the Contractor.

MEASUREMENT AND PAYMENT

Dry spot blast cleaning and undercoat painting of blast cleaned areas of existing surfaces will be measured by the square foot of spot blast cleaned areas, and will be paid for as spot blast clean and paint undercoat.

The contract price paid per square foot for spot blast clean and paint undercoat shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in dry 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.

ENGINEER'S ESTIMATE
04-143534

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
41	203024	COMPOST (EROSION CONTROL)	LB	19,500		
42	203045	PURE LIVE SEED (EROSION CONTROL)	LB	1,120		
43	203056	COMMERCIAL FERTILIZER (EROSION CONTROL)	LB	1,950		
44	203061	STABILIZING EMULSION (EROSION CONTROL)	LB	2,640		
45	260301	CLASS 3 AGGREGATE BASE	CY	710		
46	390102	ASPHALT CONCRETE (TYPE A)	TON	1,350		
47	397001	ASPHALTIC EMULSION (PAINT BINDER)	TON	4		
48	490550	FURNISH 24" STEEL PIPE PILING	LF	9,017		
49 (S)	490555	DRIVE 24" STEEL PIPE PILE	EA	286		
50 (S)	490607	48" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	560		
51 (S)	490611	72" CAST-IN-DRILLED-HOLE CONCRETE PILING	LF	2,894		
52	495115	FURNISH 24" CAST-IN-STEEL SHELL CONCRETE PILING	LF	17,556		
53 (S)	495116	DRIVE 24" CAST-IN-STEEL SHELL CONCRETE PILE	EA	314		
54	495124	FURNISH 30" CAST-IN-STEEL SHELL CONCRETE PILING	LF	30,105		
55 (S)	495125	DRIVE 30" CAST-IN-STEEL SHELL CONCRETE PILE	EA	512		
56 (S)	048496	PILE CORROSION PROTECTION	LS	LUMP SUM	LUMP SUM	
57 (S)	500001	PRESTRESSING CAST-IN-PLACE CONCRETE	LS	LUMP SUM	LUMP SUM	
58 (F)	510051	STRUCTURAL CONCRETE, BRIDGE FOOTING	CY	12,200		
59 (F)	510053	STRUCTURAL CONCRETE, BRIDGE	CY	4,350		
60	510805	DIAPHRAGM BOLSTER	EA	44		

ENGINEER'S ESTIMATE
04-143534

Item	Item Code	Item	Unit of Measure	Estimated Quantity	Unit Price	Item Total
61	048497	DRILL AND PRESSURE GROUT DOWEL	LF	7,450		
62	511106	DRILL AND BOND DOWEL	LF	50,300		
63	511109	DRILL AND BOND DOWEL (EPOXY CARTRIDGE)	EA	70		
64 (S)	048498	CORE AND BOND DOWEL	LF	2,670		
65 (S)	048499	CORE AND BOND ROD	LF	320		
66 (S)	048500	CORE CONCRETE (2") AND PRESSURE GROUT DOWEL	LF	1,830		
67 (S)	515063	CORE CONCRETE (4")	LF	590		
68 (S)	515070	CORE CONCRETE (10")	LF	55		
69 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	LB	5,931,735		
70	BLANK					
71 (S-F)	540101	ASPHALT MEMBRANE WATERPROOFING	SQFT	6,250		
72 (S-F)	550110	COLUMN CASING	LB	1,122,325		
73 (S-F)	550203	FURNISH STRUCTURAL STEEL (BRIDGE)	LB	1,101,000		
74 (S-F)	550204	ERECT STRUCTURAL STEEL (BRIDGE)	LB	1,101,000		
75 (S)	590115	CLEAN AND PAINT STRUCTURAL STEEL	LS	LUMP SUM	LUMP SUM	
76 (S)	590135	SPOT BLAST CLEAN AND PAINT UNDERCOAT	SQFT	4,900		
77 (S)	590301	WORK AREA MONITORING	LS	LUMP SUM	LUMP SUM	
78	731502	MINOR CONCRETE (MISCELLANEOUS CONSTRUCTION)	CY	21		
79 (S-F)	750496	MISCELLANEOUS METAL (RESTRAINER - PIPE TYPE)	LB	9,350		
80 (S-F)	750499	MISCELLANEOUS METAL (RESTRAINER - ROD TYPE)	LB	380,000		