

**DEPARTMENT OF TRANSPORTATION**  
**DIVISION OF ENGINEERING SERVICES**  
OFFICE ENGINEER, MS 43  
1727 30<sup>TH</sup> STREET  
P.O. BOX 168041  
SACRAMENTO, CA 95816-8041  
FAX (916) 227-6214  
TTY (916) 227-8454



*Flex your power!*  
*Be energy efficient!*

**\*\* WARNING \*\* WARNING \*\* WARNING \*\* WARNING \*\***

**This document is intended for informational purposes only.**

Users are cautioned that California Department of Transportation (Department) does not assume any liability or responsibility based on these electronic files or for any defective or incomplete copying, excerpting, scanning, faxing or downloading of the contract documents. As always, for the official paper versions of the bidders packages and non-bidder packages, including addenda write to the California Department of Transportation, Plans and Bid Documents, Room 0200, P.O. Box 942874, Sacramento, CA 94272-0001, telephone (916) 654-4490 or fax (916) 654-7028. Office hours are 7:30 a.m. to 4:15 p.m. When ordering bidder or non-bidder packages it is important that you include a telephone number and fax number, P.O. Box and street address so that you can receive addenda.

December 21, 2005

04-SF-80-13.2/13.9  
04-0120F4

Addendum No. 5

Dear Contractor:

This addendum is being issued to the contract for construction on State highway in SAN FRANCISCO COUNTY IN SAN FRANCISCO FROM 0.6 KM TO 1.3 KM EAST OF THE YERBA BUENA TUNNEL EAST PORTAL.

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 February 1, 2006.

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 13, 421, 423, 424, 426, 429, 431, 510, 518, 612, 613, 674, 675, 676, 677, 678, 679, 682, 692, 695, 717, 718, 719, 720, 721, 722, 723, 731, 734, 765, 766, 767, 768, 769, 770, 776, 783, 786, 791, 792, 807, 844, 845, 846, 847, 848, 882, 883, 884, 885, 887, 888, 913, 915, 943, 958, 980, 983, 985, 987 and 988 are revised. Half-sized copies of the revised sheets are attached for substitution for the like-numbered sheets.

Project Plan Sheets 790A, 790B, 790C, 790D, 882A, 888A and 888B are added. Half-sized copies of the added sheets are attached for addition to the project plans.

In the Special Provisions, Section 4, "BEGINNING OF WORK, TIME OF COMPLETION AND LIQUIDATED DAMAGES," is revised as follows:

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

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

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

The second through fourth paragraphs, inclusive, and the first sentence of the fifth paragraph of Section 8-1.06, "Time of Completion," of the Standard Specifications shall not apply. A working day is defined as any day, with no exceptions.

The work shall be completed in phases as described in Section 10-1.01 "Order of Work" of these special provisions.

04-SF-80-13.2/13.9  
04-0120F4

Phase 1 work shall be diligently prosecuted to completion before the expiration of **1950 WORKING DAYS** beginning on the fifteenth day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$100,000 per day as liquidated damages, for each and every day's delay in completing Phase 1 work in excess of the number of working days prescribed above for Phase 1.

Phase 2 work shall be diligently prosecuted to completion before the expiration of **2130 WORKING DAYS** beginning on the fifteenth day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$100,000 per day as liquidated damages, for each and every day's delay in completing Phase 2 work in excess of the number of working days prescribed above for Phase 2.

Phase 3 work shall be diligently prosecuted to completion before the expiration of **2310 WORKING DAYS** beginning on the fifteenth day after approval of the contract.

The Contractor shall pay to the State of California the sum of \$100,000 per day as liquidated damages, for each and every day's delay in completing Phase 3 work in excess of the number of working days prescribed above for Phase 3.

Should two or more liquidated damages accrue concurrently, no more than \$100,000 per day will be assessed. Total liquidated damages for the project will not exceed \$125,000,000.

Inspection, testing, and review duties performed by the Engineer shall be considered as included in the number of working days for completion of the phases of work and no extensions of time will be allowed for such actions in determining liquidated damages.

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

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

In the Special Provisions, Section 5-1.18, "AREAS FOR CONTRACTOR'S USE," the second paragraph is revised as follows:

"The Contractor shall have use of the areas as indicated on the plans and as follows and shall plan his work accordingly:

"Area EF" is primarily available to Contract 04-0120E4 until March 31, 2008, and then to this contract after that date. Prior to March 31, 2008, the Contractor shall coordinate any planned work in "Area EF" with the Engineer and Contract 04-0120E4 contractor. Additionally, footings at tower T1 and footing and piers at Pier E2 to be constructed by others under Contract 04-0120E4 will be substantially complete by March 31, 2008, to allow the Contractor to complete the tower and E2 work specified under the contract.

"Area CE" is designated for use by Contract 04-0120E4 until March 31, 2008. The Contractor shall have access through "Area CE" to the work area at Pier W2. After March 31, 2008, "Area CE" becomes a part of the area provided to the 04-0120P4 contractor. The Contractor shall continue to have access through the area to the work area at Pier W2.

04-SF-80-13.2/13.9  
04-0120F4

"Area FPR" is primarily available to Contract 04-0120R4 until May 1, 2007. Prior to May 1, 2007, the Contractor shall coordinate any planned work in "Area FPR" with the Engineer and 04-0120R4 contractor. After May 1, 2007, "Area FPR" shall be considered a part of "Area FP."

"Area FP" is available for use by this contract until the completion of Phase 1 activities as described in Section 10-1.01 "Order of Work" and Section 4 "Beginning of Work, Time of Completion and Liquidated Damages" of these special provisions. After completion of Phase 1 activities, "Area FP" shall be made available to 04-0120P4 contractor. The Contractor shall coordinate any planned work in "Area FP" during the time periods allocated to Contract 04-0120P4 with the Engineer and Contract 04-0120P4 contractor. The Contractor shall allow the 04-0120E4 contractor a minimum 1.6 meter wide pedestrian access through "Area FP" to the slope area above Building No. 262 (Torpedo Factory)."

In the Special Provisions, Section 5-1.18, "AREAS FOR CONTRACTOR'S USE," the following paragraph is added after the fourth paragraph:

"Commencing January 1, 2010 the Contractor shall have access to and use of the completed westbound Oakland Touchdown roadway and structures and the completed Skyway structure. The Contractor's attention is directed to Section 10-1.26 "Maintaining Traffic" for access limitations from westbound Route 80. Personal vehicles of the Contractor's employees shall not be allowed access from westbound Route 80. Access and egress will be allowed via the existing maintenance road. Prior to commencing use of the area the Contractor shall submit for information to the Engineer plans describing the planned access, egress and use of the area. Beginning six months prior to the completion of Phase 2 work the Contractor shall clear the westbound Oakland Touchdown and Skyway of all equipment and materials to allow the Contractor performing work under contract 04-0120M4 access to complete paving, striping and other activities and the Contractor shall coordinate any required access on the completed westbound facilities with the 04-0120M4 Contractor and the Engineer."

In the Special Provisions, Section 5-1.25, "PAYMENTS," the fifth paragraph is revised as follows:

"Materials furnished but not incorporated into the work in secured areas will be eligible for partial payment if the Contractor furnishes evidence satisfactory to the Engineer that its storage is subject to or under the control of the Department and that it has been designated or fabricated specifically for this project. Such materials are not required to be stored within the State of California."

In the Special Provisions, Section 5-1.25, "PAYMENTS," the following paragraphs are added after the fifth paragraph:

"No later than 60 days prior to requesting the first partial payment, the Contractor shall submit, for approval by the Engineer, a list of all elements for which progress payments will be requested. For structural steel, the list shall detail work progress milestones and corresponding payment amounts from purchase of raw materials through final fabrication. The sum of the amounts for the elements and work listed in the list shall not exceed the value of the respective contract pay item(s) less any costs that would be incurred after final fabrication, such as shipping to the jobsite or erection costs as applicable.

The list of elements and progress milestones will be used as a baseline for payment for work as it is completed. No partial payment will be made until the list is approved in writing by the Engineer. No later than the twelfth of each month in which partial payments are requested for inclusion in the estimate, the Contractor shall submit fabricator invoice(s) accompanied by State form CEM-5101 for the work completed to date. The Department will make partial payment based on such invoices, subject to verification of the completed work by the Department."

04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.01, "ORDER OF WORK," the fifth paragraph is revised as follows:

"The State will furnish to the Contractor working drawings for the as-fabricated tower footing and a steel template with holes that correspond to the as-fabricated location of the tower anchorage anchor bolt pipe sleeves and dowels no later than March 31, 2007, in accordance with the requirements in "STEEL STRUCTURES," subsection "TEMPLATE," of these special provisions. The steel template will be available in Corpus Christi, Texas for the Contractor to transport to its fabrication facility."

In the Special Provisions, Section 10-1.01, "ORDER OF WORK," the subsection "DESIGNATED PORTIONS OF WORK," is revised as follows:

**"DESIGNATED PORTIONS OF WORK"**

Attention is directed to "Beginning Of Work, Time Of Completion And Liquidated Damages," of these special provisions. The designated portions of work shall be defined as follows:

**Designated Portion of Work - Phase 1**

The Designated Portion of Work – Phase 1 shall be defined as including the following items of work:

1. All work necessary to allow the completion of Hinge "K" by the YBI Structures contractor prosecuting Contract No. 04-0120P4 as provided for under "Cooperation," of these special provisions. Temporary supports shall be fully released and shall be clear of any superstructure member by a minimum of 2 meters in any direction.
2. Cable wrapping in the area west of Pier W2(including saddle housings and cable shrouds).
3. Painting of the cable system in the area west of Pier W2
4. Removal of all temporary works in the area west of Pier W2.
5. Dehumidification of cable loop.
6. All mechanical, electrical and access details west of Pier W2.

At the completion of the Designated Portion of Work – Phase 1, the contractor shall vacate the area west of the W2 centerline to allow completion of the Hinge K closure pour by the 04-0120P4 Contractor.

**Designated Portion of Work – Phase 2**

The Designated Portion of Work – Phase 2 shall be defined as the completion of all elements of the work, as shown on the plans and special provisions, required to place traffic on the structure in the westbound direction with no further lane closures required and no work to be performed over traffic to complete Phase 3.

**Designated Portion of Work - Phase 3**

The Designated Portion of Work – Phase 3 shall be defined as the completion of all the remaining work, including the following items of work:

1. Complete removal of the temporary towers
2. Tower fender
3. Tower Skirt
4. Traveler installation
5. Internal deck painting
6. Final paint coat below deck level

04-SF-80-13.2/13.9  
04-0120F4

7. Dehumidification System (except cable loop dehumidification)
8. Access details below the roadway level
9. Eastbound access details
10. Final tightening of the eastbound barriers
11. Eastbound electrical and mechanical work
12. Eastbound Hinge A joint seal assembly
13. Eastbound striping and signs
14. Bike path striping and joint sealing
15. Bike path railing and lighting

Attention is directed to "Maintaining Traffic" of these special provisions and construction sequences as shown on the plans.

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

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

Attention is directed to "General Migratory Bird Protection," "Environmental Work Restrictions," and "Environmentally Sensitive Areas (General)," of these special provisions.

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

Attention is directed to "Move In/Move Out (Erosion Control)" in these special provisions regarding the mobilization of equipment and materials for erosion control work.

Attention is directed to "Fiber Rolls" of these special provisions, regarding restrictions for erosion control (Type D) operations."

In the Special Provisions, Section 10-1.17, "ACCELERATED WORKING DRAWINGS SUBMITTAL," the second paragraph is revised as follows:

"The Contractor shall receive approval from the Engineer for the preliminary erection plan and the weight control procedure prior to any approval of working drawings for the fabrication of the box girder structural steel, tower structural steel, and the cable system."

In the Special Provisions, Section 10-1.215, "ESTABLISH MARINE ACCESS," the first paragraph is revised as follows:

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

04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.215, "ESTABLISH MARINE ACCESS," the seventh paragraph is revised as follows:

"When approved in writing by the Engineer, the schedule of values will be used to determine progress payments for establish marine access during the progress of the work. No partial payment for establish marine access will be made until the schedule of values is approved in writing by the Engineer. Upon presentation of evidence of payment made, satisfactory to the Engineer, such as invoices or receipts for costs incurred, the Department will pay the invoiced amount in the next monthly estimate payment."

In the Special Provisions, Section 10-1.26, "MAINTAINING TRAFFIC," the following paragraph is added after the sixth paragraph:

"The Contractor shall maintain a minimum of 3.6 m traveled way in each direction, on Caltrans maintenance access road, as shown on the plans, and allow others contractors and State forces to access to the project sites, and public utilities, East Bay Municipal Utility District (EBMUD), Pacific Gas and Electric, and PacBell, to access their facilities at the EBMUD outfall, at all times."

In the Special Provisions, Section 10-1.47, "SPHERICAL BUSHING BEARING (PIER E2)," subsection "WORKING DRAWINGS," in the third paragraph, Item E.1 is revised as follows:

- "1. Method, materials, equipment, sequence, detailed procedures, and temporary support details that the Contractor proposes to use for installation of the spherical bushing bearing. The Contractor's proposed spherical bushing bearing installation including the solid shaft press fit shall not damage the lubricant at any given time during the installation. The Contractor's proposed spherical bushing bearing installation procedures and sequences shall be detailed in the superstructure construction sequences as specified in these special provisions."

In the Special Provisions, Section 10-1.47, "SPHERICAL BUSHING BEARING (PIER E2)," subsection "FABRICATION AND INSTALLATION," the eighth and ninth paragraphs are revised as follows:

"Prior to bearing installation, the Contractor shall measure the relative longitudinal distances between the centerline of E2 floor beam at box girder and the centerline of Pier E2 and relative transverse distances between the centerline of longitudinal shear plates and the centerline of Pier E2. The distances shall be measured and compared with the calculated values as specified in the approved working drawings and supplement. If the longitudinal difference between the centerline of E2 floor beam at box girder and the centerline of Pier E2 is greater than 50 mm or the transverse difference between the centerline of longitudinal shear plate and the centerline of Pier E2 is greater than 50 mm, the Contractor shall suspend bearing installation process, and submit to the Engineer a mitigation plan for approval. The mitigation plan shall include the necessary measures to be taken to compensate for the difference. After the Contractor submits the mitigation plan, the Contractor shall allow the Engineer 10 days for review. Bearing installation shall not be resumed until the Engineer has reviewed and approved, in writing, the Contractor's mitigation plan.

The Contractor shall install the press fit solid shaft to the spherical bushing. The lubricated surface and lubricant shall not be damaged as a result of press fit installation."

04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.50, "SHEAR KEY (PIER E2)," the second and third paragraphs are revised as follows:

"The shear key consists of shear key housing with nut retainer assemblies, shear key stub, spherical ring with retainer brackets, spherical housing, bearing plates, shim plates, neoprene pads, dust cover, anchor bolts, high-strength bolts, and assembly bolts. The lubricant shall be self-lubricated and shall be provided for all bronze surfaces and other surfaces as shown on the plans. Shear keys shall be anchored in place with high strength non-shrink grout.

The shear key bushing consists of spherical ring, spherical housing, and bearing plates."

In the Special Provisions, Section 10-1.50, "SHEAR KEY (PIER E2)," subsection "WORKING DRAWINGS," in the fourth paragraph, Item B.6 is revised as follows:

"6. Procedures and sequences for shear key bushing replacement, a list of equipment to be used for shear key bushing replacement, and traffic, safety, and environmental impact."

In the Special Provisions, Section 10-1.50, "SHEAR KEY (PIER E2)," subsection "MATERIALS," the table after the first paragraph is revised as follows:

Component	ASTM Specifications
Shear Key Housing, Shear Key Stub, Spherical Ring	Structural Casting, Grade 345
Spherical Housing	High Strength Manganese Bronze Centrifugally Cast, B271-C86300
Anchor Bolts	A354, Grade BD
Assembly Bolts	A240, Type 316
High Strength Bolts	A 325M
Bearing Plate & Shim Plate	A709M Grade 345

In the Special Provisions, Section 10-1.50, "SHEAR KEY (PIER E2)," subsection "MATERIALS," the following paragraphs are added after the sixth paragraph:

"Neoprene pads shall conform to Section 51-1.145, "Strip Waterstops," of the Standard Specifications and these special provisions. Neoprene pads shall have the following properties:

- A. Neoprene shall have a durometer hardness between 25-45
- B. The compressive strength shall not exceed 1000 kPa at 50% compression.

A Certificate of Compliance conforming to the provisions in Section 6-1.07, "Certificates of Compliance," shall be furnished to the Engineer certifying that the neoprene to be furnished conforms to the above provisions. The Certificate of Compliance shall be supported by a certified copy of the results of tests performed by the manufacturer on the neoprene pads."

04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.50, "SHEAR KEY (PIER E2)," subsection "MATERIALS," the last paragraph is revised as follows:

"The bronze alloy for the spherical housing shall be high strength manganese bronze centrifugally cast conforming to the requirements of ASTM Designation: B271-C86300. The mating surfaces of the spherical ring and bearing plate shall be stainless steel weld overlay conforming to the requirements of ASTM Designation: A240 Type 316. All items integral to and for the assembly of the shear key bushing shall be stainless steel conforming to ASTM Designation: A 240, Type 304 or Type 316."

In the Special Provisions, Section 10-1.50, "SHEAR KEY (PIER E2)," subsection "FABRICATION AND INSTALLATION," the seventh and eighth paragraphs are revised as follows:

"Qualified representatives from the manufacturer of the shear key assembly shall be present during field installation of all shear keys.

Prior to shear key installation, the Contractor shall measure the relative longitudinal distance between the centerline of E2 floor beam at box girder and the centerline of Pier E2 and relative transverse distance between the centerline of box girder and the centerline of Pier E2. The distances shall be measured and compared with the calculated values specified in the approved working drawings and supplement. If the longitudinal difference between the centerline of E2 floor beam at box girder and the centerline of Pier E2 is greater than 50 mm or the transverse difference between the centerline of box girder and the centerline of Pier E2 is greater than 50 mm, the Contractor shall suspend shear key installation process, and submit to the Engineer a mitigation plan for approval. The mitigation plan shall include the necessary measures to be taken to compensate for the difference. After the Contractor submits the mitigation plan, the Contractor shall allow the Engineer 10 days for review. Shear key installation shall not be resumed until the Engineer has reviewed and approved, in writing, the Contractor's mitigation plan."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "WORKING DRAWINGS," the following paragraph is added after the fifth paragraph:

"Attention is directed to "ALTERNATIVE SADDLE DESIGN," of these special provisions, for additional working drawing requirements and supplemental calculations required for alternative saddle designs."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "MATERIALS," the fifth paragraph is revised as follows:

"Steel plate designated as Pipe Beam Grade 690 on the plans shall conform to the requirements in ASTM Designation: A 709M, Grade HPS 690W with Supplementary Requirement S8, "Ultrasonic Examination," Supplementary Requirement S84 "Fracture-Critical, F, Material; Toughness Testing and Marking" tested for Zone 3; and Supplementary Requirement S93, "Limitations on Weld Repair (Fracture Critical Material Only)." Charpy V-Notch tests for the as-fabricated pipe beam and coarse grained area of the heat affected zone (HAZ) shall meet 48 joules (J) minimum average, and 38 J minimum individual at -18° C. Weld metal shall meet the requirements of AWS D1.5, Table 12.1."



04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "MATERIALS," the following paragraph is added after the fifth paragraph:

"Steel forgings designated as Pipe Beam Grade 690 on the plans shall conform to the requirements in ASTM Designation: A508M, Grade 4N, Class 2, with Supplementary Requirement S2, "Ultrasonic Testing- Reference Block Calibration" and S7, "Restrictive Chemistry for Grades 4N and 5." The longitudinal axis of tension and Charpy V-Notch test specimens shall be parallel to the pipe beam tubular axis. Each forging shall be examined 100% by MT and by UT in accordance with the ASTM requirements with the following exceptions:

- A. MT shall conform to ASTM Designation: A788, S18 with no linear indication permitted that exceeds 3 mm, where linear is defined as a maximum length to width ratio exceeding 3.0, and ASTM Designation: A275.
- B. UT shall conform to ASTM Designation: A788, S20 (method DA in two perpendicular directions) and ASTM Designation: A388."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "MATERIALS," the sixth paragraph is revised as follows:

"Steel plate designated as Pipe Beam Grade 485 and Shear Link Grade 485 on the plans shall conform to the requirements in ASTM Designation: A 709M, Grade HPS 485W with Supplementary Requirement S8, "Ultrasonic Examination," Supplementary Requirement S84 "Fracture-Critical, F, Material; Toughness Testing and Marking" tested for Zone 3; and Supplementary Requirement S93, "Limitations on Weld Repair (Fracture Critical Material Only)." Charpy V-Notch tests for the as-fabricated pipe beam and shear link heat affected zone (HAZ) shall meet 48 joules (J) minimum average at -18° C."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "MATERIALS," the following paragraph is added after the sixth paragraph:

"Steel forgings designated as Pipe Beam Grade 485 on the plans shall conform to the requirements in ASTM Designation: A508M, Grade 4N, Class 3, with Supplementary Requirement S2, "Ultrasonic Testing- Reference Block Calibration" and S7, "Restrictive Chemistry for Grades 4N and 5." The longitudinal axis of tension and Charpy V-Notch test specimens shall be parallel to the pipe beam tubular axis. Each forging shall be examined 100% by MT and by UT in accordance with the ASTM requirements with the following exceptions:

- A. MT shall conform to ASTM Designation: A788, S18 with no linear indication permitted that exceeds 3 mm, where linear is defined as a maximum length to width ratio exceeding 3.0, and ASTM Designation: A275.
- B. UT shall conform to ASTM Designation: A788, S20 (method DA in two perpendicular directions) and ASTM Designation: A388."

04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," the subsection "CASTINGS," is revised as follows:

## **"CASTINGS"**

### **General**

Castings shown on the plans as "Structural Casting Grade 345," "Structural Casting Grade 415," and "Structural Casting Grade 550" shall conform to the requirements of these special provisions. Castings for cable system components shall conform to the requirements in "Cable System" of these special provisions.

Section 8-3.01 "Welding" of these special provisions will not apply to castings and forgings. AISC certification will not be required for foundries and forge shops producing castings and forgings to the requirements of this section. Casting and forging vendors shall maintain a comprehensive quality control system conforming to an established guideline such as ISO 9000 series documents or equal.

The Contractor shall submit for the approval of the Engineer, working drawings for castings in accordance with the requirements of "Working Drawings," of these special provisions.

The Contractor shall submit for information a manufacturing procedure that shall specify all manufacturing hold points and chemical requirements, heat treatment, testing, visual and nondestructive inspection and quality control requirements. Quality control requirements and manufacturing facilities shall be subject to a quality audit as specified in Section 8-4 "Audits" of these special provisions.

The Contractor shall provide the Engineer with work schedules, and expected readiness of work for quality assurance (QA) inspection by the Engineer. The Contractor shall maintain records of all QC testing and measurements and such records shall be made available to the Engineer upon request, unless otherwise specified.

### **Casting Grades**

Castings shall be manufactured to the requirements in ASTM Designation: A148 with the following Supplementary Requirements in ASTM Designation: A718M as modified herein: S1, S4, S5, S6, S7, S8 (Individually marked), S9, S12, and S16.

GRADE	BASE GRADE
Structural Casting Grade 275	A148M, Gr.550-275
Structural Casting Grade 345	A148M, Gr.550-345
Structural Casting Grade 415	A148M, Gr.620-415
Structural Casting Grade 550	A148M, Gr.725-585

The steel shall be fully killed and made to fine grain practice.

The final tempering temperature of tempered steels shall not be less than 565 °C.

Specimens for mechanical testing shall be taken from a representative casting, a prolongation to the casting or a keel block. The test specimen block shall be in accordance with S15 of ASTM Designation: A781, with Paragraph S15.3.1 option for a 375 mm by 375 mm by 125 mm maximum cast coupon size), and be poured from the same ladle and heat treated along with the castings that it represents. The test specimens shall meet the requirements of the base grade. Charpy V-Notch tests shall meet a minimum average of 42J at 0 °C, and a minimum lateral expansion of 0.4 mm.

04-SF-80-13.2/13.9  
04-0120F4

### **Qualifications**

Personnel performing nondestructive testing (NDT) shall be qualified and certified in conformance with the requirements of the American Society for Nondestructive Testing (ASNT) Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm. The Written Practice of the NDT firm shall meet or exceed the guidelines of the ASNT Recommended Practice No. SNT-TC-1A. Each individual shall be certified as an NDT Level II technician for the process being used.

Personnel performing visual inspection shall be currently certified as (1) an AWS Certified Welding Inspector (CWI) in conformance with the requirements in AWS QC1, "Standard and Guide for Certification of Welding Inspectors;" or (2) as a Level II technician qualified in visual testing (VT) in accordance with ASNT Recommended Practice No. SNT-TC-1A and the Written Practice of the NDT firm.

### **Examination-Visual**

Each casting shall be visually examined 100% on all surfaces and shall be free of adhering sand, scale, cracks, shrinkage, unfused chills and hot tears and meet ASTM Designation: A802, Level III. Linear indications, defined as having a ratio of maximum to minimum dimensions greater than 3, tears and cracks will not be permitted. Indications less than 3mm for Level 1 zones and 6 mm elsewhere may be disregarded.

Machined surfaces shall be free of voids or other discontinuities that exceed the following:

- A. A maximum of one discontinuity within a radius of 150 mm that has a diameter not exceeding 3 mm within the saddle troughs or 5 mm elsewhere.
- B. A maximum depth of one half of the maximum diameter.
- C. A generally rounded shape with no sharp corners.

Voids that do not exceed the above and are within the saddle troughs shall be filled by the metallizing alloy during metallizing. All areas that are not shown as machined, but are designated as Level 1 on the plans shall be ground to a finish suitable for the magnetic particle, liquid penetrant and ultrasonic examinations required below.

### **Examination- Surface**

Each casting shall be examined 100% on all surfaces by visible contrast, wet magnetic particle method to ASTM Designation: E709 on the final, as-finished surface. Visible contrast, dry powder method to ASTM Designation: E709 may be used on as-cast surfaces outside of Level 1 zones where no machining is required. The prod method shall not be used. The yoke method with AC output shall be used for dry powder, magnetic particle examination. Liquid penetrant examination to ASTM Designation: E165 may be used as an alternate to magnetic particle examination of the casting.

Linear indications, defined as having a ratio of maximum to minimum dimensions greater than 3, tears and cracks will not be permitted. Indications less than 3mm for Level 1 zones and 6 mm elsewhere may be disregarded.

### **Examination-Volumetric**

Each casting shall also be volumetrically examined 100% by ultrasonic (UT) methods. Ultrasonic procedures shall be based on ASTM Designation: A 609, "Standard Specification for Longitudinal Beam Ultrasonic Inspection of Carbon and Low-Alloy Steel Castings," using Procedure A, except supplementary angle beam examination to Supplementary Requirement S1 shall be performed on castings to ensure coverage from two perpendicular directions and on areas of castings where a back reflection cannot be maintained during straight beam examination, or where the angle between the front and back surfaces of

04-SF-80-13.2/13.9  
04-0120F4

the castings exceeds 15 degrees. The Distance Amplitude Curve (DAC) method shall be used for both straight and angle beam examinations. The DAC shall be constructed using a 3.0 mm diameter reference reflector hole for areas designated as Level 1 on the plans, and a hole diameter as specified in ASTM Designation: A 609M shall be used elsewhere. At each facility producing castings, ultrasonic test calibration blocks shall be poured from the first casting heat produced for this contract. Alternatively, reference blocks may be made from cast steel that has an acoustic response similar to the castings being examined as determined by the Engineer. The calibration blocks shall be made available to the Engineer for use in QA testing of the castings and to any subcontractors that perform ultrasonic testing on the castings.

The ultrasonic examination acceptance criteria shall be as follows: Within 30 mm of any final surface, unless otherwise noted on the plans, and at locations designated as Level 1 on the plans, indications that provide a response equal to or greater than the DAC and that are planar or that exceed the area specified in ASTM Designation: A 609, Table 2 for ultrasonic testing quality Level 1 will not be permitted. At all other locations, indications that provide a response equal to or greater than the DAC and that are planar or that exceed the area specified in ASTM Designation: A 609, Table 2 for ultrasonic testing quality Level 3 will not be permitted. The method for determining whether a reflector is planar shall be based on the high directionality of amplitude response for planar reflectors or other established technique.

#### Surface Finish

All areas of steel castings that will be in contact with other elements by welding, bolting or direct contact pressure shall be machined. The finish and surface texture of faying surfaces for bolted connections shall be suitable to obtain a Slip Critical bolted connection at Class B as defined by the RCSC specification.

Unless noted otherwise on the plans, the tolerance for linear dimensions of unmachined sections shall be in accordance with the following table:

Tolerance For Linear Dimensions (mm) Unaffected By Machined Surfaces										
LINEAR DIMENSION, L	60 ≤ L < 60	120 ≤ L < 120	250 ≤ L < 250	400 ≤ L < 400	630 ≤ L < 630	1000 ≤ L < 1000	1600 ≤ L < 1600	2500 ≤ L < 2500	4000 ≤ L < 4000	4000 ≤ L
TOLERANCE	4.5	5.5	7.0	9.0	11.0	13.0	16.0	19.0	31.0	47.0

Unless noted otherwise on the plans, the thickness tolerance of unmachined ribs shall be in accordance with the following table:

Tolerance For Thickness Of Ribs (mm) Where Both Faces Are Not Machined										
THICKNESS RANGE	t < 18	18 ≤ t < 30	30 ≤ t < 50	50 ≤ t < 80	80 ≤ t < 120	120 ≤ t < 180	180 ≤ t < 250	250 ≤ t < 315	315 ≤ t < 400	400 ≤ t
TOLERANCE	+6.0 -3.0	+9.0 -3.0	+10.0 -3.0	+11.0 -3.0	+12.0 -3.0	+13.0 -3.0	+15.0 -3.0	+19.0 -3.0	+27.0 -3.0	+35.0 -3.0

The exterior surfaces of the castings, after acceptance, shall be coated as specified in "Clean and Paint Structural Steel" and "Metallized Steel Surfaces" of these special provisions. The castings shall be carefully masked to avoid coating any high strength fastener contact surface, interior or other machine finished surface.

At the time of assembly, the contact surfaces of the castings shall meet the surface finish requirements shown on the plans.

04-SF-80-13.2/13.9  
04-0120F4

No coating or oil preservative shall be applied to a casting until that casting has been inspected and approved by the Engineer. No coating or oil preservative shall be applied to metallized surfaces or to the inside of the saddle troughs. The Contractor shall provide suitable enclosures to prevent moisture from accumulating in the troughs.

### **Repair**

Third time repairs to base metal or heat affected zone at the same location and all major repairs require prior approval of the Engineer. The Contractor shall give the Engineer at least 12 hours notice prior to the start of welding. Repairs shall be defined as major when the depth of the cavity required to remove the defect exceeds 20% of the actual wall thickness or 25 mm, whichever is less, or when the extent of the cavity exceeds 65 cm<sup>2</sup>. For requests to perform third-time repairs, the Contractor shall include a metallurgical evaluation for the proposed repair. The evaluation, at a minimum, shall include the cause of the repeated defects, the reason why the repairs will not degrade the material or integrity, and the steps that will be taken to prevent similar defects from occurring in the future. The Contractor shall allow the Engineer 5 days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer. In the event the Engineer fails to complete the review within the time allowed, and if, in the opinion of the Engineer, completion of the work is delayed or interfered with by reason of the Engineer's delay in completing the review, the Contractor will be compensated for any resulting loss, and an extension of time will be granted, in the same manner as provided for in Section 8-1.09, "Right of Way Delays," of the Standard Specifications.

Minor defects that are not major repairs may be removed by grinding or chipping without welding repair, providing they conform to the following requirements:

- A. The remaining wall thickness is equal to or greater than the required minimum wall thickness.
- B. The surrounding metal is ground to a smooth contour.
- C. Specified tolerances on machined surfaces are satisfied.

Weld repairs shall be completed using qualified welding procedures that demonstrate Charpy V-Notch toughness of 34J at -30 °C in the weld metal and 34J at 0 °C in the heat-affected zone in the final delivery condition. Weld procedure tests shall be qualified on 50 mm thick plates poured from the same heat as a production casting. Weld repairs shall be given a post weld stress relief heat treatment after all welding is complete. All proposed repair or upgrading welding procedure specifications (WPSs) shall conform to the requirements of ASTM Designation: A488 and the ASME Boiler and Pressure Vessel Code, Section IX, as modified herein. Additional essential variables required for WPSs other than SMAW shall include welding travel speed (limited to ±10%), heat input (limited to +10%, -30%), and, for FCAW, the brand name of the electrode. Weld procedures with all supporting procedure qualification records (PQRs) shall be submitted in writing to the Engineer for each welding location, and shall include a description of the defect or other need for welding, the size and the shape of the excavation, the welding procedure specification, preheat and post weld heat treatment. Repair procedures for typical discontinuities, including a complete description of the type of discontinuity, size limitations, proposed weld procedures specifications, supporting procedure qualification records and proposed heat treatment if required, may be submitted to the Engineer for consideration.

After repairs, the examination and NDT inspection specified above shall be performed to ensure the repairs are satisfactory. This testing shall include the repaired area plus at least 50 mm on each side of the repaired area.

### **Marking**

Each casting shall be stenciled with its heat number and serial number. Only low stress dies may be used for hard stamping.

04-SF-80-13.2/13.9  
04-0120F4

### **Casting Design**

The Contractor shall perform finite element complex heat flow analysis for each pattern including all risers and gates that demonstrates that final solidification will occur outside of the final casting. The analytical solid model shall be sufficiently detailed and accurate to demonstrate complete coverage of ultrasonic examination by including the ability to superimpose ultrasonic beam paths on the model. Coverage may be demonstrated by drawing beam paths on printed sections of the solid model. The analytical model and supporting calculations shall be submitted to the Engineer for approval in accordance with the "Working Drawings" of this section.

At the option of the Contractor, the remaining portions of the casting components may be redesigned as castings in accordance with the requirements of this section. Any use of castings for other structural components shall follow the requirements of this section, and a detailed, written proposal shall be submitted to the Engineer for prior approval. The Contractor shall submit for the approval of the Engineer, working drawings for castings in accordance with the requirements of "Working Drawings" of this section. Working drawings for castings shall include, at a minimum, detail drawings of the redesigned cast configuration showing equivalency to the details shown on the plans.

### **Forging Alternative to Structural Castings**

At the option of the Contractor, castings shown on the plans as "Structural Casting Grade 275," "Structural Casting Grade 345," "Structural Casting Grade 415," and "Structural Casting Grade 550" may be substituted with a hot-worked forging alternative conforming to the requirements for Structural Castings specified above, as modified herein.

GRADE		BASE SPECIFICATION	GRADE
Structural	Casting	ASTM A668	Grade D
Grade 275			
Structural	Casting	ASTM A668	Grade F
Grade 345			
Structural	Casting	ASTM A668	Grade H
Grade 415			
Structural	Casting	ASTM A668	Grade K
Grade 550			

Mechanical testing for tensile and toughness properties shall be performed for each heat and heat treatment lot on prolongations of production forgings or to separate forgings that are made from the same heat of steel, have received the same reduction and type of hot working, are of the same nominal thickness, and are heat treated in the same furnace charge as the forging(s) they represent. Properties shall be as specified for the Structural Casting grade.

Each forging shall be examined visually, 100% by MT and by 100% by UT as described above with the following exceptions.

- A. MT shall conform to ASTM Designation: A788, S18 (no linear indication permitted that exceed 3 mm for Level 1 zones and 6 mm elsewhere, where linear is defined as a maximum length to width ratio exceeding 3.0) and ASTM Designation: A275.
- B. UT shall conform to ASTM Designation: A788, S20 (method DA in 2 perpendicular directions) and ASTM Designation: A388.

04-SF-80-13.2/13.9  
04-0120F4

### **Fabrication of Welded Cast Components**

Welded Cast Components are defined as structural components that are fabricated by welding plates or other steel to castings designated on the plans by a structural casting grade. Section 8-3.01 "Welding" of these special provisions shall apply to Welded Cast Components.

Any fabrication of Welded Cast Components by the foundry, excluding repairs and upgrading as specified above, shall use welding procedures qualified to ASME Section IX, as modified above, or to AWS D1.5, as modified below, using both cast and ASTM Designation: A709 or 572 plates for the qualification welds. If the foundry fabricates a component by welding plate steel prior to final properties heat treatment, the weld procedure qualifications shall demonstrate that the properties of the plate, weld, and weld heat affected zone meet the requirements for the specified Structural Casting grade in the final delivery condition.

For fabrication of Welded Cast Components by a facility other than the foundry, the foundry shall provide cast test plates to be used in weld procedure qualification testing in accordance with AWS D1.5, as modified herein and by the approved welding requirements document. The weld procedure test plates shall be the maximum thickness of plate to be welded or 50 mm, whichever is less, and shall conform to AWS D1.5, Figure 5.1. Unless otherwise specified, the tensile, bend, and Charpy V-Notch requirements shall meet those specified in AWS D1.5 for the plate steel. Charpy V-Notch tests shall be taken from the weld heat affected zone on the casting side and shall meet 34 J, minimum at 0° C. Weld procedure tests shall conform to the final heat treated condition.

For fabrication of Welded Cast Components by a facility other than the foundry, that facility shall perform or obtain a survey of the casting prior to fabrication of any components to be welded to that casting. The Contractor shall ensure that Welded Cast Components fabricated in different facilities fit up within the tolerances specified in the special provisions and the plans.

Stress relief in accordance with AWS D1.5, Section 4.4 shall be performed on each Welded Cast Component after completion of all welding.

All complete joint penetration welds in Welded Cast Components shall be inspected 100% with UT and MT in accordance with AWS D1.5 for welds in compression. All partial joint penetration and fillet welds shall be inspected 100% by MT in accordance with AWS D1.5. The Contractor shall be responsible for all weldability testing to ensure proper welding procedures, as specified in AWS D1.5, section 5.4.3."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," after subsection "CASTINGS," the subsection "ALTERNATIVE SADDLE DESIGN," is added as follows:

### **"ALTERNATIVE SADDLE DESIGN**

At the option of the Contractor, the Contractor may propose alternative design and details of the tower saddle, deviation saddles, jacking saddle, and east saddles in conformance with the details shown on the plans and in accordance with these special provisions.

Alternative saddles designs will be subject to the same requirements for quality control, quality assurance, and inspection and testing as that for the permanent work shown on the plans and in "CASTINGS," of these special provisions.

### **General**

The Contractor's proposed alternative design and details shall be consistent with the available space shown on the plans and shall not adversely impact adjacent or supporting structure. Changes required in the saddle connection to supporting structure shall be approved by the Engineer. Inspection access spaces shall not be restricted or reduced by the proposed changes.

04-SF-80-13.2/13.9  
04-0120F4

The Contractor shall submit design concept drawings of the alternative saddle to the Engineer for review prior to proceeding with the complete working drawings and any supplemental calculations. The Engineer will review and approve the design concept for conformance with the requirements shown on the plans and in these special provisions.

Should the Contractor's saddle design concept be accepted by the Engineer, the Contractor shall redesign and redetail, at his expense, any components affected by the revised saddle design concept.

#### **Design Concept**

The Contractor shall submit the design concept to the Engineer including a written description of the design approach and the proposed final saddle. The submittal shall include, at a minimum, the following:

- A. Preliminary drawings
- B. Proposed materials
- C. Proposed analytic models and computer programs
- D. Preliminary stress calculations

Proposed changes to the saddle design that are not covered by these special provisions will require review and approval of the Engineer.

The Contractor shall allow the Engineer 10 days to review the saddle design concept submittal.

Acceptance of the design concept by the Engineer shall not relieve the Contractor of any responsibility under the contract for the successful completion of the work in conformance with the requirements of the plans and specifications.

#### **Final Design**

After the design concept is accepted by the Engineer, the Contractor shall submit working drawings and supplement for the alternative saddle design. Working drawings shall include, at a minimum, the following:

- A. Complete details of the alternative saddle
- B. List of materials and properties
- C. Analytic models and a summary of results (as required for Alternative Design Category 2)
- D. Detailed stress calculations
- E. Summary of changes required in connecting structures, including:
  - 1. Tower head
  - 2. Saddle housing
  - 3. Dehumidification
  - 4. Cable handropes
  - 5. Access openings, platforms, ladders, and other fixtures
  - 6. Connection to supporting structure
  - 7. Cable shroud
  - 8. Other required changes.

The Contractor shall allow the following review times for the Engineer's review of the alternative saddle design working drawing submittal:

- A. Alternative Design Category 1: 15 working days
- B. Alternative Design Category 2: 50 working days



04-SF-80-13.2/13.9  
04-0120F4

### **Working Drawings**

The Contractor shall submit working drawings for the final design of the saddle in accordance with "WORKING DRAWINGS," in "STEEL STRUCTURES," of these special provisions.

### **Design Criteria**

Alternative saddles shall be designed using AASHTO ASD-1996 (with no allowance to overstress for seismic load case) and the following:

- A. A solid finite element analysis, where required, shall be performed by an engineer, registered as a Civil Engineer in the State of California, with extensive analysis experience using commercially available calibrated software. The mesh size shall be sufficiently fine to accurately model the stress contours.
- B. Connections between saddles and supporting elements, if modified, shall have equal or greater strength than those shown on the plans.

### **Loads**

Loads shall conform to the information shown on the plans. For cable wire pressure against the saddle trough walls in the cable plane, the Contractor shall use the cumulative pressure exerted by all the cable wires resulting from their curvature and tension. For cable wire pressure normal to the cable plane, the Contractor shall assume a hydrostatic pressure, equal in magnitude to the in-plane cable wire pressure at that location.

### **Allowable Stresses**

Allowable stresses in saddle base metal shall conform to the following:

#### **Von Mises Stresses**

- A. Dead Load + Service Load: Not to exceed 0.55 Fy
- B. Dead Load + Seismic Load: Not to exceed 0.75 Fy (with maximum localized stress risers not to exceed Fy)

#### **Principal Tensile Stresses**

- A. Dead Load + Service Load: Not to exceed 0.30 Fy
- B. Dead Load + Seismic Load: Not to exceed 0.55 Fy (with maximum localized stress risers not to exceed 0.75 Fy)

#### **Welds:**

Only CJP or PJP welds shall be used. The minimum weld size of PJP welds shall be 80% of the thinner plate thickness being connected (with the land milled to bear). PJP welds shall not carry tension in the direction perpendicular to the weld axis.

### **Materials**

Steel plate shall conform to ASTM Designation: A709M

Steel for alternative castings shall conform to the requirements in "CASTINGS," of these special provisions."

04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "FABRICATION" the subsection "Hinge K Pipe Beam," is revised as follows:

**"Hinge K Pipe Beam**

The Contractor shall fabricate pipe beams in accordance with an approved fabrication procedure conforming to the requirements of these special provisions. The submittal shall address welding heat input limitations, minimum preheat/interpass temperatures, maximum interpass temperature and post weld stress relief heat treatment (PWHT) temperature and time ranges. Welding of the pipe beam groove welds and stainless steel overlay shall be made using the SAW process unless otherwise approved by the Engineer.

Pipe beam tubulars shall be forgings. The Contractor may fabricate the pipe beam tubulars using a different fabrication method (other than forging) subject to review and approval of the Engineer.

The Contractor may select a different thickness and Grade for the pipe beam tubulars subject to review and approval of the Engineer. The thickness and Grade shall be such that the yield capacity in shear and flexure of the tubulars is between 100% and 110% of the design capacity as calculated from what is shown on the plans. The exterior radius shall remain 950 mm. Alternative grades shall meet 20% minimum tensile elongation and ASTM A505M, Grade 4N Charpy Impact requirements unless otherwise approved by the Engineer.

Welding and welding procedure qualification for Pipe Beam Grade 485 and Pipe Beam Grade 690 plate shall conform to "WELDING OF HPS 485W STEELS" and "WELDING OF GRADE 690 STEELS" sections below, respectively, in addition to the following. Procedures for welding plates to forgings and forgings to forgings shall be qualified to AWS D1.5, as modified below, using forged plates, and ASTM Designation: A709M plates. Welding parameters, including preheat, postheat, joint details and electrical parameters, shall be submitted and approval obtained before qualification testing begins. The Contractor shall be responsible for all weldability testing to ensure proper welding procedures, as specified in AWS D1.5, Section 5.4.3. Essential variables shall be limited to the variation limits of AWS D1.5, Table 5.3. Testing shall include all tests required by AWS D1.5 Section 5.7.1 for Test Plate A and the additional tests described herein. Unless otherwise specified, the tensile and bend requirements shall meet those specified in AWS D1.5 for the plate steel. For the forgings, the tensile requirement shall meet the parent steel requirement, and the bend test shall conform to AWS D1.5 requirement for the higher strength. Charpy V-Notch test specimens shall be removed from the weld metal and coarse grained area of the heat affected zone Charpy V-Notch test results for both weld metal and coarse grained area of the heat affected zone shall meet the requirements specified under "Materials" of this section. Charpy V-Notch test results for the weld metal shall meet the requirements specified in AWS D1.5, Table 12.1.

The stainless steel overlay shall be welded in the circumferential direction over the full specified pipe beam thickness using a procedure qualified for the Pipe Beam Grade 690 in accordance with AWS D1.6. Chemical analysis shall be performed on the qualification overlay 5 mm above the substrate and shall meet the chemical limits for AWS A5.9, Classification ER316L. After overlay welding, the stainless steel surfaces shall be machined to a root mean square surface finish of 0.8  $\mu\text{m}$ , with no gouges or indentations, and an out-of-roundness on the machined surface (max. OD – min. OD) not exceeding 1 mm.

The cylinder defined by the machined stainless steel surface shall be straight and concentric to the pipe beam axis within 1 mm.

All complete joint penetration welds shall be inspected 100% with UT and MT in accordance with AWS D 1.5. All partial joint penetration and fillet welds shall be inspected 100% by MT in accordance with AWS D1.5. Acceptance shall be based on the criteria for tension welds in primary members. Visual and nondestructive examination of welds shall be accepted before cladding is started. Finish machined stainless steel surfaces, plus 100 mm of the pipe beam on either side of the stainless steel surfaces, shall be examined 100% by liquid penetrant testing (PT) in accordance with ASTM Designation: E165, and the standards of acceptance shall be in accordance with AWS D1.5, Section 6.26."

04-SF-80-13.2/13.9  
04-0120F4

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "ASSEMBLY," subsection "Box Girder," the following paragraph is added after the fourth paragraph:

"For splices at the Pier E2 crossbeam, the Contractor shall field drill the bolt holes in one or both sides of each splice to ensure full contact between the girders and the bearings."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "WELDING OF HPS485W STEELS," is revised as follows:

#### **"WELDING OF HPS 485W STEELS"**

Welds between and to HPS 485W steels shall conform to the requirements in this section. All welding procedures shall be qualified by testing in accordance with the requirements in AWS D1.5 as modified herein and shall be used within the qualified limits of heat input. Previously qualified welding procedures witnessed by the State may be submitted for review based on these specification requirements. Regardless of qualification range, the heat input, preheat temperature and maximum interpass temperature shall conform to the requirements of this section.

Consumables for welding HPS 485W shall be low hydrogen. The Contractor shall provide procedure qualification records to document successful welding in accordance with AWS D1.5. The submittal shall include diffusible hydrogen tests performed by the manufacturer as described in AWS D1.5, Section 12.6.2, indicating the deposited weld metal has a diffusible hydrogen level equivalent to H4 or less using procedures specified in ANSI/AWS A4.3, "Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic and Ferritic Steel Weld Metal Produced by Arc Welding". The level of diffusible hydrogen shall not exceed the limits specified below.

The following additional requirements shall apply when welding to HPS485W steel:

- A. Only submerged arc and shielded metal arc welding are pre-approved for welding HPS 485W steel. Consumable handling requirements shall be in accordance with the requirements of AWS D1.5, Section 12.6.
- B. Filler Metal Requirements:
  - 1. Filler metals for welds joining Grade HPS 485W to Shear Link Grade 345 steels shall conform to the requirements listed in paragraph 2 below. Filler metals for welds between Grade HPS 485W and all other grades shall match the lower strength of the materials joined, unless noted otherwise on the plans.
  - 2. Filler metals for matching fillet welds, and all groove welds connecting Grade HPS 485W plates shall conform to the following requirements:
    - (a) Submerged Arc Welding (SAW) Consumables;  
SAW consumables shall meet AWS Electrode/Flux Classification F9A4 EXXX-X with supplementary moisture resistance designators -H4 or -H2, in conformance with AWS A5.23, with 1% Nickel minimum in the weld deposit.
    - (b) Shielded Metal Arc Welding (SMAW) Consumables; E9018-XXRHZ\* with 1% nickel minimum in the weld deposit.  
(\* the Designator 'R', for moisture resistant coating, is required for all SMAW electrodes used for welding HPS 485W steels. HZ shall be either H2 or H4)

04-SF-80-13.2/13.9  
04-0120F4

(c) Other Processes

No other processes will be permitted unless approved by the Engineer. Proposals shall include consumables and welding parameters. The use of other processes will be subject to approval by the Engineer based on proposed consumables and welding parameters and conformance to the testing requirements in the Guide Specification for Highway Bridge Fabrication with HPS 70W (HPS 485W), 2nd edition dated June 2003. Filler metals for other processes shall provide the properties specified below. Consumables shall have a low hydrogen designation of H2 or H4 and shall be moisture resistant. The Contractor shall perform the full ranges of tests required by AWS D1.5, Section 12.6. Diffusible hydrogen testing shall be performed in accordance with AWS A4.3, "Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic and Ferritic Steel Weld Metal Produced by Arc Welding" to demonstrate that successful welds can be achieved with a maximum level of 4mL/100g of hydrogen. Diffusible hydrogen testing may be performed by the consumable manufacturer. The diffusible hydrogen test is a required part of the procedure qualification testing for the project for consumable combinations that are not included in the Guide Specification for Highway Bridge Fabrication with HPS 70W (HPS 485W), 2nd edition dated June 2003.

3. Except for single pass fillet welds, or welds that will be fully consumed in a finished weld with satisfactory weathering characteristics, welding consumables and electrodes shall produce weld deposits that meet the requirements of AWS D1.5, Table 4.3.
4. Qualification Testing: Weld procedure qualification test requirements for HPS 485W groove welds shall be evaluated using Welding Procedure Specification (WPS) Test Plates from the greatest thickness to be welded in production and, for formed members, the as-formed base metal representing the highest forming strain, i.e., lowest ratio of diameter to thickness of a tubular, to be used in fabrication. Testing shall conform to AWS D1.5 qualification requirements, except fillet weld procedures shall be qualified in each position used, macroetch specimens shall be taken and additional sets of Charpy V-Notch specimens shall be taken within one millimeter of both the inside and outside tubular surfaces and centered on the coarse-grained area of the heat affected zone (HAZ). The test results shall meet the following properties:

Transverse tensile ultimate strength:  $\geq 620$  MPa

All-Weld-Metal: yield strength:  $\geq 485$  MPa

All-Weld-Metal: ultimate tensile strength:  $\geq 620$  MPa

All-Weld-Metal: percent elongation:  $\geq 19\%$  in 50 mm

Charpy V-Notch: as specified under Materials above.

5. In addition to the requirements for WPS qualification in accordance with AWS D1.5, diffusible hydrogen (Hd) tests shall be performed on weld metal that does not have H2 or H4 certification from the manufacturer. The deposited weld metal shall have a diffusible hydrogen level equivalent to 4 mL/100 g or less. Specimens shall be tested in accordance with AWS A4.3. Test results in excess of the specified limit are unacceptable, and a retest is required, with a revised welding or consumable control procedure. AWS D1.5, Section 5.7.6, "Exemption from Further Testing," is applicable.

04-SF-80-13.2/13.9  
04-0120F4

C. Preheat and Interpass Temperature:

1. The minimum preheat and interpass temperatures shall be in accordance with AWS D1.5, Section 12.14.  
If satisfactory results are not achieved with the above minimum preheat and interpass temperatures during development of the Welding Procedure Specification (WPS), and an increased preheat temperature is used to provide a satisfactory Procedure Qualification Record (PQR), the higher preheat temperature shall be used during fabrication as the required minimum.  
The minimum preheat or interpass temperature required for a joint composed of different base metals and/or different thickness shall be based on the highest of the minimum preheats required by AWS D1.5, Section 12.14.
2. The maximum interpass temperature for welding HPS 485W steel is 230 °C.

D. Heat Input (HI):

1.5 kilojoules per mm (kJ/mm), minimum  
3.5 kJ/mm, maximum  
as determined using AWS D1.5, Section 5.12.

- E. Backing: AWS D1.5, Section 5.4.5 is modified to allow steel backing material for WPS test plates to be of grade 345W (Sulfur = 0.025 max.) or HPS 485W material."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "WELDING OF GRADE 690 STEELS," is revised as follows:

**"WELDING OF GRADE 690 STEELS**

Welds in Grade HPS 690W steels shall conform to the requirements of AWS D1.5, as modified herein. All welding procedures shall be qualified by testing in accordance with the requirements in AWS D1.5 as modified herein and shall be used within the qualified limits of heat input. Previously qualified welding procedures witnessed by the State may be submitted for review based on these specification requirements. Regardless of qualification range, the heat input, preheat temperature and maximum interpass temperature shall conform to the requirements of this section.

Consumables for welding Grade HPS 690W shall be low hydrogen with H2 or H4 designators. The Contractor shall provide procedure qualification records to document successful welding in accordance with AWS D1.5. The submittal shall include diffusible hydrogen tests performed by the manufacturer as described in AWS D1.5, Section 12.6.2, indicating the deposited weld metal has a diffusible hydrogen level equivalent to H4 or less using procedures specified in ANSI/AWS A4.3, "Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic and Ferritic Steel Weld Metal Produced by Arc Welding."

The following additional requirements shall apply when welding to Grade HPS 690W steel:

- A. Only submerged arc and shielded metal arc welding are pre-approved for welding Grade HPS 690W steel. Consumable handling requirements shall be in accordance with the requirements of AWS D1.5, Section 12.6.
- B. Filler Metal Requirements:
  1. Filler metals for welds between Grade HPS 690W steels shall conform to the requirements of AWS D1.5 for fracture critical members, as modified by paragraph 2 below. Filler metals for welds between Grade HPS 690W and all other grades shall match the lower strength of the materials joined, unless noted otherwise on the plans.

04-SF-80-13.2/13.9  
04-0120F4

2. Filler metals for matching fillet welds, and all groove welds joining Grade HPS 690W steel to itself shall conform to the following requirements:

- (a) Submerged Arc Welding (SAW) Consumables;  
SAW consumables shall meet AWS Electrode/Flux Classification F11x4 EXXX-X with supplementary moisture resistance designators -H4 or -H2, in conformance with AWS A5.23, with 1% Nickel minimum in the weld deposit.
- (b) Shielded Metal Arc Welding (SMAW) Consumables; E11018-RHZ\* with 1% nickel minimum in the weld deposit.  
(\* the Designator 'R', for moisture resistant coating, is required for all SMAW electrodes used for welding Grade HPS 690W steels. HZ shall be either H2 or H4.
- (c) Other Processes

The use of other processes will be subject to approval by the Engineer based on proposed consumables and welding parameters. Filler metals for other processes shall provide the properties specified below. Consumables shall have a low hydrogen designation of H2 or H4 and shall be moisture resistant. The Contractor shall perform the full ranges of tests required by AWS D1.5, Section 12.6. Diffusible hydrogen testing shall be performed in accordance with AWS A4.3, "Standard Methods for Determination of the Diffusible Hydrogen Content of Martensitic, Bainitic and Ferritic Steel Weld Metal Produced by Arc Welding" to demonstrate that successful welds can be achieved with a maximum level of 4mL/100g of hydrogen. Diffusible hydrogen testing may be performed by the consumable manufacturer. The diffusible hydrogen test is a required part of the procedure qualification testing for the project for consumable combinations that do not have H2 or H4 certification from the manufacturer.

3. Qualification Testing: Weld procedure qualification test requirements for Grade HPS 690W groove welds shall be evaluated using Welding Procedure Specification (WPS) Test Plates from the greatest thickness to be welded in production and, for formed members, the as-formed base metal representing the highest forming strain, i.e., lowest ratio of diameter to thickness of a tubular, to be used in fabrication. Testing shall conform to AWS D 1.5 qualification requirements, except macroetch specimens shall be taken and additional sets of Charpy V-Notch specimens shall be taken within one mm of both the inside and outside tubular surfaces and centered on the coarse grain heat affected zone (HAZ). The test results shall meet the following properties:

Transverse tensile ultimate strength: 760-900 MPa  
All-Weld-Metal: yield strength:  $\geq 680$  MPa  
All-Weld-Metal: ultimate tensile strength:  $\geq 760$  MPa  
All-Weld-Metal: percent elongation:  $\geq 19\%$  in 50 mm  
Charpy V-Notch: As specified under "Materials" of this section.

4. In addition to the requirements for WPS qualification in accordance with AWS D1.5, diffusible hydrogen (Hd) tests shall be performed on weld metal that does not have H2 or H4 certification from the manufacturer. The deposited weld metal shall have a diffusible hydrogen level equivalent to 4 mL/100 g or less. Specimens shall be tested in accordance with AWS A4.3. Test results in excess of the specified limit are unacceptable, and a retest is required, with a revised welding or consumable control procedure. AWS D1.5, Section 5.7.6, "Exemption from Further Testing," is applicable.

04-SF-80-13.2/13.9  
04-0120F4

C. Preheat and Interpass Temperature:

1. The minimum and maximum preheat and interpass temperatures shall be in accordance with AWS D1.5, Section 12.14.  
If satisfactory results are not achieved with the above minimum preheat and interpass temperatures during development of the Welding Procedure Specification (WPS), and an increased preheat temperature is used to provide a satisfactory Procedure Qualification Record (PQR), the higher preheat temperature shall be used during fabrication as the required minimum.
2. The minimum preheat or interpass temperature required for a joint composed of different base metals and/or different thickness shall be based on the highest of the minimum preheats required by AWS D1.5, Section 12.14.
3. The maximum interpass temperature for welding Grade HPS 690W steel is 240 °C.

D. Heat Input (HI): The heat input shall conform to the recommendations of the manufacturer, but is limited to the range qualified per AWS D1.5."

In the Special Provisions, Section 10-1.59, "STEEL STRUCTURES," subsection "MEASUREMENT AND PAYMENT," the following paragraphs are added after the thirteenth paragraph:

"Whenever an alternative is shown or noted on the plans, or permitted by these special provisions, the quantities of furnish structural steel (bridge) (saddle) and erect structural steel (bridge) (saddle) will be computed on the basis of the dimensions and details shown on the plans and no change in the quantities to be paid for will be made because of the use by the Contractor of such alternatives.

Costs for preparing working drawings for alternatives shall be considered as included in the contract prices paid for the various items of work and no additional compensation will be allowed therefor."

In the Proposal and Contract, the Engineer's Estimate Items 5, 55, 56 and 61 are revised as attached.

To Proposal and Contract book holders:

Replace pages 3, 5 and 6 of the Engineer's Estimate in the Proposal with the attached revised pages 3, 5 and 6 of the Engineer's Estimate. The revised Engineer's Estimate is to be used in the bid.

Inquiries or questions in regard to this addendum must be communicated as a bidder inquiry and must be made as noted in the NOTICE TO CONTRACTORS section of the Notice to Contractors and Special Provisions.

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.

Addendum No. 5  
Page 24  
December 21, 2005

04-SF-80-13.2/13.9  
04-0120F4

This office is sending this addendum by UPS overnight mail to Proposal and Contract book holders to ensure that each receives it. A copy of this addendum is available for the contractor's use on the Internet Site:

**[http://www.dot.ca.gov/hq/esc/oe/weekly\\_ads/addendum\\_page.html](http://www.dot.ca.gov/hq/esc/oe/weekly_ads/addendum_page.html)**

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  
Office of Plans, Specifications & Estimates  
Office Engineer

Attachments



# ENGINEER'S ESTIMATE

04-0120F4

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
1	030748	WORKING DRAWING CAMPUS	LS	LUMP SUM	LUMP SUM	
2	030702	ELECTRONIC MOBILE DAILY DIARY COMPUTER SYSTEM DATA DELIVERY	LS	LUMP SUM	LUMP SUM	
3	030704	EROSION CONTROL (TYPE B)	M2	1570		
4	070010	PROGRESS SCHEDULE (CRITICAL PATH)	LS	LUMP SUM	LUMP SUM	
5	070018	TIME-RELATED OVERHEAD	WDAY	2310		
6	071322	TEMPORARY FENCE (TYPE CL-1.8)	M	205		
7	030705	3.66 M TEMPORARY GATE (TYPE CL-1.8)	EA	1		
8	049281	FURNISH TEMPORARY TOWERS	LS	LUMP SUM	LUMP SUM	
9	049816	REMOVE TEMPORARY TOWERS	LS	LUMP SUM	LUMP SUM	
10	049797	REMOVE SKYWAY TEMPORARY TOWER (AE)	LS	LUMP SUM	LUMP SUM	
11	049298	REMOVE SKYWAY TEMPORARY TOWER (AW)	LS	LUMP SUM	LUMP SUM	
12	074019	PREPARE STORM WATER POLLUTION PREVENTION PLAN	LS	LUMP SUM	LUMP SUM	
13	074020	WATER POLLUTION CONTROL	LS	LUMP SUM	LUMP SUM	
14	030706	NON-STORM WATER DISCHARGES	LS	LUMP SUM	LUMP SUM	
15	030707	TURBIDITY CONTROL	LS	LUMP SUM	LUMP SUM	
16	074032	TEMPORARY CONCRETE WASHOUT FACILITY	LS	LUMP SUM	LUMP SUM	
17	074034	TEMPORARY COVER	M2	1350		
18	030708	ACCELERATED WORKING DRAWINGS SUBMITTAL	LS	LUMP SUM	LUMP SUM	
19 (S0)	120100	TRAFFIC CONTROL SYSTEM	LS	LUMP SUM	LUMP SUM	
20	150605	REMOVE FENCE	M	90		

# ENGINEER'S ESTIMATE

04-0120F4

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
41	049818	ERECT PRECAST CONCRETE FENDER MODULES	EA	8		
42 (F)	049308	MINOR CONCRETE (COUNTERWEIGHT)	M3	430		
43 (S-F)	049309	FURNISH POLYESTER CONCRETE OVERLAY (13 MM)	M3	40		
44 (S-F)	049310	PLACE POLYESTER CONCRETE OVERLAY (13MM)	M2	3050		
45 (S)	049311	FURNISH AND INSTALL SPHERICAL BUSHING BEARING (PIER E2)	EA	4		
46 (S)	049312	FURNISH SPHERICAL BUSHING RING BEARING (HINGE K)	EA	4		
47 (S)	049313	INSTALL CIRCULAR SEGMENTED BEARING (HINGE A)	EA	16		
48 (S-F)	520102	BAR REINFORCING STEEL (BRIDGE)	KG	1 410 000		
49 (S-F)	520110	BAR REINFORCING STEEL (EPOXY COATED) (BRIDGE)	KG	48 500		
50 (F)	550203	FURNISH STRUCTURAL STEEL (BRIDGE)	KG	183 000		
51 (F)	550204	ERECT STRUCTURAL STEEL (BRIDGE)	KG	183 000		
52 (F)	049314	FURNISH STRUCTURAL STEEL (BRIDGE) (TOWER)	KG	13 095 000		
53 (F)	049315	ERECT STRUCTURAL STEEL (BRIDGE) (TOWER)	KG	13 095 000		
54 (F)	049316	FURNISH STRUCTURAL STEEL (BRIDGE) (TOWER STRUT)	EA	68		
55 (F)	049317	FURNISH STRUCTURAL STEEL (BRIDGE) (BOX GIRDER)	KG	29 235 000		
56 (F)	049318	ERECT STRUCTURAL STEEL (BRIDGE) (BOX GIRDER)	KG	29 235 000		
57 (F)	049319	FURNISH STRUCTURAL STEEL (BRIDGE) (BIKEPATH)	KG	1 273 000		
58 (F)	049320	ERECT STRUCTURAL STEEL (BRIDGE) (BIKEPATH)	KG	1 222 000		
59 (S-F)	049321	FURNISH STRUCTURAL STEEL (BRIDGE) (SADDLE)	KG	1 130 000		
60 (F)	049322	ERECT STRUCTURAL STEEL (BRIDGE) (SADDLE)	KG	1 130 000		

# ENGINEER'S ESTIMATE

04-0120F4

Item No.	Item Code	Item Description	Unit of Measure	Estimated Quantity	Unit Price	Item Total
61 (S-F)	049323	FURNISH AND INSTALL SHEAR KEY (PIER E2)	EA	4		
62 (F)	049324	FURNISH STRUCTURAL STEEL (BRIDGE) (PIPE BEAM)	KG	260 000		
63 (F)	049325	ERECT STRUCTURAL STEEL (BRIDGE) (PIPE BEAM)	KG	260 000		
64 (F)	049326	INSTALL STRUCTURAL STEEL (BRIDGE) (PIPE BEAM) (HINGE AW & AE)	EA	4		
65	049327	FURNISH STRUCTURAL STEEL (BRIDGE) (PIPE BEAM FUSE)	EA	4		
66 (S-F)	049328	FURNISH PWS CABLE SYSTEM	KG	4 800 000		
67 (S-F)	049329	ERECT PWS CABLE SYSTEM	KG	4 800 000		
68 (S-F)	049330	FURNISH SUSPENDER SYSTEM	KG	650 000		
69 (S-F)	049331	ERECT SUSPENDER SYSTEM	KG	650 000		
70 (S)	049332	TOWER SUSPENDER ASSEMBLIES	LS	LUMP SUM	LUMP SUM	
71	030712	SERVICE PLATFORM	EA	5		
72	560218	FURNISH SIGN STRUCTURE (TRUSS)	KG	9200		
73	560219	INSTALL SIGN STRUCTURE (TRUSS)	KG	9200		
74	562002	METAL (BARRIER MOUNTED SIGN)	KG	1020		
75 (S-F)	049333	PLASTIC LUMBER	M3	99		
76 (S-F)	049334	UHMW POLYETHYLENE PANEL (50MM)	M2	637		
77 (S)	590115	CLEAN AND PAINT STRUCTURAL STEEL	LS	LUMP SUM	LUMP SUM	
78 (S)	049335	CLEAN AND PAINT STRUCTURAL STEEL (TOWER)	LS	LUMP SUM	LUMP SUM	
79 (S)	049336	CLEAN AND PAINT STRUCTURAL STEEL (BOX GIRDER)	LS	LUMP SUM	LUMP SUM	
80 (S)	049337	CLEAN AND PAINT STRUCTURAL STEEL (BIKEPATH)	LS	LUMP SUM	LUMP SUM	

