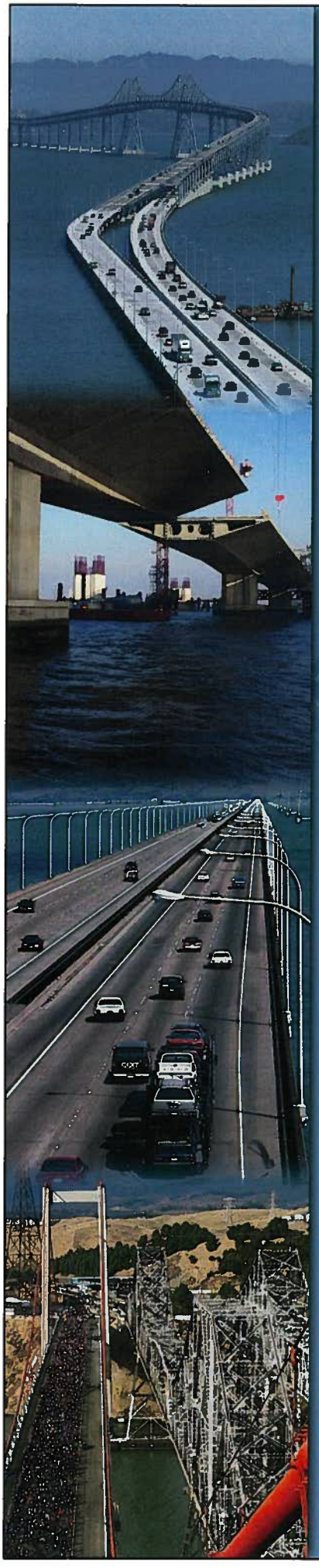


Toll Bridge Seismic Retrofit and Regional Measure 1 Programs

Independent Cost Estimate Review
San Francisco – Oakland Bay Bridge
Contract No. 04-012024
The Skyway - Orthotropic Box Girder (KFM/USI)

Preliminary Draft Issue – August 07

URS Hatch Mott MacDonald
Bay Area Management Consultants
An Association of URS Corporation and Hatch Mott MacDonald

Basis for Review:

The main remaining outstanding issue on the Skyway contract is the Notice of Potential Claims (NOPC's) filed by Kiewit/FCI/Manson (KFM) on behalf of Universal Structural Inc. (USI). USI was the subcontractor selected by KFM for fabricating the two steel orthotropic box girders (OBG) for the Skyway approaches to the Self Anchored Suspension Bridge. Based on the original Baseline Schedule, it appears that USI was planning to fabricate the two OBG's in approximately 23 months. However, USI needed approximately 35 months to complete the fabrication. This Independent Cost and Schedule Analysis provides the opinion of Bay Area Management Consultants (BAMC) concerning reasonable and substantiated cost and schedule impacts posed by delays of the fabrication of the OBG's on the Skyway contract.

KFM/USI originally filed 15 NOPC's (NOPC's 14 -25, and NOPC's 27 - 29) that were related to the fabrication of the OBG's. The most significant technical issue relates to the Reinforcing Fillet used in Measuring Closed Rib Weld Size (NOPC 15), which received an unfavorable ruling from the Dispute Resolution Board (DRB) in April 2006 towards Caltrans.

USI was the fabricator for an OBG on the "Horse Shoe Project", which was another Caltrans project that had similar welding requirements. USI stated in the DRB meetings that they interpreted the contract requirements for the Skyway based on their experience and interpretation they made on the Horse Shoe Project, which Caltrans had approved on that project. USI were able to include the reinforcement fillet weld when measuring the closed rib Partial Penetration (PJP) welds on the Horse Shoe Project; however they were not allowed to do so, on the Skyway.

KFM/USI withdrew NOPC's 14 "Undercut on the Closed Rib welding" and NOPC 28 "Stoppage Work at USI". Caltrans and KFM/USI also decided to include NOPC 19 with NOPC 15. In addition to NOPC 15, Caltrans received unfavorable DRB rulings for all the remaining outstanding NOPC's related to USI. Caltrans is attempting to reach a settlement with the Contractor, KFM, on these NOPO as well as on all the other outstanding issues related to USI on this contract.

At the time of this analysis, KFM/USI has submitted a formal cost and schedule proposal for the proposed settlement, which was dated August 18th, 2006. However, since that proposal, KFM/USI has provided Caltrans with an updated spreadsheet that shows their costs through November 2006. KFM/USI has not submitted that updated spreadsheet officially. However Caltrans has estimated the total cost of the updated spreadsheet based on similar markup rates that were used in the first cost proposal.

Entitlement:

The largest single cost impact is the sunk costs. Based on the DRB recommendations and BAMC's evaluation it appears that the Contractor's interpretation of the measurement of weld size for the closed rib to deck plate welds was reasonable per NOPC 15 white paper. This was based on the information that was available in the original contract specifications. Thus, a cost was incurred by USI to do the work at the fabrication yard based on their original interpretation; however was considered obsolete because of Caltrans interpretation of the contract and not giving the contractor a firm direction on whether to proceed with the single pass welding or not. BAMC believes that there should be some shared responsibility for this item, since the contractor is also responsible for mitigating problems that come up during the construction of the project. The degree of the shared responsibility will depend on further documentation that USI should provide and based on the audit that is being conducted by Caltrans.

Findings:

BAMC's preliminary analysis of cost and schedule indicates the following:

Costs:

USI's Original Claimed Amount (Not Incl. KFM Markup):	$22,029,692
KFM's Official Original Claimed Amount (Dated 8/18/06):	$34,435,232
KFM's Unofficial Revised Amount (Dated 5/7/07):	$41,988,898
BAMC's Independent Estimate (Average High & Low):	$18,747,190

A summarization and comparison of the BAMC estimate appears in the table following this section. Some of the major cost items include:

1. Submittals:
   Based on BAMC's previous experience it is estimated that the cost of submittals are usually 10% of the value of the work. Thus based on the bid item amount of approximately $15,000,000, it is estimated that the cost of the submittals is approximately $1.5 Million.
   Caltrans did not accept the contractor's interpretation that the closed rib welds could have been completed in a single weld. Thus, BAMC believes that the majority of the original submittals made by USI were considered obsolete, since the bulk of those submittals are based on that assumption. USI was therefore asked to resubmit the majority of their work.

2. Additional Test Welds:
   It appears that there were some tests that were ordered by the State, that were not clear whether they were required by the contract, or were additional tests that were on top of what was already in the contract. The contractor contends that the State ordered Weld Monitoring Tests (WMT's) for all closed rib welds to the skin plates fabricated in the period of May 24, 2004 through July 2, 2004. The State denies ordering the additional testing, and contends that USI's approved Fabrication Procedure required the additional tests.
   There were also some additional tests done, that BAMC believes would not have been necessary if the delay had not occurred. It is therefore BAMC's opinion that these costs should be paid by the State.

3. Welding Quality Control Program (WQCP) :
   As part of the WQCP, the contractor should include the methods and frequencies for performing all required visual inspections and documentation. A written description of the system and method of documentation the contractor will use for the identification and tracking of all welds, NDT, any required repairs, and re-inspection of non-conforming welds should also be included. The contractors system shall include provisions for permanently identifying each weld and the person who performed the weld, NDT, inspection, and repair.

   The contractor based the original WQCP on his interpretation of the contract that a single pass weld would be sufficient. Thus, the contractor was required to develop and submit a new WQCP based on Caltrans interpretation of the welding procedures and testing. The contractor's original WQCP was therefore considered obsolete. It is BAMC's opinion that the State should pay for the additional costs incurred for developing a revised WQCP.

4. Additional Lost Profit:
   It appears that USI was planning to perform the fabrication of the OBG in approximately 23 months. However, KFM's monthly schedule updates show that it took USI approximately 35 months to complete the fabrication. This implies that USI's fabrication yard was occupied for 12 months longer than what was originally planned. BAMC is assuming that during that delay the steel fabrication market was very hot, and USI could have very easily been awarded other contracts that would have generated profit for the company. Thus USI should be compensated for the profit that they would have made have they been able to use their fabrication yard for other projects.

5. Lost Profit:

This includes the profit that USI would have made if there were no changes or delays caused by either party. It was based on USI's original bid, which showed that they included a markup of approximately $2.3 Million.

6. Sunk Costs

These are the most significant and measurable of the KFM/USI costs. These are labor costs that KFM/USI expended while their interpretation of the specification was guiding their efforts until the point of realization that Caltrans was not going to accept their interpretation of the specifications. That realization took quite some time. BAMC feels that there is a shared responsibility for that lag time of realization that Caltrans meant what they said. These are costs that are expended and essentially wasted due to the different interpretation of the specification. The biggest item in this category is the labor manhours expended trying to come to grips with implementing the weld procedures to comply with the Caltrans interpretation and enforcement of the specification. The labor manhours that fall into this category all happen prior to January 1, 2005. In fact they probably all happen prior to the approval of the two pass procedure on September 21, 2004 (see DRB NOPC ruling page 109 section 4), but for the purposes of the BAMC wasted sunk cost analysis we have chosen 1/01/05 as all wasted hours due to specification mis-understanding will surely be fairly captured by this point in time.

The logic for the cost basis for this category is simply that USI had a view of the world when they started the job and everything they did was based on that view. Caltrans had a view of the world that was different, and they told USI relatively early on of that view but USI just didn't believe that Caltrans really meant it. Per the NOPC 15 DRB ruling on page 10 of section 4 of this report, it is stated fairly accurately in BAMC's opinion that correspondence between the contractor and Caltrans seemed to keep "the pot on simmer with USI believing that they were not at the point of impasse." When in fact Caltrans said what they meant and meant what they said, and in reality they were at the point of impasse from the beginning. This is a fundamental issue when deciding if there is a shared responsibility for the length of time that it took KFM/USI to shift horses and turn the page and move on and comply with the Caltrans direction. It took until 1/01/05 for KFM/USI to get fully in gear and comply with the Caltrans direction on interpretation of the specification. Why did it take essentially a whole year? So BAMC has used as it's high value for this year is all Caltrans fault and for the low value that it is a 50/50 shared responsibility in lack of communication that kept the "pot on simmer."

BAMC then has simply taken all labor hours expended during the period prior to 1/01/05 and price them as wasted sunk cost. Turning the page on 1/01/05 KFM/USI efforts are now assumed all based on Caltrans blessed specifications and weld procedures. The only other additional labor consideration then needs to be the added hours to perform the two pass procedure vs. the KFM/USI expected one pass procedure. See BAMC item #7 Cost differential between double pass and single pass for these added hours shown in figure 1.

BAMC believes that the public should not pay for the whole bill while KFM/USI was getting to the realization that there was an impasse. The 50/50 is just the BAMC judgment of a fair sharing of responsibility for communication issues.

The sunk cost item is then based on the 83,016 manhours expended prior to 1/01/05 times an estimated $75 per hour (the USI average hourly rate including overhead should be confirmed by audit). Cost: 83,016 hours x $75/hour = $6,226,200

7. Cost differential between closed rib weld two-pass versus single pass method:

The OBG's were finally built using the closed rib weld two-pass method rather than the single pass method per the directions provided by Caltrans. Based on the DRB recommendations, it appears that this was a change in the scope of work. Based on those recommendations, BAMC believes that the State should be responsible for the cost differential between the closed rib weld two-pass and the single pass method. BAMC used the estimate provided by Caltrans for the additional number of manhours it would have taken to do the two-pass weld versus the single pass weld.

8. Lost Productivity:
It is imperative that with all the delays that occurred and the ongoing dialogue between Caltrans and KFM/USI to determine the welding and testing procedures that there would be some lost productivity. It is difficult for BAMC to determine the dollar value due to the lost productivity with the given information provided. However, it is reasonable to assume that the lost productivity would be accounted for as part of the sunk costs.

9. Wasted Work\Material:
There was a considerable amount of material that was wasted or lost due to the rejection of the work that was done by USI at the early stages of the fabrication. This included but was not limited to girder 2A Soffit plate, which according to USI was repaired, however Caltrans still rejected the part. Caltrans did later agree to cover the cost of girder 2A soffit plate; however there is still a disagreement about the cost of that item.
It is BAMC's opinion that there is a reasonable justification to KFM/USI's claim, however the cost of the girder should be shared, unless USI can provide additional documentation to support their claim that the full burden should be on the State.

10. Wasted Work\Labor:
It is clear from the documents provided to BAMC that there was some wasted labor due to the work that was done by USI, but was rejected by Caltrans. This includes, but not limited to the welding using the one pass procedure that was later rejected by Caltrans. BAMC assumed that this lost labor has already been accounted for in the sunk costs.

11. Supervision Focus
It is BAMC's belief that USI's management spent a considerable amount of time and effort trying to resolve all the problems associated with the OBG. This distracted the management team from focusing on the production and the daily operations of the fabrication yard. This could have contributed to some additional lost business and some additional administrative problems.

12. Price Escalation and Interest:
The delay of the fabrication of the OBG could have caused a delay in the procurement of the material and thus an escalation in the price of the material used. In addition the freezing of the USI assets before they were paid for any of the work that would have been performed at an earlier date could have impacted the USI cashflow. This could have caused a delay to the positive cash flow to USI, and thus could have led USI to pay some additional interest on the money that they had borrowed.

13. Loss of Morale
The continuous delay, the change of management and labor force would have definitely had a negative impact on the morale of the staff working on the fabrication of the OBG. It is very demoralizing to see your colleagues being laid off. It is even more demoralizing to see somebody else do a job that one of your colleagues was doing, who had just been laid off. This will definitely have a negative impact on the productivity of the staff and on the quality of the work. However it is very difficult to quantify the loss of productivity due to the loss of morale. Thus it is reasonable to assume that the cost due to the loss of morale is included in the cost of the sunk costs.

14. Mobilization and Demobilization
At a certain point in the production of the OBG's, KFM had to make the decision to shut down the USI operation. This required the termination of the employment of some of the USI staff, which could have cost KFM a considerable amount of money. In addition KFM had to bring on the Oregon Iron Works (OIW) staff to continue the work. This required the relocation of some of the OIW staff or paying them per-diem to do the work at the USI facility.

15. KFM Administration and Risks

KFM should be compensated for administering the USI contract and coordinating all the work. BAMC estimated that to be approximately 10% of the USI costs accounted for earlier. This percentage also accounts for risks KFM had to take during the fabrication of the OBG's. However; this does not include any future risks due to any Mechanic's Liens that some of the outside suppliers might have placed on USI. It is BAMC's opinion that the State should not pay for those risks associated with the Mechanic's Lien. The State should pay for any direct costs related to the Mechanic's Lien if and only if they do occur. As of August 4, 2007, and based on the Caltrans "Contract Payments and Information System" for the Skyway contract, there are currently two claim amounts totaling $155,051. The State has a "Total Stop Notice" of $193,813 to account for these two claims. Thus, KFM should not claim any risk greater than the latter amount to account for the Mechanic's Lien.

Schedule:

BAMC analyzed the KFM Baseline schedule and the monthly updates. The Baseline schedule showed USI performing the fabrication between September 2003 and August 2005, a period of approximately 23 months. The baseline schedule showed those activities as having a positive float of 92 days. USI consumed approximately 35 months, from September 2003 until August 2005 in fabricating the Eastbound and Westbound OBG's. This is an increase of 12 months that were caused by requirements imposed by Caltrans and the slow reaction of the contractor to the Caltrans requirements. The OBG's were not on the critical path, thus they did not cause a delay to the overall completion of the project.

BAMC's Cost Estimate

Figure 1 shows BAMC's cost estimate for the various NCPC's related to the fabrication of the two OBG's by USI. BAMC used various cost factors that could have caused additional costs to be incurred by the contractor.

Figure 1. USI Cost Factors for all Outstanding NOPC's

Item No.	USI Cost Summary Categories	High	Low	Notes
1	Submittals	$ 1,500,000	$ 1,500,000	Includes all the submittals that were considered obselete due to Caltrans interpretation of the contract.
2	Additional Test Welds	$ 500,000	$ 500,000	
3	Extra WQCP	$ 200,000	$ 200,000	
4	Additional Lost Profit	$ 1,200,000	$ 1,200,000	Profit that would have been made by USI if the project was not delayed.
5	Lost Profit	$ 2,300,000	$ 2,300,000	USI lost profit on the original contract
6	Sunk Cost	$ 6,226,200	$ 3,113,100	Based on the 83,016 manhours that were expended prior to Jan 1, 2005 and an hourly rate of $75.
7	Cost Diferential between Two-pass versus Single-pass Methods	$ 2,200,200	$ 2,200,200	Based on Caltrans evaluation of 29,336 man-hours multipled by the average hourly rate of $75.
8	Lost Productivity	$ -	$ -	Included as part of the sunk costs, item 6.
9	Wasted Work & Material	$ 1,700,000	$ 850,000	Based on USI's cost estimate for girder 2A. Low range assumes shared responsibility. USI should should provide additional documentation to support the high range estimate.
10	Wasted Work/Labor	$ -	$ -	Included as part of the sunk costs, item 6.
11	Supervision Focus	$ 1,600,000	$ 1,600,000	Additonal cost due to the distraction of management, estimated at approximately 10% of the original bid.
12	Price Escalation (Interest)	$ 800,000	$ 800,000	Assumes approximately 5% interest and/or escalation over 1 year delay.
13	Loss of Morale	$ -	$ -	Included as part of the sunk costs, item 6.
14	Mobilization & Demobilization	$ 1,200,000	$ 600,000	Per-diem and relocation costs of OIW's staff.
15	Administration & Risks	$ 2,136,453	$ 1,068,227	The high range value includes $193,813 for all "Total Stop Notices" on the Skyway contract as of August 4, 2007. Low range assumes shared responsibility for the Admin & risks cost.
	Total Cost	**$ 21,562,853**	**$ 15,931,527**	**Average cost of the high and low range is $18,747,190**

It is imperative that the highest cost factor is the sunk costs. This is because there was considerable amount of work that was done by the contractor that Caltrans rejected and was therefore considered obsolete.

Recommendation:

Pending availability of a formal updated cost proposal and supporting documentation from KFM, BAMC believes that a fair and reasonable value of the cost of an overall settlement for the various issues identified in this report is approximately $18.75 million (the average of a low range of $15.9 million and a high range of $21.6 million). The higher range could only be justified if USI provides additional documentation to support the assumptions made in achieving those higher costs. The principle item in the higher range is due to the length of time it took for KFM/USI to take mitigating action to move on and perform the work in accordance with Caltrans response to the RFI's. It took a whole year longer. BAMC's low range assigns evenly shared responsibility between KFM/USI and the State. KFM/USI would have to demonstrate why they took so long to take action. This additional documentation should be held to a high degree of scrutiny. The DRB one dissenting opinion made this point that yes there was ambiguity; however the State clarified their position through the RFI process early on.

Caltrans has provided BAMC with a list of CCO's that have already been executed or are pending that were related to USI. It is very important that Caltrans go through those CCO's and verify that the contractor is not double paid for work that has already been included as part of those CCO's.

It is strongly recommended that Caltrans require KFM to submit an updated formal cost proposal and any supporting documentation before a final settlement is negotiated.

DISPUTE REVIEW BOARD

State of California-Department of Transportation

Contract Number 04-012024 – East Span Skyway Project

Dispute No. 11 – Notice of Potential Claim #27- Fabrication Procedure

Hearing Date: March 22, 2007

Hearing Attendees: Caltrans Representatives:

Douglas Coe
Patrick Lowry
Patrick Treacy
Kannu Balan
Shewit Semere

Contractor Representatives:

John Hassard-KFM
Paul Giroux-KFM
Steve Harder-USI
Brad Young-USI
Mark Nastari-USI
Robert Hosman-USI

BACKGROUND

The East Span Skyway Project consists of two superstructures (Eastbound and Westbound) consisting of 452 precast concrete girder segments and steel orthotropic box girders (OBG's) for the transition spans. The transition spans connect the concrete girders of the Skyway to the Self Anchoring Suspension Bridge project. There are two OBG's each approximately 60 meters in length, fabricated by the Subcontractor (USI) in Vancouver, WA, and transported to the jobsite by barge.

The California Department of Transportation (hereinafter referred to as the "State ", "Department", "Engineer" or "Caltrans") awarded the contract for the East Span Skyway Project (Contract No. 04-012024) to Kiewit/FCI/Manson, JV, (hereinafter referred to as "KFM", or "Contractor") on January 17, 2002. KFM awarded a Material Contract for the fabrication of the OBG transition spans to Universal Structural, Inc.(USI) on July 30, 2002.

DESCRIPTION OF DISPUTE

The contract documents require the Contractor to submit Working Drawings before commencing fabrication of the OBGs. Additionally, the Contractor is required to submit working drawings and supplemental calculations for erection of the structural steel and is specifically required to erect the orthotropic box girder transition span with a maximum of four sections. The Contractor is further required to submit to the Engineer for approval

in accordance with "Working Drawings" of the Special Provisions, detailed procedures for the fabrication of the Orthotropic box shell plating as well as the Orthotropic box section.

The Contractor claims that the Department's requirements for the submittal of Fabrication Procedures were excessive and not sufficiently defined in the contract documents.

The Contractor submitted (Submittal Number 000391) its "preliminary" Fabrication Procedure (Revision 00) to the State on October 15, 2002, about a year prior to start of fabrication, and this was determined unacceptable by the Department in its response of November 25, 2002 as representing only an outline of the fabrication sequence and not a detailed description of the procedure. The Department further indicated that a more thorough document, along with supporting shop drawings was expected, for its review.

KFM submitted Revision 01 of the Fabrication Procedure to the Department on April 22, 2003, and in its response dated May 28, 2003, the State, following its review, requested the Contractor to incorporate certain Department comments and resubmit the Procedure.

KFM responded on July 7, 2003 with Revision 02 of the Fabrication Plan attaching, a USI letter (dated June 30, 2003) which addressed the comments (five items) made in the State's letter of May 28, 2003. USI indicated that once it received approval of the items contained in its letter, they would be incorporated in the Fabrication Procedure which would then be stamped, as required, by an engineer registered in California.
The Department's letter of July 28, 2003 advised KFM that while some of USI's responses were acceptable others still required additional information.

On November 11, 2003, KFM submitted Revision 3 of the Fabrication Procedure, represented by USI's revised letter of June 30, 2003 to clear an NCR (#2). The Department advised KFM by letter dated December 4, 2003, that NCR #2 had been resolved but further advised KFM of its concerns regarding how geometric tolerances (including camber and sweep) were being measured and verified by USI in the shop and how the ribs were being stored prior to welding the deck., wing, or soffit plate.

The Department requested that the Contractor submit the design of fabrication jigs prior to the start of fabrication. NCR #4 was verbally issued on November 6, 2003, because USI had commenced fabrication without submittal of plans for fabrication jigs/fixtures. In its response of November 14, 2003, USI indicated that as there were only two separate girders it was not conducive to use fabrication jigs as there was no real repetitive advantage and it was not planning on using them at that time.

The Department informed KFM on November 26, 2003 that if USI was not planning on using fabrication jigs the Fabrication Procedure needed to be revised accordingly.

Revision 4 of the Fabrication Procedure was submitted on December 5, 2003, to incorporate USI's addition to the Dimensional Checking and Document Procedure and in response to NCR #6. The Department advised KFM on February 9, 2004 that the revision was not approved because the fabrication procedures, as then currently written, did not adequately address how the OBG's would be fabricated and assembled to ensure the specified tolerances would be met. The Department went on to say that KFM had shown it had a solid understanding of what changes need to be made to the fabrication procedures but this understanding had not been documented in the form of a submittal.

On January 16, 2004, KFM transmitted to USI a three page tabular document titled "Details of Fabrication Procedure Jigs and Fixtures" dated January 5, 2004. This document was believed by KFM "to be a complete list of Caltrans areas of interest". It was "not an instruction to USI, rather an attempt, in the spirit of cooperation, with all concerned, to share the basic information which will allow the most efficient inspection and acceptance of fabrication." USI's comments on this document were handed to Caltrans by KFM at the weekly meeting of February 11, 2004.

Then on January 20, 2004, KFM advised USI that it needed to control dimensions at every stage of assembly to ensure the final assembly came to within overall tolerances and Caltrans needed to know that there was a standard QC paper record that they, as QA, could audit.

On January 29, 2004, KFM submitted Revision 5 of the Fabrication Procedure attaching details and calculations for the use of handling devices for the OBG fabrication. The State responded on February 17, 2004 approving Revision 5 only with respect to the lifting of individual panels, and advising that the submittal did not address the subsequent lifting and assembly into larger subsections and ultimately the entire subassemblies.

Revision 6 of the Fabrication Procedure was submitted to the State on February 18, 2004 to include updated text of USI's fabrication procedure incorporating all previous changes. In a memo from KFM to USI dated February 19, 2004, KFM indicated that Caltrans would likely reject USI's Fabrication Procedure as it did not address in specific detail as to when, where, and to what numerical values of tolerance, dimensional QC would be performed.

At a joint meeting (KFM/USI & Caltrans) on February 23, 2004, it was understood that Revision 6 of the Fabrication Procedure would be superceded by Revision 7, which was being prepared by USI in consultation with Caltrans/METS. At that point in time it was KFM's and USI's understanding that the status of the Fabrication Procedure was "Approved as Noted" whereas Caltrans' position was that the procedure was "Not Approved." The parties understood one another's viewpoints and agreed that the procedures in the draft of Revision 7 were greatly improved and satisfied many of the Department's concerns.

Revision 7 of the Fabrication Procedure was submitted on March 2, 2004 and on April 5, 2004 the Department advised KFM that the procedure was not approved because it was not "of sufficient detail to demonstrate the proposed fabrication procedure." The Department maintained that KFM/USI had either not addressed, or sufficiently addressed five of the minimum of seven elements required by the special provisions to be included in the fabrication procedures. These included USI not addressing the "use of jigs" and inadequately addressing the "timing and methods for dimensional checks" as well as its "distortion control plan."

At the weekly meeting at USI on March 26, 2004, the so-called Dimensional Tolerance sheet issued by USI to KFM, was passed on to the Department for review. This document was discussed in a two day joint meeting (April 19/20) to review the draft of Revision 8 of the Fabrication Procedure, when USI indicated its intention to incorporate the Dimensional Tolerance sheet in its Fabrication Procedure.

KFM advised USI in a faxed memo dated April 6, 2004 that Caltrans had rejected Revision 7 of the Fabrication Procedure on the understanding that a draft of Revision 8 would be sent to KFM for preview and that a working group would meet to redline the

procedure for at least an "Approved as Noted" status, as a matter of urgency. This meeting took place on April 19 and 20, 2004.

USI's letter of April 14, 2004 to KFM, transmitted to the State the same day, took exception to the rejection of Revision 7 of the Fabrication Procedure and disagreed with the Department's position. This letter was transmitted to the State on April 15, 2004. USI's letter advised the Department that they had sufficiently met the requirements identified in the Special Provisions, Fabrication Procedure (revised page 242), and that although USI would comply with the Department's requests in its letter to KFM of April 5, 2004, there would be additional costs and possible schedule impacts as a result of Caltrans' additional requirements.

Revision 8 of the Fabrication Procedure was submitted on May 13, 2007, being a revision of the draft procedure which had been discussed at the joint review meeting between Caltrans/METS/USI and KFM on April 19/20, 2004. Revision 8 was "approved as noted", on June 1, 2004, with four general and eight specific "concerns" by the Department. KFM's Email to USI on June 2, 2004, attaching the Department's approval letter indicated that although the "notes" were extensive, Caltrans had not requested a resubmittal of any part of the procedure and that this was a final approval letter. KFM further indicated that all the concerns were items that should be addressed on the shop floor in establishing the working application of the written procedure.

In a letter to KFM dated June 18, 2004, the Department indicated its concern that the fabrication and assembly of the OBGs may have an adverse impact on the overall project schedule and that weld quality, shrinkage, distortion and the number of critical weld repairs requested and performed, concerned the State about USI's ability to fit the components of the box girder together. The State further indicated that since approval of the Fabrication Procedure, numerous non-conformance reports had been issued, documenting incidents where the Contractor had not followed its submitted procedures, and USI's QC had discovered numerous weld defects requiring large amounts of repairs. As of the date of the letter, the State maintained that the overall quality management for the fabrication of the Transition span appeared to be insufficient.

Revision 9 of the Fabrication Procedure was submitted on July 14, 2004, to provide for production weld monitoring tests for closed rib 80% PJP welds only to deck plates and this was approved, as noted, by the Department on August 5, 2004.

On the Contractor's understanding that the Fabrication Procedure was to be amended as needed to accurately define fabrication means and methods Revision 12 was submitted to the State on October 20, 2004, deleting intermediate dimensional checking of webs, soffit and wing plates prior to stiffener welding, revising the fabrication sequence of diagonal deck plates and revision of 500mm WMT's. The Department's response of October 29, 2004, advised KFM the revision was partially approved with concerns regarding the deletion of the intermediate dimensional checks.

In an internal memo dated October 29, 2004, USI proposed a so-called "Shop Traveler", a document that would simplify the Fabrication Procedure, streamline dimensional inspections, easily status parts, and satisfy the Department.

In a letter to KFM, dated November 1, 2004, the Department advised that the Engineer remained concerned that the Contractor's current Fabrication Procedure lacked sufficient detail to fabricate the OBG's in conformance with the contract requirements. The State reiterated its "concerns" expressed in its June 1, 2004 letter and added that

during fabrication, the Contractor had demonstrated a pattern of not following the approved procedures with respect to the documentation of dimensional checks. USI responded to this letter on December 15, 2004 responding to the State's specific topics as well as supplying certain requested information. USI maintained that the Department's concerns expressed in its letter of June 1, 2004, neither requested nor required USI to address the concerns prior to fabrication and in fact did not request that the concerns be addressed at all, although USI continued to work closely with Caltrans on site representatives to alleviate its concerns. USI added that at a meeting on November 23, 2004, Caltrans/METS had indicated the State's three main concerns had been satisfied. The Department no longer had concerns with the closed rib welding, nor about USI's QC department and that proposed implementation of the Shop Traveler would alleviate the concern over dimensional control

At a meeting between Caltrans, KFM and USI on November 19, 2004 to discuss document control, a draft of USI's proposed Shop Traveler was reviewed even though USI held that the then current method of document control was effective and met the contract requirements.

In a USI letter dated November 27, 2007, responding to NCR #60 which had been issued by the State on the basis of "Deviating from Fabrication Procedures without Engineer Approval," USI maintained that prior to approval of the Fabrication Procedure it had expressed its concern over the detail that had to be provided in order to obtain approval by Caltrans. USI was concerned that, especially during fit-up and welding of the first girder sections, process situations would be encountered that could not have been anticipated during the preparation of the Fabrication Procedure. Should this occur USI would have to come to a halt while revisions were made to the Fabrication Plan which would then be sent to the Engineer for approval and USI maintained there was no possible way it could operate under this restriction.

USI maintained that the Department was in a position to dictate the means and methods that USI was using to fabricate the girders by not allowing it to make required changes to the fabrication process. It appeared that the Department had rejected Revision 13 of the Fabrication Procedure because USI had changed to a more effective fabrication process, thereby dictating its means and methods.

In a letter to KFM, dated December 8, 2004, the Department advised that the Engineer was concerned KFM might not be adhering to the contract requirements during the fabrication and assembly of the OBG. The Department further advised the Contractor that it was moving forward at its own risk assembling the OBG without following the contract requirements and requested that additional information be provided on certain identified issues. The Department requested KFM's immediate response to five issues with sub-issues, expressing its concern that KFM would begin moving sections of the OBG prior to the Engineer's approval.

USI's letter dated January 5, 2005, with supporting documentation responded to the State's request for additional information regarding the moving of Girder segments.

On April 21, 2005 the Department advised KFM that it remained concerned that the Contractor had not responded to the Engineer's request for information in its letter of November 1, 2004 and requested a status update on certain requested information.

Revision 13 of the Fabrication Procedure to incorporate the Shop Traveler was submitted on January 18, 2004 and partially approved as noted by the Department on

February 7, 2005. The Department also reiterated its concerns expressed in its letter of June 1, 2004 when the fabrication procedures (Revision 8) were first approved.

By its letter dated March 28, 2005 USI advised KFM that it notified KFM on April 14, 2004, that the Fabrication Procedure (Revision 7) sufficiently met the requirements identified in the Special Provisions. USI also advised KFM they would comply with Caltrans requests regarding the Fabrication Procedure but that there would be additional costs and possible schedule impacts as a result of the Department's additional requirements. As a result of Caltrans insistence on USI providing an extremely high level of detail and items that are not required by the Special Provisions USI requested issuance of a CCO.

Also on March 28, 2005 USI's letter advised KFM that the Shop Traveler which USI maintained had been implemented at Caltrans/METS insistence had impacted production and caused additional costs. USI explained it had always maintained dimensional control on the Checker's shop drawing set as described in the original Fabrication Procedure. As a result of Caltrans "concerns" letters USI changed the Fabrication Procedure to use Checker Set #1 and Checker Set #2. Since the Department continued to have concerns about document control, and even though USI's believed its procedure more than complied with the Contract Documents it implemented the Shop Traveler. USI requested issuance of a CCO and the Department found no merit in the Contractor's request in its response dated April 19, 2005.

KFM submitted Revision 14 (USI Rev 15) of the Fabrication Procedure on May 6, 2005 as a response to various State letters including the November 1, December 8, 2004 and February 7, 2005 letters. The Department's response on June 2, 2005 approved the submittal except for one section of the Fabrication Procedure and a request for certain additional information followed by a letter to KFM dated June 3, 2005, which required the requested additional information prior to welding Assembly 3A and 4A transverse splice of the OBG. USI responded with the requested additional information in its letter to KFM dated June 8, 2005 and the Department approved the Fabrication Procedure albeit with comments on June 16, 2005.

On June 23, 2005 USI provided KFM with additional reasons for its request for issuance of a CCO for implementation of the Shop Traveler and repeated its request for a CCO. The Department replied on September 6, 2005, again finding no merit in the Contractor's request.

On August 11, 2005, the Department responded to USI's request to KFM, dated March 28, 2005, for issuance of a CCO regarding Fabrication Procedures, finding no merit in the request. USI responded by letter dated January 4, 2006 and repeated its request for a CCO. The Department's letter of January 11, 2006 maintained the State's positions in its previous letters of August 11, and September 6, 2005, denying merit.

The Contractor filed a Notice of Potential Claim on January 31, 2006, representing both the Fabrication Procedure and the Shop Traveler issues. The Engineer acknowledged its receipt on February 28, 2006, and NOPC #27 was referred to the DRB on September 5, 2006.

CONTRACTOR'S POSITION

The following is a summary of the Contractor's position. Full details are included in its position paper.

The DRAWINGS Subsection of the Special Provisions (Revised page 238) includes a list of items that are to be included on the working drawings. This list of items and the related provisions are no more definitive of the State's intent for the content of the Working Drawings than the listing provided on Page 242 for Fabrication Procedures.

However, the State's demands for detail in the Fabrication Procedure drew from both lists and resulted in some information from both list being included in both the Fabrication Procedure and Working Drawings by USI.

The fact is, the two Contract Provisions, individually or combined, do not provide a hint of the level of detail that the State demanded to be included in the fabrication procedure or the never ending demand for more and more information place on USI as the work progressed.

Based on the content of the Special Provisions, and its past experience on Caltrans projects, including the Richmond-San Rafael Bridge and Cypress E projects, USI planned to submit a welding sequence and a general assembly plan. The plan would also include a discussion of the general timing and methods for dimensional checks and visual and non-destructive examinations.

USI anticipated that the fabrication procedure and the State's understanding of it would allow flexibility during the girder fabrication so that USI could benefit from the experience gained during the fabrication process. USI expected the State to allow the flexibility to occur without undue demands for detail on changes to the plan or excessive administrative actions by the State when USI revised its procedures in the field. Essentially, USI believed it would be allowed to perform the work without undue interference from the State.

The State failed to clearly define the extent of its requirements for submittal of a Fabrication Procedure for the project. The State then exercised all of its power to force USI to perform work far beyond that required by the Special Provisions. The State's use of its power amounts to overzealous Contract enforcement, abuse of discretion and failure to honor its duty not to hinder, delay, or increase the cost of performance. The State's actions affected USI's entire girder assembly operation and significantly contributed to the almost three-fold increase in project costs. USI is due a contract adjustment under Standard Specifications Section 4-1.03, Changes, due to the State's actions.

DEPARTMENT'S POSITION

The following is a summary of the Department's position paper. Full details are included in its position paper.

The Contractor's position that the Department's requirements for the working drawings were "excessive" is without basis. Section 10-1.44 of the Special Provisions contains 12 distinct minimum Working Drawing requirements. The Contractor's working drawings did not satisfy these minimum requirements until the 8th Revision to their fabrication procedures. Additionally, Section 5-1.02 of the Standard Specifications, page 23 specifies, "The contract plans shall be supplemented by such working drawings prepared by the Contractor as are necessary to adequately control the work."(emphasis

added). As USI continued fabrication without approved Working Drawings, it became evident to the Department and KFM that USI did not have sufficient means, methods, and procedures "to adequately control the work."

The Department's repeated attempts to communicate its concerns regarding the fabricator's ability to meet the dimensional tolerance requirements in the Special Provisions were to no avail. USI proceeded to fabricate the Transition Span without the use of detailed fabrication jigs and fixtures. Their lack of dimensional checks and inadequate methods did not identify that the dimensions of the OBGs were outside compliance until it was too late. The Department, in order to close open cantilevers standing in the bay waters, was forced to accept a product that did not meet the dimensional requirements detailed in the Special Provisions.

DRB FINDINGS

Contract Provisions

The Standard Specifications at Section 5-1.02, PLANS AND WORKING DRAWINGS, state "The contract plans shall be supplemented by such working drawings prepared by the Contractor as are necessary to adequately control the work."

The Special Provisions at Section 10-1.44 STEEL STRUCTURES, DRAWINGS (Revised page #238) requires working drawings to contain all information required for the construction of structural steel, including at a minimum the following:

A. Design geometry lines and fabrication geometry working lines, including vertical, longitudinal and transverse;
B. Panel designations, erection sequence and locations of field splicing;
C. Details of temporary fabrication, in plan, elevation and section, material specifications and grades, weld details and all tolerances;
D. Details of permanent fabrication, in plan, elevation and section, material cuts and camber deformations, and tolerances of the fabricated panel structure. The scale of each panel plan and section shall not be less than 1:50. Full detail scales shall be larger;
E. Material and weld designations including the ASTM material specification, processes of shop fabrication including cutting, grinding and welding, weld symbols as required by AWS D1.5, and for each weld, the "Joint Designation" as listed in figures 2.4 or 2.5 of AWS D1.5.
F. Distortion control plan in accordance with AWS D1.5, Section 3.4;

Supplemental calculations shall include, but not be limited to, the following:

A. Calculations for each panel showing how the camber for extension, angular change and profile affects the cutting and assembly of the plate material.

For orthotropic box girder and pipe beam fabrication, shop practices shall be described in the working drawings and shall include:

A. Method of rib or pipe beam fabrication including bending equipment and Procedures;
B. Details of fabrication jigs (orthotropic box girder only);
C. Lifting points;
D. Details of temporary lugs or brackets and methods of handling large elements;
E. Details of tack welds and the sequence of all welding;

F. Details of removal of temporary connections and repair of material where these connections were installed;
G. Methods of repair of elements that exceed specification tolerances; and
H. Fabrication schedule.

Then under ERECTION PLAN (Revised Page #238) the Contractor is required to submit working drawings and supplemental calculations for erection of the structural steel and is specifically required to erect the orthotropic box girder transition span with a maximum of four sections.

Working drawings shall contain all information required for the erection of structural steel, including, at a minimum, the following:

A. Details and limits of each section to be erected;
B. Details of attachments to each section for transportation and lifting including location, welding and removal procedures;
C. Methods for transportation and lifting of each erected section;
D. Method of aligning adjacent sections during erection;
E. Details of temporary work platforms and other aids required for field welding;
F. Locations and methods for tack and final welds;
G. Timing and methods for dimensional checks; and
H. Timing and methods for visual and nondestructive examination.
I. Methods for connection and removal of supports and lifting attachments.

Supplemental calculations shall include, but not be limited to, the following:

A. Calculations indicating the stress on the permanent structure due to attachments and erection.
B. Estimates of final dimensions, including camber, based on dimensional measurements during the trial fit under support conditions that differ from those of the in-place condition.

Then finally, under FABRICATION, Fabrication Procedure (Revised page #242) The Contractor shall submit to the Engineer for approval in accordance with "Working Drawings," of these special provisions, detailed procedures for the fabrication of the following items:

A. Orthotropic box shell plating
B. Orthotropic box section (fabrication and splice)
C. Footings frames for Piers E3-E6, E7-E14 and E15-E16
D. Pipe Beams

Procedures shall be of sufficient detail to demonstrate the proposed fabrication procedure and verify the inspectability of welds and shall include, at a minimum, the following:

A. Stages of fabrication;
B. The extent of each subassembly;
C. The use of jigs;
D. The sequence and methods for tack and final welding;
E. The timing and methods for dimensional checks;

F. The timing and methods for visual and nondestructive examination; and
G. The support conditions, fixturing, measurement methods, match marking and location for the trial fit of erection joints.

Findings & Conclusions

It is clear that under the "Working Drawings" requirements of the contract documents the Contractor was required to submit a very significant amount of detailed information to the Department in connection with the fabrication, assembly, and erection of the orthotropic box girders.

It is the Board's understanding this was achieved by the submission of actual "Working Drawings" in combination with the "Fabrication Procedure".

The sheer volume of information required to satisfy the contract requirements would likely dictate incremental submittals and revisions to be completed before fabrication took place. This certainly proved to be the case. USI's Fabrication Procedure required eight revisions before it was first approved by the Department on June 1, 2004 (State letter 4591), although even then with a list of general and specific "concerns." There were a further seven revisions of the Fabrication Procedure submitted following that first approval.

The question before the Board is whether the level of detail required by the Department in the development of the Contractor's Fabrication Procedure was consistent with the expressed intent of the contract documents.

It is clear that USI experienced production and quality problems during the same period of time USI was developing its Fabrication Procedure. Starting with the Department's response, dated December 4, 2003, to the submittal of Revision 3 of the Fabrication Procedure, when the State expressed its concerns as to how geometric tolerances(including camber and sweep) were being measured and verified by USI in the shop, the State repeatedly expressed its concerns about dimensional tolerances and how USI intended to meet the specified tolerances.

KFM developed a spread sheet in early January 2004 titled "Details of Jigs and Fixtures" which was intended to capture the State's "areas of interest" with respect to inspection and acceptance of fabrication. The spread sheet was modified to include USI's comments on January 9, 2004 and KFM added the Department's concerns on January 16, 2004. The document was developed to enable the parties to share basic information and was portrayed as not being an instruction to USI and the Board finds accordingly.

The Department's responses to Revisions 3, 4, 7, 8, 12, 13 of the Fabrication Procedure and Department letters to KFM dated, November 26, 2003 (State letter #3118) and November 1, 2004 (State letter # 5986) all included reference to various "concerns" both general and specific, but did not indicate that they were to be incorporated into the Fabrication Procedure by USI and they often were not. As referenced above, Revision 8, the first approved Fabrication Procedure, listed four general and eight specific concerns by the Department. However, many of the Department's "concerns" ultimately became requirements. For example approval of Critical Weld Repair #041-87 R1 was withheld by the Department by letter dated November 10, 2004, pending the Contractor's response to the Engineer's concerns expressed in State letters dated June 1, 2004 (#4591) and November 1, 2004 (#5986) respectively.

KFM's Paul Hegarty, in his written response, dated April 12, 2007, to DRB questions requesting his opinion as to whether in the development of the Fabrication Procedure, the Department's requests for "more information" as well as its expressed "concerns" were unreasonably beyond the bounds of the contract stated as follows:

"I repeatedly looked to Caltrans for direction to support their concerns. In general no clear direction was forthcoming..... As to the KFM contract, it is my opinion that the full extent of Caltrans requests were beyond the bounds of the contract."

In responding to another Board question as why the word "concern"was used and whether the Department's requests for "more information" and expressing "concerns was a clear indication of what USI was expected to do in order to satisfy the State Mr Hegarty stated:

"No. Much of the time I didn't think the State knew exactly what they wanted. Why was the word concern used? If I know what I want and to what I am entitled under the contract then I feel safe in directing action with specific reference to the contractual requirements."

Nonetheless, it does appear to the Board that the Department may have been right in some of its "concerns" particularly regarding timing and methods for dimensional checks required to meet specified tolerances, since both the east-bound and west-bound transition spans did not meet the specified tolerances with respect to some deck elevations. Interestingly, both the east-bound and west-bound transition span decks were out of tolerance even though the west-bound span was only 10% assembled when Oregon Iron Works took over from USI on November 17, 2005. According to Caltrans, OIW used USI's Fabrication Procedure for all work other than the Hinge Pipe Beam Diaphragms which may account for the westbound transition span also being outside the specified tolerances – assuming there were deficiencies in the Fabrication Procedure relative to dimensional controls. However it is not for the Board to determine whether or not there may have been deficiencies in the Fabrication Procedure, or that USI may not have followed its Fabrication Procedure, as Caltrans has claimed, that possibly led to the OBGs being fabricated and assembled outside the specified tolerances with respect to some deck elevations.

Notwithstanding the State's determination that 30% of the east-bound deck elevations and 28% of west-bound deck elevations of the OBGs were out of tolerance, it is the Boards understanding that, but for the decks, the transition spans were fabricated within the specified tolerances and both spans were ultimately accepted by the Department as suitable for their intended purpose following a "fit for purpose" study.

The Board questions whether perhaps the OBG specified tolerances were appropriate or realistically achievable considering the more generous allowable tolerances in the adjacent concrete structures to which the OBGs were framed into.

Based on the evidence provided to it the DRB concluded that the Contractor's initial submittals of the Fabrication Procedure were incomplete and did not meet the contract requirements for Working Drawings.

At a joint meeting (KFM/USI & Caltrans) on February 23, 2004, it was understood that Revision 6 of the Fabrication Procedure would be superceded by Revision 7, which was being prepared by USI in consultation with Caltrans/METS. At that point in time it was KFM's and USI's understanding that the status of the Fabrication Procedure was "Approved as Noted" whereas Caltrans' position was that the procedure was "Not

Approved." The parties understood one another's viewpoints and agreed that the procedures in the draft of Revision 7 were greatly improved and satisfied many of the Department's concerns. However, Revision 7 was rejected by the Department.

In USI's letter dated April 14, 2004, following the Department's rejection of its Fabrication Procedure, Revision 7, USI advised KFM that it had "sufficiently met the requirements identified in the Special Provisions, Fabrication Procedure (Revised page 242)." This letter was transmitted to the Department by KFM on April 15, 2004.

KFM's Paul Hegarty, in answering a DRB question as to whether he agreed that USI had, as of April 13, 2004, "exceeded the requirements of the contract regarding the level of detail for an approvable Fabrication Procedure", and, "if so had he advised Caltrans accordingly", stated: "Yes. It was possible to fabricate with the level of detail we had. Caltrans were aware up to the minute of my understanding of the status of the fabrication procedure. Official written notices would come from USI in the first instance."

Following the Department's rejection of Revision 7 of the Fabrication Procedure on April 5, 2004 a working group of Caltrans/METS and Contractor representatives met to redline a draft of Revision 8 of the procedure for at least an "Approved as Noted" status, as a matter of urgency. This meeting took place on April 19 and 20, 2004.

Fabrication Procedure (Revision 8) was finally approved on June 1, 2004, although still qualified with a list of Department general and specific concerns and a further seven revisions of the procedure were submitted during the course of the contract work.

A number of the later Fabrication Procedure Revisions were the result of the Department's requirements for QA /QC procedures to make it easier, or at least more efficient, for QA review of the work by State representatives. Some revisions appeared to be the result of the Engineer's continued requirement for USI to make changes to the Fabrication Procedure that resulted in changes in the Contractor's means and methods.

The Shop Traveler, which was incorporated into Revision 13, and approved by the Department on February 7, 2005, was developed by USI as a means of satisfying the Department's concerns about dimensional checking. Initially, each of USI's dimensional checkers had his own set of plans (shop drawings) on which he recorded each "piece" as being checked after marking each "piece" as accepted in the shop. In order to satisfy the Department's need to verify the checking process USI introduced a second set of "checker" plans for Caltrans' use. USI's checker would record dimensional checks on drawing set #1 and then transfer the information to drawing set #2 (Caltrans' set) - this was additional work for USI. The transfer process was not necessarily done immediately, and the Department, in carrying out its QA responsibilities, and from time to time, found USI in non-compliance with its procedure. This led to the development and implementation of the Shop Traveler by USI whereby the dimensional checker transferred the information from his checker set of shop drawings to the Shop Traveler. Once the Shop Traveler was implemented by USI the Department approved certain Critical Weld Repairs that had been on hold pending its implementation. The Board finds the Shop Traveler to be a constructive addition, by Caltrans, to the Fabrication Procedures.

USI is certified under the American Institute of Steel Construction (AISC) Quality Certification Program, Category III, Major Steel Bridges with a Fracture Critical Rating. This is the highest standard achievable for fabricators working to the requirements of the AISC Steel Certification program and have been approved, certified and audited by the

AISC on an annual basis. USI had performed thirty-three prior contracts for the Department, including Cypress E and the retrofit of the Richmond-San Rafael Bridge, and appeared to be eminently qualified to satisfactorily perform the contract work.

Subject to the language in the contract documents, USI believed at the outset that from its past experience on Caltrans projects its normal fabrication and QC procedures would satisfy the State.

However, USI appeared to have production and quality issues in 2004 and KFM's letter to USI of June 16, 2004 (LTR 000019) expressed the concern by KFM as to USI's ability to deliver, in a timely manner, the East-bound OBG in a condition acceptable to KFM or the State. The very same concern was expressed by the State in its letter to KFM dated June 18, 2004.

Nevertheless, the Board concluded that USI's performance of the work was impacted by the Department's actions and continued requirements for the Contractor to provide more and more information that was beyond the indications in the contract documents.

The Board finds and concludes that the level of detail required by the Department from the Contractor was neither indicated in the "Working Drawings" provisions in the Contract Documents nor could it have been reasonably foreseen even given USI's extensive prior experience on numerous State contracts. From the evidence and testimony presented, the Board concluded that the Department used the Fabrication Procedure as a vehicle to attempt to get USI to improve its quality, to comply exactly with what the Department wanted by way of additional information and production and QC procedures, forcing the Contractor to change its means and methods. The acceptance criteria for the Fabrication Procedure appeared to be a moving target with the Department's requirements evolving with time and with the Department's "concerns" appearing to have been largely based on how the State thought the work should have been performed. In doing so, the Department stepped beyond a reasonable interpretation of the requirements of the contract documents, at least following the submittal of Revision 7 of the Fabrication Procedure which the Board believed satisfied the Contract requirements.

Notice

Although a memorandum from USI to KFM, dated November 12, 2003, providing the status of fabrication for the OBGs, stated "We are currently working on a Notice of Potential Claim for delays caused by Caltrans inspectors and Caltrans Representatives" it apparently was not transmitted to the Department

KFM first put the Department on notice in its letter to the State dated April 15, 2004 (KFM–LET 763) following the Department's rejection of Revision 7 of USI's Fabrication Procedure on April 5, 2004. The Contractor advised that it would comply with the Department's requests under State letter #5.03.1-004075, dated April 5, 2004, adding that "there will be additional costs and possible schedule impacts as a result of Caltrans additional requirements." The Board is not aware of a Department response to KFM's letter of April 15, 2004.

However, it was not until March 28, 2005 that USI requested a CCO for Fabrication Procedure "as a result of Caltrans insistence on USI providing a extremely high level of detail not required by the Special Provisions." By a separate letter of the same date USI

requested that a CCO be issued for "implementation of a "Shop Traveler" at Caltrans/Mets insistence."

The Department denied the CCO requests for Fabrication Procedure on August 11, 2005 and for Shop Traveler on April 19, 2005. USI's letter dated June 23, 2005, responded to the Department's denial of the Shop Traveler request and repeated its request for issuance of a CCO. The State denied the request on September 6, 2005.

USI's letter dated September 30, 2005 maintained that the Shop Traveler and Fabrication Procedure required by the State on this project far exceeded the requirements enforced on previous projects performed by USI and that since June 1, 2004, when the Department approved Fabrication Procedure, Revision 8, there had been seven revisions to the procedure. USI repeated its request for a CCO for the additional work.

Then on January 4, 2006, USI responded further to the Department's letter of August 11, 2005 claiming the State had caused USI to perform work that could not have been contemplated at time of bid, that the specifications were void of objective criteria upon which a bidder could have anticipated the need to provide Fabrication Procedures to the extent actually required by the State on this project. USI repeated its request for a CCO.

The Department denied USI's request on January 11, 2006 and NOPC #27 was filed on January 26, 2006.

Although the DRB finds merit in the Contractor's claim the Board also finds that the Contractor inexplicably failed to comply with the time requirements of the notice of potential claim provisions of the contract (Standard Specifications, Section 9-1.04).

The Contractor's written notices of impact costs and its requests for additional compensation via a contract change order do not satisfy the Section 9-1.04 requirements. The State's denial of a contract change order is specifically listed in Section 9-1.04 as requiring the filing of an NOPC if the Contractor wants to pursue its claim. Silence after denial of a contract change order request may convey the impression that the Contractor a) has been convinced by the State's argument that no change order is due, or b) that it considers the pursuit of a claim inappropriate or too costly and burdensome.

At the hearing, the Contractor expressed concern that the action giving rise to the claim, the consideration of the claim and the rejection of a request for additional compensation were attributable to one and the same person (judge, jury and executioner). The Contractor questioned the lack of involvement of the Engineer (capital "E"). The "Engineer" is defined in Section 1-1.18 of the Standard Specifications as "The Chief Engineer, Department of Transportation, acting either directly or through properly authorized agents, ---". It is highly unlikely that the Chief Engineer involves himself in the day-to-day contract administrative correspondence that does not rise beyond the project level. But it is highly likely that the Chief Engineer will involve himself in a timely NOPC that appears to have significant monetary impact.

USI's position papers for NOPC 27, Fabrication Procedure, contain numerous instances of State conduct that, if true, constitutes, or borders on, bad faith conduct:

- page 3 of 18: "interference from the State"
- page 4 of 18: "hoping to appease the State"
- page 4 of 18: "modified the fabrication procedures any way the State wanted just to get the State's approval"
- page 4 of 18: "the implementation of the traveler was particularly disruptive"

- page 5 of 18: "State repeatedly badgered USI"
- page 6 of 18: "The State's actions –border on hindrance and interference"
- page 7 of 18: "State manipulated USI"
- page 7 of 18: "State holding USI hostage"
- page 16 of 18: "—there is a clear pattern of actions and inactions by the State on the Skyway project that, when taken together, constitute ignorance of the State's duty not to hinder, delay or increase the Contractor's cost of performance".

In the face of these grave allegations it is difficult to understand why these "hindrances", "disruptions", "badgering", "holding hostage", and so forth, did not precipitate one or more timely notices of potential claim. For a different trier of fact, such as a judge or arbitrator, the absence of such notices may well call into question the veracity of the Contractor's allegations and lead to summary denial of the claim.

Conclusion:

The Contractor's first notice letter to the Department was filed on April 15, 2004. There does not appear to be any evidence of any earlier written or verbal notice and this should be the effective date for calculation of any additional compensation. Although USI did not file a request for CCO's for both the Fabrication Procedure and the Shop Traveler until March 28, 2005, the Board was not provided with any evidence that the State had been prejudiced in any way either prior to or after that date.

DRB RECOMMENDATION

The DRB unanimously recommends that the Contractor be compensated, under Clause 4-1.03 CHANGES, of the Standard Specifications, in preparing the OBG Fabrication Procedure, for its costs in providing additional information, requested by the Department, after April 15, 2004. These costs would not apply to new, essential added elements to the Fabrication Procedure, other than the Shop Traveler.

Impact costs, including delays, to the fabrication operations that can be shown to be the direct result of the unusual demands of the Fabrication Procedure and which caused un-necessary changes to the Contractor's planned means and methods are also a compensable change to the contract.

Respectfully submitted:

Warren M. Bullock	Richard A. Lewis	Frederick Graebe
DRB Member	DRB Member	DRB Member

Date: June 10, 2007

DISPUTE REVIEW BOARD

State of California – Department of Transportation

Contract Number 04-012024 – East Span Skyway Project

Dispute No. 13 – Notices of Potential Claim #20 & #23– Administration of Critical Weld Repair Requests

Hearing Date: May 4, 2007

Hearing Attendees: Caltrans Representatives:

Douglas Coe
Patrick Lowry
Don Ross
Kannu Balan
Shewit Semere

Contractor Representatives:

Paul Giroux-KFM
Steve Harder-USI
Brad Young-USI
Dustin Harder-USI
Mark Nastari-USI
Gary McCabe USI
Ken Esteb-USI
Chris Amonson-USI

BACKGROUND

The East Span Skyway Project consists of two superstructures (Eastbound and Westbound) consisting of 452 precast concrete girder segments and steel orthotropic box girders (OBG's) for the transition spans. The transition spans connect the concrete girders of the Skyway to the Self Anchoring Suspension Bridge project. There are two OBG's each approximately 60 meters in length, fabricated by the Subcontractor (USI) in Vancouver, WA, and transported to the jobsite by barge.

The California Department of Transportation (hereinafter referred to as the "State", "Department", "Engineer" or "Caltrans") awarded the contract for the East Span Skyway Project (Contract No. 04-012024) to Kiewit/FCI/Manson, JV, (hereinafter referred to as "KFM", or "Contractor") on January 17, 2002. KFM awarded a Material Contract for the fabrication of the OBG transition spans to Universal Structural, Inc. (USI) on July 30, 2002.

DESCRIPTION OF DISPUTE

The Special Provisions in Section 8-3.01, Welding, provide for the Engineer's review and approval of critical weld repairs. This dispute is about how the State administered that process. This relates to all the OBG fabrication work, both closed rib and nonclosed ribs, part and panel assembly through girder assembly.

Notices of Potential Claim #20 & #23 were submitted by KFM as a result of the Engineer's response to the Contractor's requests to repair welds. The Contractor maintained it was entitled to additional compensation based on the information requested by the Department to accompany the weld repair requests whereas the Engineer requested that the Contractor address poor weld quality and workmanship prior to approving the weld repair requests.

In a series of letters dated June 21, 2004, approving requests for Critical Weld Repairs (CWR) 04-6, 04-7, 04-8, 04-9, 04-10 (all in piece assembly pa 84), 04-11, 04-12, 04-13, 04-16 (all in pa 57) and June 22, 2004 CWR 04-18, 04-19 ,04-20, 04-22 (all in pa 57) the Department expressed its concern that (a) the repairs could have been avoided with a more effective quality control program (b) the number of repairs may affect the fatigue life of the material and have a negative impact on the overall life span of the structure (c) the detrimental effect the large number of excavations and incidents of re-welding would play in the distortion and shrinkage of the material and (d) the steps KFM was taking to mitigate these issues in the future so as to prevent such a large number of repairs.

USI's response to KFM, dated June 29, 2004, indicated that the Department's approval of the CWR requests verified that the repair as submitted met the terms of the contract, but that USI would not accept any design responsibility for work performed in accordance with the contract. USI also expressed its understanding that the State's dimensional tolerance concern was confined to vertical closed rib locations in diaphragms pa 57 and pa 84.

The Department's letters of July 29, 2004 and August 5, 2004 reiterated its concern about the detrimental effects resulting from the large number of excavations, incidents of re-welding and the distortion and shrinkage of material and that the number of repairs requested was higher than the best general practice in modern bridge shops. The Engineer also indicated that its concerns regarding dimensional tolerances were not limited to the closed rib locations in diaphragms pa 57 and pa 84. The Department referred to State letters #4588 of May 21, 2004 which specifically addressed an NCR regarding "dimensional checking" and #4591 of June 1, 2004 which in approving the Contractor's Fabrication Procedure (Revision 8) listed four general and eight specific "concerns."

The Contractor, in its response of August 26, 2004 maintained that the Department had not shown it had violated the specification with regard to the frequency

of weld repairs and was not aware of any statistics identifying the acceptable amount of repairs for general practice in modern bridge shops. The Contractor also maintained the Department's tolerance concerns had been addressed in its Fabrication Procedure.

CWR 04-87

CWR 04-87 on Girder 4A, pa 96 diaphragm to pa 20 soffit, was first submitted on 10/25/04 but USI was verbally notified by the Department that it was rejected for lack of sufficient detail. Written notice of rejection was by letter dated November 10, 2004. CWR 04-87R1 was resubmitted on 11/09/04 with additional details but again rejected by the Department on 11/15/04 with a requirement for the Contractor to address State letters #4591 and #5986. USI's letter dated November 15, 2004 disagreed that the Department's approval of the CWR should be contingent on USI's response to the two State letters. USI maintained that State letter #4591 expressed the State's general and specific concerns but did not request additional information to be provided. State letter #5986 did request additional information regarding specific issue and USI was currently in the process of responding to both letters but maintained the Department should not reject any CWR based on lack of response to these letters. USI requested the issuance of a CCO as a result of its incurred additional cost and schedule impacts.

At a meeting on November 16, 2004, between the Department, KFM and USI to discuss methods of document control a draft of USI's proposed Shop Traveler, to better track and communicate dimensional tolerance measurements, was reviewed. Although USI wanted to give the Traveler a week's trial, both KFM and the Department were of the opinion to implement immediately and provided there were not significant differences between the Shop Traveler and the Fabrication Plan only the Shop Traveler would need to be modified. The State indicated that as soon as the Shop Traveler was implemented CWR 04-87 would be approved.

CWR 04-87R2 which included implementation of the Shop Traveler was submitted November 24, 2004 and was approved by the Department on December 7, 2004.

The Department denied the Contractor's request for a CCO for lack of merit on December 9, 2004 and KFM filed a Notice of Potential Claim dated December 14, 2004, with the Department confirming its receipt on December 28, 2004.

The Department denied merit to the Contractor's request for additional compensation by letter dated August 16, 2005 and the matter was referred to the DRB on August 23, 2005.

CWRs 04-171/172

CWRs 04-171/172, both for unacceptable LOP, were submitted December 8 and December 9, 2004, respectively, and rejected by the Department, first verbally, and then by letter dated December 15, 2004, with a request for additional information. In a letter to KFM, dated December 17, 2004, USI maintained the requested information was neither

required by the Contract, nor would it have any affect on the outcome of the repair and requested a CCO for additional costs and impact.

CWR's 04-171/172, Revision 1, were submitted December 17, 2004, verbally approved on December 21, 2004, and confirmed by letter dated January 25, 2005.

The Contractor's request for a CCO was denied for lack of merit by the State on February 24, 2005, and a Notice of Potential Claim, dated March 9, 2005, was filed by KFM and its receipt acknowledged by letter dated March 17, 2005. The matter was referred to the DRB on December 15, 2005.

CONTRACTOR'S POSITION

NOPC's #20 and #23 are about the administrative process for requests by the Contractor for critical weld repairs (CWR). When certain types of weld defects occurred, the Contract required the Contractor to submit to the Engineer, in writing, the type of defect and the Contractor's proposed procedure for the repair of the defect. The Contract states, "The Engineer shall have 5 days to review these procedures." The process described in the Contract is simple.

At USI the State changed the requirements. The State required additional information, including tracking and trending information, and steps that the Contractor could take to minimize the defects in the future to be included in the CWRs. This action caused unanticipated extra QC, supervisory and administrative work to be performed just to submit the CWR.

Then the State changed the approval process. The provision indicates that the Engineer's sole responsibility is to review the proposed procedure. While it does not provide for alternative dispositions, USI was reasonable in believing that one of three commonly used responses would be provided.

- Direct the Contractor to not perform the repair,
- Approve the proposed repair procedure, or,
- Reject the proposed repair procedure because it did not conform to the contract requirements.

At USI the State added two options to those listed above.

- Reject the CWR, making approval contingent upon USI's response to the State's concerns, or USI's performance of a task not related to the CWR. CWR 04-87 is an example of that action.
- Either reject the CWR until USI changed its means and methods to conform to the way the State wanted the repair performed or approve the repairs with the changes to means and methods dictated or noted by the State.

From the outset of welding and the preparation of weld repair requests in May of 2004 to about mid-June 2005 the State repeatedly expressed its concerns with USI's performance of the work. The State began expressing its concerns about the number of weld repairs on the fourth CWR and never let up. On June 21, 2004, while mproblems

were occurring with the single pass closed rib welds the State notified USI that it was withholding all CWRs, even those not related to the closed rib work until a meeting set for June 30, 2004. This act demonstrated the State's disregard for the Contract provisions.

Soon after the June 30 meeting the State responded to the pending CWRs, but then, as demonstrated byCWRs 04-70, 77, 87, 171, and 172, the State adopted tactics that interfered with USI's performance. The most outrageous incident is CWR 04-87 where in October 2004 the State withheld approval of CWR 04-87 until USI responded to two letters and in doing so implemented the Shop Traveler. The State delayed the approval of 04-87 by approximately one month while the traveler was implemented.

In the fall of 2004 USI protested several CWRs where the State withheld its approval of the repair process while USI responded, either providing additional information (not required by the Contract) or responded to the State's concerns. Three of the CWRs were taken all the way to NOPCs, CWRs 04-87, 171 and 172. The remaining protests were incorporated into NOPCs 20 and 23 due to the similarity of the protested actions.

The five CWRs described below are representative of the three types of acts of extra work and interference by the State:

CWR 04-77 Extra Work. This CWR was for lack of penetration on a closed rib weld on Girder 3 after the two pass procedure had been qualified in September. USI had an approved WPS for the weld repair. The State rejected the weld repair request requiring that USI demonstrate its ability to perform repairs, and then delayed it even further by requiring more information on the submittals. The extra work included the additional administrative work and mockups to demonstrate the repair procedure.

CWR 04-87 Extra Work and Withholding Approval Contingent Upon Response to Unrelated Issue. On CWR 04-87 the State's rejection of the first submittal was not based on the Contract requirements. It was, in fact, based on the State's demand for additional information and for USI to respond to the State's concerns expressed in two unrelated letters, one of which was not even written at the time of the submittal rejection

CWR 04-171 and 172 Withholding Approval Contingent Upon Response to Unrelated Issue. CWRs 171 and 172 were for lack of penetration indications on closed rib welds. The State requested additional information not directly related to the weld repair. The type of information requested by the State could have been obtained by direct conversation with USI without delay to the approval of the weld repair. The State's rejection, request for more information and later approval of the CWR without any changes to the process or procedure is interference with USI's operations.

CWR 04-70 Interference with Means and Methods. The State rejected CWR 04-70 because it did not believe that the repair could physically be performed. USI was required to perform a mockup of the repair condition and demonstrate to the State that the work could be performed.

The State's requirement that USI respond to unrelated issues interfered with and delayed USI's performance of the repairs and thus delayed completion of USI's work.

These acts by the State amount to its failure to review the proposed procedure within 5 days allowed by the Contract. The actual time impact of the CWR that is rejected for unrelated information includes the original preparation of the CWR, the State's review time, the time for USI to complete the unrelated tasks and the time for the state to review the new information and the repair procedure itself. Just putting the ball in USI's court does not divert the responsibility for the delay from the State.

The State's act of dictating means and methods interfered with USI's right to allocate its resources as it determined, increased the inefficient use of resources, increased USI's cost of performance and extended the time of performance. We find no provision in the contract that allows the State to direct extra work without the issuance of a Change Order.

The State's addition of requesting more information made extra work for USI. The State's actions of making approvals contingent upon performance of unrelated tasks and its interference in USI's means and methods are violations of the State's duty not to hinder, delay or increase the costs of performance. USI is due an adjustment to the Contract for time and costs incurred as a result of the State's actions.

At the DRB hearing, USI maintained that the Engineer effectively directed the means and methods of both the repair and production welding procedures. In response to this allegation, the Board asked USI to furnish information to support its position. With transmittal dated May 15, 2007, the Board was furnished a number of CWRs along with three pages which summarize its allegations of State direction and provides specific CWRs that it indicates support its position, as follows:

> "The State would not approve CWR's forcing meetings where the State would direct USI's means and methods. The State would force USI to adopt various changes including additional QC inspection and assignment of specific welders in order to get approval of CWR's. This is evidenced by the revision to USI's CWR's stating the addition of QC inspection. However, the State's approval letters made it clear that they wanted additional QC and wanted the weld repair limited to specific welders (See CWR 04-103).
>
> Initially, USI did not change its submittals to include the additional QC or specific welders but the State made it clear its approval letters and by NCR's that USI had to limit the repairs to specific welders. When USI tried to perform the repair without the specified welder the State issued an NCR (See CWR 04-223).
>
> Ultimately, the State made its approvals contingent on USI putting specific welders directly in the submittal. If this was not done the State would reject the submittal (See CWR 04-012).
>
> The following are some examples of these situations:

1. CWR 04-103 (State requires welder #34)
2. CWR 04-112 (State requires welder #34)
3. CWR 04-214 (State requires welder #34)
4. CWR 04-223 (State requires welder #34 – USI Received NCR 68 on this CWR because we did not use welder #34).
5. CWR 04-226 (State requires welder #34 or #63)
6. CWR 05-007 (State requires welder #34 or #63)
7. CWR 05-012 (State rejects and requires USI to revise submittal to limit welders. USI forced to resubmit with limiting welders to #34, #53, or #15. State no longer provides limit on welder in State Letter.)
8. CWR 04-224R1 (USI required to submit limiting to welders #34, #63, or #15 or submittal will be rejected.)
9. CWR 05-44R1 (USI required to submit limiting to welders #34, #63, #3, or #15 or submittal will be rejected.)

- The State held CWR approvals hostage until USI limited the repair to specific welders. The State also provided limited approval as long as USI made repairs with specific welders.

1. Email Dated June 23, 2005 – State provided reject rates for welders based on WEB TO DECK welds and sent this to Mark Nastari (Note: These reject rates were based on the most difficult weld because of the inaccessibility/design issues).
2. Meeting 6/23/04 – See Mark Nastari Email Dated July 7, 2005. Mark was forced to limit welders in order to get approval of 20 CWR's that the State was holding approval on.
3. Finally, the State provided limited approval of CWR's which shows the State's intent to limit USI repairs to specific welders (See examples, CWR 05-213R2, 05-214R2, 05-209R2, and 05-208R2).

<u>State Direction to Use Specific Weld Process and/or Procedures</u>:

USI was directed on numerous occasions to use specific weld processes and procedures.

1. CWR 05-015
2. CWR 05-040R1
3. CWR 05-212R2
4. CWR 05-226RI
5. CWR 05-233R1
6. CWR 05-236Rl
7. CWR 05-244R1

The State has also rejected submittals and only approved them when the repair would be limited to specific weld wire (Note: Several of these were referenced in the State presentation as being responded to in 1 day. These were rejected on 6/2/05 and were not approved until 6/10/05 when the specific wire was noted on the CWR).

1. CWR 05-081R4
2. CWR 05-126R3
3. CWR 05-127R3
4. CWR 05-129R3
5. CWR 05-147R3A1
6. CWR 05-203R2
7. CWR 05-204R3A1

Other State Direction:

- Requalify Welders – The State required USI to requalify welders on multiple occasions when the welder was unable to successfully repair the weld (Example is CWR 05-340R2)
- The State would reject CWR's with the request for (1) What Caused the Problem (2) Procedures to Correct. (Examples are CWR 05-340R2 and CWR 05-316R2).
- The State would reject CWR-s and state, that they are not satisfied Contractor is "eliminating or reducing FCAW rejection rate" (Example is CWR 05-040R5).
- The State rejected CWR's for LOP discrepancies (Example is CWR 05-052R1 w/ resubmittal 05-052R1A1)
- The State would reject CWR's on occasion and ask for the history on the first repair (Example is CWR 05-059)."

DEPARTMENT'S POSITION

The defects which the Contractor requested to repair in CWRs 04-87R1, 04-171 and 04-172 were symptoms of a much larger problem. CWRs 04-171 and 04-172 were a result of welding operators making adjustments to the welding machine that was resulting in LOP and melt-through on the same weld. The Contractor's weld repair requests neither recognized nor included repair procedures to remedy these kinds of defects.

1. Engineering Judgment

The Special Provisions contain multiple hold points where the approval of the Engineer must be obtained. Some decisions will inevitably require additional information for the Engineer to reach a conclusion. When a Contractor is not operating with due diligence and good faith to provide acceptable weld quality and workmanship equal to "the best general practice of modern bridge shops" as required by Section 55-3.01 of the Standard Specifications, the review and approval of submittals by the Engineer becomes even more important. The Department does not believe it is reasonable for the Engineer to overlook the negligence of a Contractor when evaluating weld repair requests, when the repairs are a direct result of that negligence.

2. Timeliness

The Department's response times to the CWRs in question were within the five days as allowed by Section 8-3.01 of the Special Provisions. The Department received CWR 04-87R1 on November 10, 2004 and verbally responded on November 15, 2004. The Department received CWRs 04-171 and 04-172 on December 2004 and verbally responded the same day.

3. USI did not just make a mistake, they were negligent

In the period of time that the Contractor was attempting to gain approval for its Fabrication Procedure, the Department wrote three letters (State Letters #3118, #3568 and #4075) which enumerated its concerns whether the Contractor would be able to meet fabrication tolerances. These concerns were again raised in the Department's approval of the Fabrication Procedure (State Letter #4591).

The Department wrote multiple Non-Conformance Reports (NCRs) documenting instances where USI simply failed to follow the approved Fabrication Procedure. It is the Contractor's responsibility to ensure the OBG conforms to contract documents. Despite the concerns raised by the Department, the Contractor elected to proceed with fabrication without modifying its means and methods as documented in the Fabrication Procedure. More concerning was the fact that USI started fabrication and then elected to not perform dimensional checks documented in its approved Fabrication Procedure. While the Contractor contends that the error was simply a mistake, the Department believes USI was negligent in not performing dimensional checks on as many as 73% of the assemblies.

4. Weld Monitoring Tests Served their Purpose

The WMTs were intended to be a tool to ensure that the closed rib welds were consistent in quality with the approved closed rib weld procedure. The Special Provisions provide that "In the event that monitoring test specimens do not provide quality similar to those originally developed and accepted, fabrication shall cease." The Contractor did not comply with this requirement and attempted to argue that nothing was wrong. The Engineer eventually had to halt fabrication on the closed rib to deck welds before the Contractor realized there was a problem. CWRs 04-171 and 04-172 were directly related to problems identified during this time. These CWRs were submitted on December 9, 2004. Twelve of the twenty (60%) WMTs performed prior to December 9, 2004, were rejected, including all four WMTs from the previous day. Four of the six WMTs done immediately after the CWRs were submitted were also rejected.

The Contractor's weld repair request never contemplated the scenario that the welds would contain unacceptable melt-through in addition to LOP and the Department could not approve the repair request until the Engineer had confidence that the Contractor had determined the full extent of the weld defects. Additionally, the presence of unacceptable melt-through may have changed the repair approach, procedure or technique. Ribs with unacceptable melt-through would have needed to be removed and

new closed ribs welded to the skin plate. It was only after the Department stopped production and asked additional questions pertaining to CWRs 04-171 and 04-172 that KFM's welding expert became involved to identify the problem.

FINDINGS

At the DRB hearing, the State requested that the Board only provide recommendations on the specific CWRs noted in NOPCs #20 and #23. While these NOPCs specifically mention certain CWRs (04-87, 04-171 & 172), it is clear to the Board that USI's intent with these two NOPCs was to provide a general protest of what USI alleges was unauthorized and inappropriate administrative policy by the Engineer in its oversight of the OBG fabrication. In USI's defence, the State's rejection of USI's request for a CCO without any real explanation, and the general negative atmosphere at the time, caused USI to determine it would be to no avail, and only make the situation worse, if it repeatedly filed multiple claim notices on every occasion it witnessed what it perceived to be similar disregard of the specifications by the Engineer, concerning the CWRs.

It is the goal of this Board to provide the parties with Findings and Recommendations on disputes referred to it that objectively address entitlement issues and provide sufficient explanations of the basis for its determinations, in order to maximize the potential for the ultimate resolution of issues by the parties. The Board will honor the Department's request to address only the CWRs mentioned on NOPCs #20 and #23 in its Recommendation. However the Board in good conscience believes it is obliged to consider all the information that has been provided to it by the parties regarding this dispute in its Findings and Conclusions. It is our hope that this will be taken into consideration in the resolution of this matter.

NOPCs #20 and #23 specifically note CWR 04-87, CWR 04-171 and CWR 04-172. The Contractor also provided detailed information on two other CWRs (CWR 04-70 and CWR 04-77) in its Position Paper and at the hearing, as additional examples of where USI has been similarly impacted by the Engineer's actions. The Board has reviewed this information.

All these CWRs provide examples where requests for additional information, not directly related to the proposed repair procedure delayed the remedial work. In addition the Department's concerns as to minimizing repairs in the future, forced USI to make changes to its procedures whether they were necessary or not. The requirement to provide mock-ups of the required procedure for CWR 04-70 and CWT 04-77 became compensable additional work once the procedure was shown to be successful. This is similar to extra testing or the uncovering of previous work, performed at the direction of the Engineer. When such testing reveals no defect that requires repair, the costs are compensable. CWRs 04-171 and 172 involved a combination of melt-through and presumed LOP on the same closed rib weld.

The State argued that the defects were symptoms of much larger problems, such as the welding operators making adjustments to the welding machines, which in the case of CWRs 04-171 and 04-172, resulted in LOP and melt-through on the same weld.

The State indicated that twelve of the previous twenty (60%) of the WMTs performed prior to December 9, 2004, were rejected, including all four of the WMTs from the previous day. Four of the six WMTs done immediately after the CWRs were submitted were also rejected.

The State's comparative criteria for WMT evaluation was the approved "worst macroetched section" which USI claims, represents a "perfect weld." The specifications do allow "uniform melt-through" not to exceed 6mm.

While the WMTs apparently failed to meet the established standard, these welds were not necessarily outside the specification, and while the repairs should not have been delayed as a consequence, a review and audit of the production welding by all the parties to identify the reasons for the increased variation in the closed rib welds, was appropriate and required by the specification. The Engineer had the right to require "two consecutive successful additional specimen trials" before allowing deck panels to continue to be fabricated. However, the Engineer does not have the right to dictate the means and methods to be used to correct any production problems.

On USI's powerpoint slide #33 (page 17 of the hard copy) it referenced "USI LTR 230 dated 1/27/06." The Board requested copies of this letter along with any letters referenced therein. USI's LTR 230 (transmitted to the State with K-F-M's LTR 001487) requested that the CWR issues in certain State letters, specifically, #5.03.1-008688, #5.03.1-008687, #5.03.1-008255 and #5.03.1-008253 be addressed as a part of NOPC 20 and 23. The Board has not been provided any correspondence documenting the State's response to this request. While no testimony was provided on these letters, the Board has received and reviewed this information.

The referenced letters provide various CWR approvals conditioned on the understanding that the repair would be performed with the Lincoln Ultra Core electrodes. Also the letters confirmed the Engineer approved certain CWRs after being informed that the State selected welders would perform the repairs. Other approvals were conditioned based on repairs being performed only in "the 1G or 2G position".

These letters confirm that USI had at least four additional requests for CCOs with regard to numerous CWRs which were transmitted to the Department by KFM letters 001271, 001279, 001312, and 001314 in July and September, 2005.

At the hearing USI maintained that the Engineer effectively directed the means and methods of both the repair and production procedures. In response to this allegation the Board asked USI to furnish information to support its position. With transmittal dated May 15, 2007 the DRB was furnished three pages of narrative which summarized its allegations and provided specific CWRs to support its position. This information has

been included in the Contractor's position in this report and has been reviewed by the Board.

This supplemental information confirmed that the State limited the welders that could perform weld repair work.USI included nine examples of this. USI's Mark Nastari in his Email dated July 7, 2005, confirmed the requirement to limit the welders on repair work in order to get 20 CWRs released. USI maintained the limited approvals of four other CWRs confirmed the State's intention of limiting weld repairs to specific welders.

USI provided six examples where the State directed use of specific weld processes and procedures. Seven CWR examples are provided where the State has directed the use of specific weld wire.

Other miscellaneous directions by the State included in the supplemental information the following:

- Requalifying of welders on multiple occasions after unsuccessful weld repairs.
- CWRs were rejected for lack of information on (1) what caused the problem and (2) procedures to correct (three examples referenced)
- CWRs rejected because Contractor not "eliminating or reducing FCAW rejection rate."
- CWRs rejected for LOP discrepancies
- CWRs rejected until history of first repair furnished

The Special Provisions provide for the Engineer's notification in writing and review of the procedures for critical weld repairs not submitted in the WQCP. This dispute is about how the State administered the process in relation to the specification requirements.

The requirements for providing notice to the Engineer and the proposed repair procedure for critical weld repairs are found in Special Provisions, Section 8-3.01, Welding, Welding Quality Control (Revised Page #78) as follows:

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

This section requires the Contractor to notify the Engineer of any necessary critical weld repairs in writing when discovered and provide its proposed repair

procedures to correct them. The Engineer then has 5 working days to review and approve these proposed repair procedures. The remedial work cannot proceed until the Contractor receives written approval by the Engineer of its proposed procedures. While the Contract is silent on the options available to the Engineer, this section implies the Engineer may either approve or disapprove the proposed repair procedure if it believes the procedure does not conform to the Contract requirements. This section also implies that the Engineer is obligated to provide the Contractor an explanation for any rejection or qualified acceptance of the proposed repair procedure. The Contract did not require USI to provide the cause or remedy of a welding problem in the production process as a part of the CWR submittal, but only include the type of defect and the proposed repair procedure.

The Department alleged that the number of repairs were excessive and did not meet the standards for good workmanship. USI indicated that they had a 2.09% repair rate and quoted the Engineer as having stated in the Oakland Tribune on April 6, 2005, that 5% rejection rate was normal for steel fabrication of bridges. The Board does not find the number of repairs to be unreasonable or excessive.

The Board believes that many of the CWR submittals required by the Engineer may not have been necessary under the Contract for the reasons described in the Board's Findings and Recommendations of various other NOPCs such as NOPCs #15, 16, 18, 21, 22, 25, 27 and 29. In addition, USI claims there were 176 CWRs addressing administrative matters. While the Board has not confirmed this number, it believes there were CWRs submitted responding to administrative issues rather than specific incidents of critical weld repair.

While the Board has not based its findings on such comparison, the SFOBB, SAS, Contract #04-120F4, Special Provisions in Section 10-1.59, Steel Structures, when compared to Section 10-1.44, Steel Structures of the Special Provisions for this Contract confirms that substantial additional language has been added in the SAS specifications with regard to the information required from the Contractor when the Engineer's approval for remedial work is necessary. While this Contract required the Contractor to only provide notice of the defect and "the proposed repair procedures to correct them", the SAS specifications provided the following:

> "For requests to perform repairs, the Contractor shall include an engineering evaluation of the proposed repair. The engineering evaluation, at a minimum, shall include what is causing the defects, why the repairs will not degrade the material properties, and what steps are being taken to prevent similar defects from happening again in the future."

Many of the Engineer's responses to the Contractor's weld repair requests on this Contract required additional supplemental information which often could well be effectively classified as an "engineering evaluation" as described in the SAS specifications noted above. If it was the State's intent to require this supplemental information with requests for critical weld repairs on this project, it was obligated to

provide notice to the Contractor, at least, equivalent to that provided in the SAS Contract. No such notice was provided in this Contract.

The State referenced an NCR which indicated that 73% of the dimensional checks required by the fabrication procedure had not occurred on a particular audit of the records. USI disputed this percentage and explained that the required dimensional checks had been performed and were noted on the checker#1set of plans, but this data had not yet been transferred to checker set #2 which was a duplicate set of plans provided for the Engineer's convenience. USI maintained that the checker #1 set of plans always had dimensional checks as required and the problem was in the delay in transferring this information to the duplicate set of plans which was maintained per Caltrans' request.

The State claims that its responses were timely and in the most part averaged 1.2 days per response. The USI responded that while the verbal responses may have been prompt in the most part, an inappropriate rejection has a significant untimely impact and the Department should be responsible for delays beyond the 5 working day period or the whole period if the CWR was not required to be submitted under the terms of the contract. It appears to the Board that the State did verbally respond in a timely basis in most cases albeit in many cases with an inappropriate response or rejection.

The Board respects the Engineer's responsibility to ensure acceptable weld quality and workmanship equal to "the best general practice of modern bridge shops." However, when the State, effectively directed USI's means and methods, delayed approval of repair procedures unnecessarily by requiring information on production issues, and required the Contractor to provide engineering evaluations not required under the contract, the Contractor is entitled to be compensated for the impacts of the Department's actions. The record is almost devoid of change orders for extra work as a consequence of the State's actions and provides limited explanation for its "no merit" responses to various USI requests for CCOs. Had the contract administration of issues between KFM/USI and the State been pursued contemporaneously, as they surfaced, the Board believes a less tense and adversarial relationship between the State and USI would have existed and much of the additional costs and delays to the OBG fabrication could have been obviated.

USI's welding consultant, D.L. McQuaid, provided his perspective, in a written review dated April 30, 2007, on the issues discussed in this claim. He concluded:

- For Caltrans to state that they needed to know more about how the weld was made is not defendable because how the weld was made does not affect how the weld is repaired. Once non-destructive testing established that the welds were rejected, the repair procedure is based on that information, not on what welding process was used or how the weld was made. If the repair procedure needs to be changed, Caltrans shall be notified and the procedure would be revised and resubmitted for approval.
- Caltrans has exercised its approval rights in an unfair and unreasonable manner. (CWR 04-087 is an example).

- Caltrans has used arbitrary and inconsistent approval standards to force their will on Universal (CWR 04-171 and CWR 04-172 are examples).
- Caltrans established a new performance standard which Universal was forced to meet (CWR 04-171 and CWR 04-172 are examples).
- I believe that Caltrans has abused its authority and should be held responsible for their actions. The power of approval rights and the right to stop work alone is tantamount to a power of economic life or death of Universal Structural Inc. Such authority exercised in such a relationship carries commensurate legal responsibility."

NOTICE

The Board has concluded that NOPCs #20 and #23, along with USI's request for CCOs were submitted in a timely manner. The Board believes these notices were really intended as a general protest regarding the Engineer's administrative policy on CWR submittals. After these two NOPCs, USI continued to file requests for CCOs due to the CWR issues. As further explanation for USI not filing additional and numerous NOPCs on other CWRs the Board notes KFM's Paul Hegarty's responses in his April 12, 2007 reply to Board questions. He states: ".....Caltrans refused to be taken to task on the contractual issues in our meeting....." In response to DRB question #5 Mr Hegarty stated: ".....their (Caltrans) style of management tends to blur the lines between contractual obligations and additional work,...."

However, there remains the question as to whether the State has been prejudiced by the lack of formal individual notice identifying each CWR that was impacted by the Engineer's inappropriate administration. In that the State continued to contend that its actions in the administration of CWRs were appropriate and within its authority, the Board concluded that additional multiple NOPCs regarding the same issues would have had no consequence on the administration of the Engineer's oversight policy. Consequently, the Board doubts that the State was prejudiced by USI's failure to file NOPCs on each of the other CWRs that have been impacted by the State's administrative policy.

CONCLUSION

The Board has concluded that the Engineer required the Contractor to provide more information, in certain of its requests for critical weld repairs, than is indicated as being required in the Special Provisions. These requirements for supplemental information bordered on what has been termed in the SAS specifications as an "engineering evaluation". This often required utilizing the services of outside welding experts, consultants and metallurgical experts to perform research and provide reports in response to the Engineer's concerns. In addition, USI was required to perform mock-ups of certain welds and weld repairs in order to prove their feasibility and confirm their acceptability to the Engineer. In some cases, repair requests were rejected, or delayed, pending the Contractor's response to the Engineer's informational inquiries and concerns. Often the requests for information and response to the Engineer's concerns were not directly related to the requested weld repair procedure. Once USI responded to the inquiry or concerns of the Engineer, the repair requests was usually approved without any

change to the repair procedure originally proposed. In many cases, the State effectively directed the means and methods of the repair and/or the production process to be used by USI by specifying which welder could be used to perform the specific repair and require the use of certain resources or electrodes.

The Engineer persisted in continually requiring USI to indicate what changes in its procedures it was going to make to ensure such repairs would not be required in the future. Further, in that the Engineer considered the rate of CWRs as excessive, it continually required USI to take action and/or make changes in order to reduce the rate of CWRs in the future. This situation was exacerbated by the fact that the Engineer demanded submittal of CWRs concerning administrative issues. Further, based on various Findings and Recommendations on other USI claims heard by this Board, the Engineer required submittal of CWRs in situations not required by the Contract Documents.

In summary, the Board finds that the State:

- Required information not required by the Contract to be included in requests for weld repairs
- Delayed approval of requests to repair welds by requiring USI to respond to its concerns or requests for information not related to the requested repair
- Interfered with USI's determination of its means and methods by assigning or causing USI to assign specific resources and processes for the performance of repairs and make unnecessary changes to the production process.

RECOMMENDATION

With regard to the CWR noted in NOPC #20 (CWR 04-87) the DRB unanimously recommends that the Contractor be entitled to compensation under Section 4-1.03, Changes, of the Contract Standard Specifications for its additional reasonable costs and impacts of being required to provide information beyond that required in the Contract Documents for requests to perform weld repairs and other remedial work in order to obtain the Engineer's approval.

With regard to the CWRs noted in NOPC #23 (CWR 04-171 and 04-172) the DRB unanimously recommends that the Contractor be entitled to compensation under Section 4-1.03, Changes, of the Contract Standard Specifications for its additional reasonable costs and impacts due to the Department's rejection of the right to perform repairs until the requested information was provided to the State and reviewed.

In addition, the Contractor is entitled to compensation for its additional reasonable costs and impacts as a consequence of the Engineer's direction that affected the means and methods of the fabrication procedure as well as the QA/QC procedures beyond that specifically required in the Contract Documents.

Responding to the Department's request, the Board has limited its recommendation to the specific CWRs noted in NOPCs #20 and #23. However, the Board encourages the parties to give full consideration to the Findings and Conclusions above in reaching a final resolution of all the CWR issues.

Respectfully submitted,

Warren M. Bullock	Frederick Graebe	Richard A. Lewis
DRB Member	DRB Member	DRB Member

Dated: June 10, 2007.

DISPUTE REVIEW BOARD

State of California – Department of Transportation

Contract Number 04-012024 – East Span Skyway Project

Dispute No. 12 – Notice of Potential Claim #25 – Critical Weld Repair Requests

Hearing Date: May 3, 2007

Hearing Attendees:	Caltrans Representatives:	Peter Siegenthaler
		Douglas Coe
		Patrick Lowry
		Patrick Treacy
		Don Ross
		Kannu Balan
		Shewit Semere
	Contractor Representatives:	
		Paul Giroux-KFM
		Steve Harder-USI
		Brad Young-USI
		Mark Nastari-USI
		Gary McCabe-USI
		Ken Esteb-USI
		Chris Amonson-USI

BACKGROUND

The East Span Skyway Project consists of two superstructures (Eastbound and Westbound) consisting of 452 precast concrete girder segments and steel orthotropic box girders (OBG's) for the transition spans. The transition spans connect the concrete girders of the Skyway to the Self Anchoring Suspension Bridge project. There are two OBG's each approximately 60 meters in length, fabricated by the Subcontractor (USI) in Vancouver, WA, and transported to the jobsite by barge.

The California Department of Transportation (hereinafter referred to as the "State", "Department", "Engineer" or "Caltrans") awarded the contract for the East Span Skyway Project (Contract No. 04-012024) to Kiewit/FCI/Manson, JV, (hereinafter referred to as "KFM", or "Contractor") on January 17, 2002. KFM awarded a Material Contract for the fabrication of the OBG transition spans to Universal Structural, Inc. (USI) on July 30, 2002.

DESCRIPTION OF DISPUTE

This dispute is about the type of weld repairs that must be submitted to the Engineer for review and approval before the repairs can be made. Particularly in question is

whether or not the Contractor can repair defects located in excess of 65% of the weld depth in non-Fracture Critical Member (FCM) welds. The Special Provisions and AWS code both contain information relative to this dispute. This dispute relates to all the work including the closed ribs segment assembly and girder assembly.

The dispute is based on the different interpretations of USI and the State as to when critical weld repair (CWR) submittals to the Engineer for prior approval were required. The Special Provisions section 8-3.01, Welding Quality Control, paragraph G (Revised Page #77) states:

> "G. Standard procedures for performing noncritical repair welds. Noncritical repairs welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, overlap or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size."

USI interpreted this provision to be a restatement of AWS D1.5 Section 12.17.2 and believed it only applied to weld repairs that were noncritical on FCM's. Apparently, the State's interpretation was that this provision was a stand alone definition of all noncritical weld repairs and was applicable for all members of the orthotropic box girders, whether FCM or not.

The Engineer also referenced the following paragraph in Section 8-3.01 of the Special Provisions (Revised Page #78):

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

In the summer of 2003, prior to the start of work, USI prepared and submitted its WQCP. USI prepared the WQCP to encompass as many repair situations it anticipated were possible to allow weld repairs to proceed without additional approval of the Engineer. Work Procedure 9.0.1 Rev. 4 was approved by the State in State Ltr 2346 on August 13, 2003, prior to the start of work.

The approved repair procedure classified repairs as falling into one of three categories or classifications. USI's Welding Quality Control Plan (WQCP) includes provisions for repairs to nonfracture critical members and fracture critical members as follows:

> "1.0 SCOPE
>
> 1.0 This procedure covers the repair of both welds metal and base material. Repairs are classified as:

1.1.1 Nonfracture Critical
1.1.2 Noncritical Status on fracture critical members (FCM)
1.1.3 Critical Status on fracture critical members (FCM)"

The approved work procedure also includes the following in paragraph 2.0, Defect Removal:

"Please Note: Depending on the classification or status of the type of repair, Non FCM, Noncritical FCM or Critical FCM, the amount of weld metal that may be removed and the reporting requirements to the engineer vary. Please Note: **All second repairs to the same area, regardless of status, require engineer approval.**

2.1 Unacceptable portions of weld metal or base metal may be removed by grinding, or carbon-arc cutting, followed by grinding to bright metal.

2.2 Unacceptable portions of welds shall be removed without substantial removal of base material. (For nonfracture critical welds, refer to AWS D1.5 for extent of excavation allowed. Nonfracture critical welds may follow the guidelines for noncritical status repairs.)"

Section 3.0, Classification - Nonfracture Critical and Noncritical Status Fracture Critical.

"3.1 – The following conditions are pre-approved, without specific case-by-case approval from the engineer. Repair may proceed as soon as the QA inspector has verified that the discontinuity does not exceed the limits listed below and that there is an appropriate WPS that has previously been approved for the project.

3.1.1 – Welds to deposit additional metal to make up for insufficient weld size, and/or to fill limited excavations to remove unacceptable edge or surface discontinuities, rollover or undercut."

As the weld repair request process was implemented in May and June 2004, the difference between USI's understanding of the contract and the State's enforcement of the specifications surfaced. This was discussed in the meeting of June 14, 2004. However, the State's assertion of its concerns in both the approval and "not approved" (rejection) letters for the various submitted CWRs clouded the issue until September 7, 2004. Over several months USI undertook steps to get relief from the burdensome CWR process. This effort culminated in the June 2005 partnering meeting which focused on improving the CWR process as well as the communication process between the State and USI. In a follow up meeting USI made formal proposals to streamline the process but these were not accepted by the State.

Over a three month period, from March to May 2004, USI and the State worked on the refinement of the CWR process. USI submitted several repair requests in the NCR format and the State reviewed them. There were indications that the State representative

and USI found the requests acceptable but the Engineer wanted an alternate format. Early in May, the CWR form was developed and USI converted its NCRs to CWRs.

CWRs were discussed at the June 14, 2004 meeting at which time the State made it clear, in effect, that repairs to all members would be treated as FCMs and would require Engineer prior approval in accordance with the FCM protocol.

At this time USI submitted 19 additional CWRs, most related to Hinge Pipe Beam Diaphragms (HPBDs). The State's response to each was that it was "concerned" about metal fatigue issues and dimensional tolerances and then it rejected HPBD pa 57 pa 84. USI objected to the State's concerns and rejection, indicating the contract provisions were silent about fatigue issues and claimed that it was in compliance with the contract's dimensional tolerance requirements. The State responded to USI's letter in late July. The State held its interpretation of the contract and stated it would continue to express concerns about metal fatigue and dimensional tolerances.

On September 7, 2004 USI wrote LTRS 35 and 36 discussing various problems including its concern with the critical weld repair requirements and maintaining that the contract was ambiguous with respect to weld repairs and especially weld repairs on non FCMs.

In June 2005, USI made three formal suggestions to streamline the CWR process and reiterated its disagreement with the State's interpretation of the CWR requirement. On June 17, 2005, USI LTR 147, using USI's interpretation of Special Provisions and AWS D1.5, noted that the numbers of CWRs could be reduced significantly. On June 22, 2005, USI LTR 148, USI requested Caltrans have an on site representative to approve CWRs, to speed up the approval process and allow USI to respond separately to Caltran's concerns, questions and statistics in parallel with the actual repairs. On June 23, 2005, USI LTR 150, USI requested to perform excavations of weld defects concurrent with the formal CWR approval process.

The State responded on June 29, 2005, State LTR 8163, reaffirming its position that no remedial work was to begin until the repair procedures were approved in writing by the Engineer. The State further corresponded on August 11, 2005 as State LTR 8452 regarding critical weld repair approvals, stating it was satisfied with the current procedures. USI, on August 19, 2005, USI LTR 178 responded to State's LTR 8163 with regard to the nonfracture critical weld repairs and the apparent difference in understanding by the State and USI of the contract provisions, and requested a contract change order for additional costs and time.. On September 21, 2005, USI LTR 186 responded to the State LTR 8452 requesting that the current process required by the State be modified to allow USI to proceed with repairs while the State's concerns, questions and statistics were answered separately. The Board found no State response to this letter. On October 18, 2005, in State LTR 9006, the Engineer denied USI's request of August 19, 2005 for a contract change order regarding the approval of weld repairs. On November 1, 2005, USI submitted NOPC 25 on the basis of Caltrans' insistence that USI submit CWR requests for approval for non-fracture critical welds with defects exceeding 65% of the depth of the weld. On November 30, 2005, the Engineer responded in State LTR 9222 and rejected this NOPC, among others, as having no merit.
The matter was referred to the DRB on December 15, 2005.

CONTRACTOR'S POSITION

USI understands that the State held a very broad view of the definition of "noncritical repair welds", considered that it applies to all welds other than critical welds and notes it cites a portion of the Special Provisions from Revised Page #77 in support of that position. USI reads that same specification in light of industry, AWS and AASHTO terminology as applying only to welds in Fracture Critical Members.

The contract special provisions have defined repairs for non-fracture critical items and members as being per AWS D1.5 section 3.7 with the sole addition that second time repairs (re-repairs) require the Engineer's approval.

Special provisions – Page #252, paragraph F. (under "Design Details") states:

> "Weld repairs – In addition to the provisions in AWS D1.5, Section 3.7.4 re-repairs of welds or base metal shall require prior approval of the Engineer. Repairs to Fracture Critical Members shall be as specified in AWS D1.5, "AASHTO/AWS Fracture Control Plan (FCP) for Nonredundant Member, Section 12.17."

The contract special provisions have <u>not</u> redefined the noncritical status repair classification. This term has a precise meaning to the industry, AWS and AASHTO. It refers to conditions that require repair on Fracture Critical Members that are considered routine, to be expected conditions that will be encountered in normal fabrication. The Fracture Control Plan recognizes that there is a need to repair typical, expected discontinuities and makes provisions for the Fabricator to have pre-approval to repair specific defects and discontinuities at present severity limits.

The commentary to the current edition of AWS D1.5, for paragraph 12.17.2 of the Fracture Control Plan states the following:

> C12.17.2 Noncritical Repair Welds. There are two classifications for repairs: Noncritical and critical repairs. Noncritical repairs shall be as described in this subsection and are usually of limited difficulty: increasing weld size for undersize welds, removing minor edge gouges, excavations less than 65% of the weld size in depth, repairing undercut, and base metal surface repairs.

Compare this to the Special Provision paragraph that has been inadvertently interpreted to apply to other than fracture critical members.

> Special Provisions – Page #77, Paragraph G.
> "Standard Procedures for performing noncritical repair welds. Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, overlap or undercut. The depth of these excavations shall not exceed 65 percent of the specified weld size."

Section 3.7.4 of AWS states the following:

> *"3.7.4 Prior approval of the Engineer shall be obtained for repairs to base metal (other than those required by 3.2), repair of major or delayed*

cracks, repairs to ESW and EGW welds with internal defects, or for a revised design to compensate for deficiencies."

In this case, we are not talking about:

1) repairs to base metal
2) repairs of major or delayed cracks
3) repairs to welds made by the electroslag or electrogas welding processes
4) revised designs to compensate for repairs that cannot be made as they are inaccessible for repair
5) re-repairs to welds on nonfracture critical items.

The repair section of AWS D1.5, in section 3.7.2, allows the contractor the option of repairing a weld or completely removing and replacing the entire weld or the entire assembly except as modified by AWS D1.5 paragraph 3.7.4, which was only modified, as shown above to ask for Engineer's approval for the five points listed. Removal of the entire weld, when obviously 100% is greater than 65% was never modified for nonfracture critical welds on nonfracture critical weldments, in the Project Special Provisions.

The State's definition of noncritical repair welds is in no way distinct from the definition given in AWS D1.5. In fact, the definition, although longer in the Fracture Control Plan itself, is almost word for word. The definition given in the Special Provisions for noncritical status repairs was lifted from the Fracture Control Plan in Chapter 12 of AWS D1.5. It would not apply to nonfracture critical welds without further modification or clarification. There is nothing in the Special Provisions that would cause a bidder to believe that the definition given in the Special Provisions would apply to anything other than to the definition given by AWS D1.5.

Noncritical status is clearly delineated in the USI repair procedure as being applicable to Fracture Critical Members only. USI has defined these classifications exactly as they are defined by AWS and AASHTO. Any other meaning was not distinctly noted in the Special Provisions.

The definition of noncritical status given in the Special Provisions refers to fracture critical members and should not be applied to nonfracture critical members. It is a misapplication of the Code to apply this terminology or rules to nonfracture critical items. AWS has subsequently had to clarify the application of fracture critical rules to nonfracture critical applications. They state that the fracture control plan is not to be used indiscriminately by designers as a crutch "to be safe" and to circumvent good engineering practice. Fracture critical classification is not intended for "important" welds. Fracture critical status is for nonredundent tension bridge members that, should they fail, would cause a catastrophic collapse of the bridge.

The State cites a paragraph on Revised Page #78 that states:

"Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs or any other type of repairs not submitted in the WQCP are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No

remedial work shall begin until the repair procedures are approved in writing by the Engineer."

The State then goes on to cite portions of the USI Welding Quality Control Plan (WQCP). What the State missed in USI's repair procedure is that we also made provision for the "other type of repairs", namely nonfracture critical member repairs, being treated strictly as nonfracture critical – noncritical status repairs.

In the work procedure number 9.0.1 titled "Weld Repair Control Repair Preapproval", USI obtained prior approval to repair nonfracture critical welds without additional notification of the Engineer for all of the discontinuities that the Fracture Control Plan lists for noncritical status repairs of fracture critical welds. We additionally stated that for nonfracture critical welds, to refer to AWS D1.5 for the extent of excavation allowed. Please note, the excavation allowed is 100%. Our work procedure makes provision for applying rules for the repair of noncritical status fracture critical welds to nonfracture critical welds.

The USI approved work procedure states the following in paragraph 2.0, *Defect Removal*:

"Please Note: Depending on the classification or status of the type of repair, Non FCM, Noncritical FCM or Critical FCM, the amount of weld metal that may be removed and the reporting requirements to the engineer vary. Please Note: **All second repairs to the same area, regardless of status, require engineer approval.** (emphasis added).

2.1 Unacceptable portions of weld metal or base metal may be removed by grinding, or carbon-arc cutting, followed by grinding to bright metal.

2.2 Unacceptable portions of welds shall be removed without substantial removal of base material. (**For nonfracture critical welds, refer to AWS D1.5 for extent of excavation allowed.** (emphasis added). Nonfracture critical welds may follow the guidelines for noncritical status repairs.)"

Our approved repair procedure classified repairs as falling into one of three discrete categories or classifications. Our procedure status:

"1.0 SCOPE

1.0 This procedure covers the repair of both welds metal and base material. Repairs are classified as:

1.1.1 Nonfracture Critical

1.1.2 Noncritical Status on fracture critical members (FCM)

1.1.3 Critical Status on fracture critical members (FCM)"

The first bold print above applies to second time repairs. Even though this Special Provision is taken from the AWS Chapter 12 Fracture Control Plan, we included this in the WQCP for nonfracture critical welds since the Special Provisions very clearly added this to the rules given in AWS D1.5, section 3.7.4 that apply to the repair of nonfracture critical welds.

The second bold print in our approved repair procedure states: "**For nonfracture critical welds, refer to AWS D1.5 for extent of excavation allowed.**" The repair

section of AWS D.1.5, in Section 3.7.2, allows the contractor the option of repairing a weld or completely removing and replacing the entire weld or the entire assembly except as modified by AWS D1.5 paragraph 3.7.4. Section 3.7.4 of AWS states the following:

> "3.7.4 Prior approval of the Engineer shall be obtained for repairs to base metal (other than those required by 3.2), repair of major or delayed cracks, repairs to ESW and EGW welds with internal defects, or for a revised design to compensate for deficiencies."

In the case of repairs to nonfracture critical members when the excavation is more than 65% of the specified weld size, we are not talking about the items listen in 3.7.4 and thus prior approval is not required.

For nonfracture critical welds, the 65% limit on the depth of excavations has been wrongfully imposed. Record keeping was not part of the code or Special Provision requirements. For noncritical status repairs, record keeping was not part of the code or Special Provision requirements.

By imposing notification and the requirement for critical weld repair reports on items that should not, by AWS D1.5 standards the State is imposing critical status fracture critical weld requirements on items that should not be subjected to these types of controls.

As to the portion of our repair procedure that references nonfracture critical welds grouped along with noncritical status repairs, the USI procedure did make the provision to take care of nonfracture critical repairs using the same regulations as those for noncritical status fracture critical member repair. However, USI's procedure stated this as follows: "Nonfracture critical welds may follow the guidelines for noncritical status repairs". USI provided itself with this choice for two specific reasons only, to weld repair, as a preapproved condition, occasional nicks and gouges in thermally cut plate edges or nonfracture critical members at a 10 mm depth limitation, and to include base material repairs to ASTM A6.

Any depth notch or gouge on the cut edge of a nonfracture critical member would otherwise require the Engineer's approval to restore by welding. This approval to weld, from the Engineer, would have been required on a case-by-case basis. Except for these repair conditions, USI would not have a reason to invoke the critical status repair regulations for nonfracture critical items.

It is apparent that the Contract Special Provisions are subject to two interpretations, that the specifications are ambiguous and that the Contract is defective. When specifications are ambiguous, the responsibility for the ambiguity is with the party that drafted the specification. In this case USI has incurred substantial additional cost and the project completion has been delayed by the State's enforcement of its interpretation. USI has suffered additional cost and delays as a consequence of the State's administrator according to its interpretation of the specifications. USI hereby requests a change order for its additional costs and time under the provision of Standard Specification Section 4-1.03, Changes, and 5-1.04 Coordination and Interpretation of Plans, Standard Specifications and Special Provisions.

Even though the State contends that the timing of USI's claim notice prejudiced its opportunity to act on the problem, their contention is without basis. The State did not change its administration regarding these matters, and in fact, by letter SL 8163 notified USI that USI's interpretation was incorrect. The State continued with the enforcement of its interpretation for another 624 submittals.

DEPARTMENT'S POSITION

Section 8-3.01 Welding (Revised Page #78) of the Special Provisions states:

> "Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer."

The above quoted paragraph clearly requires the written approval of the Engineer for weld repairs with only two exceptions.

One except is for noncritical weld repairs. This term is specifically defined by Special Provisions (Revised Page #77) as follows.

> "Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, overlap or undercut."

The only other exception is for repairs addressed by the Welding Quality Control Plan (WQCP). Section 3.1 lists repairs that may proceed without specific case by case approval of the Engineer and includes the following statement.

> "For non-critical status repair welds, the first-time excavation and repair from one side of groove welds and fillet welds which contain unacceptable porosity, slag, and fusion defects (cracks are specifically excluded here) provided that he excavations do not exceed the following length limits of 65% of weld size (depth), shown on the drawing." (The following table of lengths is omitted for brevity)

This exception was written and proposed by the Contractor and approved by the Engineer for incorporation into the WQCP.

All repairs outside the specific exceptions noted above are subject to the Engineer's approval. This includes "non-critical" or critical weld repairs. The Special Provisions do not differentiate between whether the repair is on fracture critical material or non-fracture critical material.

1. <u>The Contractor's interpretation of the Special Provisions is not reasonable</u>. The fundamental premise behind USI's argument is that there is a "similarity of the words in the Special Provisions and the AWS code" (KFM-LET-1276, dated 6/21/05, Exhibit C.1). USI contends that this similarity allows them to discount the other language in Section 8-3.01 of the Special Provisions and rely solely on the language in AWS D1.5. The Department disagrees.

The use of similar language by the Department in Section 8-3.01 of the Special provisions and Section 12 of AWS D1.5 was intentional. The Department incorporated

the similar language into Section 8-3.01 of the Special Provisions to apply to all weld repairs, whether the material is classified as fracture critical or not.

2. USI changed its interpretation of the Special Provisions after it began experiencing problems related to its poor workmanship and weld quality. The Contractor's interpretation of the Special Provisions at bid time was documented in USI Work Procedure 9.0.1, dated April 14, 2003 (Exhibit C.2). USI then complied with this procedure for 19 months and submitted 607 requests to obtain Engineer approval for non-noncritical weld repairs. A review of KFM-LET-1276 indicates that USI did not develop this new interpretation of the Special Provisions until after meeting with the Department on June 14, 2005. During this meeting, the Department reiterated its requests to USI to work on eliminating the number of weld repairs on the job. As opposed to working with their shop personnel on the shop floor to improve their weld quality and workmanship, USI reviewed the Special Provisions and invented a new interpretation of the Special Provisions.

3. NOPC #25 was not timely. The Contractor submitted KFM-LET-1276 on June 21, 2005 (Exhibit C.1). This was 19 months after USI started fabrication and had already submitted 607 requests for Engineer approval of non-critical weld repairs. Section 9-1.04 of the Standard Specification states:

> "The written notice of potential claim shall be submitted to the Engineer **prior to the time that the Contractor performs the work** giving rise to the potential claim for additional compensation " (Exhibit A.2, emphasis added).

Section 8-3.01 of the Special Provisions requires that a critical weld repair be approved by the Engineer, prior to performing the repair, whether the repair is in fracture critical material or non-fracture critical material.

NOPC #25 is another example of a fabricated claim after the fact. USI understood the requirements of Section 8-3.01 of the Special Provisions **before** bid time as evidenced by their work on Richmond San Rafael. USI understood the requirements of Section 8-3.01 **at** bid time as evidenced by the fact that they did not submit a bidder inquiry. And USI understood the requirements **after bid time** when they developed, submitted, and received approval for Work Procedure 9.0.1.

The Department believes USI understands the requirements of Section 8-3.01, but due to the number of weld defects and unsuccessful repair attempts resulting from USI's poor workmanship, had to look for creative ways to interpret the Special Provisions and blame someone else for their own workmanship and quality.

DRB FINDINGS

The relevant Contract specifications and AWS D1.5 provisions

Special Provisions 8-3.01 (Revised Page #73)

> "Requirements of the AWS welding codes shall apply unless specified otherwise in the Standard Specifications, on the plans, or in these special provisions."

SPS 8-3.01 WELDING, Welding Quality Control, (Revised Page #76) includes the following:

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

SPS 8-3.01 WELDING, Welding Quality Control, (Revised Pages #76 and #77) contains a list of items to be included in the WQCP. Item G (Revised Page #77) is relevant to this dispute.

> "G. Standard procedures for performing noncritical welds. Noncritical repair welds are defined as welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations that were performed to remove unacceptable edge or surface discontinuities, overlap or undercut. The depth of these excavations shall not exceed 65% of the specified weld size."

More information is provided in the Special Provisions on Revised Page #78.

> "Except for noncritical weld repairs, the Engineer shall be notified immediately in writing when welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP are discovered and also of the proposed repair procedures to correct them. The Engineer shall have 5 working days to review these procedures. No remedial work shall begin until the repair procedures are approved in writing by the Engineer."

Special Provisions 10-1.44 (Revised Page #252)

> "Steel fabrication shall conform to the requirements of AWS D1.5, except FCMs shall be fabricated to Chapter 12 of the AWS D1.5 "AASHTO/AWS Fracture Control Plan (FCP) for Nonredundant Members," except as modified in these special provisions."

Special Provisions Section 10-1.44, STEEL STRUCTURES, SHOP WELDING, Design Details, Paragraph F (Revised Page #252) direct the reader to AWS D1.5 Code:

> "Weld repairs – In addition to the provisions in AWS D1.5, Section 3.7.4, re-repairs of welds or base metal shall require prior approval of the Engineer. Repairs to Fracture Critical Members shall be specified in AWS D1.5, "AASHTO/AWS Fracture Control Plan (FCP) for Nonredundent Member," Section 12.17."

The Special Provisions here add re-repairs to the requirements noted in AWS D1.5 Section 3.7.4, as a condition for Engineer pre approval of weld repairs on Non-FCMs.

The Special Provisions confirm the applicability of the Fracture Critical Members (FCM) and the Fracture Control Plan (FCP) per AWS D1.5 Code Section 12 Item G (Revised Page #77) as quoted above appears to be an abbreviation of AWS D1.5 Section 12.17.2. Furthermore, there is nothing in the Special Provisions to indicate that Paragraph G replaces, supercedes or changes any AWS provisions.

The Special Provisions refer to two distinct AWS Code Sections, namely, Sections 3.7.4 and 12.17:

AWS D1.5 Section 3.7.4 states as follows:

> "3.7.4 Prior approval of the Engineer shall be obtained for repairs to base metal (other than those required by 3.2), repair of major or delayed cracks, repairs to ESW and EGW welds with internal defects, or for a revised design to compensate for deficiencies."

AWS D1.5 Chapter 12, Fracture Control Plan (FCP) is specifically for Fracture Critical Members. AWS D1.5, Section 12 is AASHTO/AWS Fracture Control Plan (FCP) for Nonredundant Members. Section 12.1 includes the following:

> "All steel bridge members and member components designated on the plans or elsewhere in the contract documents as fracture critical shall be subject to the additional provisions of this section."

AWS D1.5 Section 12.17, Repair Welding, states as follows:

> "Repair welding is defined as any welding, including removal of weld or base metal in preparation for welding, necessary to correct unacceptable discontinuities in materials or workmanship. Welded repairs shall be categorized as noncritical (see 12.17.2) or critical (see 12.17.3), with separate requirements for each."

Although there is a similarity in language between AWS D1.5, 12.17.2 and Special Provision 8-3.01, Para G, the Department's position is that this Special Provision does not differentiate between FCM and non-FCM, that the Special Provision supercedes AWS D1.5 and that any weld repair other than noncritical is a critical weld repair requiring the Engineer's approval. The Board does not agree with the State's position that this provision provides that all weld repairs are either critical or noncritical or that it supercedes AWS D1.5.

Special Provisions Section 8-3.01 excludes noncritical repair welds from requiring prior approval before repairing. Further AWS D1.5, Section 12.17.1 confirms noncritical repairs for FCMs may be pre-approved per 12.17.2.

AWS D1.5 Section 12.17.2 Noncritical Repair Welds states as follows:

> "Noncritical repair welds are generally welds to deposit additional weld beads or layers to compensate for insufficient weld size and to fill limited excavations to remove unacceptable edge or surface discontinuities, rollover or undercut, including:
>
> (1) Gouges in cut edges that are 10mm (3/8 in.) deep, or less.
>
> (2) Laminar discontinuities less than 25mm (1 in.) deep, or with a depth less than one-half the thickness of the cut edge, whichever isles, provided the discontinuity is not within 300 mm (12 in.) of a butt joint loaded in tension. Repair shall be made by excavating from the cut edge.
>
> (3) Repair of base-metal surfaces as provided in AASHTO M160/M160M (ASTM A 6/A 6M).

(4) First-time excavation and repair from one side of groove welds and fillet welds which contain unacceptable porosity, slag and fusion discontinuities, provided the excavations do not exceed the following limits:
(Note: Table given for length of excavation per length of weld omitted for brevity)
The depth of groove weld excavation shall not exceed 65 percent of the weld size shown on the drawings.
(5) Repairs to cracks confined to root passes discovered and corrected before depositing subsequent weld passes.
(6) Repairs to ends of members where there is no dead load or live load stress.
(7) Deposition of weld metal up to 10mm (3/8 in.) deep, or ¼ the base-metal thickness, whichever is less, to correct for length or joint geometry.
(8) Except as required by 12.15, PWHT shall not be required, unless the excavation is greater than 12mm (1/2 in.) deep."

AWS D1.5 Section 12.17.3 Critical Weld Repairs states as follows:
"Except as provided in 12.17.2, all welded repairs shall be considered critical. They include, but are not limited to the following:
(1) Repair of gouges in cut edges greater than 10 mm (3/8 in.) deep.
(2) Repair of laminar discontinuities, except as provided in 12.17.2(2). Repair may be made from the cut edge, or from a surface, as approved by the Engineer.
(3) Repair of surface or internal discontinuities in rolled, forged, and cast products not covered by 12.17.2(3).
(4) Repair of cracks in base metal and welds including lamellar tears except as provided in 12.17.2(5).
(5) Corrections requiring weld removal and rewelding except as provided in 12.17.2(4).
(6) All welding to correct errors in fabrication such as improper cutting, punching, drilling, machining, assembly, etc."

AWS D1.5 Section 12 clearly defines critical and noncritical weld repair classifications as pertaining only to FCM. Therefore, based on the content of the Special Provisions and AWS D1.5 Section 3.7.4 and 12.17 the following weld repairs are subject to prior approval by the Engineer before repair is performed.

* Welding problems, deficiencies, base metal repairs, or any other type of repairs not submitted in the WQCP (Section 8-3.01, Page #78)
* Repairs to base metal (other than those required by 3.2), (AWS D1.5, Section 3.7.4)
* Repair of major or delayed cracks. (AWS D1.5, Section 3.7.4)

* Re-repairs of welds or base metal. (Section 10-1.44, Revised Page #252)
* Repairs to ESW and EGW welds with internal defects. (AWS D1.5, Section 3.7.4)
* Repairs for a revised design to compensate for deficiencies. (AWS D1.5, Section 3.7.4)
* FCM Critical Repairs. (AWS D1.5 Section 12.17.3)

AWS D1.5 Section 3.7.2 (for non-FCM) does not require the Engineer's approval for repairs. It allows the complete removal of indications (to a depth of 100%) without the Engineer's approval. Section 3.7.2 states as follows:

> "3.7.2. The contractor has the option of either repairing an unacceptable weld, or removing and replacing the entire weld or the entire assembly, except as modified by 3.7.4. The repaired or replaced weld shall be reinspected by the method originally used, and the same technique and quality acceptance criteria shall be applied. If the contractor elects to repair the weld, it shall be corrected as follows."
>
> Sections 3.7.2.1 through 3.7.2.4 then describe the work to repair the following situations."
>
> 1. Overlap or excessive convexity.
> 2. Excessive concavity of weld or crater, undersize welds, undercutting.
> 3. Excessive weld porosity, excessive slag inclusions, incomplete fusion.
> 4. Cracks in weld or base metal.

An essential part of this dispute is whether or not defects appearing beyond the 65% depth of weld had to be submitted to the Engineer for approval. The State citing the Special Provisions on Revised Pages #77 and #78 maintained that all repairs deeper than 65% of the weld size had to be submitted to the Engineer for approval. The Board has concluded that nothing in the Special Provisions alerts a bidder that weld repairs for non-FCM will require prior approval by the Engineer beyond what is required in AWS D1.5, Section 3.7.4, except for re-repairs. This is confirmed in Section 10-1.44, paragraph F (Revised Page #252) wherein the State has modified Section 3.7.4 by adding second time repairs, but leads bidders to believe that the remainder of Section 3.7 is still applicable and unchanged. The Special Provisions did not add the 65% depth of weld excavation limitation to AWS D1.5 Section 3.7.

While the Board has not based its findings on such comparison, the SFOBB, SAS, Contract #04-0120F4, Special provisions in Section 10-1.59, Steel Structures, when compared to Section 10-1.44, Steel Structures, of the Special Provisions for this Contract confirm that the subsequent contract does provide significantly more clarity as well as changes the intent of the Department with regard to prior approvals by the Engineer before certain weld repairs are to be performed. The SAS provisions clearly identify which weld repairs will require prior approval by the Engineer. When notice to the

Engineer is required prior to performing weld repair the SAS specifications indicate the Contractor will provide:

> "...the proposed repair procedures to correct them. For requests to perform repairs, the Contractor shall include an engineering evaluation of the proposed repair. The engineering evaluation, at a minimum, shall include what is causing the defects, why the repairs will not degrade the material properties, and what steps are being taken to prevent similar defects from happening again in the future."

While USI was frequently required by the Engineer to provide such information in its CWR requests on this Contract, no such appropriate warning of this requirement was provided in this Contract's specifications. Also, it appears the SAS specifications do not have any additional special limitations for the depth of defect that can be excavated in a weld repair.

The Special Provisions do not redefine all weld repairs as "non-critical" or "critical." The Special Provisions are written within the context of the industry's understanding of AWS D1.5. The Special Provisions, on both Sections 8-3 Welding and 10-1.44 Steel Structures, makes clear reference to application of AWS D1.5 Code Section 12.17 in reference to FCM. Special Provisions Section 10-1.44 adds approval requirements for Non-FCM under AWS Section 3.7.4. The Contract does not redefine non-FCM weld repairs to follow FCM requirements. The Contract clearly amends 3.7.4 to add re-repairs but does not add a 65% limitation. In fact, the Special Provisions do not change or delete AWS Section 3.7.2 which applies to all welds for non-FCM (except those noted in 3.7.4) and allows the complete removal of a weld without the Engineer's approval.

It is clear that AWS D1.5, Section 3.7, deals with weld repairs for nonfracture critical members. The terms "critical" and "non-critical" are not found anywhere in Subsection 3.7.

AWS D1.5, Section 12, specifically applies to fracture critical nonredundant members or fracture critical members (see Section 12.1). The critical and non-critical terms are defined in Section 12.17, Repair Welding, as follows:

> "Weld repairs shall be categorized as non-critical (see 12.17.2) or critical (see 12.17.3) with separate requirements for each."

The USI approved Welding Quality Control Plan (WQCP) supports and is consistent with its position on this dispute. USI begins its Weld Repair Control procedure by identifying under "Scope" three different classifications of weld repair as follows:

1.1.1 Nonfracture Critical
1.1.2 Noncritical Status, on fracture critical members (FCM)
1.1.3 Critical Status, on fracture critical members (FCM)

Under "2.0, Defect Removal " USI's plan stated in part:

"Please Note: Depending on the classification or status of the type of repair, Non FCM, Noncritical FCM or Critical FCM, the amount of weld metal that may be removed and the reporting requirements to the Engineer vary." Further, under 2.2 it states: "(For nonfracture critical welds, refer to AWS D1.5 for the extent of excavation allowed. Nonfracture critical welds may follow the guideline for noncritical status repairs)."

Thus the Contractor has retained the option to follow either procedure, but clearly retains the right to perform weld repairs under AWS D1.5, Section 3.7.2, where applicable. Also, as required by the Special Provisions Section 8-3.01, the WQCP included standard procedures for performing noncritical status weld repairs on FCMs in order that these could be pre-approved. The WQCP clearly confirms USI's intent for nonfracture critical weld repairs to be excavated to the extent allowed in AWS D1.5, as a pre-approved procedure.

USI's letter (#178) of August 19, 2005, clearly explains its intent in its WQCP pointing out the same clauses noted above. It is difficult to believe there were no other discussions between the parties on this issue. Notwithstanding, the Department administered USI's WQCP based on its own interpretation of that document.

No pre-bid inquiry was made by USI, KFM or any other bidder regarding the issues raised in this claim. USI understood the requirements of the contract provisions including AWS D1.5, was an experienced bridge fabricator having staff experienced and competent in the performance of Caltrans' projects. As no patent ambiguity existed and USI's interpretation of the intent of the specifications was reasonable and consistent with its past fabrication experience on Caltrans projects, a pre-bid inquiry on the issues that have surfaced in this dispute was not warranted.

NOTICE

The State alleges that it has been prejudiced by the timing of the filing of NOPC 25. USI's concern with the Engineer's insistence on requiring CWRs for weld repairs in accordance with the requirements of Section 12 of AWS D1.5 was discussed with the Department's representatives at the June 14, 2004 meeting. USI's letters numbers 35 and 36 of September 7, 2004 further discuss this requirement, among other things, and notes the Contract is ambiguous in this regard. One letter requests a CCO if the State possesses an "acceptable amount of repair" criteria that should have been included in the contract provisions.

By June 2005 the CWR issue and the Engineer's interpretation of the Contract had become a substantial impediment to the completion of the work. This was discussed at the June 15, 2005 Partnering Meeting and documented as a formal protest in USI's June 17, 2005 Letter number 147.

The Engineer's letter of June 29, 2005 (SL 8163) confirms the State's interpretation of the Contract and provided direction to comply with the State's interpretation of the specifications regarding their requirement for submitting CWRs.

After the Partnering Meeting of June 15, 2005, USI provided three letters proposing ways to mitigate the impact of the CWR requirements being enforced by the Engineer. This was addressed in USI letter numbers 147, 148 and 150. The State rejected the first two suggestions. The third was accepted in principle, but after the State gutted almost all of the proposed procedures, the proposed change was of little value.

On August 19, 2005, USI's letter number 178 provided further detailed rebuttal to the State's position on the CWR issues as well as requesting a CCO. On October 26, 2005 (SL 9050), the Engineer referencing the Special Provisions (Revised Page #78) and directed, "In addition to proposing a welding procedure to repair properly excavated

defects, future requests to perform weld repairs shall identify welding problems and/or deficiencies that cause the defect and what steps and procedures are proposed to correct them in the future. Requests that do not include such information shall be subject to rejection."

USI responded to State Letter number 8452 on September 21, 2005 with USI Letter number 186. The State responded again on October 18, 2005 (SL 9006) denying USI's request for a Change Order.

NOPC #25 (12) dated November 1, 2005 was filed shortly thereafter. USI also followed through in their Letter 204 of November 3, 2005 with a very comprehensive explanation in response to State Letter 9050 accompanied with an equally comprehensive report from NPI discussing the various welding concerns of the Engineer.

When the State received USI's notice letter of June 17, 2005, which clearly identified the issue with regard to the conflicting interpretation of the Contract, USI had submitted 409 of the 1,033 first time CWR submittals. Subsequent to this claim letter, it appears the Engineer made no change in the administration of the contract with regard to its requirement for submittal of CWRs, nor did it take any significant mitigating actions to reduce the impact of these requirements on the fabrication work.

The Board notes the State had constructive notice of the issues raised in this dispute in 2004. Even with the subsequent claim notice in June of 2005, the Department did not make any changes or take any mitigating actions after receiving the notice. This provides confirmation that the State suffered no material prejudice due to the timing of the claim notice. The NOPC was filed in a timely manner after the June 2005 claim notice when taking into consideration the exchange of information and potential settlement efforts that occurred regarding this issue between the June 17, 2005 claim letter and the formal filing of the NOPC of November 1, 2005. While the Board notes the claim notice could have been more timely, the State has not provided any convincing evidence to establish it was prejudiced as a consequence. The Board also notes that the State in its various responses to the Contractor's suggestions, proposals and requests regarding this issue did not foreclose further discourse on the matter by referring the Contractor to the notice of potential claim provisions of the contract.

DRB CONCLUSION

In effect, the Engineer classified all the weld repairs to be either noncritical or critical whether on Fracture Critical Members or Nonfracture Critical Members. Consequently, the State required CWRs to be submitted on any weld repairs that required defect removal deeper than 65% of the weld size. As a consequence of the State's interpretation of the Contract specifications and apparent misreading of the intent of USI's approved WQCP, the Engineer required USI to submit first time CWR submittals that were not required by AWS D1.5 or required under the Contract specifications. The DRB finds the Contractor's interpretation for the CWR submittal requirements and which weld repairs had the 65% excavation limitation, to be reasonable and consistent with the Contract specifications and AWS D1.5.

DRB RECOMMENDATION

The DRB unanimously recommends that the Contractor be entitled to an equitable contract adjustment under the Standard Specifications, Section 4-1.03, Changes, for the reasonable costs and impact of being required to prepare, submit and respond, as a consequence of the Engineer's requiring submittal of CWRs for first time weld repairs, not required by the specifications, or AWS D1.5. This would include any costs or impact of enforcing the 65% excavation limitation on weld repairs that the Contractor should have been allowed to perform under AWS D1.5 Section 3.7, and its approved WQCP.

Respectfully submitted,

Warren M. Bullock	Frederick Graebe	Richard A. Lewis
DRB Chairman	DRB Member	DRB Member

Date: June 8, 2007

Appendices

*The following were added January 2014 for easy reference/convenience

1—Skyway CCO 230 from 2/2008

2—TBPOC Approval from 12/2007

3—NOPC 15 White paper 6/2006

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONTRACT CHANGE ORDER

Change Requested by: Engineer

CCO: 230 Suppl. No. 0 Contract No. 04 - 012024 Road 04-SF,Ala-80-13.9/14.3,0.0/1.6 FED. AID LOC.: ACIM-080-1(085)8N

To: **KIEWIT / FCI / MANSON a JV**

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. ***NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities and prices to be paid. (Segregate between additional work at contract price, agreed price and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. This last percentage shown is the net accumulated increase or decrease from the original

This Contract Change Order represents complete accord and satisfaction for Notices of Potential Claim (NOPC) Nos. 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 27, 29, filed on behalf of Universal Structural, Inc., and the outstanding Contract Change Order Nos. 88 S1, 171, 172, 187, and resolves all other outstanding issues, disruptions, and impacts, concerning the fabrication of the Orthotropic Box Girder. The Contractor agrees to waive any and all current or future claims, including but not limited to sub-contractor claims, sub-supplier claims, and surety claims, related to the above NOPCs, Change Orders, and Item 65 "Furnishing Structural Steel (Orthotropic Box Girder)".

Adjustment of Compensation at Lump Sum:

For this CCO the Contractor will be paid $19,900,000.00 in accordance with Standard Specification 4-1.03 "Changes". This agreed lump sum amount constitutes full compensation, including all markups, all direct and indirect costs. All overhead costs, and all project impacts associated with the above NOPCs, Change Orders, and Item 65 "Furnishing Structural Steel (Orthotropic Box Girder)" have been collectively resolved by way of this Contract Change Order and Contract Change Order No. 200.

Adjustment of Compensation at Agreed Lump Sum $19,900,000.00

Estimated Cost: Increase ☑ Decrease ☐ $19,900,000.00

By reason of this order the time of completion will be adjusted as follows: 0 days

Submitted by

Signature	Resident Engineer	Date
	DOUG COE, Supervising Br. Eng.	1-31-08

Approval Recommended by

Signature	Construction Manager	Date
Michael Forner	MIKE FORNER	1-31-08

Engineer Approval by

Signature	Construction Manager	Date
Michael Forner	MIKE FORNER	2/7/08

We the undersigned contractor, have given careful consideration to the change proposed and agree. If this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment therefor the prices shown above.

NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specifications as to proceeding with the ordered work and filing a written protest within the time therein specified.

Contractor Acceptance by

Signature	(Print name and title)	Date
	A. T. Skoro, Vice President	2/5/08

U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION CALIFORNIA DIVISION OFFICE

RECORD OF PRIOR APPROVAL FOR MAJOR CONTRACT CHANGE ORDERS

PROJECT NO.	CCO NO.	CONTRACT NO.	DIST-CO-RTE-PM
ACIM -080-1(085)8N	230	04-012024	04-SF,Ala-80-13.9/14.3,0.0/1.6

REQUESTED BY:	CALTRANS HQ	DATE
Jake VanEnckevort	X RE/DISTRICT	1/17/08

PROPOSED CHANGE:

This change order provides for the resolution of all NOPC's, issues, disruptions, impacts, and outstanding contract change orders associated with the fabrication of the Orthotropic Box Girders by Universal Structural, Inc. (USI), a material supplier to KFM.

REASON FOR CHANGE:

This contract change order is written in accordance with Claim Settlement Report (CSR) No.3, "USI Fabrication of Orthotropic Box Girders" dated December 18, 2007. USI has had difficulty fabricating the orthotropic box girder to meet the contract specifications for some time now and Caltrans has taken twelve Notices of Potential Claim to the DRB. The DRB ruled against Caltrans for every NOPC. This CSR resolves the issue in a negotiation to reduce the Department's exposure due to several factors. The CSR detailed several areas of exposure for Caltrans:

1. Closed rib PJP welds – difficulties related to USI's weld procedures and testing (DRB ruled Caltrans procedures were defective)
2. Administrative Issues related to critical weld repairs and heat straightening (DRB ruled some repairs were unnecessary or not required by contract and Caltrans interfered with USI's means and methods)
3. Contractor's claims of fabrication disruption (Caltrans accepts some exposure)

The DRB's rulings weaken Caltrans's position for arbitration. In addition, Caltrans has considerable exposure due to the financial insolvency of USI allegedly brought about by this contract.

The contractor is claiming $37,692,098. Caltrans has detailed approximately $25 million in exposure in CSR #3 and has proposed a settlement of $19,900,000. FHWA has determined that although a large part of this issue is the contractor's responsibility, and is not in agreement with some of the DRB findings, this settlement nevertheless results in less cost overall to the public.

TIME EXTENSIONS	ACTIVITY ON CRITICAL PATH AFFECTED BY CCO (IF TIME EXTENSION INVOLVED)
_NONE __ DAYS ___ DEFERRED	

ESTIMATE OF COST:	CCO:	METHOD OF PAYMENT
$ 19,900,000 INCREASE $__DECREASE	CONTRACT ITEM AGREED PRICE	X ADJUSTMENT OF COMPENSATION EXTRA WORK AT FORCE ACCOUNT

THE WORK COVERED BY THE PROPOSED REVISION AS DESCRIBED ABOVE IS APPROVED SUBJECT TO SUBMISSION OF SUPPORTING DOCUMENTATION INCLUDING COST EVALUATION AND JUSTIFICATION OF TIME EXTENSIONS.

OTHER CONDITIONS:

PRIOR APPROVAL TO PROCEED GRANTED BY:	DATE OF AUTHORIZATION:
Nancy E. Bobb	1/26/08

Form FHWA 7-358(c) Rev 3/93 (Copy to CT)

TELECOPY

California Department of Transportation

CONSTRUCTION DIVISION

TO: District 4 CCO Desk

Date: 2/4/2008

Contract No.: 4 - 012024

Road: SF, ALA-80-13.9/14.3, 0.0/1.6

FED. No.: ACIM-080-1(085)8N

To: SARTIPI - 04

Attention: 04 - SARWARY

HQ Direction: TO ISSUE AND APPROVE

CCO No. 230 **Sup. No.** 0 **Rev. No.** 0

Per Your Submittal Dated: 2/1/2008 **CCO Category Code:** E - R - C - D

PROVIDES COMPENSATION FOR THOSE ITEMS IDENTIFIED IN CSR NO. 3 DATED DECEMBER 18, 2007.

NOTE THIS TELECOPY APPLIES TO THE SUPPLEMENTAL NECESSARY TO PROVIDE THE FULL PAYMENT AMOUNT DUE TO CAS LIMITATIONS.

RECOMMENDED ISSUE AND APPROVE IS CONDITIONAL ON THE FOLLOWING:

1. OBTAINING THE TBPOC'S APPROVAL AUTHORITY PRIOR TO PRESENTING THIS CHANGE TO THE CONTRACTOR.

2. OBTAINING THE CONTRACTOR'S SIGNATURE ON THE AGREED PRICE/POTENTIAL CLAIM RESOLUTION CCO.

THE TOTAL COST OF THIS CHANGE IS SHOWN AS $19,900,000.00 WITH NO TIME ADJUSTMENT. NOTE THAT TIME HAS BEEN ADDRESSED IN CCO 200.

Items:	$0.00
Force Account:	$0.00
Agreed Price:	$0.00
Adj. of Comp.	$19,900,000.00
Total:	**$19,900,000.00**
Time:	**(NONE)**

ELIZABETH DOOHER,
Acting Assistant Division Chief, by:

Ken Darby
Division of Construction
1120 "N" Street, MS-44, Sacramento, CA 95814
Fax Number: (916) 654-5735
To Confirm Transmission, Call (916) 654-5259

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

CONTRACT CHANGE ORDER MEMORANDUM

TO: MICHAEL FORNER / DOUG COE, Supervising Br. Eng.

FROM: DOUG COE, Supervising Br. Eng.

FILE: E.A. 04 - 012024
CO-RTE-PM 04-SF,Ala-80-13.9/14.3,0.0/1.6
FED. NO. ACIM-080-1(085)8N

CCO# **230** SUPPLEMENT#: **0** Category Cod **ERCD**

CONTINGENCY BALANCE (Incl. this change **$2,315,352.94**

COST: **$19,900,000.00** INCREASE ☑ DECREASE ☐

HEADQUARTERS APPROVAL REQUIRED? ☑ YES ☐ NO

SUPPLEMENTAL FUNDS PROVIDED: **$0.00**

IS THIS REQUEST IN ACCORDANCE WITH ENVIRONMENTAL DOCUMENTS? ☑ YES ☐ NO

CCO DESCRIPTION:
CSR # 3, USI Settlement

PROJECT DESCRIPTION:
REPLACE SFOBB EAST SPAN

Original Contract Time:	Time Adj. This Change:	Previously Approved CCO Time Adjustments:	Percentage Time Adjusted: (including this change)	Total # of Unreconciled Deferred Time CCO(s): (including this change)
1000 Day(s)	**0** Day(s)	**424** Day(s)	**42** %	**9**

THIS CHANGE ORDER PROVIDES FOR:
the resolution of all NOPC's, issues, disruptions, impacts, and outstanding contract change orders associated with the fabrication of the Orthotropic Box Girders by Universal Structural, Inc. (USI), a material supplier to Kiewit/FCI/Manson, a JV (KFM), and any and all current or future claims, including but not limited to sub-contractor claims, sub-supplier claims, and surety claims, related to Item 65 "Furnishing Structural Steel (Orthotropic Box Girder)".

This contract change order is written in accordance with the Claim Settlement Report (CSR) No. 3, "USI Fabrication of Othotropic Box Girders" dated December 18, 2007, and approved by Richard Land, Chief Engineer, on January 23, 2008.

All field related impacts and costs associated with this Contract Change Order have been collectively resolved by way of this Contract Change Order and Contract Change Order No. 200 (CSR # 2-Global Settlement).

The CSR approves a payment of $19,900,000.00 to resolve the Issues.

The method of payment for this change order will be adjustment of compensation at agreed lump sum in the amount of $19,900.000.00. This agreed lump sum constitutes full compensation, including all markups. This CCO can be financed from the project's contingency funds. A summary of the total costs agreed on by both the Engineer and the Contractor, and the detailed cost analysis is provided in the CSR and the project records.

Ms. Nancy Bobb, FHWA Bay Bridge Project Manager, provided Prior Approval via an electronic message on January 26, 2008. A printed copy of the prior approval provided by Ms. Bobb is attached.

Ken Terpstra, SFOBB Project Manager, is in concurrence with this change. Mr. Terpstra provided concurrence by signing the CSR on January 4, 2008.

District Prior Approval was obtained by Mr. Mike Forner, SFOBB Construction Manager, by signing the CSR on January 4, 2008.

Patrick Treacy, Headquarters Construction Coordinator, provided concurrence on January 22, 2008.

Maintenance concurrence is not required as this change order does not affect maintenance facilities or operations and does not include maintenance funds.

Contract Change Order No. 200 (CSR # 2-Global Settlement) resolved all impacts to the contract time for this change order.

CONTRACT CHANGE ORDER MEMORANDUM

CONCURRED BY:			
Construction Engineer:	Mike Forner	Date	1/31/08
Bridge Engineer:	Douglas Coe DJC	Date	1/31/08
Project Engineer:		Date	
Project Manager:	Ken Terpstra	Date	1/4/08
FHWA Rep.:	Nancy Bobb	Date	1/26/08
Environmental:		Date	
Other (specify):	TPOC	Date	12/11/07
Other (specify):		Date	
District Prior Approval By:	Mike Forner	Date	1/4/08
HQ (Issue Approve) By:	Ken Darby	Date	
Resident Engineer's Signature:		Date	1-31-08

ESTIMATE OF COST

	THIS REQUEST	TOTAL TO DATE
ITEMS	$0.00	$0.00
FORCE ACCOUNT	$0.00	$0.00
AGREED PRICE	$0.00	$0.00
ADJUSTMENT	$19,900,000.00	$19,900,000.00
TOTAL	$19,900,000.00	$19,900,000.00

FEDERAL PARTICIPATION

☑ PARTICIPATING ☐ PARTICIPATING IN PART ☐ NONE
☐ NON-PARTICIPATING (MAINTENANCE) ☐ NON-PARTICIPATING

FEDERAL SEGREGATION (If more than one Funding Source or P.I.P. type)
☑ CCO FUNDED PER CONTRACT ☐ CCO FUNDED AS FOLLOWS

FEDERAL FUNDING SOURCE	PERCENT

ITEM 5: SAN FRANCISCO-OAKLAND BAY BRIDGE UPDATES

d. USI Claims Analysis: Authority to Negotiate

TOLL BRIDGE PROGRAM
OVERSIGHT COMMITTEE

Memorandum

TO: Toll Bridge Program Oversight Committee (TBPOC) **DATE:** December 6, 2007

FR: Tony Anziano, Toll Bridge Program Manager, Caltrans

RE: Agenda No. - 5d

Item- San Francisco-Oakland Bay Bridge

USI Claims Settlement, Authority to Negotiate

Recommendation:
APPROVAL

Cost:
$20,000,000 – within current budget

Schedule Impacts:
N/A

Discussion:

Universal Structures, Incorporated (USI) was a steel fabricator headquartered in Vancouver, Washington. USI performed a wide variety of steel fabrication, including steel bridge fabrication. In the early 1990s, USI fabricated the steel deck for the "Horseshoe Ramp" that connects the westbound Interstate 80 near the San Francisco-Oakland Bay Bridge Toll Plaza to I-880 southbound via the West Grand connector. This was part of the Cypress Replacement project.

USI was a subcontractor to KFM for the East Span Skyway contract and the E2-T1 contract. USI was originally subcontracted to fabricate the two-steel transition decks (the steel "tubs") at the west end of the Skyway and the footing boxes for the E2 and T1 tower foundations. USI also had plans to be involved in the SAS and was a member of the four-firm consortium, Bay Bridge Fabricators, LLC, formed to capture fabrication of the SAS deck and tower. Bay Bridge Fabricators has been at the center of the ongoing "Buy America" discussion in Congress that has focused on the SAS contract.

USI's subcontract for fabrication of the two-steel decks was in the amount of $15,596,816. USI estimated that it would require 111,400 man hours to complete the work. Work on the two-steel decks began in September 2003.

The Department's oversight at USI was limited to consultant oversight due to a moratorium on out-of-state travel imposed by the Governor Davis. This consultant oversight was provided by a materials inspection consultant.

Fabrication problems arose almost immediately, stemming from significant differences between USI and the Department in the interpretation of key welding specifications. Fabrication activities would be held up while these differences were discussed. In many cases, these disputes languished, taking up to a year to reach a Dispute Resolution Board (DRB). The number of disputes grew, the fabrication process became extremely inefficient, and USI began to become strained financially.

A total of 15 Notices of Potential Claim (NOPC) were filed by USI. Of these, 2 were withdrawn and 1 was found to be merited by the Department. The remaining 12 were submitted to the three-member DRB. The DRB ruled in favor of USI in all submitted NOPCs. 10 of the rulings were unanimous and the remaining 2 rulings were 2-1 in favor of USI. The most significant NOPC, NOPC 15 (actually only the second NOPC filed by USI), involved a dispute over the method of measuring the depth of a key weld, the rib stiffener to top deck weld. The critical nature of this weld, the time taken to resolve the dispute, and the impact of the dispute of USI's planned means and methods all combined to start a steep downhill trend in the overall fabrication effort.

USI's financial difficulties eventually led to KFM's utilization of provisions in its subcontract to assume management control over USI's operations. Fabrication of the steel deck sections was completed in August 2006, one year later than planned, under KFM management. The E2-T1 work originally placed with USI was distributed to Oregon Iron Works and Kiewit Offshore Services for completion. At this time USI is no longer a going business concern. It is not in bankruptcy, but most of its assets have been liquidated.

KFM's stated value for this claim is $38,000,000. The Department has audited USI records and has confirmed that USI actually utilized 414,915 man hours for the Skyway work, 372% above the man hours originally estimated. This very large overrun in man hours is generally consistent with the fabrication delays and problems associated with the ongoing specification disputes that occurred throughout the work. It is also generally consistent with the range of value for the claim established by the Department and BAMC.

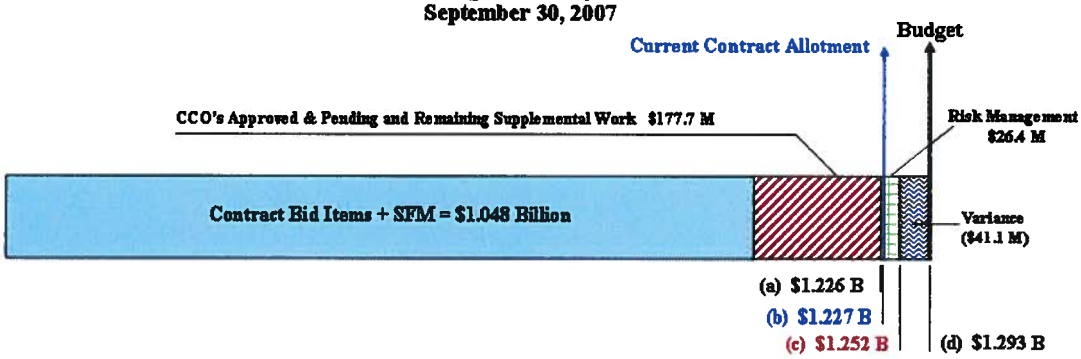
The Department's analysis of the audit results indicates that the USI claim has a value of between $14,600,000 and $23,900,000. BAMC has performed an independent estimate of

the claim and has established a range of value between $15,800,000 and $21,400,000. This claim is listed in the Risk Management Plan and the Skyway Risk Register states a range of risk between $8,000,000 and $34,000,000. A verbal analysis of exposure will be presented at the upcoming TBPOC meeting.

This claim was specifically excluded from the last major settlement of KFM Skyway claims due to the lack of a complete audit at that time.

Authority to negotiate a settlement of this claim is being requested in an amount not to exceed $20,000,000. This is within the current budget and is included in the green risk management cost in the 3rd Quarter Budget Balance Beam below.

Skyway Contract 04-012024
Budget Analysis
September 30, 2007



Contract 04-012024 Skyway
Current Contract Budget Funding Status
September 30, 2007 Basis

Contract Bid Items	$	1,043,541,000
State Furnished Materials (SFM)	$	4,276,439
Subtotal	$	1,047,817,439
Supplemental Work	$	6,565,700
Contingency At 5%	$	52,616,861
Subtotal Original Contract Allotment	$	1,107,000,000
Supplemental Budget Allocation Approved	$	119,500,000
Subtotal Current Contract Allotment	$	1,226,500,000 (b)
Remaining Unallotted Budget (Current Contract Budget - Current Contract Allotment)	$	66,500,000
Total Current Contract Budget	$	1,293,000,000 (d)
Reported Total Forecast At Completion In 2nd Quarter 2007 TBSRP Report		$1,293,000,000

Contract 04-012024 Skyway
Contract Forecast At Completion (FAC) & Variance
September 30, 2007 Basis

Contract Bid Items	$	1,043,541,000
State Furnished Materials (SFM)	$	4,276,439
Subtotal	$	1,047,817,439
Supplemental Work Remaining	$	6,026,577
CCO's		
CCO's (Approved (250) + Pending (22) = Total (272))	$	170,650,254
CCO's = or > $1 Million Pending PCC's approval CCO# 213 (1)	$	1,000,000
Subtotal	$	1,225,494,270 (a)
Risk Management	$	26,397,000
Total	$	1,251,891,270 (c)
Variance (Total - Current Budget)	$	(41,108,730)

Confidential Draft – For Deliberative Purpose Only

Attachment: N/A

RM1 and TBSRP Projects Support Bay Area Management Consultants	TASK ORDER No. 25 – NOPC 15

Task Order Title: Skyway Bridge NOPC 15 – Closed Rib Weld Measurement

Task Order Scope/Description:

- Review DRB Recommendation Letter
- Review States Position Paper
- Review USI's Position Paper
- Provide an independent interpretation of the contract requirements and standard industry practice for this detail.
- Provide Recommendations

Task Order Response - Revision History

Rev	Date (dd/mm/yy)	Author	Checker	Approver
	5/9/06	SAM/JSY /TDJ		
01	5/10/06	SAM/TCA	JSY	
02	06/07/06	SAM/TCA	JSY	
03	06/09/06	SAM		
04	06/12/06	SAM/TCA	JSY	TSH

Executive Summary

It is our view that the success of the Contractor's claim relies on their insistence that the weld in question is a combination weld i.e. a partial joint penetration weld (PJP) plus a fillet weld. Such welds are normally defined to achieve a desired overall weld profile. The PJP, depending on its volume, might be made up of a single run or multiple runs but it is understood that the fillet would either be added as a subsequent and separate activity or the end result of the completed weld. A combination weld would be called up on the drawings with two distinct symbols and the fillet weld would have a defined size that would be relative to the size of the PJP. A PJP whether produced in a single pass or multiple passes would protrude slightly from the face of the material, this protrusion or excess weld is known as weld reinforcement and within limits is acceptable and desirable, concavity/lack of fill or undercut however is not. In the case of the Skyway project, the weld reinforcement was limited to 3mm for this particular weld. The weld as defined by the State is shown on Figure 1, The weld as submitted is shown on Figure 2. The weld measurement criteria is shown on Figure 3. BAMC agrees with the contractor that the weld shown on Figure 2 meets the specified requirement and the contractor is entitled to compensation.

The State appears to have maintained throughout that the intended weld was not to be considered a combination weld. The Contract drawings define a PJP; the Contract Drawings did not specify a combination weld. RFI 54 has been quoted differently by each party but was raised and answered before shop drawings were submitted. When shop drawings were submitted they detailed a PJP with a fillet weld, the fillet weld size however was specified as only 3mm. Although the weld as detailed was a combination weld the fillet weld portion was not to be considered a structural part of the weld, 80% penetration was the relevant part of the weld. These drawings were however approved by the State. It is not clear whether the drawings were produced incorrectly with the intention of limiting weld reinforcement or with the intent of producing the weld actually defined. Regardless, as in many instances, the State did not object to the fabricator providing more weld material than required with the

understanding the end result would produce a weld with 80% penetration. Other documentation produced by the Contractor such as weld procedures, UT procedures and Fabrication Procedure all implied an understanding of the contract requirements in line with that of the State. The weld procedures, particularly the early single pass procedures, could not have produced the weld as shown on the shop drawings and it is therefore assumed that the actual weld produced was in line with the State's understanding of the contract.

The Contractor within their paper also insists that the following requirement within the special provisions is required "*All corner and T-Joint groove welds shall be reinforced with fillet welds with a size of ¼ times the thickness of the abutting members, or 10mm, whichever is less.* The top, side and bottom plates are 16mm thick and the trough units have wall thicknesses of 8mm, a quarter of these is 4mm or 2mm respectively. Although the Contractor claims that this requirement is applicable, they have not strictly complied with it. The Contractor, while quoting effective throat and weld size states that the deduction of 3mm does not apply and is not an issue in this situation, the reason for this is not given or understood. Clause 2.3.1.3 of AWS [1996] says that the effective size of a PJP is the depth of the bevel less 3mm and that for a PJP and Fillet weld combination weld it is the shortest distance from the root to the face less 3mm. If these requirements are read in conjunction with the contract specification that requires the weld size to be 80% of the thickness of the closed rib then the State's position is correct. On page 7 of 33 the contractor states that the clause is not relevant; however, the contractor does not explain why it is not relevant.

There are arguments for and against the fact that the weld in question is, or is not a combination weld. A combination weld is acceptable for this application, provided that the weld achieves 80% penetration of the rib thickness and the weld reinforcement is limited to ensure that the eccentricity is compatible with the design intent - typically in the range 0 to 3 mm. Ultimately the designer of record would determine if the weld proposed in the shop drawings is an acceptable weld. Obviously the designer had no objection adding the 3mm reinforcement with the anticipation of the fabricator providing 80% penetration.

The precedence that each of the contract documents take over one another should be considered. The consideration of documents that are not included within the contract documents (such as the 2002 AWS and the SAS contract specification) is also questionable.

Review of NOPC 15 – Closed Rib Weld Measurement

1 Dispute

The dispute is a question as to how the effective weld size of the closed rib to plate weld is to be measured. USI contends that AWS D1.5-1996, (AWS D1.5) which is a supplementary contract document, requires the reinforcing fillet weld to be included in the weld size measurement while the Department contends that the weld reinforcement is to be excluded from the weld size measurement. Basically USI wants to measure the weld including the reinforcing fillet per AWS D1.5 for a combination partial joint penetration groove weld and a fillet weld and the State wants to achieve joint penetration equal to 80% of the rib thickness and do not accept that the PJP weld is a combination weld.

USI believes that a contract adjustment is warranted based on three aspects of contract administration:

1. The Contract is ambiguous
2. The State's enforcement of it's interpretation of the Contract is a change in the character of the work
3. The Specification and Drawings inadequately describe the work as the State intended it to be performed.

2 Basis of Review

Documents received for review were as follows:

a) USI Position Paper dated 14th February 2006
b) State's Position Paper dated 15th February 2006
c) Dispute Review Board Findings & Conclusions dated April 10th 2006

Also reviewed were the:

d) Special Provisions for the Skyway Project
e) AWS D1.5: 1996
f) Selective shop drawings of the orthotropic box girder
g) USI's Welding procedures
h) USI's UT procedures
i) USI's fabrication procedures

AWS D1.5: 2002 has not been adopted within this review as the drawings and specifications were prepared to AWS D1.5: 1996. References to the 2002 issue made by USI, the State and the DRB have not therefore been commented upon.

We have not undertaken an audit of the documentation received to determine if it was complete. Furthermore we are not able to check the authenticity of the factual statements that are included in the documents that relate to the works undertaken by USI or of the actions of the State or its representatives. However, the comprehensive nature of the submissions has been adequate for the review to be undertaken.

The comments presented in this paper are based on international experience.

3 Description

The key features of the typical cross section of the OBG are the deck, soffit, wing and web plates, including the longitudinal closed ribs that strengthen the plates. The closed ribs are specified to be joined to the deck, soffit, web and wing plates by partial joint penetration (PJP) welds.

Below is a summarized description of the dispute obtained from the Dispute Review Board (DRB) Recommendation Letter.

During preparation of the shop drawings KFM (General Contractor) filed an RFI on behalf of USI (Steel Fabricator). This RFI questioned if the reinforcement was to be considered in the total effective weld size for the closed ribs.

The State responded stating that "The reinforcing fillet size is not considered in the total effective weld size for the closed ribs." It is noted that USI in section 4.1 use the term "reinforcement" in both the question posed and the answer given whereas the State quote the words "reinforcing fillet" from the same RFI. Without seeing the RFI we do not know which was actually used but the differences between the two terms should be understood. Weld reinforcement is defined on page 4 of the State's paper.

More details of the dispute and timelines of RFIs and letters are available in the DRB's Recommendation Letter. However, after reviewing the various Position Papers it appears the dispute is related to the wording in the contract documents related to weld size and penetration. In general, we agree with the State's requirements for this weld detail and we understand the fabricator's interpretation of the contract documents.

4 Review of Special Provisions

The Contractor's position paper references the Special Provisions Section 10-1.44 STEEL STRUCTURES, SHOP WELDING; General Provisions where it states that "*All corner and T-Joint groove welds shall be reinforced with fillet welds with a size of ¼ times the thickness of the abutting members, or 10mm, whichever is less*" this is indeed in the special provisions and it's applicability is debatable however does not appear to have been the subject of an RFI. The definition in AWS of a T

joint is "*A joint between two members located approximately at right angles to each other in the form of a T*". The trough stiffeners are skewed T joints and considered non standard and are only practicably welded from one side. The weld detail in question is determined by weld procedures trials which are required to be approved by the Engineer. The Contractor has quoted this as being a requirement for the trough to deck welds and thereby defined the weld as being a combination weld, the DRB have also adopted this view. The 3mm fillet weld defined on the shop drawings does not however correspond to ¼ of either the trough or the deck plate and does not therefore comply with this requirement.

The Shop Welding General Provisions (Section E) requires that "*Ribs shall be welded to the deck plate in accordance with a welding procedure that is qualified to meet penetration requirements as specified in these special provisions. The procedure shall be approved by the Engineer before it is adopted for production and shall be monitored during production .....*" It is noted that the primary requirement to achieve a specified penetration is laid down early. The next relevant section of the Specification following the General Provisions noted above is the "*Welding of Closed Ribs to Deck Plate*". Section A of which reads "*Welding of closed ribs to deck plates shall be accomplished with a welding process and procedure capable of achieving a minimum of 80% penetration of the rib thickness.*" We understand this to be the Qualified Weld Procedure referred to in the General Provisions quoted above. The Specification, (Section B), Weld Procedure Trials, goes on to say "*The Engineer will evaluate all the rib to deck plate weld details and make a selection based on the as-welded configuration of the joint. The macroetched sections of the selected welding procedure will be evaluated and given a quality status based on visual inspection (VT) and UT. The evaluation criteria for the macroetched sections shall be a minimum weld size of 80% of the rib thickness.*" Although both penetration and weld size are discussed in the Special Provisions, penetration is mentioned procedurally and weld size appears to be the evaluation criteria.

There is a degree of ambiguity within the Specification, however, with prior experience in the design, specification and supervision of projects utilising this particular detail, we are of the opinion that the intent is clear. The primary requirement to achieve a specified penetration is laid down early. This requirement is driven by fatigue issues associated with the potential for local eccentricity at such welded joints. The requirement for 80% penetration has become the internationally accepted norm and we believe is well understood by fabricators experienced in welding closed ribs to deck plates.

5 AWS D1.5 - 1996

The Contractor's main basis for the claim appears to rest on their interpretation of AWS' definition of 'Weld Size'. The definition adopted is quoted from clause 2.3.4 which relates to "*The effective weld size of a combination partial joint penetration groove weld and a fillet weld*". The State however maintains that the weld in question is a partial joint penetration groove weld and on this basis the correct definition of the effective weld size is defined within clause 2.3.1.3. Section 2 of AWS D1.5 relates to the design of welds and the term 'effective weld size' is used throughout apart from in 2.1.3 where it states that "*Contract design drawings shall specify the effective weld length and, for partial penetration groove welds, the required weld size, as defined in 2.3.*" Within Annex V of AWS D1.5, the term 'weld size' is defined for a fillet weld and for a groove weld. The definition for 'groove weld size' is "*The joint penetration of a groove weld*", the definition of 'joint penetration' is "*The distance the weld metal extends from the weld face into a joint, exclusive of reinforcement*". The drawing referenced, details a PJP but there is no call up requiring a reinforcing fillet.

Associated with the PJP is a (6) which according to table 2.5 of AWS D1.5 (Note D) refers to the minimum weld size as shown in table 2.2. The minimum effective weld size (as specified in table 2.2) is 6mm for plate less or equal to 20mm. However 2.1.3 states that the "*Contract design drawings shall specify the effective weld length and, for partial penetration groove welds, the required weld size, as defined in 2.3*" and 2.3.1.3 provides a different definition, all be it for effective weld thickness, to that within Annex V. It is further required within 2.1.3 that "*Shop or working drawings shall specify the groove angles ..and depths (S) applicable for the weld size (E) required for the welding processes and position of welding to be used.*" Such additional information would be expected to be provided by the

Contractor. There is discrepancy and ambiguity within AWS D1.5 1996, which raises questions as to the weld size specified on the Contract drawing. However, we maintain that the intent of the specification and the drawing is that a PJP shall be provided, its size has been clarified via response to RFI's as being as that defined within Annex V of D1.5.
On page 8 of the Contractor's paper the weld size (6) is stated as being the "effective weld size" but this definition appears to have been adopted from the 2002 version of AWS. It should however be noted that the drawings in question were produced in 2000 and 2001 and would therefore have been prepared in accordance with AWS D1.5:1996.

6 Review of USI's Position Paper dated 14th February 2006

The paper states that "The dispute is whether the State is measuring the closed rib size for the Orthotropic Box Girder in accordance with the Contract requirements". In the absence of any other statement to the contrary it is this statement that is taken to be the essence of the dispute. The Contractor's main basis for the claim appears to rest on their interpretation of AWS' definition of 'Weld Size'.

In the 'Background' section of the Executive Summary it is stated that the Special Provision (SP) 10-1.44 specifies "minimum weld size of 80% of the rib thickness".

The Special Provisions (SP) 10-1.44 actually states in Section A of the 'Welding of Closed Ribs to Deck Plate' on page 222 "*Welding of closed ribs to deck plates shall be accomplished with a welding process and procedure capable of achieving a minimum of 80% penetration of the rib thickness*". However, Section B on page 223 states "*The evaluation criteria for the macroetched sections shall be a minimum weld_size of 80% of the rib thickness; ..*" These requirements on first sight would appear to be contradictory. The difference between these two requirements is shown in Figures 1 and 2 of the contractor's paper. The contractor asserts that the former criterion is "a vague Special Provision" but in our international experience this is normal requirement that is well understood by fabricators experienced in the welding of closed ribs to deck plates.

Section 2 of the Contractor's paper is a detailed review of AWS D1.5 welding symbols and requirements and also highlights the requirement within 10-1.44 – Steel Structures, Shop Welding, General Provisions that "All corner and T-joint groove welds shall be reinforced with fillets welds...". The relevance and impact of the latter is subject to further debate. As noted above reliance is made on a version of AWS that was not current at the time of drafting the contract drawings nor was it referenced within the Special Provisions. The 2002 version would however have been current during weld procedure trials and production of shop drawings, the relevance of this should again be the subject of further debate. The weld in question is clearly detailed on the Contract drawings supplied as a partial joint penetration (PJP) groove weld. Reinforcing fillet welds are not detailed and are not intended. The weld is NOT a combination weld i.e. groove weld plus additional (separate) fillet weld(s). Indeed in extremis the measurement method shown in Plate 6 of the Contractor's paper could result in the replacement of a PJP by a fillet weld, which is clearly not the intention. Designers recognize that the performance of the closed rib to deck plate is critically dependent on the eccentricity of the weld with respect to the centreline of the leg of the rib. Fillet welds produce the greatest eccentricity and have been shown to have inferior fatigue performance to that of the PJP as specified. The definition of "weld size" put forward by the Contractor is specific to a combination partial joint penetration groove weld and a fillet weld (a combination weld), however as stated above, the weld in question is not a combination weld. There is therefore no basis for reference to clause 2.3.4 of AWS D1.5: 1996. Furthermore, the Contractor notes that the deduction of 3mm as required by 2.3.1.3 does not apply and is not an issue in this situation. No justification is given for this and we are unable to find reason why this is not applicable as claimed. The definition of a combination weld as taken from 2.3.4 of AWS is "*the shortest distance from the joint root to the weld face of the diagrammatic weld minus 3mm, for any groove detail requiring such deduction (see Annex I)*"

The definition of a PJP is provided within Annex V of AWS D1.5 as is that for joint penetration. Both have correctly been referenced within the State's paper. We are therefore of the opinion that the special

requirement for the evaluation criteria of weld procedure trials for microetched sections (minimum weld size of 80% of the rib thickness) should not be in question.
In our opinion the intent of the contract is clear and consistent with the requirements of international practice in orthotropic deck fabrication. It would be appropriate for the contractor to query the apparent anomaly between "penetration" and "weld size" but the response given by the State saying that the measurement should be from the face of the closed rib is the expected response and was provided in a timely manner in the shop drawing phase of the project.

Section 4 of the Contractor's paper is very surprising in describing considerable difficulty in achieving the 80% penetration which has become an international industry standard. USI indicated that they consulted persons outside of their organization in attempting to adjust their welding operations to achieve acceptable welds satisfying the State's penetration requirement. This could be interpreted as indicative of lack of knowledge regarding successful fabrication of closed ribs to steel plates for OBG's.
The Contractor, in 4.3 states that the State demanded the performance of non-specific volumetric UT testing on the closed rib to plate welds and as a result further defects were found which led in part to the rejection of the single pass procedure. We would note that the special provisions require that 15% of these welds are required to be Ultrasonically Tested (UT). It is also apparent that the additional UT was required after finding visual defects. We would consider the action taken by the State to be normal practice and in accordance with the Special Provisions which state "*Acceptance – If unacceptable discontinuities (as defined in AWS D1.5) are found in any weld not 100% nondestructively examined, the entire weld shall be examined by the same method*" The type of defects found as a result of this additional testing are not highlighted and their severity cannot therefore be commented upon.

In Section 5 the contractor produces more detailed argument in relation to the apparent contradictions in the specification between the requirements for "penetration" and "weld size" and the contention that a reinforcing fillet weld was required. We would acknowledge that there is apparent contradiction but that these were clarified by the State in a manner that is consistent with industry practice.

Item 5.2.3 refers to parts of the specification that are said to support the view that there was a requirement for the inclusion of a reinforcing fillet. The acceptance of a reinforcing fillet between 0 to 3mm is a purely practical relaxation that recognizes that a PJP will [unless ground flush after welding] have some reinforcement. By limiting this to 3mm the eccentricity of the weld is being controlled which is beneficial to the fatigue performance. The minimum size of 0 ensures that the PJP is not concave with a deficient throat thickness.

The contractor quotes three points for the basis of the claim:

- Contradiction in the contract – we would agree that the two requirements described in Sections A and B of SP 10-1.44 could appear contradictory. However, they can as easily be read as complimentary as follows: - the former requirement defining the depth of penetration required and the latter ensuring that the size of the weld throat is at least equal to 80% of the rib thickness. We would conclude that they are not contradictory.

- The measurement method ordered by the State materially altered the character of the work – we would not agree with this assertion since from our international experience the requirement for welding closed ribs to deck plates is widely understood by fabricators who are experienced with this type of work

- The Contract inadequately described the work required – we would not agree with this statement for the reasons given in the preceding two bullet points.

7 Review of State's Position Paper dated 15th February 2006

The State's position is comparatively brief but corresponds to our view of the issues raised by the Contractor's paper. Although our view is on the necessary engineering requirements to achieve the proper

PJP weld for this specific detail. The literal interpretation of the Special Provisions will probably take precedence.

The list of bridges given in the paper where penetration requirements for closed rib to deck plate welds have been specified as a percentage of plate thickness is not exhaustive and clearly demonstrates current industry practice. We have direct experience of a number of the bridges listed where we have been involved directly as designers, checkers and in construction supervision and we can confirm that the State's requirements are industry practice and are achievable by experienced fabricators.

The fabricator (USI) requested clarification of the weld size measurement and the State clarified the requirements to the fabricator in a timely manner. The clarification provided by the State is consistent with industry practice and other recent major bridges. Weld size is the depth of penetration and this is the size expected by Caltrans.

8 Review of Dispute Review Board Findings & Conclusions dated April 10th 2006

The Dispute Review Board (DRB) found in favour of USI for each of the three claims and commented as follows:

- The Contract was ambiguous
  - The DRB stated that if there was a basis to the State's interpretation of Section 10-1.44, then there were two different interpretations of the Contract and that defines an ambiguous Contract.
  - The Contractor's interpretation is reasonable and well found in the Special Provisions and AWS D1.5 Code requirements.
- The State's enforcement of it's interpretation of the Contract is a change in the character of the work
  - The State refused to recognise the merit of USI's request for a CCO.
  - The State enforced their interpretation throughout work.
  - The State's direction materially changed the work increasing the time and cost of performance.
- The Specification and Drawings inadequately described the work as the State intended it to be performed.
  - The specification and drawings for the SAS contract reflect changes to the specifications and drawings that can be directly tied to the disputes on this project

The DRB appear to have reviewed the requirements of the Special Provisions along with the definitions given within AWS D1.5 1996, AWS 3.0 2001 and AWS D1.5:2002 and concur with USI that the welds in question are combination welds. The DRB acknowledges that the 2002 version of D1.5 is not a referenced contract document but included it as it was referred to in both position papers.

The DRB accept that the Special Provisions and AWS both require corner and T-joints to have reinforcing fillet welds and that the Contractor's interpretation at the time of bid, that this weld was a combination PJP and fillet weld, was a reasonable one.

The last paragraph in the State's Position of the DRB report states that the DRB did not determine whether this weld detail is normally specified in this way. The DRB limited its review to the contract specification. However, the DRB considered the recent SAS contract and the 2002 AWS D1.5 Specifications in their decision. Regardless, the State should expect a competent fabricator to work with the RFI response, especially if there are no cost implications.

In the case of established practice and worldwide understanding of orthotropic panel fabrications for box girders or deck plates, there are numerous examples which demonstrate that the requirements of this weld detail is well understood within the industry.

The DRB also found that the State knew there was a problem existing that was unlikely to be resolved and had ample opportunity to mitigate its impact.

The DRB unanimously concluded that the Contractor's interpretation of the measurement of the weld size was reasonable and in accordance with the contract requirements.

9 Review of Shop Drawings, Fabrication, Welding and UT Procedures

Our review of the USI's documents developed to fabricate the OBG is summarized as follows:

- Contract Dwg Sheet 283, dated 18 May 2001 – this drawing shows a PJP with minimum effective weld size of 6mm and implies a groove angle of approx 45 degrees.
- Shop Dwg sheet A5G/H Rev -, dated March 2003 – This drawing relates to infill (splice) sections of the closed troughs, the weld call up for the trough to deck weld is a 6mm partial penetration weld with a 3mm reinforcing weld, the joint type reference TC-P4-S is the same as that on the weld procedure. TC being a corner joint, P4 being a PJP single bevel groove and S being submerged arc welding.
- Shop Dwg sheet A5G/H Rev I, dated Sep 2003 – A different joint type reference TC-P8-GF is shown for the same trough to deck weld (single J groove of GMAW), we do not have the associated Weld Procedure. The weld shown is a 5mm PJP J prep with a 3mm FW on top.
- Shop Dwg sheet 17B/B Rev B, dated Jun 2003 – This drawing relates to the deck panels. The trough to deck weld is detailed as a 6mm PJP with a 45 degree groove angle with a 3mm reinforcing weld. The joint type reference is the same as that on the Weld Procedure.
- Shop Dwg sheet 21A/C Rev B, dated Jun 2003 – As above.
- Shop Dwg sheet 1B/B Rev I, dated Oct 2003 – This drawing relates to the deck panels. The trough to deck weld is detailed as a 6mm PJP with a 45 degree groove angle with a 3mm reinforcing weld. The joint type reference relates to the Weld Procedure.
- Shop Dwg sheet 2B/B Rev I, dated Oct 2003 – As above.
- The quality control documentation provided implies a sound understanding of the requirements of the special provisions as intended by the State.
- Four Weld Procedure Specifications have been provided PQR-FCM-45A Rev 0 dated 23 Jul 2004, PQR-FCM-45D Rev 0 dated 23 Jul 2004, PQR-FCM-47A dated 16 Sep 2004 and PQR-FCM-47D dated 16 Sep 2004. All procedures refer to the joint type TC-P4-S (modified) with a zero root gap, 2.5mm root face and 48 degree groove angle. All are for a joint type TC-P4-S.
- The Weld Procedure Specification PQR-FCM-45A Rev 0 shows a dashed reinforcing fillet weld on top of the PJP suggesting a combination weld, the procedure however only requires a single pass with reinforcement being noted as being limited to 3mm. The limiting of weld reinforcement is analogous to the limiting or avoidance of weld concavity or lack of fill.
- Weld Procedure Specification PQR-FCM-45D shows a full lined reinforcing fillet (without size), the procedure however again only requires a single pass.
- The Weld Procedure Specification PQR-FCM-47A Rev 0 (16 Sep 04) shows a dashed reinforcing fillet weld on top of the PJP, the procedure details a two pass SAW. Reinforcement is noted as being limited to 3mm.
- The Weld Procedure Specification PQR-FCM-47D Rev 0 (16 Sep 04) shows a full lined reinforcing fillet (without size) on top of the PJP, the procedure details a two pass SAW.
- Three revisions of the UT procedure for evaluation of penetration of the trough to deck welds have been provided; Rev 000 dated 23 Oct 2003, Rev 001 dated 20 May 2004 and Rev 003 dated 14 Oct 2004. Although there is more detail in Rev 3 they are all based on the same acceptance criteria of min 80% penetration, or rather LOP no greater than 1.6mm.

In summary, despite the Contract drawings showing a PJP weld, the shop drawings, subsequent to RFI 54, show a PJP and a 3mm FW. The 3mm FW does not comply (for size) with the contractor's argued requirement to reinforce *with fillet welds with a size of ¼ times the thickness of the abutting members.* The State approved these shop drawings. It is therefore questionable whether the draftsman intended that the 3mm FW call up was included to imply weld reinforcement of the PJP of 3mm. Furthermore, weld procedures produced by USI imply that a PJP without a FW was intended

and trialed. UT and fabrication procedures produced by USI align with the State's intention and our understanding of the specification i.e. that the acceptance criteria of 80% penetration is achieved. It is only the shop drawings that detail a combination weld.

10 Principal Observations and Conclusions from Our Review of the Documents

- The Contractor believes that the Specification and Drawings inadequately describe the work as the State intended it to be performed. BAMC agrees the specification is not clear. It is our understanding that:
    - For a non standard weld detail such as this, the performance specification should provide the minimum essential information on the contract design drawings. This minimum, as clarified by AWS 2.1.3, would be the weld type, length and size. Acceptance of such a weld is given only on successful completion of weld procedure trials. As stipulated above, despite the specification being misinterpreted, we believe that the special conditions provided a satisfactory performance specification left to interpretation by AWS D1.5. The Contract drawing further did not clearly define the size of the weld.
    - AWS D1.5:1996 has slight contradictions with respect to definitions and could be misinterpreted either intentionally or unintentionally
    - The "Special Requirements" are not totally clear with respect to the acceptance criteria for the welding of orthotropic deck ribs and could in combination with the above be misinterpreted either intentionally or unintentionally.
- The State has the obligation to clarify the information presented in the contract documents through either the RFI or shop drawing review process. Once the clarification is presented the Contractor is to complete the work as requested by the State. The Contractor is obligated to notify the State if this will result in additional material, labor and time. Without this process the Contractor could potentially continue to do unacceptable work.
- The weld requirements stipulated by the State in responses to various RFIs and letters are correct and consistent with industry practice. The clarification provided by the State was done in a timely manner providing appropriate time for USI to complete the work as the State specified. If this is viewed as a change in the character of the work then USI would be entitled to the additional weld metal and labor to complete the welds, but not the delays associated with their unwillingness to accept the State's clarification and their apparent inability to complete the work.
- With international experience of the design, specification and construction supervision of projects adopting the very same weld, our review concludes the following:
    - Weld Size
        - The weld in question is clearly detailed on the Contract drawings supplied as a partial joint penetration (PJP) groove weld. Reinforcing fillet welds are not detailed on the contract drawings and are not intended. The weld is NOT a combination weld i.e. groove weld plus additional (separate) fillet weld(s).
        - The specification stipulates that "*All corner and T-Joint groove welds shall be reinforced with fillet welds with a size of ¼ times the thickness of the abutting members, or 10mm, whichever is less*". This requirement would likely be interpreted as being relevant for the weld in question. We are not aware of an RFI being raised to clarify this. Despite the Contractor's argument that this requirement is applicable they did not comply with it in so much as the FW defined was not ¼ of the plate thickness.
        - The definition of weld size put forward by the Contractor is in question and relates only to a combination partial joint penetration groove weld and a fillet weld (a combination weld). The weld is not shown on the contract drawing as a combination weld and if considered a combination weld due to requirements to reinforce, the effective size is also put in question.
        - The definition of a PJP is provided within Annex V of AWS D1.5 as is that for joint penetration. Both have correctly been referenced within the State's paper.
        - The special requirement for the evaluation criteria of weld procedure trials for microetched sections (minimum weld size of 80% of the rib thickness) should

not therefore be in question and indeed testing procedures produced by the Contractor imply that this requirement is fully understood.

- The specification of a PJP weld with a minimum 80% penetration is the norm for this particular joint and is accepted internationally as being so. The execution of this particular weld requires specialist skills and has been consistently achieved by experienced fabricators throughout the World.
- The State clarified the requirements of the PJP weld to the contractor in a timely manner and apparently USI was unwilling to accept the State's clarification and had difficulty making the weld.
- The Fabrication, UT and Weld Procedures produced by the Contractor all imply an understanding of the contract requirements which align with that of the State. It is only the shop drawings which have consistently shown or implied a weld that does not comply with the contract documents as we and the State understand them.

11 Recommendations:

It is important to ensure that the contractual hierarchy of the various documents that have been quoted in the submissions is understood.

Consideration should be given to the relevance and consequence of the requirement set down in Section 10-1.44 STEEL STRUCTURES, SHOP WELDING; General Provisions where it states that "*All corner and T-Joint groove welds shall be reinforced with fillet welds with a size of ¼ times the thickness of the abutting members, or 10mm, whichever is less*"

BAMC finds that ambiguity existed with the contract specification and AWS D1.5 allows a weld reinforcement up to a certain size. Therefore, the state's position for weld measurement to exclude payment for the weld reinforcement is not reasonable. (See figures 1 and 2 at the end of this report.) BAMC recommends that the contractor be compensated reasonably for his costs related to approval of these welds.

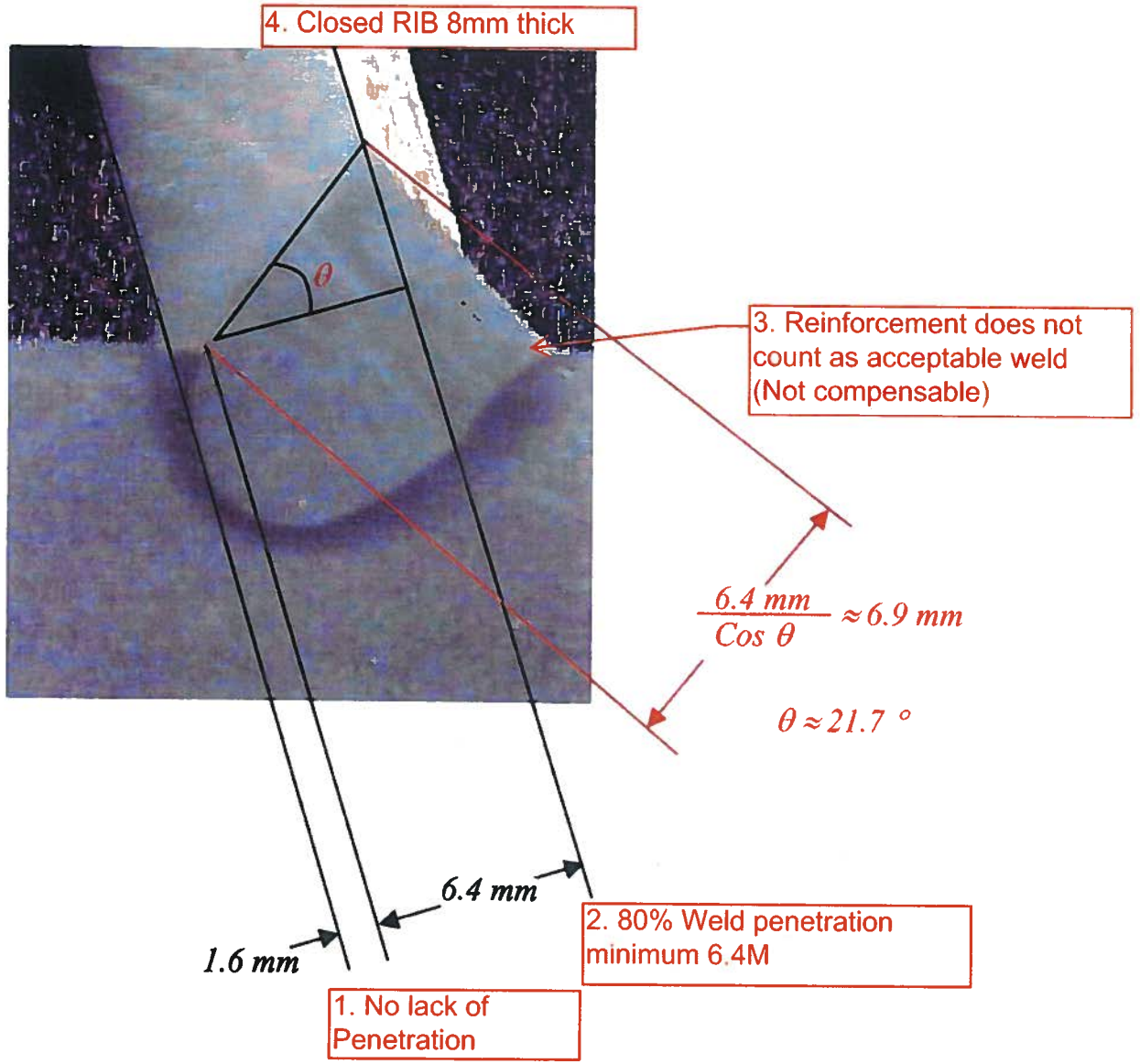


Figure 1 State Interpretation of Weld Spec

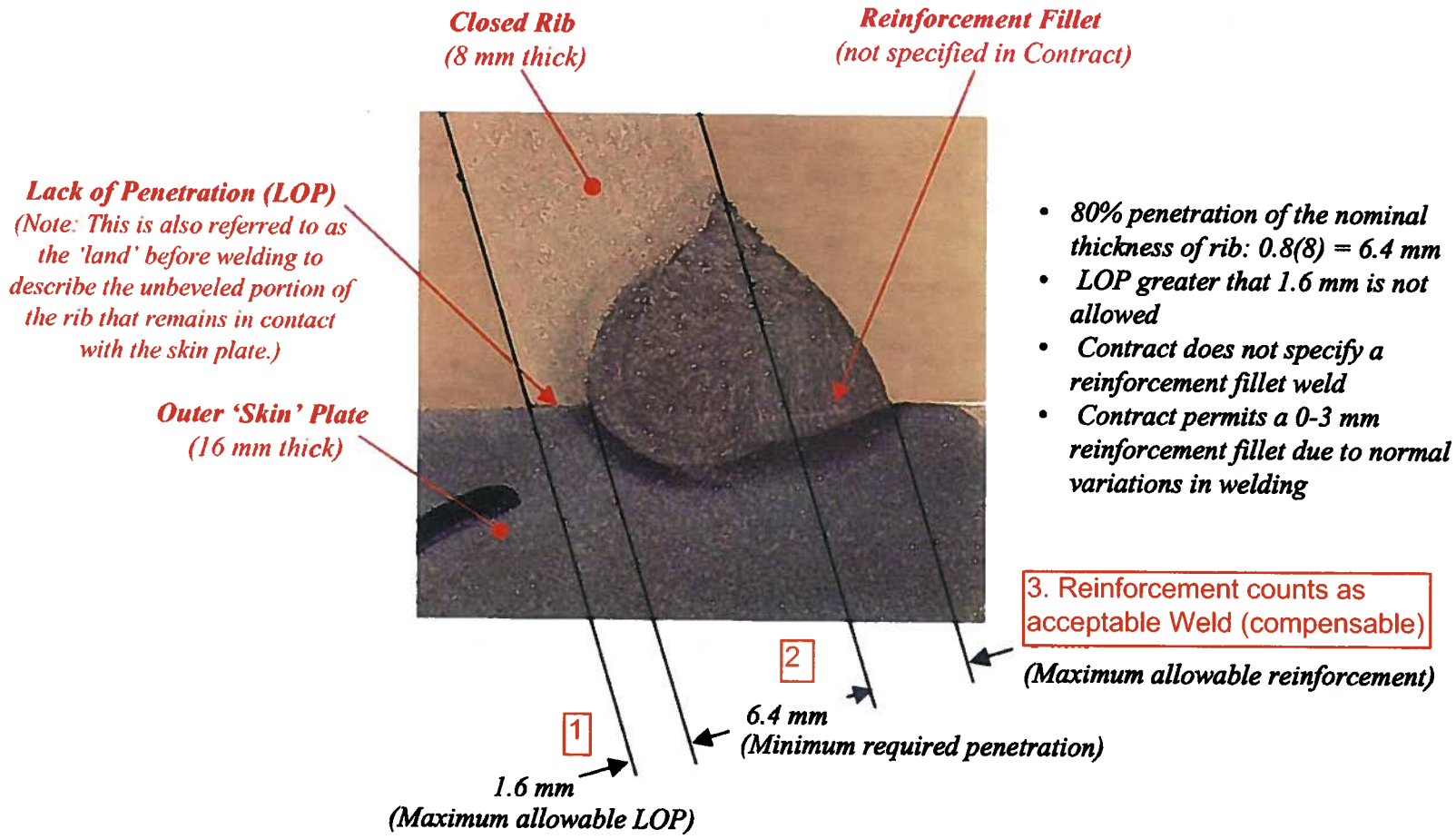


Figure 2 Contractor Interpretation Weld Spec

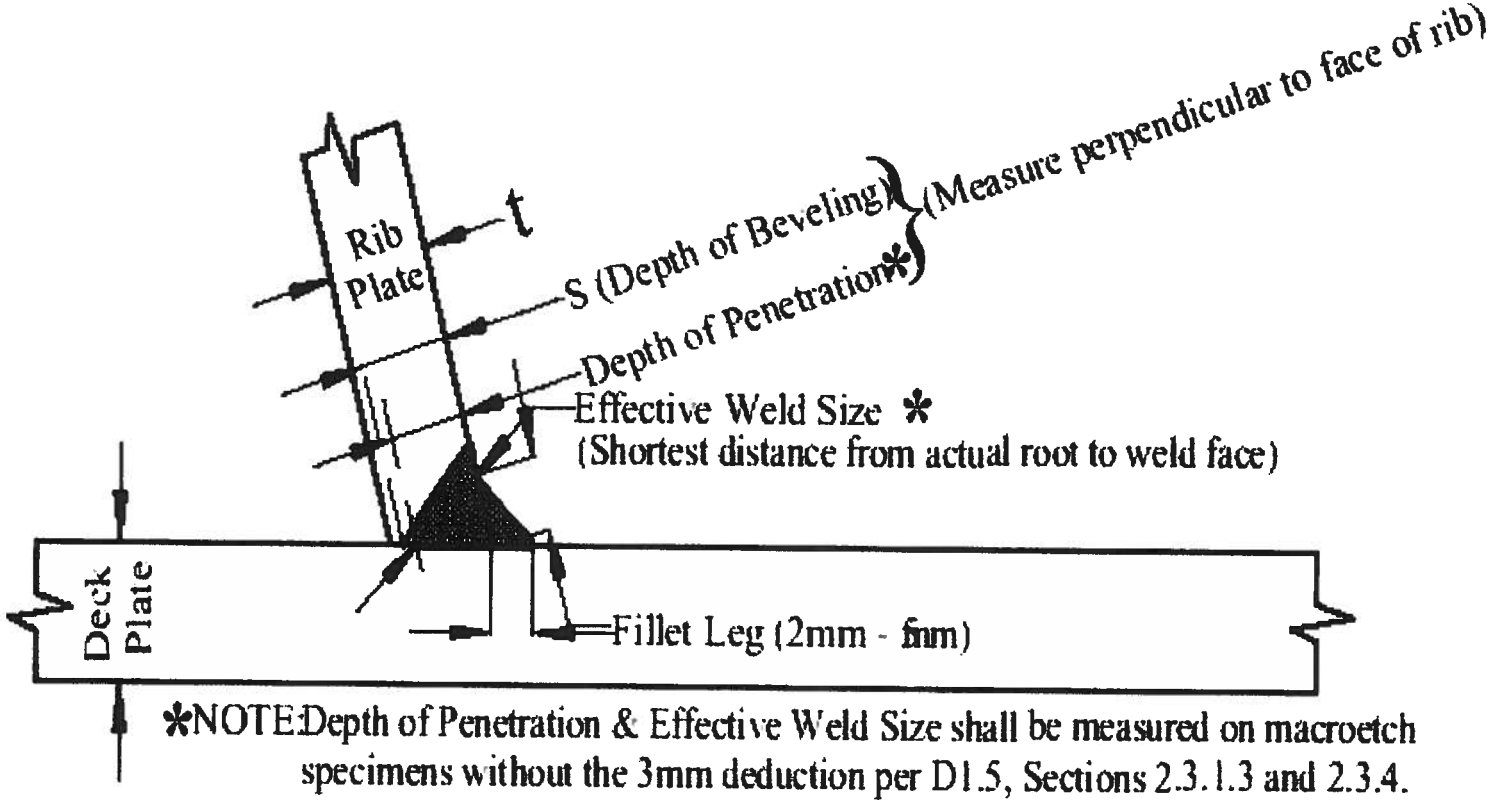


Figure 3 Measurement Criteria