

**DEPARTMENT OF TRANSPORTATION**  
 DIVISION OF ENGINEERING SERVICES  
 Office of Structural Materials  
 Quality Assurance and Source Inspection



Bay Area Branch  
 690 Walnut Ave. St. 150  
 Vallejo, CA 94592-1133  
 (707) 649-5453  
 (707) 649-5493

Contract #: 04-0120F4  
 Cty: SF/ALA Rte: 80 PM: 13.2/13.9  
 File #: 69.25B

## QUALITY ASSURANCE -- NON-CONFORMANCE REPORT

**Location:** Changxing Island, Shanghai, P.R. China

**Report No:** NCR-000576

**Prime Contractor:** American Bridge/Fluor Enterprises, a JV

**Date:** 01-Jan-2010

**Submitting Contractor:** Zhenhua Port Machinery Company, Ltd (ZPMC), Changxing Island

**NCR #:** ZPMC-0549

### Type of problem:

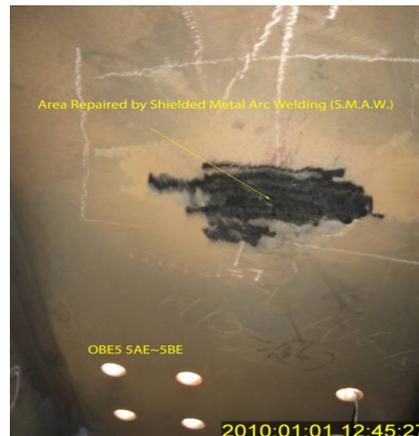
<b>Welding</b>	<b>Concrete</b>	<b>Other</b>	
<b>Welding</b>	<b>Curing</b>	<b>Procedural</b>	<b>Bridge No:</b> 34-0006
<b>Joint fit-up</b>	<b>Coating</b>	<b>Other</b>	<b>Component:</b> OBG Segments 5AE and 5BE
<b>Procedural</b>	<b>Procedural</b>	<b>Description:</b>	

**Reference Description:** Weld Repair without Engineer's Approval (CWR) and without WPS, Weld OBE5-004, Segments 5AE/5BE

### Description of Non-Conformance:

During the Quality Assurance in-process visual inspection of lift 5 East, the QA inspector (QA) discovered the following issues:

- Weld repair was performed without the Engineer's approval.
- No approved welding procedure specification (WPS) was onsite during the welding repair process.
- This weld is identified as: OBE5-004
- Y location is 710mm measured from the Counter Weight side on the interior of the Deck Plate at Panel Point (PP32).
- This is a second time weld repair performed on a Transverse Indication.
- ZPMC discovered this indication utilizing the Magnetic Particle (MT) method.
- Lift 5 East is located in the OGB Trial Assembly Area.



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# QUALITY ASSURANCE -- NON-CONFORMANCE REPORT

( Continued Page 2 of 2 )

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**Applicable reference:**

Special Provisions Section 8-3; The Engineer shall be notified 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 proposal repair procedures to correct them.

AWS D1.5-2002 Section 3.7.4; Prior approval of the Engineer shall be obtained for repairs to base metal, repairs of major or delayed cracks.

AWS D1.5-2002 Section 6.3.1; The inspector shall make certain that all WPS's are qualified in conformance with Section 5 of this code The inspector shall make certain that each welding operation is covered by a written WPS and that such WPS's are available to the welders and inspectors for reference.

**Who discovered the problem:** Tim J. Murphy

**Name of individual from Contractor notified:** CK Chan

**Time and method of notification:** 1500 hours, 01/01/10, Verbal

**Name of Caltrans Engineer notified:** Bill Howe

**Time and method of notification:** 1900 hours, 01/01/10, Email

**QC Inspector's Name:** Wang Li Yang

**Was QC Inspector aware of the problem:** Yes No

**Contractor's proposal to correct the problem:**

**Comments:**

This report is for the purpose of determining conformance with the contract documents and is not for the purpose of making repair or fit for purpose recommendations. Should you require recommendations concerning repairs or remedial efforts please contact Eric Tsang, 15000422372, who represents the Office of Structural Materials for your project.

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<b>Inspected By:</b>	Guest,Skylar	SMR
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<b>Reviewed By:</b>	Wahbeh,Mazen	SMR
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**DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge**

333 Burma Road  
Oakland CA 94607  
Tel: Fax:

**NON-CONFORMANCE REPORT TRANSMITTAL**

<b>To:</b>	AMERICAN BRIDGE/FLUOR, A JV 375 BURMA ROAD OAKLAND CA 95607	<b>Date:</b>	02-Jan-2010
<b>Dear:</b>	Mr. Charles Kanapicki	<b>Contract No:</b>	04-0120F4 04-SF-80-13.2 / 13.9
<b>Attention:</b>	Mr. Thomas Nilsson Project/Fabrication Manager	<b>Job Name:</b>	SAS Superstructure
<b>Subject:</b>	NCR No. ZPMC-0549	<b>Document No:</b>	05.03.06-000539
<b>Reference Description:</b>	Weld Repair without Engineer's Approval (CWR) and without WPS, Weld OBE5-004, Segments 5AE/5BE		

The attached Non-Conformance Report describes an occurrence where the contractor did not comply with a requirement of the contract document as indicated below:

- Material or Workmanship not in conformance with contract documents.
- Quality Control (QC) not performed in conformance with contract documents.
- Recurring QC issue that constitutes a systematic problem in quality control.
- Non-Conformance Resolved.

**Material Location:** OBG **Lift:** 05

**Remarks:**

During the Quality Assurance in-process visual inspection of lift 5 East, the QA inspector (QA) discovered the following issues:

- Weld repair was performed without the Engineer's approval.
- No approved welding procedure specification (WPS) was onsite during the welding repair process.
- This weld is identified as: OBE5-004
- Y location is 710mm measured from the Counter Weight side on the interior of the Deck Plate at Panel Point (PP32).
- This is a second time weld repair performed on a Transverse Indication.
- ZPMC discovered this indication utilizing the Magnetic Particle (MT) method.
- Lift 5 East is located in the OGB Trial Assembly Area.

**Action Required and/or Action Taken:**

Submit a repair procedure to the engineer for approval. Notify the engineer prior to starting the repair work. A response for the resolution of this issue is expected within 7 days.

**Transmitted by:** Bill Howe Sr. Transportation Engineer

**Attachments:** ZPMC-0549

**cc:** Rick Morrow, Gary Pursell, Peter Siegenthaler, Stanley Ku, Brian Boal, Jason Tom, Contract Files, Ching Chao

**File:** 05.03.06

## NCR PROPOSED RESOLUTION

**To:** CALTRANS - SAS Superstructure  
333 Burma Road  
Oakland CA 94607

**Attention:** Pursell, Gary  
Resident Engineer

**Ref:** 05.03.06-000539

**Subject:** NCR No. ZPMC-0549

**Dated:** 25-Feb-2010

**Contract No.:** 04-0120F4  
04-SF-80-13.2 / 13.9

**Job Name:** SAS Superstructure

**Document No.:** ABF-NPR-000600 Rev: 00

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### Contractor's Proposed Resolution:

**Reference Resolution:** For the welding without a WPS onsite, ZPMC has discussed this matter with the onsite personnel and reinforced Section 6.3.1 of AWS D1.5. Based on this ZPMC requests closure of this NCR.

ZPMC received the Engineer's approval to conduct the repair documented on December 24, 2009 in CWR B-996. Therefore that part of the NCR is not valid. For the welding without a WPS onsite, ZPMC has discussed this matter with the onsite personnel and reinforced Section 6.3.1 of AWS D1.5. Based on this ZPMC requests closure of this NCR.

**Submitted by:** Ishibashi, Joshua

**Attachment(s):** ABF-NPR-000600R00;

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### Caltrans' comments:

**Status:** CLO

**Date:** 07-Mar-2010

The documentation received is sufficient to close this NCR.

**Submitted by:** Howe, Bill

**Date:** 07-Mar-2010

**Attachment(s):**

## DEPARTMENT OF TRANSPORTATION

CHINA FABRICATION TEAM

666 Feng Bin Road

Changxing Island, Shanghai, PRC



## REVIEW OF CONTRACTOR'S SUBMITTAL

To: Thomas Nilsson, American Bridge/Fluor, a Joint Venture  
Gary Pursell, Resident Engineer

Review Date: Dec-24-2009

From: Eric Tsang, Structural Materials Representative

Contract No.: 04-0120F4

Date/Time Submittal Received: Dec-21-2009/ 14:20

China Standard Time  
(GMT+08:00)

Contractor's Transmittal #: AFC-CAL-TRN-005068

Rev. # 0

<input type="checkbox"/> substantially <b>complies</b> with contract requirements and is approved			
<input checked="" type="checkbox"/> substantially <b>complies</b> with contract requirements and is approved as noted.			
<input type="checkbox"/> Lacks sufficient information and/or contains unacceptable items that must be corrected or prior to resubmital			
Verbal Notification		<input checked="" type="checkbox"/> No	<input type="checkbox"/> Yes
		Date:	Time:
Name of individual from Contractor Notified:			
This submittal is a:	<input type="checkbox"/> Welding Report	<input checked="" type="checkbox"/> Critical Weld Repair	
	<input type="checkbox"/> Request for Information	<input type="checkbox"/> Heat Straightening Request	
	<input type="checkbox"/> Fabrication Procedures	<input type="checkbox"/> Other:	
Submitting Contractor: <u>American Bridge – Fluor, a Joint Venture</u>			
ITEMS REVIEWED	COMPLIES		COMMENTS
1.	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	5AE/5BE cracks repair

### Remarks:

Description should read "Per the AWS D1.5 paragraph 6.26.3.2 (1), (2), & (3), ABF and CT performed the re-ultrasonic inspection and revealed planar linear indications by scanning pattern D."

Reviewer: Eric Tsang

Date: Dec-24-2009

Construction Concurrence: SJE Initial 12/24/09 Date

Received by (ABFJV):

Date: 12/24/09 Time: 10:11





TRANSMITTAL LETTER

PROJECT: S.F.O.B.B.

DATE:2009-12-21

TO: ROSEMARY/ABF JV QA DEPARTMENT

FROM: ZPMC QA DEPARTMENT

SUBJECT: OBG CWR

SUBMITTED FOR YOUR INFORMATION AND SUBMITTAL TO CALTRANS FOR APPROVAL  
ENCLOSED WITH THIS TRANSMITTAL IS ONE COPY OF

(01) B-CWR996 REV.0

PLEASE SIGN THIS TRANSMITTAL AND RETURN TO Me.

ACKNOWLEDGEMENT

PLAN HOLDER:

*Rosemary*

DATE: 12-31  
RECEIVED 21 DEC 2009

COMPANY:



PHONE NO.

PLAN NUMBER:N/A

#R787-QCP-102



关键焊缝返修报告  
Critical Welding Repair Report (CWR)

版本  
Rev. No.:

0

项目名称 Project Name:	美国海湾大桥 SFOBB	部件图号 Drawing No.:	Lift 5E	报告编号 Report No.:	B-CWR996
合同号 Contract No.:	04-0120F4	部件名称 Item Name:	5AE+5BE transverse splice weld	NDT 报告编号 NDT Report No.:	NA
项目编号 Project No.:	ZP06-787				

Description:

描述:

Per the AWS D1.5 paragraph 6.26.3.2 (1), (2) & (3), ABF and Caltrans performed the Re-Ultrasonic inspection and revealed planar linear indications by scanning pattern D. ~~Some indications in the 2E were further evaluated by excavation and were determined by ZPMC, ABFJV and CT to be the defects of porosity / slag and also include transverse cracks etc. The detail of the location and finding please find from the attached report and draft.~~

ABF和加州依据AWS D1.5第6.26.3.3(1), (2), (3)条规定的要求重新对焊缝进行UT的D向扫查时,发现有部分不连续的存在,其中包括超标点和不超标点。~~这些不连续通过进一步碳刨等挖开方式验证,存在各种内部缺陷,包括裂纹。具体的缺陷位置和描述详见附件报告和下述草图。~~

E.T. 12.24.09

This procedure applies to the repair of all defects and other planar defects that are found by UT. 此返修程序适用于所有UT发现的超标点和不超标点的返修。

WJ No. 焊缝编号: OBE5-004, OBE5A-004, OBE5A-005, OBE5A-003, OBE5A-002

Location位置: 1G/2G/3G/4G

Welding process焊接方法: SMAW

检验员 (Inspector): Li Liming 日期 (Date): 2009.12.21

*Li Liming* 2009-12-21

焊缝返修位置示意图:

Draft of Welding Discontinuity:

SEE ATTACHMENTS

见附件

<input type="checkbox"/>	APPROVED
<input checked="" type="checkbox"/>	APPROVED AS NOTED
<input type="checkbox"/>	RETURNED FOR CORRECTION
Pursuant to Section 5-1.02 of the Standard Specifications State of California	
DEPARTMENT OF TRANSPORTATION Division of Engineering Services Office of Structure Construction	
SJE for RM	12/24/09
Structure Representative	Date

Cause:

原因:

1. Most of these welds are designated as Non-SPCM, so ZPMC did not control these welding according to the SPCM requirements.  
大部分焊缝图纸要求为非SPCM, 因此焊接过程中没有按照SPCM 的控制要求来进行。
2. Some welder did not pay attention and weld complied with all requirements from the approved WPS..  
个别焊工操作质量差, 未能符合批准WPS上所有的要求。
3. It is not fully controlled during the welding, especially there is not enough interpass cleaning.  
焊缝烧焊过程中局部监控不到位。层间清理不彻底。

车间负责人 (Foreman): *Ma Kwai quan*

日期 (Date): *2009.12.21*

<input type="checkbox"/>	APPROVED
<input checked="" type="checkbox"/>	APPROVED AS NOTED
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DEPARTMENT OF TRANSPORTATION Division of Engineering Services Office of Structure Construction	
<i>SJE</i>	<i>RM</i>
Structure Representative	Date

Disposition:

处理方法:

1. Successful repairs are achievable only when careful application of all of the following process steps are carried out in sequence without variation.

只有当采用了如下所有的方法并按照顺序正确执行后,才可以成功得进行返修。

- a. Careful excavation of all defects and preparation of the repair site are paramount to a successful repair, and the grinding should be continuous unless a long portion of weld is removed  
对超标和不超标的缺陷进行仔细得挖掘和焊接前对返修区域很好的处理是对成功得返修极为关键的。
- b. Provide positive controls and MT tests to ensure the complete removal of the defects.  
提供正确得控制和MT检测,以确保缺陷完全被清除干净。
- c. Clean the repair site to remove foreign matter and debris before the start of any work.  
在进行任何工作前,对返修区域清理干净。
- d. Apply preheat of at least 160°C to the repair and insure that the preheat covers a sufficient area of the repair.  
对返修区域进行预热,并确保在足够的区域内达到足够的预热温度。
- e. Weld the repair in accordance to an approved welding procedure.  
根据批准的WPS进行返修。
- f. Apply postheat blankets and heaters to maintain the proper postweld heat (at least one hour at 160 °C) for the required time.  
对返修后进行足够时间的后热处理,并使用电加热板进行。至少保证160°C一小时。
- g. Allow parts to cool to ambient temperature and wait the required time (48 hours minimum) before performing nondestructive evaluation of the repair site.  
等构件冷却到室温并等待48小时后才能对返修区域进行NDT检测。

2. Excavation of the defect.

缺陷的挖掘清除

- b. Any contaminants present in the area to be repaired, such as rust, paint, UT gel etc, shall be removed before any gouging or grinding to remove the weld defect is done.  
任何返修区域内的杂物,比如锈迹,油漆,UT的浆糊等,都应在对焊缝缺陷进行碳刨和打磨前清理干净。
- c. Using air-arc gouging or grinding to remove the weld defect including the material above and to either side of the defect to the prescribed limits. Removal shall be witnessed by the CWI and MT verify that the defect was located and totally removed.  
使用碳刨或者打磨的方法对焊缝的缺陷清除,包括缺陷上面和左右的材料。  
碳刨过程需有CWI见证,确保缺陷的位置和缺陷完全被清除。之后MT确认。
- d. Preheat to 65° C before performing any gouging to remove weld metal defects.  
在开始对焊缝缺陷进行碳刨,对焊缝预热到 65° C.
- e. Excavation shall be as long as necessary to remove any defects that are extend 50mm by each side.  
碳刨应去除缺陷并左右延伸各50mm的区域。
- f. All excavations shall be ground to bright metal and 100% MT verify that no indication prior to doing any welding.  
在进行焊接前对碳刨区域打磨出金属光泽。100%MT确认无缺陷。
- g. Excavation of material shall be limited to no more than 4 mm per pass and the depth of excavation shall not exceed 2/3T ± 2mm.  
每层碳刨深度不能大于4mm。碳刨的总深度不能大于2/3的板厚±2mm。
- h. When a crack is still present and excavations have reached the 2/3T ± 2mm maximum, and repair work shall proceed in accordance with one of the following procedures  
如果,当碳刨深度已经达到了2/3的板厚±2mm,但MT显示缺陷依然存在,则返修工作需按照下列条款要求进行:

- 1. repair both sides of excavation  
两面进行碳刨和返修

- a. preheat repair area to 65°C prior to performing any gouging. 碳刨前预热至65度。

<input type="checkbox"/>	APPROVED
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Office of Structure Construction	
SJE for RM	12/24/09
Structure Representative	Date

Disposition:

处理方法:

- b. specify limit that the excavation to no more than 4mm per pass  
每一道碳刨量深度不能大于4mm.
- c. prepare excavation such that all metal is ground clean to a smooth, shiny metal finish and starts and stops are tapered to a 1:1 slope.  
碳刨后将坡口打磨平滑, 且挖出的凹槽部分两个端头要有 1:1 的斜式过渡。
- d. preheat to 160°C in accordance with table 1 and maintain this temperature throughout the entire repair procedure, including backgouging and welding of opposite side.  
按照表一的要求预热到 160 度, 并且该温度要求持续整个焊接过程, 包括反面清根和反面的焊接。
- e. weld first side of repair in accordance with the approved WPS.  
按照批准的 WPS 进行第一个面的焊接。
- f. excavate from the opposite side until sound weld metal is reached.  
从反面进行碳刨和打磨直至露出金属光泽。
- g. perform 100% MT of excavation to ensure crack has been removed entirely.  
对碳刨出的坡口位置进行 100% 的 MT 检测, 确保裂纹清除干净。
- h. prepare excavation such that all metal is ground clean to a smooth, shiny metal finish and starts and stops are tapered to a 1:1 slope.  
对碳刨出的坡口要进行打磨平滑, 确保连个端头有 1:1 的斜式过渡。
- i. weld opposite side of repair in accordance with the approved WPS.  
按照 WPS 的要求进行反面的焊接。
- j. after weld has been completed, apply post weld heat treatment (PWHT) in accordance with the temperature requirements of table 1 for a minimum of one hour.  
焊接完成后, 按照表 1 的要求对焊缝进行后热处理, 处理时间至少 1 小时。
- k. once repair has undergone the required PWHT, allow weld to cool gradually by automatic control of the heat machine.  
后热结束后, 需要对焊缝进行保温, 进行缓冷处理。

2. repairing in two stages 第 2 种返修方案

- a. initial excavation 初步碳刨
  - i preheat repair area to 65°C prior to performing any gouging .  
碳刨前加热到 65 度。
  - ii excavation of material shall be limited to no more than 4mm per pass.  
碳刨的过程要注意每层刨除掉的焊缝厚度不能大于 4mm。
  - iii prepare excavation such that all metal is ground clean to a smooth, shiny metal finish and starts and stops are tapered to a 1:1 slope.  
对碳刨出的坡口要进行打磨平滑, 确保连个端头有 1:1 的斜式过渡。
  - iv preheat to 160°C in accordance with table 1 and maintain this temperature throughout the entire repair procedure.  
按照表一的要求预热到 160 度, 并且该温度要求持续整个焊接过程。
  - v weld first side of repair in accordance with the approved WPS.  
按照批准的 WPS 进行第一个面的焊接。
  - vi after weld has been completed, apply PWHT in accordance with the temperature requirements of table 1 for a minimum of one hour  
焊接完成后, 按照表 1 的要求对焊缝进行后热处理, 处理时间至少 1 小时
  - vii once repair has undergone the required PWHT, allow weld to cool gradually by automatic control of the heat machine.  
后热结束后, 需要对焊缝进行保温, 进行缓冷处理。

<input type="checkbox"/>	APPROVED
<input checked="" type="checkbox"/>	APPROVED AS NOTED
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b. repair of opposite side 反面的返修

i preheat repair area to 65°C prior to performing any gouging .

碳刨前加热到 65 度。

ii excavation of material shall be limited to no more than 4mm per pass. Continue excavation until sound weld metal from opposite side repair is reached.

碳刨的过程要注意每层刨除掉的焊缝厚度不能大于 4mm。碳刨至另侧完好焊缝金属位置。

iii prepare excavation such that all metal is ground clean to a smooth, shiny metal finish and starts and stops are tapered to a 1:1 slope.

对碳刨出的坡口要进行打磨平滑, 确保连个端头有 1:1 的斜式过渡。

iv preheat to 160°C in accordance with table 1 and maintain this temperature throughout the entire repair procedure.

按照表一的要求预热到 160 度, 并且该温度要求持续整个焊接过程。

v perform 100% MT of excavation to ensure crack has been removed entirely.

100%MT 确保所有的裂纹已经彻底移除干净。

vi weld opposite side of repair in accordance with the approved WPS.

按照 WPS 的要求进行反面的焊接。

vii after weld has been completed, apply PWHT in accordance with the temperature requirements of table 1 for a minimum of one hour.

焊接完成后, 按照表 1 的要求对焊缝进行后热处理, 处理时间至少 1 小时。

viii once repair has undergone the required PWHT, allow weld to cool gradually by automatic control of the heat machine.

后热结束后, 需要对焊缝进行保温, 进行缓冷处理。

h. When the weld defect appears to have been removed the groove shall be ground clean to bright metal and the excavation shall be tested for complete defect removal using 100% MT per approved procedure.

当缺陷看似被清理后, 对清理区域进行打磨到金属光泽并使用 100%MT 确认缺陷移除干净。

i. If all indications are removed, the weld defect is considered to have been removed. No welding shall begin except on two sided repairs until all 100% MT indications have been removed.

如果所有的 MT 指示均被移除, 则认为所有的缺陷均被移除。在 MT 指示均被移除之前, 不得进行任何焊接。除非是双面返修。

j. Once the proper depth is reached, the groove shall be tapered to the surface of the existing weld by grinding at a slope of 1 to 1. The excavation of the defect shall extend a minimum of 50mm beyond each end of the defect including the taper.

当碳刨达完成后, 碳刨表面应打磨成 1:1 的斜势。而且碳刨应在缺陷位置向两边各延伸 50mm, 包括斜势。

k. When all grinding is completed in the area to be repaired, a final 100%MT test will be run by QC personnel to verify that all indications have been removed.

返修区域打磨完成后, 应有 QC 进行 100%MT, 以确认所有的指示都已清除。

l. After the gouge is accepted by QC, the entire area shall be cleaned to remove all traces of loose debris and MT powder.

碳刨得到 QC 的验收后, 整个范围内的杂物比如小碎片和 MT 干磁粉等均需清理干净。

### 3. Welding.

#### 焊接

a. Preheat shall be applied to the repair area in such a way that the entire area to be repaired and all adjacent material out to a distance of 75mm in all directions of excavation, heated to the higher of the appropriate value shown in Table 1. Preheat application is always stated as a minimum value. Higher preheat values may be required if the joint has too high a degree of restraint.

必须对返修区域, 包括返修点周边 75mm 范围内进行预热, 预热温度应高于下面表 1 中的规定温度。预热温度要求始终只是一个最低值。如果接头的拘束应力很大的话, 也可以要求更高的预热温度值。

<input type="checkbox"/>	APPROVED
<input checked="" type="checkbox"/>	APPROVED AS NOTED
<input type="checkbox"/>	RETURNED FOR CORRECTION
Pursuant to Section 5-1.02	
of the Standard Specifications	
State of California	
DEPARTMENT OF TRANSPORTATION	
Division of Engineering Services	
Office of Structure Construction	
WPS: SJE for R7	12/24/07
Structure Representative	Date

Disposition:

处理方法:

- b. SMAW filler metal shall be rated to a hydrogen level of H4 or better.  
SMAW焊材的扩散氢等级必须等于或低于H4.
- c. The groove shall be filled using the approved SMAW or SAW filler metal in accordance with an approved WPS.  
坡口应使用并根据批准的 SMAW 或者 SAW 进行焊接。
- d. Once the preheating process is started the repair area shall be maintained at this preheat level until all welding is completed. This includes any additional time to remove the defect from the second side gouge.  
当预热开始直到焊接结束, 返修区域的温度应始终维持。这也包括从反面碳刨将缺陷移除的预热时间。
- e. The CWI shall verify that the welder understands all starts and stops are to be clean and smooth before an arc is struck on them to provide a means to tie the next weld pass into the end of the weld.  
CWI应该确保焊工在层间清理时能对层间成型不好的位置进行适当的打磨, 以使下一道焊接能融合到前一道。
- f. Before welding over previously deposited metal, all slag shall be removed and the weld and adjacent base metal shall be brushed clean.  
开始下一道焊接前, 所有的焊渣必须清理, 而且焊道和周边母材必须刷干净。
- g. Preheat shall be maintained on the repair continuously once it is first applied until the weld is complete and the postweld heating phase begins at once.  
预热温度在整个返修过程中必须维持好, 直到焊接结束。结束后, 立即就开始后热处理。

4. Postweld Heat Treatment.

后热处理

- a. After welding is completed but before the temperature falls below that of the preheat value from Table 1, it shall be maintained at the post heat temperature shown in Table 1.  
当焊接结束后, 等温度降到表1规定的最低预热温度前, 后热温度必须保持在表1中的规定温度。
- b. Post weld heating shall be maintained for a minimum of 1 hour.  
后热处理至少进行1小时。
- c. After the post weld heating time has been reached the repair shall be cooled by removing the heating source and leaving the blankets in place or by another method that will insure the temperature is cooling down gradually.  
后热结束后, 通过移除加热源并用保温毯放在焊缝上或者其他方法, 使焊缝能够缓冷。
- d. Per the specification require performing the Final UT, MT and Visual inspections, which shall be done at least after 48 hours have passed after the weld repair area has cooled to ambient temperature.  
只有当焊缝冷却到室温后的48小时之后, 才能开始最终的UT, MT和VT检测。
- e. Perform all NDT in accordance with contract plans as well as ABF approved procedure by ABF/CT, ZPMC will coordinate.  
返修结束之后, ABF和CT 按照标书要求和ABF批准的工艺对焊缝进行NDT检测, ZPMC进行配合。
- f. All inspection activities shall be documented which includes backgouge inspections.  
所有的检验工作均应被记录成文件, 也包括碳刨的检验。

工艺: *Wintiefeng* 2009.12.24 审核:  
Technical Engineer:

Approved By:

<input type="checkbox"/>	APPROVED
<input checked="" type="checkbox"/>	APPROVED AS NOTED
<input type="checkbox"/>	RETURNED FOR CORRECTION
Pursuant to Section 5-1.02	
of the Standard Specifications	
State of California	
DEPARTMENT OF TRANSPORTATION	
Division of Engineering Services	
Office of Structure Construction	
<i>SJE for RM</i>	<i>12/24/09</i>
Structure Representative	Date



# 关键焊缝返修报告

## Critical Welding Repair Report (CWR)

版本  
Rev. No.:**0**

项目名称 Project Name:	美国海湾大桥 SFOBB	部件图号 Drawing No.:	Lift 5E	报告编号 Report No.:	B-CWR996
合同号 Contract No.:	04-0120F4	部件名称 Item Name:	5AE+5BE transverse splice weld	NDT 报告编号 NDT Report No.:	NA
项目编号 Project No.:	ZP06-787				

**纠正措施:****Corrective Action to Prevent Re-occurrence:**

- All new segments splice welds shall be strictly controlled by the Lead CWI  
所有新的箱体拼缝的焊接应有LEAD CWI严格监控。
- All welding parameters shall be verified and recorded.  
所有的焊接参数应被确认并记录成报告。
- Welds shall be made using SMAW (H4) and / or SAW only. FCAW WPS using Supercored 71H shall be approved by ABF JV prior to use. Elevated preheats and postheats may be required by this procedure above what is required for normal SMAW or SAW welding.  
必须只能使用SMAW (H4) 和/或SAW进行焊接。FCAW的方法必须通过ABF的审核后才能使用。而且, FCAW的预热温度和后热温度可能相对普通的SMAW和SAW情况时, 需要适当提高。
- ZPMC shall document and provide results of all the inspections conducted  
ZPMC必须记录所有的检验, 并将所有检验报告提交。
  - 100%VT of excavation and 50mm either side of the weld excavation.  
对碳刨区域和两边50mm范围内碳刨后进行100%VT
  - 100%MT of excavation and 50mm either side of the weld excavation.  
对碳刨区域和两边 50mm 范围内碳刨后进行 100%MT
  - Interpass cleaning.  
层间清理
  - VT of repaired area.  
返修区域返修后的VT
  - MT of repaired area.  
返修区域返修后的MT
  - UT of repaired area.  
返修区域返修后的UT
- All the new segment splice weld joint shall be under the fabrication and control according to the revised welding procedure which all agreed by three parties.  
以后环缝烧焊要按照三方同意的最新的焊接工艺的要求进行生产和监控。

<input type="checkbox"/> APPROVED
<input checked="" type="checkbox"/> APPROVED AS NOTED
<input type="checkbox"/> RETURNED FOR CORRECTION
Pursuant to Section 5-1.02 of the Standard Specifications State of California
DEPARTMENT OF TRANSPORTATION Division of Engineering Services Office of Structure Construction
SJE for RM 12/24/09
Structure Representative Date

**Table 1: Preheat & Postheat Requirements for Various Metal Thicknesses****表1 预热和后热温度表**

Base Metal Thickness 母材厚度	Minimum Preheat 最低预热温度	Minimum Postheat 最低后热温度
T ≤ 40mm	160°C	160°C
40mm < T	200°C	200°C

车间负责人 (Foreman): *MaRuiguan*日期 (Date): *2009. 12. 21*

参照的WPS编号 Repair WPS No.:		WPS-345-SMAW-1 G(1F)-FCM-Repair -1 WPS-345-SMAW-2 G(2F)-FCM-Repair -1 WPS-345-SMAW-3 G(3F)-FCM-Repair -1 WPS-345-SMAW-4 G(4F)-FCM-Repair -1		工艺员 Technologist:		Niutie fang 2009.12.21	
返修(碳刨)前预热温度 Preheat Temperature Before Gouging:				返修的缺陷 Description of Discontinuity:			
焊前处理检查 Inspection Before Welding:				焊前预热温度 Preheat Temperature Before Welding:			
最大碳刨深度 Max. Depth of Gouge:				碳刨总长 Total Length of Gouge:			
焊工 Welder:		焊接类型 Welding Type:		焊接位置 Position:			
焊接电流 Current:		焊接电压 Voltage:		焊接速度 Speed:			
返修后检查 Inspection After Repair:							
外观检查 VT Result:		检验员 Inspector:		日期 Date:			
NDT复检 NDT Result:		探伤员 NDT Person:		日期 Date:			
见证: Witness/Review:							
备注: Remark:							

#R787-QCP-900

<input type="checkbox"/> APPROVED
<input checked="" type="checkbox"/> APPROVED AS NOTED
<input type="checkbox"/> RETURNED FOR CORRECTION
Pursuant to Section 5-1.02 of the Standard Specifications State of California
DEPARTMENT OF TRANSPORTATION Division of Engineering Services Office of Structure Construction
SJE for RN      12/24/09
Structure Representative      Date



### UT Report

Project Name: SFOBB SAS Bridge.

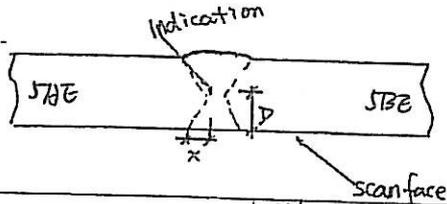
Date: 2009.12.9

Lift / Segment No.: 5AE/5BE

Location: A1, A2, A10

Report Number: UT-5E-006 (1/2)

Refer to the attached sketch.



Material:- A709	Thickness:- 14/14 20/20	Examination Specification:- AWS D1.5
Surface Condition:- <input type="checkbox"/> As Welded <input checked="" type="checkbox"/> Dressed	Acceptance Criteria:- AWS D1.5 Table 6.3	Test Procedure Number:- ZPQC-UT-01
Type of Instrument:- HS610E	Type of Transducer:- 2.5P20; 2P20x20	Reference Block:- IIW
Transducer Angle:- 0°; 70°	Welding Process:- <input checked="" type="checkbox"/> FCAW <input type="checkbox"/> SMAW <input type="checkbox"/> GMAW <input type="checkbox"/> SAW	Couplant:- CMC Paste

Weld No.	Indication No.	Scan Face	Dimensions (mm)				Indication Rating "J"	Evaluation	Inspector	Inspection Date
			"Y" from O Axis	"X"	Length "L"	Depth "D"				
OBES-002 (A10)		outside	/	/	/	/	ACC.	S016, S014	09.12.9	
OBES-003 (A1)			/	/	/	/	↓	S013, S002		
OBES-004 (A2)	1	↓	710	10	30	16.8	+6	LLI, REJ.	S002	
	2	↓	820	10	30	16.1	+8	↓	↓	

Observation:-  
 Scanning Pattern:- A, B, C, D  
 Pattern D conducted inline with Transverse Segment Assembly Splice Ultrasonic Testing Procedure.

Legend: ACC-Accept, REJ-Reject, TLI-Transverse Linear Indication, LLI-Longitudinal Linear Indication, RI-Rounded Indication, LF--Lack of Fusion.

Prepared By:-	ZPMC	ABFJV	Reviewed By:-	ABFJV
Name		Wangzhenhua	Name	STEVE LAWTON
Sign		WangZH (S001)	Sign	[Signature]
Position			Position	FOAM / LEVEL III
Date		2009.12.9	Date	19 DEC. 09

5AE, 5BE

UT-5E-006 P/2

CROSSBEAM

OBE

SPLICE

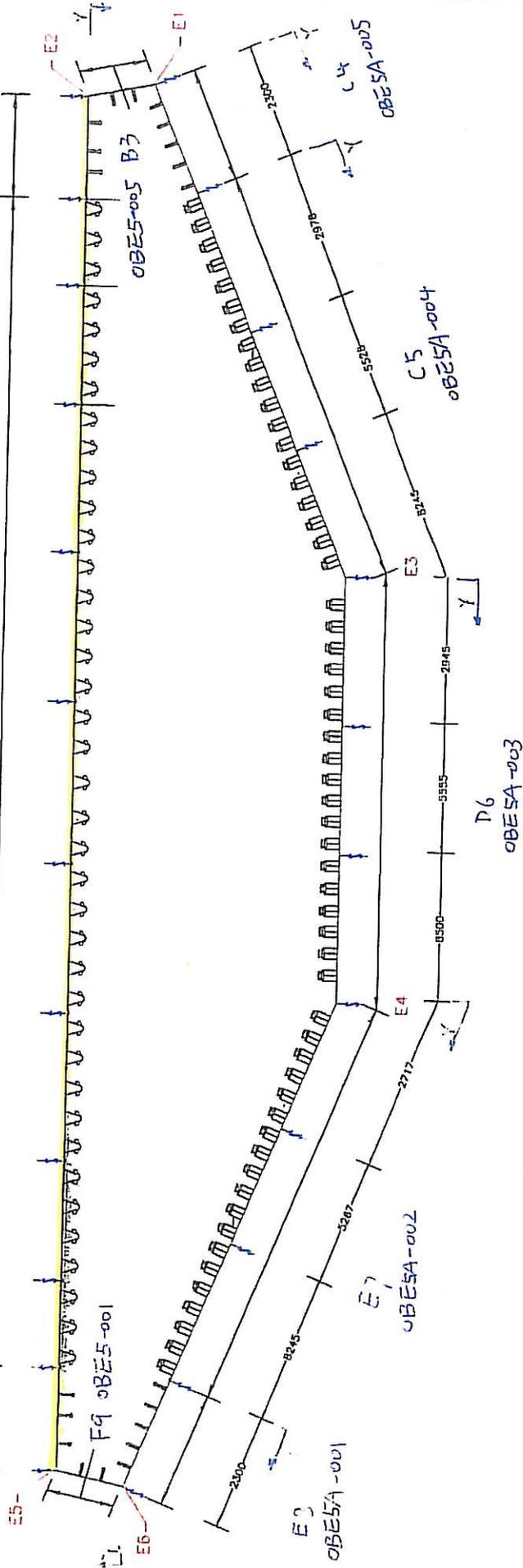
BIKE PATH

A10

A1

OBES-003

A2  
OBES-004



SEGMENT:	SPLICE	
DESCRIPTION:	SEGMENT SPLICE INDICATION TRACKING OBE OUTER SKIN SEAMS (LKG EASTEND)	
DRAWN BY:	F.J.P.	JOB # 01-0120FA
DATE:	SEPTEMBER 2009	ENC # OBE_SPLICE



5AE/5BE

UT-5E-003 (2/2)

CROSSBEAM

OBE

SPLICE

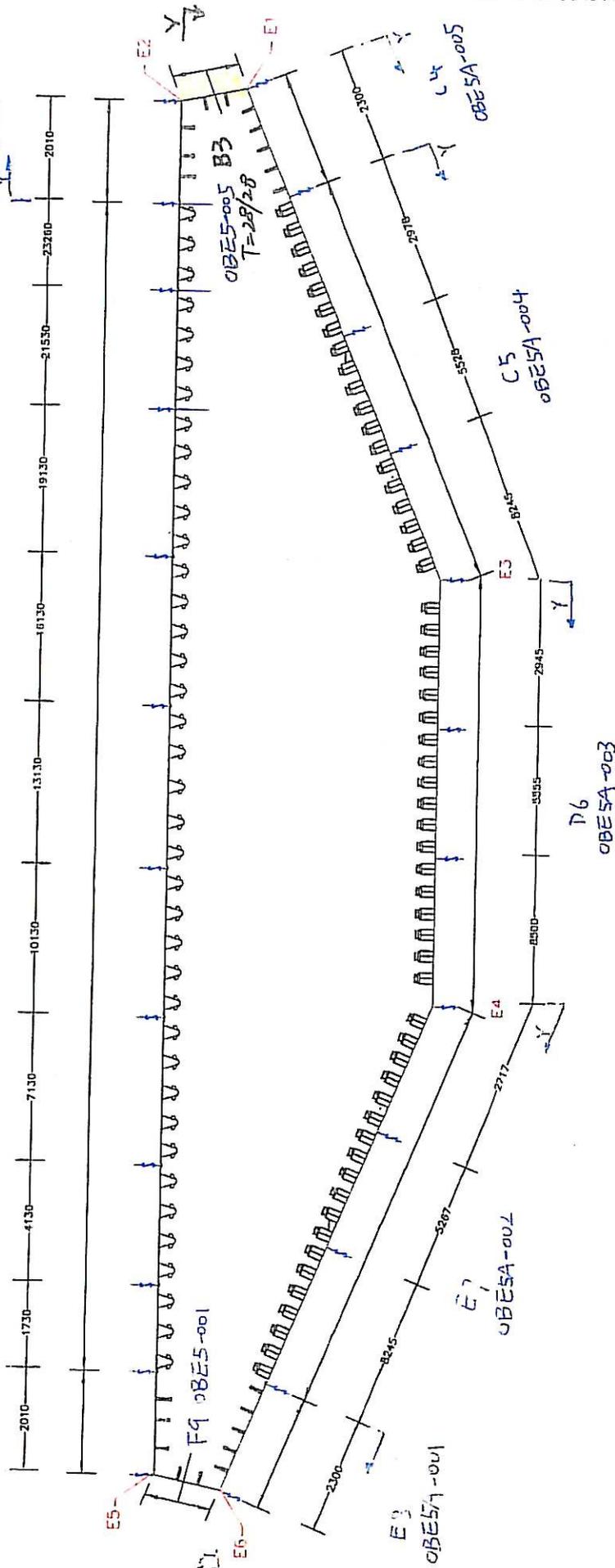
BIKE PATH

A10

A1

OBES-003

A2  
OBES-004



1" = 100'

SECTION:	SPLICE	SEGMENT SPLICE INDICATION TRACKING
DRAWN BY: R.P.	JUN # 04-012074	DESCRIPTION: OBG OUTER SKIN SEAMS (LKG EASTBND)
		DWG # OBG_SEAMS
		DATE: SEPTEMBER 2008



SAE/5BE

UT-5E-005 (2)

CROSSBEAM

OBE

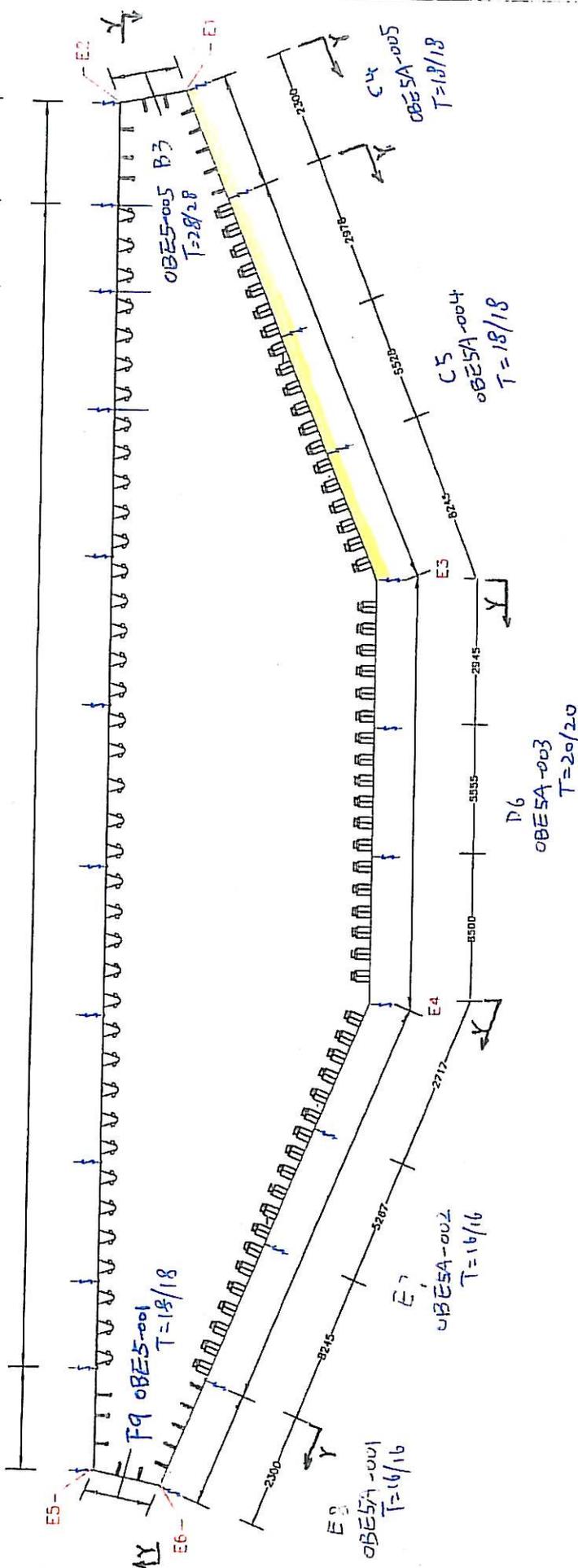
SPLICE

BIKE PATH

A10 T=20/20  
0BE5-002

A1 T=14/14  
0BE5-003

A2 T=20/20  
0BE5-004



SEGMENT: SPLICE	SEGMENT SPLICE INDICATION TRACKING
DRAWN BY: R.P.	DESCRIPTION: OBG OUTER SKIN SEAMS (LKG EASTEND)
JOB # 04-012064	DWG # OBG_SEAMS
	DATE: SEPTEMBER 2009

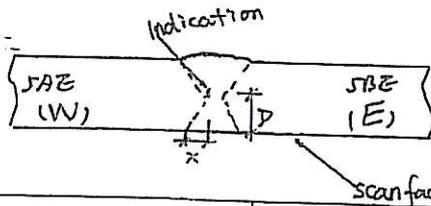


UT Report

Project Name: SFOBB SAS Bridge.

Date: 2009.12.08

Lift / Segment No.: 5AE/SBE Location: D6 Report Number: UT-SE-004 (1/2)  
Refer to the attached sketch.



Material:-	A709	Thickness:-	20/20	Examination Specification:-	AWS D1.5
Surface Condition:-	<input type="checkbox"/> As Welded	<input checked="" type="checkbox"/> Dressed		Acceptance Criteria:-	AWS D1.5 Table 6.3
Type of Instrument:-	Hs610e			Test Procedure Number:-	ZPQC-UT-01
Type of Transducer:-	25P20, 2P20X20			Reference Block:-	IIW
Transducer Angle:-	0°, 70°			Couplant:-	CMC Paste
Welding Process:-	<input checked="" type="checkbox"/> FCAW			<input type="checkbox"/> SMAW	<input type="checkbox"/> GMAW
				<input type="checkbox"/> SAW	

Weld No.	Indication No.	Scan Face	Dimensions (mm)				Indication Rating "d"	Evaluation	Inspector	Inspection Date
			"Y" from O Axis	"X"	Length "L"	Depth "D"				
0BE5A-003-1 (D6)	1	outside	5200	5	10	13	+16	TLI. REJ	S013	09.12.8
	2	↓	5410	15	10	16.5	+12			
	3	OUTSIDE	4660	+5	10	12.1	+16	TLI. RET	CT	21 DEC. 09
	4	↓	3820	+15	15	8.4	+15	↓	CT	21 DEC. 09
	5	↓	3685	+15	15	10.7	+16	↓	CT	21 DEC. 09

Observation:-  
Scanning Pattern:- A, B, C, D  
Pattern D conducted inline with Transverse Segment Assembly Splice Ultrasonic Testing Procedure.

Legend: ACC--Accept, REJ--Reject, TLI--Transverse Linear Indication, LLI--Longitudinal Linear Indication, RI--Rounded Indication, LF--Lack of Fusion.

Prepared By:-	ZPMC	ABFJV	Reviewed By:-	ABFJV
Name		Wangzhendua	Name	STEVE LAUTON
Sign		Wangzh (S001)	Sign	[Signature]
Position			Position	FGAM / LEVEL III
Date		2009.12.8	Date	21 DEC. 09

5AE/5BE

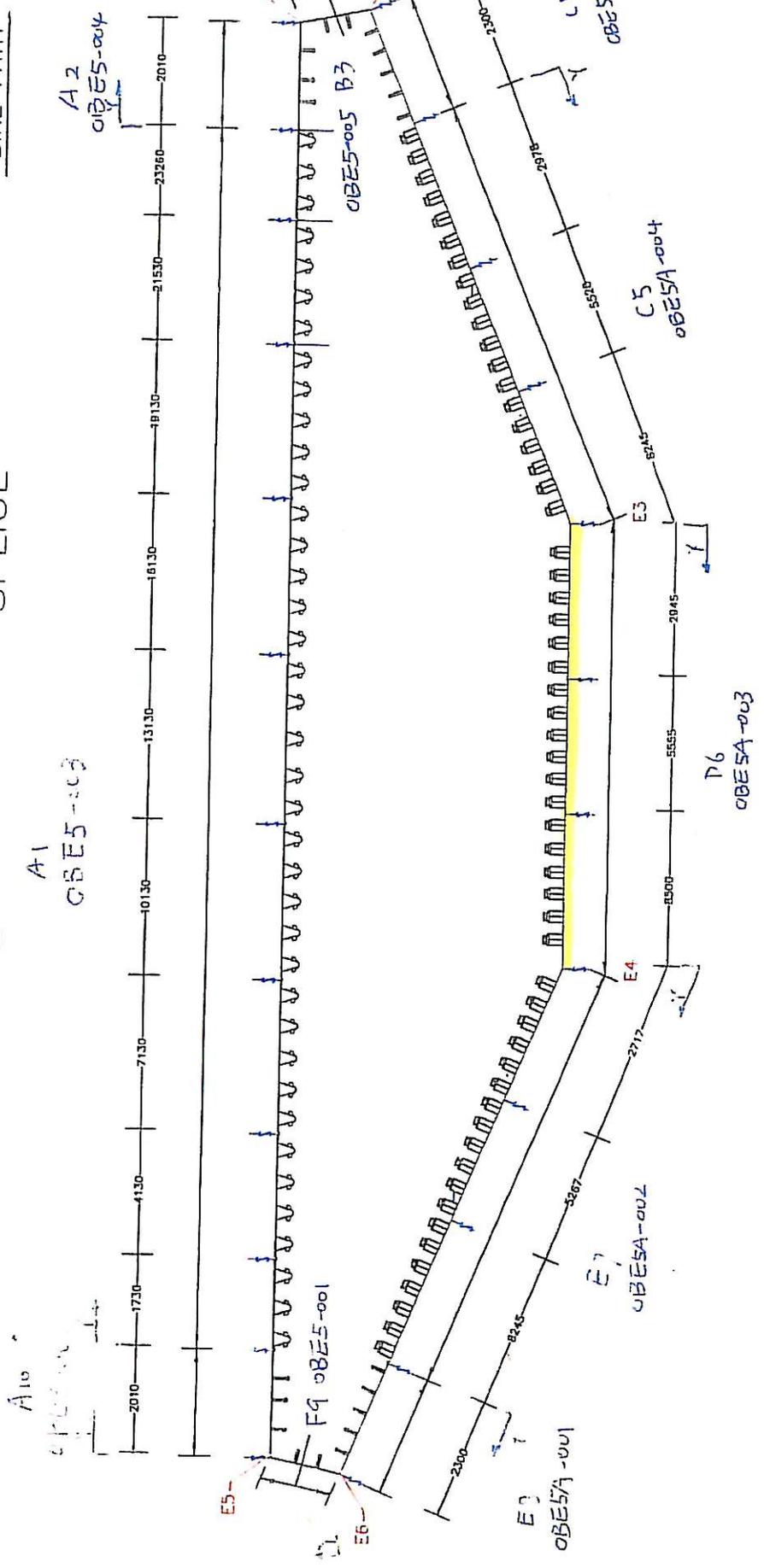
UT-5E-004 (1/2)

CROSSBEAM

OBE

SPLICE

BIKE PATH



SEGMENT: SPLICE	SEGMENT SPLICE INDICATION TRACKING
DRAWN BY: R.P.	DESCRIPTION: OBG OUTER SKIN SEAMS (LKG EASTEND)
JOB # 04-0130F4	DWG # OBG_SEAMS
DATE: SEPTEMBER 2009	





UT Report

Project Name: SFOBB SAS Bridge.

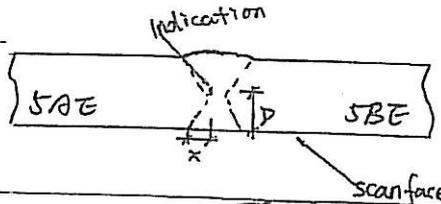
Date: 2009.10.22

Lift / Segment No.: 5AE/5BE

Location: F9.E7.E8

Report Number: UT-5E-002 (1/2)

Refer to the attached sketch.



Material:-	A709	Thickness:-	F9: 18/18 E7/E8: 16/16	Examination Specification:-	AWS D1.5		
Surface Condition:-	<input type="checkbox"/> As Welded	<input checked="" type="checkbox"/> Dressed		Acceptance Criteria:-	AWS D1.5 Table 6.3		
Type of Instrument:-	USN5dL / HS610e			Test Procedure Number:-	ZPQC-UT-01		
Type of Transducer:-	2.25MHz / 1.0; 2.25 / 6.3 x .75; 2.5P20x20x20			Reference Block:-	ITW		
Transducer Angle:-	°: 68.5, 70.6, 69.7, 69			Couplant:-	CMC Paste		
Welding Process:-	<input checked="" type="checkbox"/> FCAW				<input type="checkbox"/> SMAW	<input type="checkbox"/> GMAW	<input type="checkbox"/> SAW

Weld No.	Indication No.	Scan Face	Dimensions (mm)				Indication Rating "d"	Evaluation	Inspector	Inspection Date
			"y" from O Axis	"x"	Length "L"	Depth "D"				
OBESA-001 (FA)		outside	/	/	/	/	/	ACC.	S002	09.10.22
OBESA-001 (EA)		/	/	/	/	/	/		S002, S003, S007	
<del>OBESA-002 (E7)</del>		/	/	/	/	/	/		S025	
OBESA-002 (E7)		outside	580	8	10	9.67	+14	TLI REJ	S002	09/12/20
								Additional Indication after ZPMC Repair		
								21 DEC. 09		

Observation:-  
 Scanning Pattern:- A, B, C, D  
 Pattern D conducted inline with Transverse Segment Assembly Splice Ultrasonic Testing Procedure.

Legend: ACC--Accept, REJ--Reject, TLI--Transverse Linear Indication, LLI--Longitudinal Linear Indication, RI--Rounded Indication, LF--Lack of Fusion.

Prepared By:-	ZPMC	ABFJV	Reviewed By:-	ABFJV
Name		Wang Zhenhua	Name	STEVE LAUSTON
Sign		Wang ZH (5001)	Sign	[Signature]
Position			Position	FOAM / LEVEL III
Date		2009.10.22	Date	21 DEC. 09

5AE/5BE

UT-5E-002 (2/2)

CROSSBEAM

OBE

SPLICE

BIKE PATH

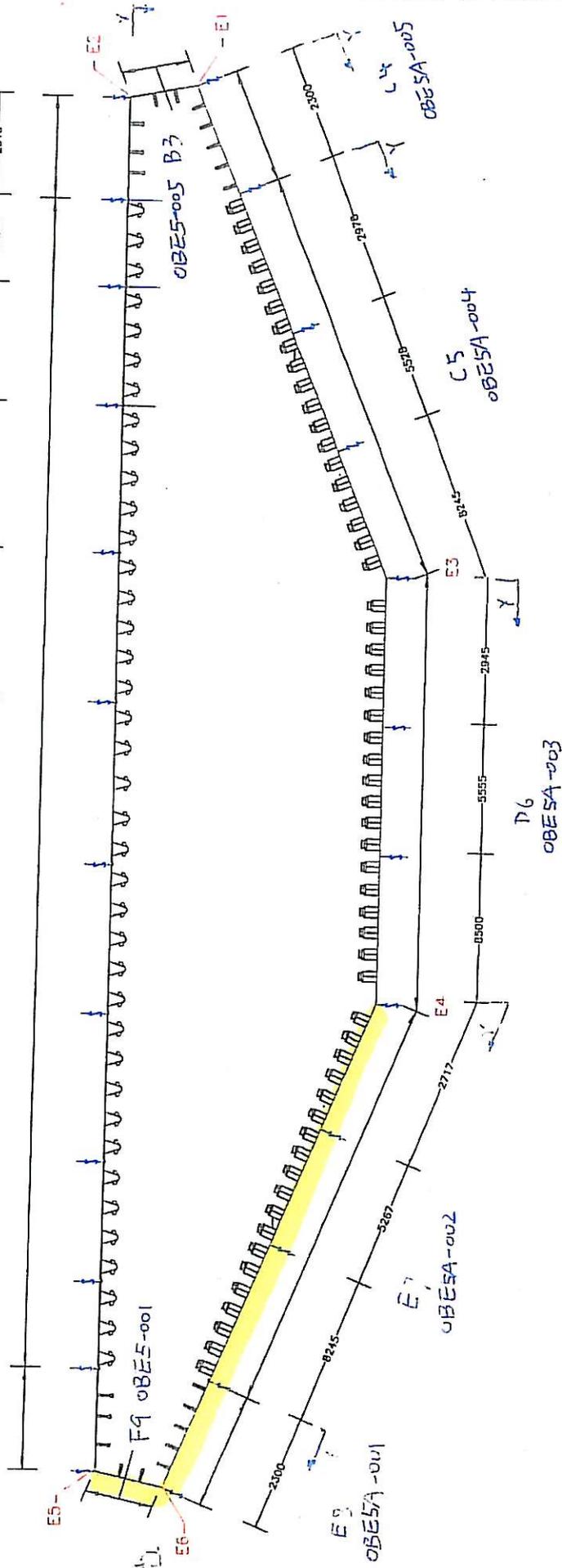
A10

A1

OBES-003

A2

OBES-004



Warn Prints

SEGMENT:	SPLICE		
DESCRIPTION:	SEGMENT SPLICE INDICATION TRACKING OBG OUTER SKIN SEAMS (LKG EASTEND)		
DRAWN BY:	R.P.	DATE: SEPTEMBER 2009	
JOB #:	04-012074	DWG #:	ORG-SEAMS





**DEPARTMENT OF TRANSPORTATION**

DIVISION OF ENGINEERING SERVICES

Office of Structural Materials

Quality Assurance and Source Inspection



Bay Area Branch  
690 Walnut Ave. St. 150  
Vallejo, CA 94592-1133  
(707) 649-5453  
(707) 649-5493

Contract #: 04-0120F4Cty: SF/ALA Rte: 80 PM: 13.2/13.9File #: xx.25A**QUALITY ASSURANCE -- NON-CONFORMANCE RESOLUTION****Location:** Changxing Island, Shanghai, P.R. China**Report No:** NCS-000607**Prime Contractor:** American Bridge/Fluor Enterprises, a JV**Date:** 14-Apr-2010**Submitting Contractor:** Zhenhua Port Machinery Company, Ltd (ZPMC), Changxing Island **NCR #:** ZPMC-0549**Type of problem:**

<b>Welding</b>	<b>Concrete</b>	<b>Other</b>	
<b>Welding</b>	<b>Curing</b>	<b>Procedural</b>	<b>Bridge No:</b> 34-0006
<b>Joint fit-up</b>	<b>Coating</b>	<b>Other</b>	<b>Component:</b>
<b>Procedural</b>	<b>Procedural</b>	<b>Descriptor:</b>	

**Date the Non-Conformance Report was written:** 01-Jan-2010**Description of Non-Conformance:**

During the Quality Assurance in-process visual inspection of lift 5 East, the QA inspector (QA) discovered the following issues:

- Weld repair was performed without the Engineer's approval.
- No approved welding procedure specification (WPS) was onsite during the welding repair process.
- This weld is identified as: OBE5-004
- Y location is 710mm measured from the Counter Weight side on the interior of the Deck Plate at Panel Point (PP32).
- This is a second time weld repair performed on a Transverse Indication.
- ZPMC discovered this indication utilizing the Magnetic Particle (MT) method.
- Lift 5 East is located in the OGB Trial Assembly Area.

**Contractor's proposal to correct the problem:**

Submit CWR after work has been completed and discuss Contract requirements regarding having appropriate WPS on hand during welding with on site QC.

**Corrective action taken:**

Contractor submitted CWR after repair work was completed and NDT inspections have verified the weld in question is in conformance with Contract specifications. ZPMC has reiterated the Contract requirements regarding having an approved WPS on site during welding to the QC in charge of the area during the time of the incident.

**Did corrective action require Engineer's approval?**

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## QUALITY ASSURANCE -- NON-CONFORMANCE RESOLUTION

( Continued Page 2 of 2 )

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Yes    No

**If so, name of Engineer providing approval:**

**Date:**

**Is Engineer's approval attached?**            Yes    No

**Comments:**

This report is for the purpose of determining conformance with the contract documents and is not for the purpose of making repair or fit for purpose recommendations. Should you require recommendations concerning repairs or remedial efforts please contact Jim Simonis 152.1675.3703, who represents the Office of Structural Materials for your project.

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**Inspected By:**    Simonis,Jim

Quality Assurance Inspector

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**Reviewed By:**    Wahbeh,Mazen

QA Reviewer