

**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  
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Contract #: 04-0120F4Cty: SF/ALA Rte: 80 PM: 13.2/13.9File #: 69.25B**QUALITY ASSURANCE -- NON-CONFORMANCE REPORT****Location:** Changxing Island, Shanghai, PRC**Report No:** NCR-000207**Prime Contractor:** American Bridge/Fluor Enterprises, a JV**Date:** 21-Oct-2008**Submitting Contractor:** Zhenhua Port Machinery Company, Ltd (ZPMC), Changxing Island**NCR #:** ZPMC-0184**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> East Shaft, Skin E; South Shaft, Skin C, Lift 1
<b>Procedural</b>	<b>Procedural</b>	<b>Description:</b> East Shaft, Skin E, and South Shaft, Skin C	

**Reference Description:** 04-0120F4 Special Provisions**Description of Non-Conformance:**

ABF/ZPMC was welding outside the parameters of their WPS to build up the joints on the East Shaft, Skin E, Lift 1 and South Shaft, Skin C, Lift 1, Longitudinal Stiffeners. The Contractor was utilizing a weave bead technique which is outside the tolerances of the WPS-345-FCAW-3G-3F-Repair for travel speed thus modifying their Heat Input into the material. The width of the weave bead observed was approximately 50 millimeters. Below is a digital photograph illustrating the welding performed on Skin Plate C of the South Shaft, lift 1 and what was observed on the East Shaft, Skin E, (Lift 1) on 10-20-2008.

**Applicable reference:**

Section 8-3, Welding Quality Control "...No welding shall be performed until the WQCP is approved in writing by the Engineer...Each WQCP shall include the following items, as determined by the Engineer...S.

Pre-qualified Welding Procedure Specifications (WPS), if applicable...V. Non-qualified Welding Procedure Specifications (WPSs) supported by PQR testing."

**Who discovered the problem:** Greg Bertlesman, Quality Assurance Inspector

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## QUALITY ASSURANCE -- NON-CONFORMANCE REPORT

( Continued Page 2 of 2 )

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**Name of individual from Contractor notified:** Steve Lawton, Quality Control Manager

**Time and method of notification:** 10/21/08;1500;Verbal

**Name of Caltrans Engineer notified:** Jun Xu

**Time and method of notification:** 10/23/08;0700;Verbal

**QC Inspector's Name:** Zhao Chen Sun

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

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

None at this time.

**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 Joshua Ishibashi, who represents the Office of Structural Materials for your project.

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**Inspected By:** Ishibashi,Josh

SMR

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**Reviewed By:** Smith,Ryan

SMR



**DEPARTMENT OF TRANSPORTATION - District 4 Toll Bridge**

333 Burma Road  
Oakland CA 94607  
Tel: Fax:

**NON-CONFORMANCE REPORT TRANSMITTAL**

**To:** AMERICAN BRIDGE/FLUOR, A JV  
375 BURMA ROAD  
OAKLAND CA 95607

**Date:** 27-Oct-2008

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

**Dear:** Mr. Charles Kanapicki

**Job Name:** SAS Superstructure

**Attention:** Mr. Dave Williams Consultant

**Document No:** 05.03.06-000178

**Subject:** NCR No. ZPMC-0184

**Reference Description:** outside the tolerances of the WPS-345-FCAW-3G-3F-Repair for travel speed

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:** Tower **Lift:** 01

**Remarks:**

ABF/ZPMC was welding outside the parameters of their WPS to build up the joints on the East Shaft, Skin E, Lift 1 and South Shaft, Skin C, Lift 1, Longitudinal Stiffeners. The Contractor was utilizing a weave bead technique which is outside the tolerances of the WPS-345-FCAW-3G-3F-Repair for travel speed thus modifying their Heat Input into the material.

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

Propose a resolution for the identified non-conformance with revised procedures to prevent future occurrences.

**Transmitted by:** Jun Xu

**Attachments:** ZPMC-0184

**cc:** Rick Morrow, Gary Pursell, Mark Woods, Doug Coe, Scott Kennedy

**File:** 05.03.06

## NCR PROPOSED RESOLUTION

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

**Attention:** Pursell, Gary  
Resident Engineer

**Ref:** 05.03.06-000178

**Subject:** NCR No. ZPMC-0184

**Dated:** 18-Dec-2008

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

**Job Name:** SAS Superstructure

**Document No.:** ABF-NPR-000185 **Rev:** 00

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### Contractor's Proposed Resolution:

**Reference Resolution:** ZPMC has been notified that a weave pass of this width is indicative of a travel speed that may be out of parameters for the weld procedure noted. ZPMC will grind and MT the weld build up area.

The weld build up measured is 50mm. The NCR states that the travel speed was outside the parameters of the weld procedure based upon a measured weave pass. It is unclear based on the NCR information how the inspector determined the Travel Speed was out of parameters based on the width of the weld pass. Without this information the heat input cannot be calculated. ZPMC has been notified that a weave pass of this width is indicative of a travel speed that may be out of parameters for the weld procedure noted. ZPMC will grind and MT the weld build up area.

### Submitted by:

**Attachment(s):** ABF-NPR-000185R00

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### Caltrans' comments:

**Status:** REJ

**Date:** 30-Dec-2008

The proposed resolution is not acceptable. An FCAW bead width of 50mm is an indication of travel speed outside of weld parameters. Also, it exceeds the maximum allowable bead width of 25mm per Section 4.14.1.5 of AWS D1.5.

This Non-Conformance, along with the extensive amount of buttering as documented in Non-Conformance ZPMC-0190, gives the Department cause for concern about the quality of the weld build-up. The proposal to grind and MT the weld build-up area is not sufficient, and more extensive testing than MT only should be performed to ensure the quality of the weld.

Please contact the Department's representatives in Shanghai to discuss this issue, and propose a resolution with a revised NPR or with a Request for Information.

**Submitted by:** Wright, Doug

**Date:** 31-Dec-2008

**Attachment(s):**

## NCR PROPOSED RESOLUTION

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

**Attention:** Pursell, Gary  
Resident Engineer

**Ref:** 05.03.06-000178

**Subject:** NCR No. ZPMC-0184

**Dated:** 17-Mar-2009

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

**Job Name:** SAS Superstructure

**Document No.:** ABF-NPR-000185 **Rev:** 01

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### Contractor's Proposed Resolution:

**Reference Resolution:** As per discussions with CT additional hardness testing was performed and documented. MT and UT will be carried out after machining.

As per discussions with CT additional hardness testing was performed and documented. See attached documentation. MT and UT will be carried out after machining. ZPMC requests closure of this NCR as the heat input issue has been addressed by the hardness testing.

### Submitted by:

**Attachment(s):** ABF-NPR-000185R01;

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### Caltrans' comments:

**Status:** REJ

**Date:** 15-Apr-2009

The proposed resolution is not acceptable. There were inconsistencies with the attached hardness testing results, and the hardness sampling locations could not be identified. Please coordinate with the Department's representatives in Shanghai for hardness testing in the presence of the Engineer.

**Submitted by:** Wright, Doug

**Date:** 15-Apr-2009

**Attachment(s):**

## Hardness Survey on Buttering area at Long Stiff End

### Location : 1st Lift South Tower ( Skin C )

Reading taken at	Location	Reading 1	Reading 2	Reading 3	Ave.
Buttering weld	1	180	182	183	182
Buttering weld	2	183	207	181	190
Buttering weld	3	199	179	182	187
HAZ	4	195	196	192	194
HAZ	5	195	211	201	202
HAZ	6	207	219	187	204
Base Metal	7	232	220	230	227
Base Metal	8	190	193	188	190
Base Metal	9	186	188	203	192
Long Stiff edge**	10	157	156	157	157

\*\*Addition Point No. 10 is done in edge of Long Stiff

### Location : 1st Lift East Tower ( Skin E )

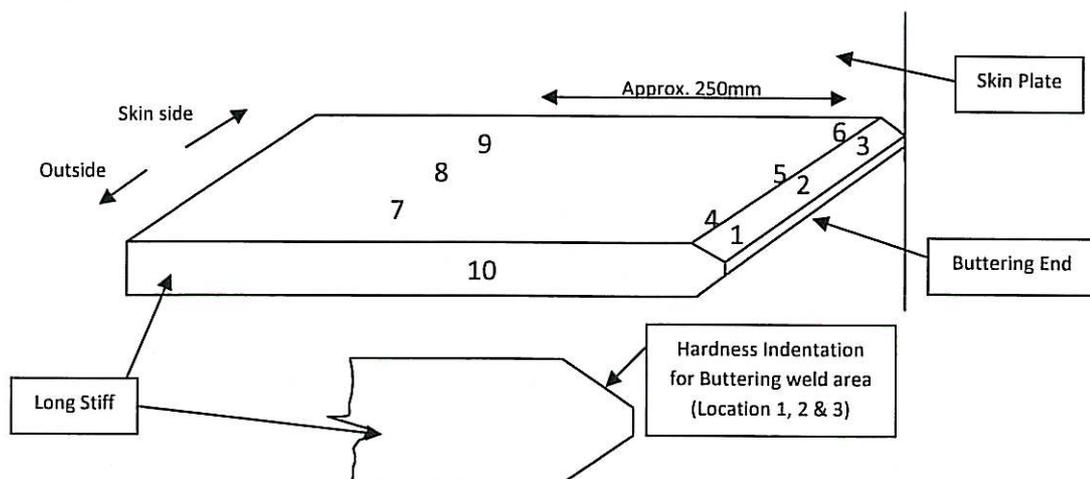
Reading taken at	Location	Reading 1	Reading 2	Reading 3	Ave.
Buttering weld	1	188	184	190	187
Buttering weld	2	172	191	201	188
Buttering weld	3	175	198	192	188
HAZ	4	202	186	190	193
HAZ	5	195	175	180	183
HAZ*	6	Nil	Nil	Nil	0
Base Metal	7	166	162	178	169
Base Metal	8	171	183	185	180
Base Metal	9	175	177	180	177

\*HAZ cannot be identified after etching, no reading is taken.

#### Note :

- 5 Readings are taken in each tested point in general, highest and lowest values are deleted and not used.

### Location of Hardness Indentation Points

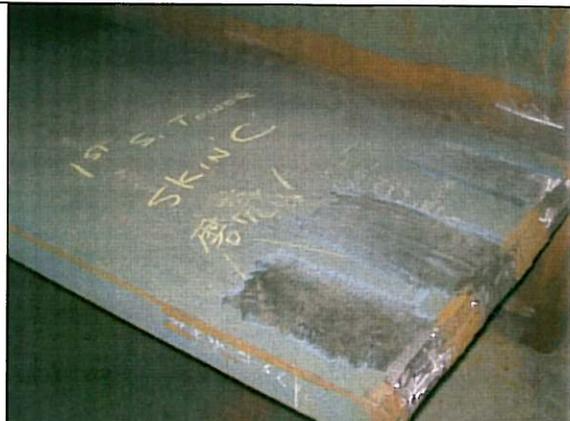


Photos Reference for Hardness Survey in Long Stiff

A. 1<sup>st</sup> Lift South Tower ( Skin C )



Tested Long Stiff in Skin C



Tested Locations



Hardness Checking Process



Hardness reading ( Hv 180 ) in weld



Hardness Reading ( Hv 195 ) in HAZ

Photos Reference for Hardness Survey in Long Stiff

B. 1<sup>st</sup> Lift East Tower ( Skin E )

<p>1<sup>st</sup> Lift East Tower Skin E</p>	<p>Tested Long Stiff</p>
<p>Check on Base Metal</p>	<p>Base Metal Hardness ( Hv 162 )</p>
<p>Check on Buttering weld ( Hv 190 )</p>	<p>Check on HAZ ( difficult to locate HAZ )</p>

## NCR PROPOSED RESOLUTION

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

**Attention:** Pursell, Gary  
Resident Engineer

**Ref:** 05.03.06-000178

**Subject:** NCR No. ZPMC-0184

**Dated:** 14-Oct-2009

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

**Job Name:** SAS Superstructure

**Document No.:** ABF-NPR-000185 **Rev:** 02

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### Contractor's Proposed Resolution:

**Reference Resolution:** Attached are the locations of hardness testing in Lift 1 of the South and East shafts in built up areas. ZPMC requests closure of the NCR based on the submitted documentation.

Attached are the locations of hardness testing in Lift 1 of the South and East shafts in built up areas. Contained in the attachment are pictures of the methodology and equipment used to gather the data. ZPMC requests closure of the NCR based on the submitted documentation.

### Submitted by:

**Attachment(s):** ABF-NPR-000185R02;

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### Caltrans' comments:

**Status:** CLO

**Date:** 14-Oct-2009

Based on the submitted documentation and verbal clarification from the ABF JV representative during the regularly scheduled weekly Tower Meeting, the proposed resolution is acceptable.

The Department concurs that Non-Conformance ZPMC-184 is closed.

**Submitted by:** Lee, Ken

**Date:** 14-Oct-2009

**Attachment(s):**

# Hardness Testing Lift 1, East and South Shaft

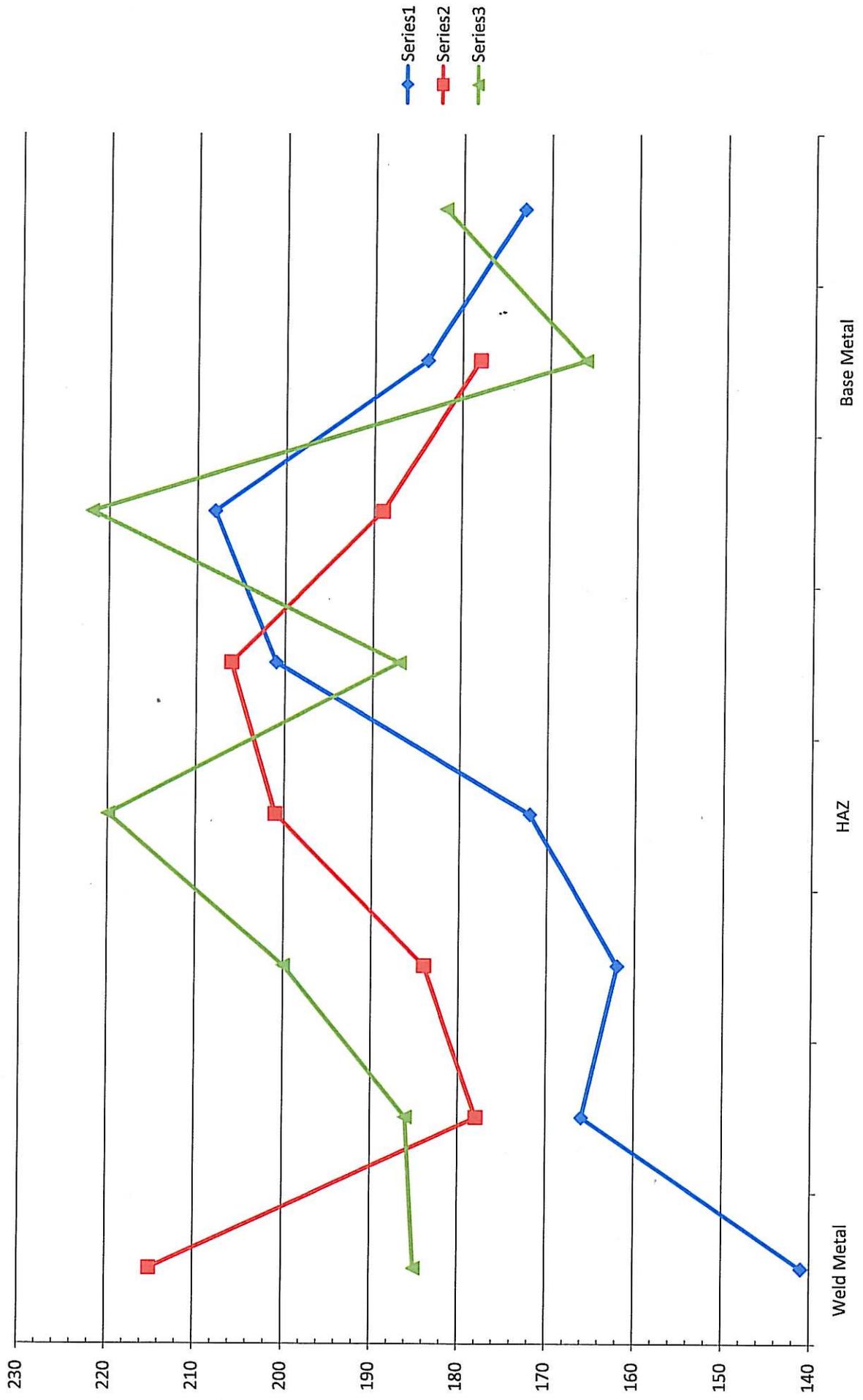
## East - 5/5/2009

172	156	143	182	Weld Metal
168	158	151	181	
158	141	181	182	
167	181	173	160	HAZ
171	149	149	176	
158	154	159	181	
174	170	163	159	Base Metal

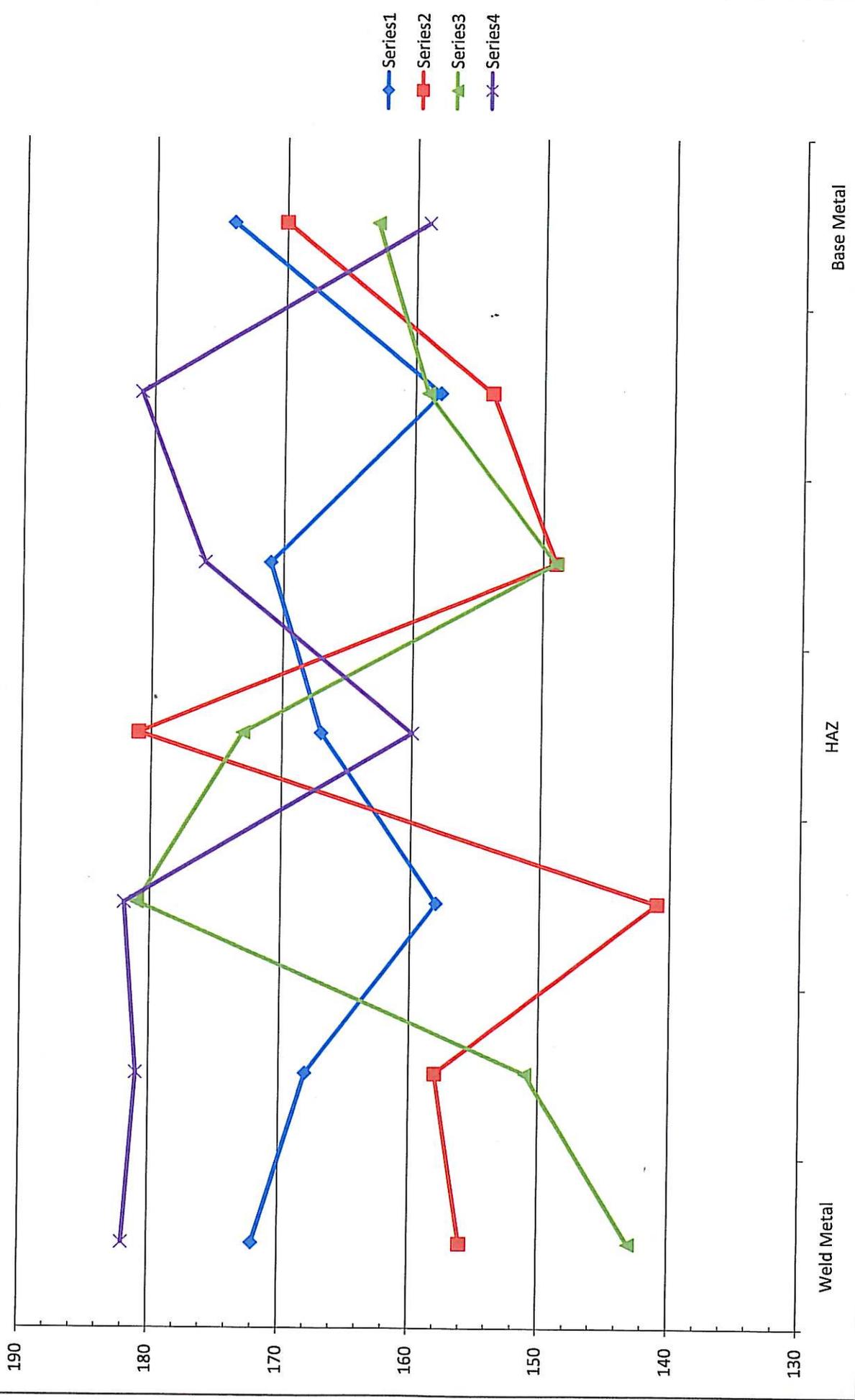
## South - 4/28/2009

141	215	185	Weld Metal
166	178	186	
162	184	200	
172	201	220	HAZ
201	206	187	
208	189	222	
184	178	166	
173		182	Base Metal

# Vickers Hardness - South Shaft Buttering - 4/28/2009



# Brinnell Hardness - East Shaft Buttering - 5/5/2009



Hardness Testing Lift 1, East Shaft



Hardness Testing Lift 1, East Shaft



Hardness Testing Lift 1, East Shaft



Hardness Testing Lift 1, East Shaft

TH140  
Hardness Tester  
TIME GROUP Inc.

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No.:

Operator:

Time: 08:47:29  
Date: 05/05/2009

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Probe Type: D  
Impact Direc.: ↓  
Average: 07  
Material:  
(Cast) Steel

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172	171
168	158
158	174
167	

Average = 167HB

# Hardness Testing Lift 1, East Shaft

156	149
158	154
141	170
181	

Average= 158HB

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143	149
151	159
181	163
173	

Average= 159HB

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182	176
181	181
182	159
160	

Average= 174HB

Hardness Testing Lift 1, South Shaft



Hardness Testing Lift 1, South Shaft



Hardness Testing Lift 1, South Shaft



Hardness Testing Lift 1, South Shaft





Hardness Testing Lift 1, South Shaft

Hardness Testing Lift 1, South Shaft

1	191	16	185
2	166		186
3	162		200
4	172		220
5	201		187
6	208		224
	184		166
	173		182

7	215		
8	178		
	184		
	201		
	206		
	189		
	178		

184

166

173

182

~~184~~ 215

178

184

201

206

189

178

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(707) 649-5453  
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Contract #: 04-0120F4Cty: SF/ALA Rte: 80 PM: 13.2/13.9File #: xx.25A**QUALITY ASSURANCE -- NON-CONFORMANCE RESOLUTION****Location:** Changxing Island, Shanghai, PRC**Report No:** NCS-000308**Prime Contractor:** American Bridge/Fluor Enterprises, a JV**Date:** 08-Oct-2009**Submitting Contractor:** Zhenhua Port Machinery Company, Ltd (ZPMC), Changxing Island **NCR #:** ZPMC-0184**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:** 21-Oct-2008**Description of Non-Conformance:**

ABF/ZPMC was welding outside the parameters of their WPS to build up the joints on the East Shaft, Skin E, Lift 1 and South Shaft, Skin C, Lift 1, Longitudinal Stiffeners. The Contractor was utilizing a weave bead technique which is outside the tolerances of the WPS-345-FCAW-3G-3F-Repair for travel speed thus modifying their Heat Input into the material. The width of the weave bead observed was approximately 50 millimeters.

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

Perform harness testing, 100% UT and 100% MT on the weld build up.

**Corrective action taken:**

Hardness testing was performed on both East & South Shaft weld build up, indicating acceptable results. 100% UT and MT NDT results were submitted, indicating that the weld build up is sound, and the welds were subsequently verified by QA.

**Did corrective action require Engineer's approval?** 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 Serge Sinevod, 134-8257-0045, who represents the Office of Structural Materials for your project.

**Inspected By:** Sinevod, Serge

Quality Assurance Inspector

**Reviewed By:** Wahbeh, Mazen

QA Reviewer