GUSSET PLATE ANALYSIS

SUM-8-1.99
PID No. 85246

SR 8 over CSX Railroad, Wheeling & Lake Erie Railroad,
Akron Metro RTA, Cuyahoga Valley Scenic Railroad,
Remnants of the Pennsylvania & Ohio Canal,
Little Cuyahoga River, and East North Street

City of Akron
Summit County, Ohio

October 2009

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INTRODUCTION

Bridge SUM-8-0199, the Expressway Viaduct, is a high-level bridge carrying State Route 8 over CSX Railroad, Wheeling & Lake Erie Railroad, Akron Metro RTA, Cuyahoga Valley Scenic Railroad, remnants of the Pennsylvania & Ohio Canal, Little Cuyahoga River, and East North Street in Akron, Ohio. The structure comprises three units: the three-span girder rear approach (Unit 1), the three-span deck truss main unit (Unit 2), and the two-span girder forward approach (Unit 3). The overall length of the bridge is 1,582.75 feet. The bridge carries an estimated 128,410 vehicles per day (2001), including about 8,480 trucks (6.6%).

Unit 2 of Bridge SUM-8-0199, a three-span deck arch truss structure, has some similarities to the I-35W bridge in Minneapolis which failed on August 1, 2007. On January 15, 2008, the National Transportation Safety Board (NTSB) issued an interim report about the failure, focusing on apparent design errors on two gusset plates. The Federal Highway Administration (FHWA) subsequently issued an advisory recommending analyzing gusset plates on other truss bridges as part of the truss load ratings.

The truss gusset plates of Bridge SUM-8-0199 had not been analyzed previously. Gusset plate analysis was not included in the then-current scope of services. On January 23, 2008, District 4 requested that Richland Engineering Limited provide a proposal for analyzing the existing gusset plates in the three-span deck truss (Unit 2). Richland Engineering Limited was authorized on February 20, 2008, to analyze the gusset plates.

In the absence of shop drawings or detailed field measurements, the SUM-8-0199 truss gusset plates were analyzed based on the full plate thickness and dimensions scaled from the original design drawings. The analysis indicated a rating at L_4 of HS 20.1 governed by "horizontal" shear, along a line averaging the slope of the lower chord members framed into the joint.

The report *Gusset Plate Analysis*, dated April 2008, recommended that "both gusset plates at all four of the L_4 locations…be carefully inspected. Thickness measurements should be taken at intervals along the horizontal shear line. The average thickness for each plate should be used to then re-evaluate the capacity of each of the eight L_4 gusset plates."

On December 8, 2008, District 4 requested that Richland Engineering Limited provide a proposal for "additional inspection, gusset plate analysis and rehabilitation plans for Structure SUM-8-0195" and authorized Part 4 – Gusset Plate Inspection, Re-analysis, and Retrofit Plans.

ANALYSIS METHOD

No shop (fabrication) drawings are available for the structure. The gusset plates are not dimensioned in the design drawings, nor is the rivet spacing within the various connections dimensioned. The required gusset plate thickness and the steel type are indicated for each of the gusset plates, and a standard rivet size is called out. (A subset of the original construction plans is included in the appendix.) Field measurements, therefore, were required to establish the gusset plate dimensions.

The field measurements included the gusset plate outlines and diagonals (since shop drawings are not available), the gusset plate thickness (both to confirm the plan thicknesses and to find section losses), and the flatness of the gusset plates. The plate thickness measurements were accomplished using an ultrasonic thickness gage. The L_4 gusset plates were measured in January 2009. The remaining gusset plates were measured in March and April 2009. (Field notes and photographs are included in the appendix.)

Richland Engineering Limited performed a truss rating analysis in Part 1 of this project, as part of the Preliminary Engineering Study. We used the truss member loads derived during that analysis for the gusset plate analysis. (A summary of the truss member loads is included in the appendix.)

The steel properties for the analysis are based on the steel descriptions in the general notes in the original construction plans. Two types of steel were called out for the structure, including the gusset plates:

(c) *Copper-bearing carbon structural steel and rivet steel shall conform to Section M-7.4(b) of the specifications.*

According to the 1951 ODOT *Construction and Material Specifications*, Section M-7.4 (b), "Structural steel, copper bearing, shall conform to the requirements of Sec. M-7.4 (a), Structure Steel…" with the addition of a small amount of copper.

Paragraph 2 of Section M-7.4 (a) says that "All structural, and rivet steel shall conform to ASTM Designation A7."

Therefore, the gusset plates labeled as **(c)** are treated as A7 steel. Based on the AASHTO *Manual for Condition Evaluation of Bridges*, the yield strength A7 steel is 33 ksi.

(s) *Silicon steel shall conform to ASTM specifications for structural silicon steel, Designation A94.*

According to the AASHTO *Manual for Condition Evaluation of Bridges*, the yield strength of A94 steel varies between 45 ksi and 50 ksi, depending on its thickness. For plates $1\frac{1}{8}$" and under, the yield strength is 50 ksi.

Since the maximum gusset plate thickness in the plans is $\frac{7}{8}$", the gusset plates labeled as **(s)** are treated as A94 steel with a yield strength of 50 ksi.

The gusset plate analysis was performed in accordance with the FHWA Publication FHWA-IF-09-014, *Load Rating Guidance and Examples For Bolted and Riveted Gusset Plates In Truss Bridges* dated February 2009. Specifically, the analysis was based on Load Factor Rating with the following factors:

- 0.9 – Global factor of safety for non-redundant bridges
- 0.8 – Shear resistance factor for connection length > 50 inches
- 1.0 – Gusset plate shear reduction factor, Ω (based on conversation with Tom Lefchik, FHWA)
- 1.2 – Effective length factor, k, for unbraced gusset plate
- 1.0 – Effective length factor, k, for gusset plate braced by floorbeam connection

RESULTS SUMMARY

The results of the analyses are shown on the following pages. (The detailed calculations for each of the gusset plates are included in the appendix.) Findings requiring further attention include:

- The analysis confirmed that the L_4/ L_4' gusset plates do need overplated. (The overplating had already been designed, and was included in Project 354(09).)
- The gusset plates at L_1/L_1' and most of the upper chord fail the edge buckling criteria of AASHTO 10.16.11.3.
- Bows greater than or equal to ¼ inch were measured at a number of gusset plates.

RECOMMENDATIONS

Based on this analysis of the gusset plates for the truss spans (Unit 2) of Bridge SUM-8-0199, Project 354(09) was deferred. The following work was added to the project, which was subsequently let as Project 8027(09):

- Stiffen the gusset plates failing the edge buckling criteria of AASHTO 10.16.11.3 by adding angles to the implicated plate edges. (This edge-of-plate stiffening does not require the "double-nut method.") A total of 80 plate edges, at 32 gusset-plated truss connections, were added to the project.
- Reinforce gusset plate edge bows greater than or equal to ¼ inch with angles to restrict further movement out of plane. (Reinforcing bowed plates requires the "double-nut method" to tie into the existing chord members.) A total of 50 plate edges, at 23 gusset-plated truss connections, were added to the project.
- Reinforce interior gusset plate bows greater than or equal to ¼ inch with plates to restrict further movement out of plane. (Reinforcing bowed plates requires the "double-nut method" to tie into the existing chord members.) Plate reinforcement for the outside gusset plate of three lower-chord connections was added to the project.

SUM-8-1.99 GUSSET PLATE CONDITIONS

REPAIR CRITERIA -

Gusset plate bow equal to or greater than 1/4" = add angles only
Gusset plate edge unstiffened length criteria not met = add angles
Existing gusset plate stiffener = connect to chord

Parallel bowing (+ bowing out, - bowing in)
Inventory Load Rating less than HS 20-44 = add plate and angles as needed

Bow ≥ 1/4"
Unstiffened Edge only
Existing Stiffener only
Both Unstiffened Edge & Existing
Both Unstiffened Edge & Existing
Rating <HS 20

SECTION LOSS - AVG = Average loss over entire plate
MAX = Maximum single measured loss

WEST TRUSS

SPAN	PANEL	PLATE THKNS	INSIDE PLATE SECTION LOSS DATE	INSIDE PLATE SECTION LOSS AVG	INSIDE PLATE SECTION LOSS MAX	INSIDE PLATE MAX BOW	INSIDE PLATE MAX BOW LOCATION	OUTSIDE PLATE SECTION LOSS DATE	OUTSIDE PLATE SECTION LOSS AVG	OUTSIDE PLATE SECTION LOSS MAX	OUTSIDE PLATE MAX BOW	OUTSIDE PLATE MAX BOW LOCATION	EDGE BUCKLING CRIT	EXISTING INVENTORY LOAD
Pier 3	L0	3/4"	19-Mar	27%	45%	1/8"	General	16-Mar	24%	47%	1/8"	Edge	Pass	HS 22.1
4	L1	3/4"	16-Mar	25%	52%	**1/4"**	Edge	16-Mar	24%	35%	1/8"	Interior	**FAIL**	HS 24.6
4	L2	3/4"	17-Mar	24%	40%	3/16"	Edge	17-Mar	24%	41%	1/16"	General	Pass	HS 54.8
4	L3	3/4"	17-Mar	24%	51%	**3/8"**	Edge	17-Mar	28%	57%	3/16"	General	Pass	HS 28.3
4	L4	3/4"	9-Jan	27%	53%	1/8"	Edge	9-Jan	26%	56%	3/16"	Interior	Pass	**HS 11.0**
4	L5	3/4"	19-Mar	31%	44%	3/16"	Edge	19-Mar	33%	52%	1/16"	General	Pass	HS 24.3
4	L6	3/4"	10-Mar	26%	47%	1/8"	Interior	9-Mar	19%	36%	3/16"	Interior	Pass	HS 25.1
4	L7	3/4"	10-Mar	9%	44%	3/16"	Edge	9-Mar	16%	37%	**3/8"**	Edge	Pass	HS 35.4
Pier 4	L8	7/8"+3/4"	9-Mar			0		9-Mar			0		Pass	HS 38.0
5	L9	3/4"	13-Mar	20%	44%	**1/4"**	Edge	13-Mar	20%	53%	1/8"	General	Pass	HS 36.5
5	L10	3/4"	9-Mar	22%	43%	3/16"	Edge	13-Mar	26%	47%	1/16"	General	Pass	HS 47.8
5	L11	3/4"	23-Mar	16%	36%	1/8"	General	23-Mar	34%	57%	3/16"	Edge	Pass	HS 45.3
5	L12	3/4"	24-Mar	24%	39%	1/8"	General	24-Mar	35%	52%	**5/16"**	General	Pass	HS 29.0
5	L13	3/4"	24-Mar	20%	44%	3/16"	Interior	24-Mar	26%	47%	3/16"	Edge	Pass	HS 39.8
5	L12'	3/4"	25-Mar	38%	55%	1/8"	General	25-Mar	28%	52%	3/16"	Interior	Pass	HS 29.0
5	L11'	3/4"	26-Mar	18%	60%	1/8"	General	26-Mar	19%	35%	**1/4"**	Interior	Pass	HS 45.3
5	L10'	3/4"	6-Mar	25%	44%	1/8"	General	6-Mar	23%	39%	**1/4"**	Interior	Pass	HS 47.8
5	L9'	3/4"	6-Mar	21%	53%	0		5-Mar	22%	52%	**1/4"**	General	Pass	HS 36.5
Pier 5	L8'	7/8"+3/4"	2-Mar			0		2-Mar			0		Pass	HS 48.1
6	L7'	3/4"	4-Mar	13%	31%	**1/4"**	Edge	4-Mar	27%	60%	1/8"	Edge	Pass	HS 35.4
6	L6'	3/4"	4-Mar	19%	40%	1/8"	Interior	4-Mar	17%	52%	3/16"	Interior	Pass	HS 25.1
6	L5'	3/4"	31-Mar	15%	40%	**3/8"**	Edge	31-Mar	23%	47%	3/16"	Interior	Pass	HS 24.3
6	L4'	3/4"	9-Jan	17%	45%	1/16"	Edge	9-Jan	21%	45%	3/16"	Interior	Pass	**HS 12.7**
6	L3'	3/4"	31-Mar	20%	40%	1/8"	Edge	31-Mar	30%	55%	**5/16"**	Edge	Pass	HS 28.3
6	L2'	3/4"	2-Apr	15%	27%	**1/4"**	Edge	2-Apr	39%	63%	**1/4"**	Interior	Pass	HS 54.8
6	L1'	3/4"	2-Apr	20%	35%	1/8"	Interior	2-Apr	35%	60%	1/16"	General	**FAIL**	HS 24.6
Pier 6	L0'	3/4"	3-Apr	19%	49%	1/8"	Interior	3-Apr	20%	44%	3/16"	Edge	Pass	HS 22.1

EAST TRUSS

SPAN	PANEL	PLATE THKNS	INSIDE PLATE SECTION LOSS DATE	INSIDE PLATE SECTION LOSS AVG	INSIDE PLATE SECTION LOSS MAX	INSIDE PLATE MAX BOW	INSIDE PLATE MAX BOW LOCATION	OUTSIDE PLATE SECTION LOSS DATE	OUTSIDE PLATE SECTION LOSS AVG	OUTSIDE PLATE SECTION LOSS MAX	OUTSIDE PLATE MAX BOW	OUTSIDE PLATE MAX BOW LOCATION	EDGE BUCKLING CRIT	EXISTING INVENTORY LOAD
Pier 3	L0	3/4"	24-Apr	21%	44%	1/8"	General	24-Apr	26%	53%	**1/4"**	Edge	Pass	HS 22.1
4	L1	3/4"	23-Apr	31%	57%	1/8"	Interior	23-Apr	27%	47%	3/16"	Interior	**FAIL**	HS 24.6
4	L2	3/4"	23-Apr	31%	49%	1/8"	Edge	23-Apr	34%	48%	3/16"	Interior	Pass	HS 54.8
4	L3	3/4"	22-Apr	22%	43%	3/16"	Interior	22-Apr	29%	48%	**5/16"**	Edge	Pass	HS 28.3
4	L4	3/4"	8-Jan	21%	60%	3/16"	Edge	8-Jan	21%	47%	3/16"	Interior	Pass	**HS 12.7**
4	L5	3/4"	21-Apr	24%	37%	**1/4"**	Edge	21-Apr	35%	52%	1/8"	General	Pass	HS 24.3
4	L6	3/4"	11-Mar	17%	36%	1/8"	Edge	11-Mar	25%	43%	**1/4"**	Interior	Pass	HS 25.1
4	L7	3/4"	11-Mar	18%	69%	1/8"	General	11-Mar	22%	52%	3/16"	Edge	Pass	HS 35.4
Pier 4	L8	7/8"+3/4"	10-Mar			0		11-Mar			1/16"	Edge	Pass	HS 38.0
5	L9	3/4"	12-Mar	27%	57%	1/16"	Interior	12-Mar	21%	44%	1/16"	General	Pass	HS 36.5
5	L10	3/4"	12-Mar	17%	37%	1/8"	Interior	12-Mar	22%	43%	**1/4"**	General	Pass	HS 47.8
5	L11	3/4"	16-Apr	29%	52%	1/8"	Edge	16-Apr	35%	52%	3/16"	Interior	Pass	HS 45.3
5	L12	3/4"	16-Apr	33%	47%	**1/4"**	Edge	16-Apr	29%	52%	1/8"	Interior	Pass	HS 29.0
5	L13	3/4"	15-Apr	34%	71%	1/8"	Edge	15-Apr	28%	57%	**5/16"**	Edge	Pass	HS 35.5
5	L12'	3/4"	14-Apr	26%	43%	1/8"	Edge	14-Apr	24%	43%	**1/4"**	Interior	Pass	HS 29.0
5	L11'	3/4"	14-Apr	33%	59%	1/8"	General	14-Apr	24%	41%	1/8"	General	Pass	HS 45.3
5	L10'	3/4"	5-Mar	16%	51%	1/16"	General	5-Mar	29%	55%	1/8"	Interior	Pass	HS 47.8
5	L9'	3/4"	5-Mar	14%	51%	1/8"	General	5-Mar	35%	60%	1/16"	Interior	Pass	HS 36.5
Pier 5	L8'	7/8"+3/4"	3-Mar			0		3-Mar			0		Pass	HS 48.1
6	L7'	3/4"	3-Mar	14%	36%	0		3-Mar	18%	39%	1/8"	General	Pass	HS 35.4
6	L6'	3/4"	4-Mar	13%	41%	3/16"	Edge	3-Mar	16%	36%	3/16"	Interior	Pass	HS 25.1
6	L5'	3/4"	9-Apr	27%	45%	1/8"	Edge	9-Apr	26%	47%	**5/16"**	Interior	Pass	HS 24.3
6	L4'	3/4"	8-Jan	17%	35%	**1/4"**	Edge	8-Jan	22%	51%	1/8"	Edge	Pass	**HS 12.4**
6	L3'	3/4"	8-Apr	29%	52%	**5/16"**	Edge	8-Apr	25%	49%	1/8"	Edge	Pass	HS 28.3
6	L2'	3/4"	8-Apr	25%	43%	1/16"	Edge	8-Apr	30%	45%	1/8"	General	Pass	HS 54.8
6	L1'	3/4"	6-Apr	29%	44%	1/8"	Edge	6-Apr	29%	49%	3/16"	Interior	**FAIL**	HS 24.6
Pier 6	L0'	3/4"	6-Apr	27%	55%	3/16"	Edge	6-Apr	23%	45%	1/8"	Interior	Pass	HS 22.1

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SUM-8-1.99 GUSSET PLATE CONDITIONS

REPAIR CRITERIA -

Gusset plate bow equal to or greater than 1/4" = add angles only
Gusset plate edge unstiffened length criteria not met = add angles
Existing gusset plate stiffener = connect to chord

Parallel bowing (+ bowing out, - bowing in)
Inventory Load Rating less than HS 20-44 = add plate and angles as needed

Bow ≥ 1/4"
Unstiffened Edge only
Existing Stiffener only
Both Unstiffened Edge & Existing
Both Unstiffened Edge & Existing
Rating <HS 20

SECTION LOSS - AVG = Average loss over entire plate
MAX = Maximum single measured loss

WEST TRUSS

SPAN	PANEL	PLATE THKNS	INSIDE PLATE SECTION LOSS DATE	INSIDE PLATE SECTION LOSS AVG	INSIDE PLATE SECTION LOSS MAX	INSIDE PLATE MAX BOW	INSIDE PLATE MAX BOW LOCATION	OUTSIDE PLATE SECTION LOSS DATE	OUTSIDE PLATE SECTION LOSS AVG	OUTSIDE PLATE SECTION LOSS MAX	OUTSIDE PLATE MAX BOW	OUTSIDE PLATE MAX BOW LOCATION	EDGE BUCKLING CRIT	EXISTING INVENTORY LOAD
Pier 3	U0	1/2"											Pass	HS 22.7
4	U1	3/4"+1/2"	16-Mar			1/16"		16-Mar			1/8"	General	Pass	HS 34.8
4	U2	3/4"	17-Mar			1/16"	Edge	17-Mar			1/16"	Edge	Pass	HS 32.0
4	U3	3/4"	18-Mar			1/16"	Interior	18-Mar			1/16"	Interior	FAIL	HS 35.9
4	U4	3/4"	18-Mar			- 5/16"	Edge	18-Mar			- 3/16"	General	Pass	HS 27.8
4	U5	3/4"	19-Mar			+ 3/16"	Edge	19-Mar			+ 1/4"	Edge	FAIL	HS 27.2
4	U6	3/4"	19-Mar			+ 1/4"	Edge	19-Mar			+ 1/4"	General	FAIL	HS 24.4
4	U7	3/4"	20-Mar			+ 3/16"	Edge	20-Mar			+ 1/4"	Edge	FAIL	HS 34.8
Pier 4	U8	3/4"	20-Mar	5%		1/8"	General	20-Mar	5%		1/8"	General	FAIL	HS 48.8
5	U9	3/4"	20-Mar			+ 1/4"	Edge	20-Mar			+ 1/4"	Edge	FAIL	HS 37.6
5	U10	3/4"	23-Mar			1/16"	General	23-Mar			3/16"	Interior	FAIL	HS 45.3
5	U11	3/4"	23-Mar			1/8"	Edge	23-Mar	2%		1/4"	Interior	Pass	HS 40.8
5	U12	3/4"	24-Mar			1/16"	General	24-Mar			1/16"	General	FAIL	HS 24.3
5	U13	3/4"	25-Mar			1/16"	Edge	25-Mar			1/16"	Interior	Pass	HS 30.3
5	U12'	3/4"	25-Mar			1/16"	General	25-Mar			1/8"	General	FAIL	HS 24.3
5	U11'	3/4"	26-Mar			1/16"	General	26-Mar			1/16"	General	Pass	HS 40.8
5	U10'	3/4"	27-Mar			1/16"	General	27-Mar			3/16"	Interior	FAIL	HS 45.3
5	U9'	3/4"	27-Mar			1/8"	Edge	27-Mar			1/8"	Interior	FAIL	HS 37.6
Pier 5	U8'	3/4"	27-Mar	5%		1/8"	Edge	27-Mar	10%		3/16"	Edge	FAIL	HS 48.8
6	U7'	3/4"	30-Mar			1/16"	Edge	30-Mar			1/8"	Edge	FAIL	HS 34.8
6	U6'	3/4"	30-Mar			1/8"	Edge	30-Mar			1/16"	Interior	FAIL	HS 24.4
6	U5'	3/4"	30-Mar			3/16"	Edge	30-Mar			1/8"	Interior	FAIL	HS 27.2
6	U4'	3/4"	1-Apr			1/16"	General	1-Apr			1/16"	General	Pass	HS 27.8
6	U3'	3/4"	1-Apr			1/16"	General	1-Apr			1/8"	Edge	FAIL	HS 35.9
6	U2'	3/4"	2-Apr			0		2-Apr			1/16"	General	Pass	HS 32.0
6	U1'	3/4"+1/2"	3-Apr			1/16"	General	3-Apr			1/16"	General	Pass	HS 34.8
Pier 6	U0'	1/2"											Pass	HS 22.7

EAST TRUSS

SPAN	PANEL	PLATE THKNS	INSIDE PLATE SECTION LOSS DATE	INSIDE PLATE SECTION LOSS AVG	INSIDE PLATE SECTION LOSS MAX	INSIDE PLATE MAX BOW	INSIDE PLATE MAX BOW LOCATION	OUTSIDE PLATE SECTION LOSS DATE	OUTSIDE PLATE SECTION LOSS AVG	OUTSIDE PLATE SECTION LOSS MAX	OUTSIDE PLATE MAX BOW	OUTSIDE PLATE MAX BOW LOCATION	EDGE BUCKLING CRIT	EXISTING INVENTORY LOAD
Pier 3	U0	1/2"											Pass	HS 22.7
4	U1	3/4"	24-Apr			1/8"	Edge	24-Apr			1/4"	Edge	Pass	HS 34.8
4	U2	3/4"	23-Apr			1/16"	Edge	23-Apr			1/8"	Interior	Pass	HS 32.0
4	U3	3/4"	22-Apr			1/8"	Edge	22-Apr			1/8"	General	FAIL	HS 35.9
4	U4	3/4"	21-Apr			1/8"	Interior	21-Apr			1/8"	Interior	Pass	HS 27.8
4	U5	3/4"	20-Apr			0		20-Apr			1/8"	Interior	FAIL	HS 27.2
4	U6	3/4"	20-Apr			1/8"	Edge	20-Apr			1/8"	Edge	FAIL	HS 24.4
4	U7	3/4"	20-Apr			1/8"	General	20-Apr			1/8"	Edge	FAIL	HS 34.8
Pier 4	U8	3/4"	17-Apr			1/8"	Interior	17-Apr			3/16"	Interior	FAIL	HS 48.8
5	U9	3/4"	17-Apr			1/8"	Interior	17-Apr			1/16"	General	FAIL	HS 37.6
5	U10	3/4"	17-Apr			1/8"	Edge	17-Apr			3/16"	Edge	FAIL	HS 45.3
5	U11	3/4"	16-Apr			1/8"	Interior	16-Apr			1/8"	General	Pass	HS 40.8
5	U12	3/4"	15-Apr			1/8"	Edge	15-Apr			3/16"	Edge	FAIL	HS 24.3
5	U13	3/4"	15-Apr			3/16"	Edge	15-Apr			1/8"	Edge	Pass	HS 30.3
5	U12'	3/4"	14-Apr			1/8"	General	14-Apr			1/16"	General	FAIL	HS 24.3
5	U11'	3/4"	13-Apr			1/16"	Edge	13-Apr			3/16"	Interior	Pass	HS 40.8
5	U10'	3/4"	13-Apr			1/8"	Edge	13-Apr			3/16"	Interior	FAIL	HS 45.3
5	U9'	3/4"	13-Apr			1/8"	General	13-Apr			3/16"	Edge	FAIL	HS 37.6
Pier 5	U8'	3/4"	10-Apr			3/16"	Edge	10-Apr			1/8"	General	FAIL	HS 48.8
6	U7'	3/4"	10-Apr			+ 3/16"	Edge	10-Apr			+ 5/16"	Edge	FAIL	HS 34.8
6	U6'	3/4"	10-Apr			+ 3/16"	General	10-Apr			+ 1/4"	Interior	FAIL	HS 24.4
6	U5'	3/4"	9-Apr			1/8"	General	9-Apr			3/16"	Interior	FAIL	HS 27.2
6	U4'	3/4"	9-Apr			1/8"	Edge	9-Apr			1/8"	Interior	Pass	HS 27.8
6	U3'	3/4"	8-Apr			1/16"	Interior	8-Apr			1/8"	Interior	FAIL	HS 35.9
6	U2'	3/4"	8-Apr			1/16"	General	8-Apr			1/4"	Edge	Pass	HS 32.0
6	U1'	3/4"	6-Apr			0		6-Apr			0		Pass	HS 34.8
Pier 6	U0'	1/2"											Pass	HS 22.7