2019 Midwest Bridge Preservation Partnership Meeting
Bismarck, ND

Fouad Jaber, PE

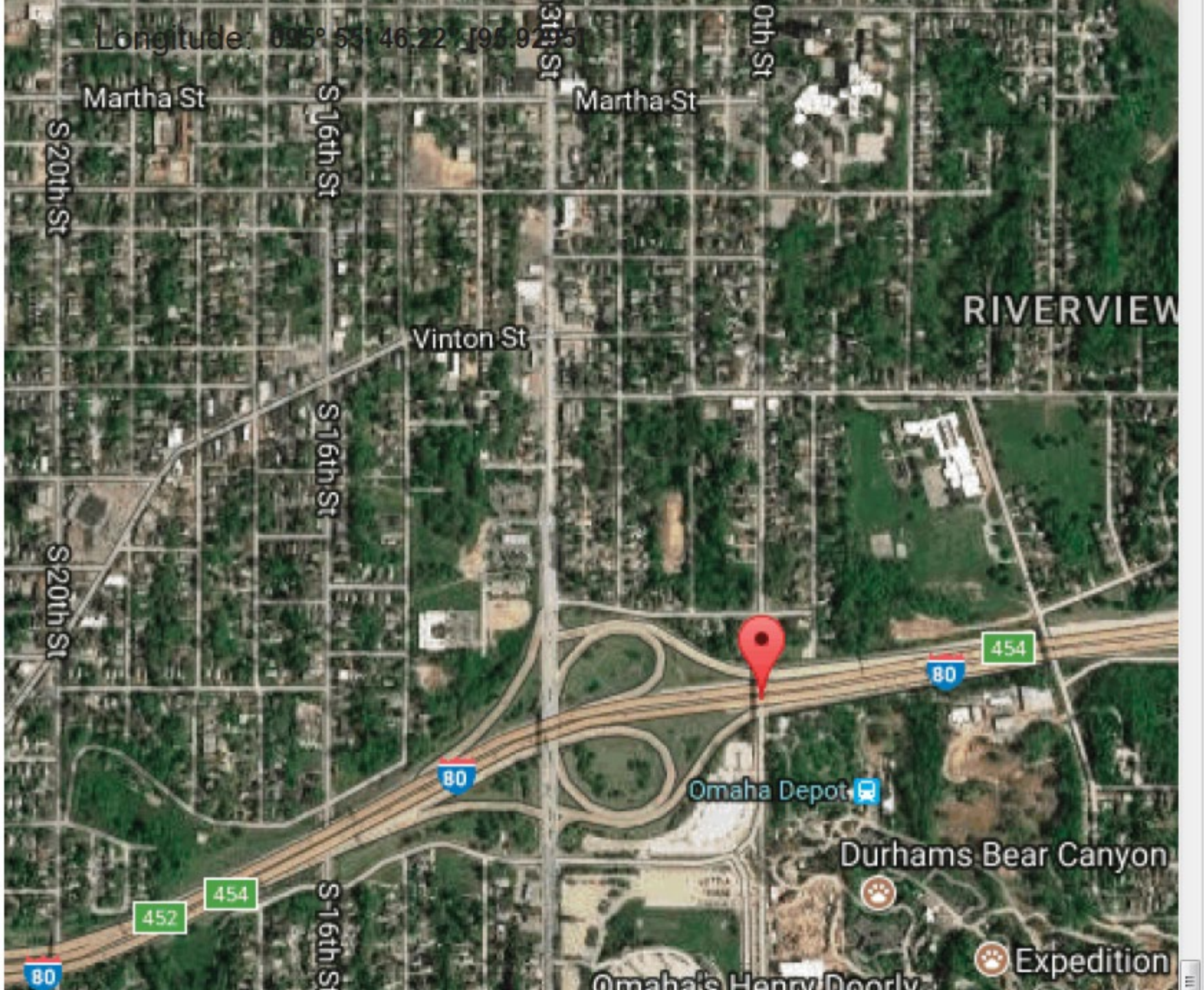
NEBRASKA

Good Life. Great Journey.

DEPARTMENT OF TRANSPORTATION

WOWT - RV fire slows 80 traffic
http://www.wowt.com/content/news/Vehicle-fire-slows-80-traffic-484311181.html

RV fire on I-80 under 10th street bridge Omaha


Longitude: 095° 55' 46.22" [95.9295]
Martha St
Martha St
S 20th St
S 16th St
31st St
30th St
Vinton St
RIVERVIEW
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454
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Durhams Bear Canyon
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2018/06/01


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06-28-2018


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PIER


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Damage Inspection Report

Situation: On Friday, June 1st, 2018, an RV caught fire on the I-80 WB shoulder directly adjacent to the pier of the 10th street bridge (S080 45433). The fire caused damage to the I-80 WB pavement, barrier rail, north face of the bridge pier, steel elements of the superstructure, bridge deck, and utilities attached to the bridge. The fire department used 7 fire trucks to put out the fire.
Deck: The deck has areas of spalling with exposed rebar next to Girder A (East Girder). Hammer sounding the underside of the deck did not indicate delamination. There is evidence of damage to the epoxy coating of the exposed reinforcing. All utilities on the bridge were consumed.
Superstructure: High heat has caused distortion of the webs of Girders A, B, and C with out of plane measurements up to 1 5/8". Cross frames between A-B, and B-C have buckled, and the Pier Diaphragm between A-B has buckled. After power washing, no cracks were detected and no discoloring of the steel was evident. Minor pitting of the steel was observed. See Appendix A for a key plan of the damaged girders, cross frames and pier diaphragm and sketches of the affected girders.
Bearings: The exterior of the pot bearings are scorched with the galvanizing coming off at Bearing A. Minor pitting of the steel was observed. No other damage, or extrusion of the inner elastomeric element to the bearings, was observed.
Substructure: Large areas of the north face of the east pier column have shallow spalling. Spalling is occurring at the pedestals near the bearings. Hammer sounding the concrete revealed no areas of delamination.
I-80 Paving: There are large areas of shallow spalling to the shoulder and left passing lane of I-80 WB. There are localized spalls of the barrier rail near the pier with no exposed rebar. See Appendix B for limits of paving damage.

Description:

Shallow spalling to I-80 WB shoulder, left lane, and barrier rail.

Description:

Widespread fire damage and CS 3 spalls to the north face of the east pier column. 4 cores taken for testing.

Reference Photo/Sketch No.: 74,73 **Type of Defect:** Spall

Description:

Heat distortion to girder webs with out-of-plane measurements up to 1 5/8". Evident in Girders A, B, and C. Order of severity: A (worst), B, C

Reference Photo/Sketch No.: 33,11 **Type of Defect:** Girder Web Distortion

Description:

1st set of crossframes away from the pier have distortion in bays from A-B, B-C.

Damage Inspection Report

Reference Photos

Description:

Bearings covered in soot and melted plastics (Typical at A and B). After powerwashing, bearings have minor pitting (Girder B shown).

Reference Photo/Sketch No.: 20,85 **Type of Defect:** Bearing Scorched

Description:

Girder A Bearing after power washing. Galvanizing coming off. Spalling to pedestals near bearings.

Sequential Photo No.(s): 92,82 **Type of Defect:** Bearings Scorched / Spall

Damage Inspection Report

Reference Photos

Description:
Deck spall along Girder A near the pier. Reinforcing exposed with damage to epoxy coating.

Reference Photo/Sketch No.: 55,61 **Type of Defect:** Deck Spall / Exposed Rebar

Description:

Power washing revealed no dis-coloring of the steel from high heat. No cracks in welds were found.

WOWT - *Authorities say semi fire linked to brake issue*
http://www.wowt.com/content/news/Authorities-say-semi-fire-linked-to-brake-issue-488217971.html


BURGER KING
JIMMY


YOU SAY IT
and your TV finds it.
COX
Sprint

Description:
South rail scorched

Sequential Photo No.(s): 2,3 **Type of Defect:** Barrier damage


07/30/2018


07/30/2018

Description:
Scarring of the epoxy overlay along the shoulder. Cores taken out of the deck.

Sequential Photo No.(s): 7,10 **Type of Defect:** Overlay Damage

Results of Concrete Core Tests:

Compressive Test Results:

Core 2 (Bridge Deck) f'c=7110 psi
Core 4 (Bridge Pier – Low) f'c=6990 psi
Core 6 (Bridge Pier – High) f'c=6460 psi

Petrographic Test Results:

Core 1 (Bridge Deck)
Core 3 (Bridge Pier – Low)
Core 5 (Bridge Pier - High)

Fire damage in Cores 1 & 3 appears to be limited to surface crazing, slight paste softening, extensive microcracks and slight paste discoloration. Fire damage is primarily confined to a 0.1 to 0.4 inch thick zone near the outside surfaces of the cores that were exposed to fire. Core 5 exhibits several short, surface-parallel microcracks in the outer 0.4 inch region; otherwise, no fire –related damage is observed. The crushed limestone coarse aggregate in the concrete is typically sensitive to exposure to elevated temperatures and would respond by changing color. The lack of color change in the aggregate suggests the concrete was not heated to temperatures greater than 250° – 300° C (482° – 572° F) or was not subjected to elevated temperatures long enough for color change to occur. The body of the concrete cores away from the damaged surface regions is in good condition without evidence of distress or deterioration and the concrete exhibits good physical properties evidenced by relatively hard and dense paste.

Recommendation:

Recommendations are separated into three types of effort – 1) repair of the concrete portions of the bridge pier, bridge decks, roadway median barrier and roadway, 2) repair of the structural steel girders, crossframes and diaphragms and 3) repair of the miscellaneous bridge components damaged by the fire.

Repair of Concrete: Based on the visual inspection and the petrographic testing, the north face of the bridge pier, the underside of the bridge deck in the area of the fire and the lower roadway median barrier and riding surface as documented in the inspection were damaged by the fire. We recommend the following:

- The concrete bridge pier may be repaired by removing of concrete on the north face down to the reinforcing. Concrete anchors embedded into the remaining concrete may be necessary to anchor the repair concrete to the existing concrete.
- The underside of the concrete bridge deck is difficult to repair to a pre-fire damaged condition. Replacement of this area of bridge deck is our recommendation for repairing it to a pre-fire damaged condition. The another option would be recognize the loss of structural life of the bridge deck caused by the fire and take measures such as applying concrete sealers to the bridge deck to preserve the remaining life.
- The roadway median barrier and roadway surface may be repaired in a similar manner as the concrete bridge pier. However, it may be more cost effective to fully replace the damaged areas.
- The bridge aesthetic coatings may be repaired by reapplication per the manufacturer's recommendations.

Recommendations for Steel Girder Damage: Based on the visual inspection, distortion of the girder webs for girders A, B & C was evident between the pier and the North field splice. Note that the inspection only progressed to approximately 10 feet south of the north field splice due to traffic restrictions. Therefore, distortion at the field splice and north of the field splice was not measured. Girder web distortion will adversely affect the shear capacity of the girders. We are unaware of a method to repair the distorted web and increase the girder shear capacity to pre-fire capacity. Therefore, we would recommend the following:

- Replacement of the girder field sections affected by the fire.
- To determine the extents of the fire damage, we would recommend LIDAR scanning of girders to further quantify the extent of out-of plane deformation of girder webs. Based on the results of the scanning, determine the extents of girder replacement.
- Replace cross frames and Pier diaphragms identified in the visual inspection. Use LIDAR results to determine if other cross frames were affected.
- Determine repair or replacement recommendations for other fire damaged members identified by the scanning.

Recommendations for the other items affected

- Bearings affected by the fire have lost their protective galvanized coating. Although no evidence of damage to the internal elastomer was found, the elastomers are not directly visable. It is recommended to replace the pot bearings with the girder replacement. Additionally, utility conduit will need to be replaced.
- Replace damaged paving panels and median barrier for I-80.

maximum magnitude of 1.63 inches. No significant deformation is measured along the spans of Girders D, E, F, and G.

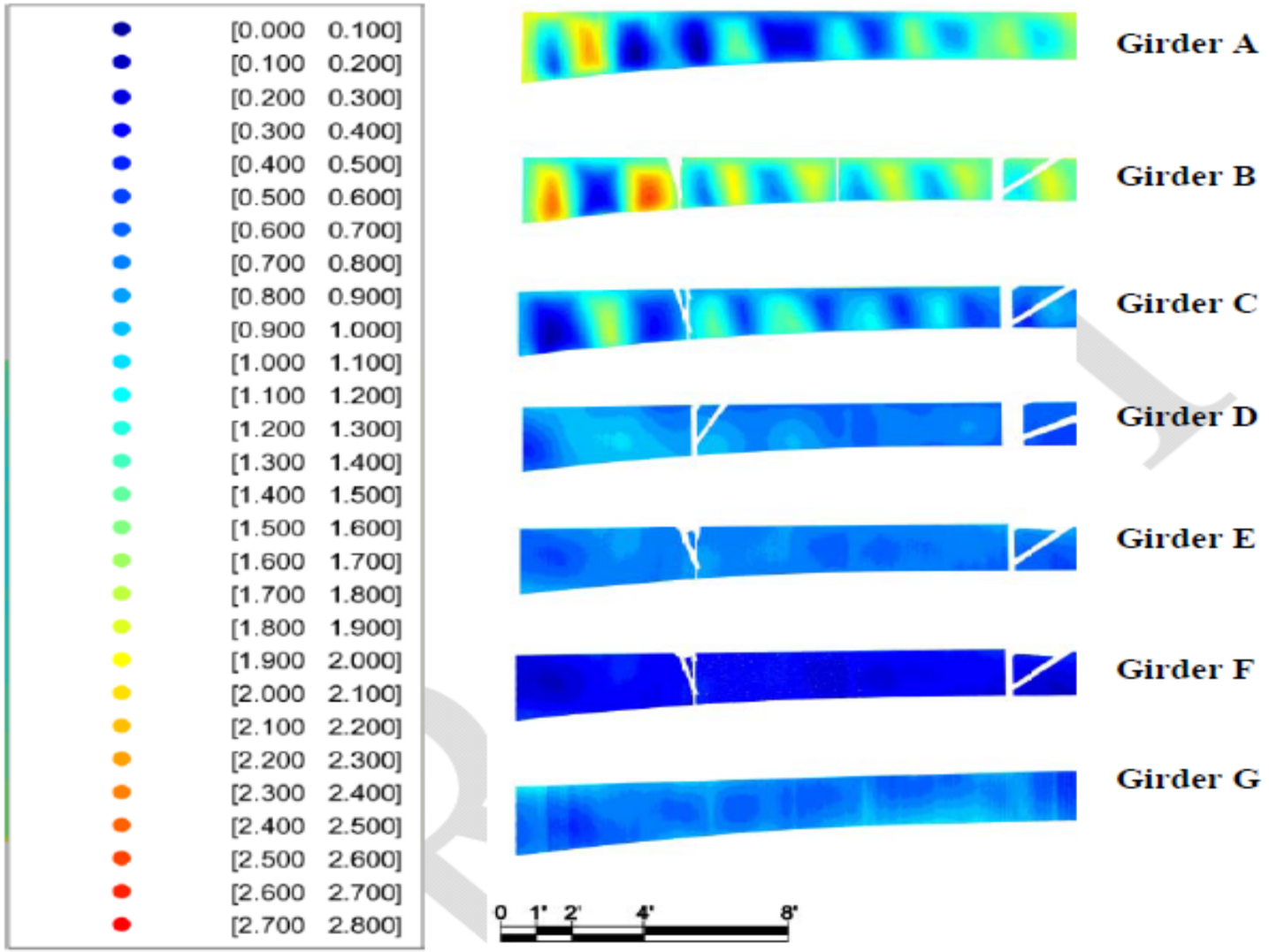


Figure 12. Depth-map analysis results for the girders on the westbound side of the bridge (in inches).

Scope of Work

General Description

As a follow-up to inspection and assessment of the fire damage to the 10th Street Bridge over I-80, Bridge Office will prepare contract plans for the repair services. Repair effort shall include:

- Heat straightening of girder webs for Girders A, B & C over the westbound I-80 lanes,
- Replacement of damaged girder cross frames or separators,
- Surface preparation and painting of steel pot bearings damaged by fire,
- Shotcrete Repairs to concrete spalls on the face of the pier column and the pier cap and repairs to concrete spalls to the I-80 median barrier
- Shotcrete repairs to concrete spalls on the bottom of the bridge deck,
- Utility Repairs (Bridge Lighting)
- Replacement of paving panels damaged by fire

– Girder Straightening

Develop plan details showing extent of out-of plane deformation of Girders A-C due to fire damage. Provide notes and direction for returning the girder webs to acceptable geometry. Include plan notes for surface preparation and painting of exterior fascia of exterior girder. Assume one plan sheet.

– Cross Frame and Separator Replacement

Provide locations requiring new cross frames or separators. Provide details for replacement cross frames and separators. Assume one plan sheet.

– Pot Bearing Repairs

Provide details for surface preparation and application of paint to damaged pot bearings. Assume ½ sheet of plan details.

- Pier and Median Barrier Repairs

Provide details for extents of concrete removal. Provide details for concrete repair by shotcreting, including supplemental reinforcing steel. the clear cover will be overbuilt (thickened) to allow for the addition of welded wire mesh and concrete anchors to anchor the shotcrete repairs. Include notes for repairs to the color coating to bridge pier.

– Bottom of Bridge Deck Shotcreting

Provide details for concrete removal and shotcreting operations, including any supplemental reinforcing steel to anchor the shotcrete to the existing bottom of deck. Assume ½ sheet of plan details and assume the bottom of deck concrete will be overbuilt (thickened) to allow for the addition of welded wire mesh and concrete anchors to anchor the shotcrete repairs.

– Utility Repairs

Provide details for replacement of the pier pack light on the north side of Pier 1 between Girders B & C.

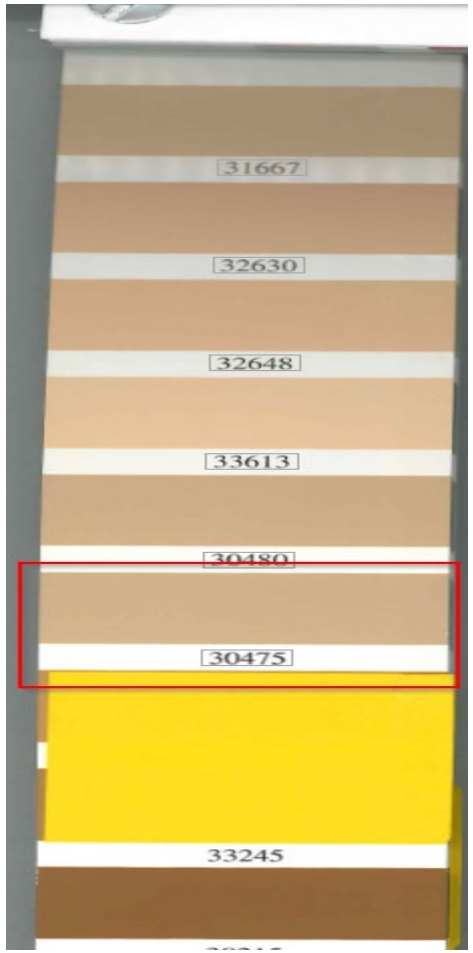
– Special Provisions

Develop special provisions as needed for the proposed repairs to accommodate pay items and technical requirements for repairs and girder heat straightening.

Field paint exterior fascia of Girder A to the limits shown. The trial color of the finish coat shall be a brown matching Federal Color 20045. The Contractor shall apply the trial finish color to a sample section of the girder. Based on the trial color application, the tint of the finish coat shall be adjusted to best match the color for the weathering steel as determined by the Engineer prior to full production field painting of the girders.

Field paint pot bearings for Girders A, B, C at Pier No. 1. The finish coat shall be light gray tone Matching Federal Color 26373.

The Contractor shall provide a finish coat in a color and gloss approved by the Engineer. The finish color for the girders shall be brown, Federal Standard 595 color number 30045. The finish color of all other concrete shall be beige, Federal Standard 595 color number 30475.



GIRDER WEB HEAT STRAIGHTENING NOTES:

At the specified girder web locations, as shown on the plans, girder webs shall be heat straightened to the tolerances specified in the plans and notes.

Prior to beginning work, the Contractor shall submit to the Engineer documentation of 10 or more years of experience in the field of heat straightening major structural elements on highway or railroad bridges and a documented list of at least three bridge structures that have been successfully heat straightened.

The Contractor shall notify the Engineer 2 weeks prior to the starting date of heat straightening operations.

The Contractor shall blast clean the portions of the beam, in accordance with the plans, that have been damaged and require heat straightening.

Heating shall be done using No. 7 or smaller torch tips on an oxygen-acetylene gas mixture. The temperature of the steel during heat straightening shall be between 600°F and 1200°F to produce deformations of the steel member conforming to the specified tolerances. Heating patterns and sequences shall be selected by the contractor to match the type of damage. After the beam has been heat straightened, the heating pattern used shall be furnished to the Engineer for informational purposes. In no case shall the temperature exceed 1200°F (a dull red) as determined with use of temperature indicating crayons, liquids or a bimetal thermometer.

Material shall be heated in a single pass following the specified pattern and allowed to cool to below 250°F prior to re-heating.

The Contractor shall provide the Engineer with temperature indicating crayons manufactured for 600°F, 1000°F, 1200°F, and 1350°F.

The temperature of the heated metal may be determined by the color of the steel adjacent to the tip of the torch by using temperature crayons to correlate the temperature of the heated metal to the color of the steel. In normal daylight conditions, 1200°F will be indicated by a satiny, silver color near the torch tip. After cooling, the area should be gray in color.

Only quenching with clean dry air will be permitted. Cooling with compressed air may be done only after the steel has cooled naturally to at least 600°F. Cooling shall be uniform throughout the heated area.

After the heat straightening has been completed, the Engineer will visually inspect the repaired beam. At the Engineer's discretion, nondestructive testing of the structural steel may be performed if cracks are suspected. The State will do all testing.

Out of plane local web deviations shall be repaired to a tolerance of 7/16 inch. Contractor shall prepare a procedure to measure the out of plane web deviation and submit to the Engineer for approval.

The item HEAT STRAIGHTENING GIRDER shall be measured and paid per each for each girder straightened and accepted by the Engineer. This work shall include all materials, equipment, tools, labor and incidentals necessary to complete

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KEEP OUT

Total Value for Change Order 015 **$359,921.83**

On June 1, 2018 a recreational vehicle was traveling westbound on Interstate 80. The RV began to overheat and pulled onto the median shoulder under the 10th St. Bridge. The RV caught on fire and damaged the bridge deck, girders, pier, median barrier and the concrete pavement.

All of the costs associated with this change order are a direct result of that incident.

The Concrete Protection Barriers will be provided by the NDOT.

The State Property Damage Report Number is 00056273.

To provide for the item(s) of work and to establish a basis of payment.

The agreed unit price was negotiated and is considered reasonable.

The agreed unit price(s) shall be full compensation for all material, labor equipment, tools and incidentals necessary to complete the work.

QUESTIONS???

Stand

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Ratings and Loads

Deck (58): **Choose an item.** Superstructure (59) : **Choose an item.** Substructure (60) : **Choose an item.** Culvert (62) : **Choose an item.**

Design Load (031): **Choose an item.** Type of Overlay : **Add Overlay Type**

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