BRIDGE # 27004
PED AT ST ANTHONY over Mississippi River

DISTRICT: Metro          COUNTY: Hennepin          CITY/TOWNSHIP: Minneapolis
STATE: Minnesota

Date of Inspection: 10/15/2018
Equipment Used:

Owner: State Highway Agency

Inspected By: Lovelace, Barritt; Parker, Marc

Report Written By: Marc Parker
Report Reviewed By: Joseph Fishbein
Final Report Date: 02/14/2019
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<th>PAGE NUMBER</th>
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<td>2018 UNDERWATER INSPECTION FIGURES FOR PIERS 1 THROUGH 12.</td>
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UNDERWATER INSPECTION

REPORT SUMMARY

The substructure units inspected at Bridge No. 27004, Piers 1 through 12, were found to be generally in fair to poor condition. There was moderate to advanced deterioration at approximately half of the exposed mortar joints around the perimeter of Piers 1 through 4 and 8 through 11, with 1 to 3 inch penetration typical and other locations exhibiting greater penetration of up to 36 inches. Heavier grout loss and cracking was typically observed from 2 feet below the waterline to the arch spring-line. An in-depth inspection at each pier was performed to assess the masonry condition from the spring line to the channel bottom. Detailed grout loss measurements, crack locations and other findings for this portion of the inspection can be found attached to the end of this report.

In addition, Piers 5 through 7 exhibited areas of concrete section loss with exposed reinforcing steel, mostly located on the upper 1.5 feet of the concrete encasements along the downstream noses and east pier faces. Pier 5 had an area of encasement undermining at the northeast corner which was not observed during the previous underwater inspection in 2017.

Riprap installed around piers had minor deterioration but both the placement and overall channel bottom configuration appeared stable compared to the previous inspection with no noticeable signs or scour. A moderate accumulation of timber debris was noted in the channel between the East Abutment and Pier 4.

INSPECTION FINDINGS

(A) The channel bottom material around Piers 1, 2, and the east face of Pier 3, as well as at the downstream end of Piers 11 and 12 consisted of sand, typically allowing up to 2 inches of probe rod penetrations. The remainder of the channel bottom around the piers consisted primarily of 6 inch to 4 foot diameter riprap.

(B) Piers 8 through 11 exhibited moderate to advanced deterioration of mortar joints (approximately 90%, 70%, 80% and 25% of the mortar joints at Piers 8, 9, 10 and 11 respectively), typically 1/2 to 3 inches deep. Maximum penetration of 15, 36, 21, and 15 inches was observed at Piers 8, 9, 10 and 11 respectively. The grout loss extended above the waterline to the pier spring line and was generally in worse condition with deeper penetration and widespread loss above the waterline. The granite blocks also exhibited vertical cracks from the spring line to 2 feet below the waterline at random locations. Cracks widths typically ranged from 1/16" to 1/8" wide.

(C) Concrete section loss, with 3 to 9 inch penetrations and exposed reinforcing steel, was noted on the top 1.5 feet of the pier encasement of Piers 5 through 7.

(D) Piers 1 through 4 exhibited moderate to advanced deterioration of mortar joints (approximately 75%, 75%, 80% and 60% of the mortar joints at Piers 1, 2, 3 and 4 respectively), typically 1/2 to 3 inches deep. Maximum penetration of 15, 15, 24, and 15 inches was observed at Piers 1, 2, 3 and 4 respectively. The grout loss extended above the waterline to the pier spring line and was generally in worse condition with deeper penetration and widespread loss above the waterline. The granite blocks also exhibited vertical cracks from the spring line to 2 feet below the waterline at random locations. Cracks widths typically ranged from 1/16" to 1/8" wide.

(E) A formed concrete ledge (over-pour) was partially exposed along a portion of the downstream end of the west face of Pier 4 at the channel bottom.

(F) A concrete step in the pier shaft at Pier 11 was partially exposed around the upstream and downstream pier ends at approximately 11 feet below the waterline.

(G) Random accumulations of timber debris consisting of 1 foot diameter and smaller trees and branches was observed in spans 1 through 3 from the channel bottom to the waterline.

(H) At Pier 5, the footing is undermined 12 feet along the east face from northeast corner, and 2 feet along the north face from northeast corner. Undermining cavity maximum vertical dimension was 18 inches, typical penetration was 18 inches with up to 24 inches of horizontal penetration.
(I) One steel ice breaker panel was missing from the upstream nose of Pier 10.

(J) A moderate accumulation of timber debris was observed at the upstream noses of Piers 5, 6, 7 and 9. The accumulations consisted of 6 to 18 inch diameter logs and branches extending from the waterline to the channel bottom.

RECOMMENDATIONS

(A) Detailed measurements were taken at the granite block mortar joints both above and below water and found widespread deterioration. Piers 1-4 and 8-10 had approximately 75% mortar loss, and Pier 11 had approximately 25% mortar loss. Detailed drawings mapping the mortar loss penetrations have been uploaded to SIMS and attached to this report. Masonry deterioration should be closely monitored during future inspections and repairs should be performed.

(B) Presently, the channel bottom makeup, especially within the regions of higher flow, appears stable. Underwater imaging using Single Beam High-Resolution sonar was performed by Collins while the underwater inspection was being performed. Continue to monitor the channel bottom configuration in the vicinity of the substructure units during future underwater inspections and continue to perform underwater imaging. Consider scour countermeasures if any of the pier foundations become significantly exposed and/or undermined.

(C) Defect conditions of the substructure units has not significantly increased. however, due to the presence of advanced mortar loss at Piers 1-4 and 8-11 and due to the high flows and turbulent conditions, it is recommended to continue a twelve (12) month inspection frequency of the piers until appropriate repairs are made.

Contractor: Collins Engineers, Inc.
Contractor Job Number: 11356
UNDERWATER INSPECTION

1. BRIDGE DATA
   Bridge #: 27004
   Feature Intersected: Mississippi River
   Facility Carried: PED AT ST ANTHONY
   District: Metro
   County: 027 - Hennepin

   Bridge Description:
   The superstructure consists of twenty one stone arch spans and one steel deck truss span resting on two abutments and
   twenty one stone arch and/or reinforced concrete piers. The substructure units are designated as the East Abutment, Piers 1
   through 21 and the West Abutment.

2. INSPECTION DATA
   Professional Engineer/Team Leader: Barritt Lovelace, Marc Parker
   Inspection Diver: Barritt Lovelace, Marc Parker
   Date of Underwater Inspection: 10/15/2018
   Weather Conditions: Overcast, 20°F to 40°F
   Underwater Visibility (feet): 1 to 6
   Waterway Velocity (ft/sec): 1 to 5

3. SUBSTRUCTURE INSPECTION DATA
   Substructure(s) Inspected: Piers 1 through 12
   General Shape:
   Eleven piers consist of a rectangular masonry shaft supported by multi-step stone and/or concrete encased foundation. One
   pier consists of a reinforced concrete pier with a stone masonry decorative facade.

   Maximum Water Depth at Substructure(s) Inspected (feet): 17.7

4. WATERLINE DATUM
   Water Level Reference: Top of Pier 12/bottom of the Stone arch spring line.
   Waterline Elevation (feet): 749.2
   Description: The waterline was approximately 9.2 feet below reference.

5. NBIS CODING INFORMATION
   (Minnesota specific codes are used for 92B and 113)

   Item 60: Substructure: Code: 4
   Item 61: Channel and Channel Protection: Code: 7
   Item 62: Culvert: Code: 
   Item 92B: Underwater Inspection: Code: Y 10 15/2018
Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

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<th>X</th>
<th>No</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>(Mark your selection with an X)</td>
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6. **STRUCTURAL ELEMENT CONDITION RATING**

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<th>Element Description</th>
<th>Quantity</th>
<th>Unit</th>
<th>Conditions</th>
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<tbody>
<tr>
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<td>Masonry Pier Wall</td>
<td>308</td>
<td>LF</td>
<td>CS3 308</td>
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<tr>
<td>210</td>
<td>Reinforced Concrete Pier Wall</td>
<td>48</td>
<td>LF</td>
<td>CS3 48</td>
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<tr>
<td>885</td>
<td>Scour</td>
<td>1</td>
<td>EA</td>
<td>CS3 1</td>
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The routine underwater inspection of Bridge 27004 (St. Anthony Falls Pedestrian or Stone Arch Bridge over the Mississippi River) was primarily completed on October 15, 2018. The underwater inspection was conducted from a 21 foot boat. The inspection was conducted by a team consisting of a PE-Diver with a valid MnDOT Team Leader certification, a backup diver and a dive tender. The inspection utilized commercial dive equipment and techniques (SSA and/or SCUBA) in accordance with OSHA regulations. Profiles were taken along the upstream and downstream faces of the bridge and around the periphery of substructure units to determine the presence, location and area of scour.

The bridge elements inspected consisted of eleven masonry piers and one reinforced concrete pier. According to the bridge inventory or design drawings, eleven piers consist of a rectangular masonry shaft supported by multi-step stone and/or concrete foundation and one pier consists of a reinforced concrete pier with a stone masonry facade. Inspection procedures followed FHWA guidance and the MnDOT Bridge and Structure Inspection Program Manual with channel bottom probing to search for foundations. The routing underwater inspection frequency is recommended to remain at 12 months based on the condition of the mortar joints between the granite blocks. Inspection procedures should continue to follow the above approach and standard guidance with a minimum 100% Level I and 10% Level II intensity efforts.
## Minnesota Structure Inventory Report

**Bridge ID:** 27004  
**PED AT ST ANTHONY**  
over Mississippi River

### GENERAL

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<td>Owner</td>
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<td>FHWA Year Reconstructed</td>
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<td>Deck Rebars</td>
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### ROADWAY ON BRIDGE

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<td>B:</td>
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</tr>
<tr>
<td>C:</td>
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### MINNESOTA BRIDGE INSPECTION REPORT

**BRIDGE 27004  PED AT ST ANTHONY OVER Mississippi River**

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<th>Location:</th>
<th>St. Anthony Falls</th>
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#### Appraisal Ratings - Approach: N Waterway: 9

Required Bridge Signs - Load Posting: 0 - Not Required

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Unofficial Structurally Deficient: N
Unofficial Functionally Obsolete: N
Unofficial Sufficiency Rating:

#### ELEM NBR ELEMENT NAME REPORT TYPE INSP. DATE QUANTITY QTY CS 1 QTY CS 2 QTY CS 3 QTY CS 4

| 30 | Steel Deck Corrugated/Orthotropic/Etc. | Underwater | 10/15/2018 | 6600 SF | 6300 | 300 | 0 | 0 |

Notes: This element refers to the ballast plate deck in Span #13 (constructed in 1960). The condition rating for this element should consider the 5/8” thick wrought iron ballast plate as well as the small transverse beams supporting it (12” deep rolled beams spaced at about 2 ft.). The deck is 200 x 33 = 6,600 SF [2008] Leaching at joints in steel ballast plate.

[2010/2016] The ballast plate and transverse support beams have some isolated areas of paint failure and surface corrosion. This is mainly located along the deck edges at the ballast plate joints (4 joints in each truss panel). Estimate 5% (300 SF) as condition state 2.

[2017-2018] No change.

| 510 | Wearing Surfaces | Underwater | 10/15/2018 | 53900 SF | 53255 | 585 | 60 | 0 |

Notes: This element refers to the wearing surface on the entire length of the bridge (52,900 SF).

[1993] Wearing surface installed (12 ft. wide bituminous bikeway in the center, with a 6 ft. wide concrete sidewalk on each side).

Bituminous Bikeway

[2012] Bituminous wearing surface has some small potholes near the expansion joints.
[2013] Approximately 300 SF of bituminous patching performed within the previous year.
[2015] Transverse cracks have been sealed and minor spalls repaired with epoxy. Bituminous edge at centerline drain is breaking up in random areas.

[2016] Approximately 2,500 LF of transverse sealed cracks (250 SF CS 2), 300 SF of patches (CS 2), and 30 SF of minor potholes (CS 3)

[2017-2018] Asphalt cracks have been sealed.

Concrete Walkways

[2012] Concrete sidewalks have isolated transverse cracks, with minor delamination & spalls - the concrete along the median drain has isolated spalls. These locations have been marked out by City of Minneapolis Bridge Maintenance.

[2016/2017] The concrete sidewalks have approximately 350 LF of moderate transverse cracks (35 SF CS 2) and 96 LF of wide unsealed cracks (10 SF CS 3) and 20 SF of spall (CS 3).

| 113 | Steel Stringer | Underwater | 10/15/2018 | 788 LF | 768 | 20 | 0 | 0 |

Notes: There are 4 stringer lines - they are 36” deep rolled beams (36” WF @160##). 197 x 4 = 788 LF.

[2012-2018] The stringers have some isolated paint failure and surface corrosion (mainly on the bottom flange edges). The webs and flanges have some chalking.

| 515 | Steel Protective Coating | Underwater | 10/15/2018 | 14000 SF | 13160 | 700 | 140 | 0 |

Notes: [1993] Stringers painted with a Alumapoxy Primer coat (the original red lead primer was not completely removed) and an Urethane Enamel finish coat.

[2016] Estimate painted area of stringers (including stringer bracing in end panels) to be 14,000 SF. See notes for Element #113. Estimate 5% at condition state 2 and 1% at condition state 3.

[2017-2018] No change.
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<th>ELEM NBR</th>
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<th>REPORT TYPE</th>
<th>INSP. DATE</th>
<th>QUANTITY</th>
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<td>40</td>
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Notes: [1963] Steel deck truss constructed over the Upper Saint Anthony Lock (it replaced two 100 ft. masonry arch spans).
[2008] Bubbled/peeled paint, flaking & surface rust. 10% unsound paint.
[2012] The deck truss top & bottom chord members have some isolated paint failure and surface corrosion along the top exterior edges (mainly on the south truss). The top plate on the north truss top chord member U1'-U2' has two small areas with corrosion and minor pitting where the original railing posts were located.
[2014] The deck truss top & bottom chord members have some minor paint failure and surface corrosion along the top exterior edges between the top plate & vertical plate mainly on the south truss lower chord.
[2015] 15% unsound paint.
[2016] Truss members have chalking and fading paint of surfaces with a southern exposure.
[2017-2018] No change.

| 515     | Steel Protective Coating | Underwater       | 10/15/2018 | 18600 SF | 13490    | 5000     | 100      | 10       |
|---------|                         | Fracture Critical| 05/31/2018 | 18600 SF | 13490    | 5000     | 100      | 10       |

Notes: [1993] Truss painted with a Alumapoxy Primer coat (the original red lead primer was not completely removed) and an Urethane Enamel finish coat.
[2016] Painted area on steel deck truss (including lateral bracing, sway bracing, and struts), estimated at 18,600 SF. See notes for Element #120. Estimate 5,000 SF as condition state 2, 100 SF as condition state 3, and 10 SF as condition state 4.
[2017-2018] No change.

| 145     | Masonry Arch          | Underwater       | 10/15/2018 | 1900 LF  | 0        | 1786     | 76       | 38       |
|---------|                       | Fracture Critical| 05/31/2018 | 1900 LF  | 0        | 1786     | 76       | 38       |

Notes: This element includes the masonry arch barrels and vertical spandrel walls in Spans #1-12 and #14-22 (constructed in 1883).
[1907/1910] Masonry arch spans were reinforced in stages. The spandrel area (between the spandrel walls) was filled with reinforced concrete and the spandrel walls were reinforced with 1-3/8" diameter tie rods and anchor rods (these are the ones with the round washers marked "R-559"). The anchor rods are 10 ft. long (anchoring into the concrete fill), while the tie rods are 26'-9" long (full width of bridge). Drains were installed in the spandrel walls at each pier as part of the 1907-1910 retrofit. There are some additional ties rods/anchor rods present in the arch spandrel walls that have rectangular washers - it is unknown when these were installed.
[1965] Flooding on the Mississippi River severely undermined Pier #6, resulting settlement of approximately 14". Subsequent repairs included reinforcement of the arch barrels in Spans #6 & 7 (with concrete encased steel beams). The upper masonry course on both spandrel walls (at Pier #6) were leveled by adding a layer of concrete. Masonry blocks in the arch barrels and spandrel walls(scattered locations throughout the bridge) were refaced with concrete around this same time.
[1993] Fractures in the arch barrels were injected with epoxy and sealed, the masonry joints were tuck-pointed. Numerous masonry blocks on the arch barrels and spandrel walls (scattered locations throughout the bridge) were refaced with a stone veneer. The tie rod ends were repainted.
[1997] Limestone blocks have moderate weathering, some have loose spalls.
[1998] Some concrete repairs have cracking (separating slightly from stone).
[2012/2016/2017] The limestone masonry blocks on the arch barrels have moderate weathering throughout, with isolated spalls (typical depth of 4"-6", with some slightly deeper), and some scattered cracking. Some of the masonry joints are open - this is mainly on the west spans where the 1993 ground line was altered due to excavation of the mill ruins from 1997-2001. There is leakage through the arch barrel in Spans #14 & 15 (adjacent to Pier #14), and in Span #8 (near Pier #7) - the masonry blocks have staining and spalling due to this leakage. The spandrel wall masonry blocks located below the pier drains (where downsputs have not been installed) have staining, cracking & spalling. The upper masonry course along the spandrel walls have mortar loss, leakage, and weed intrusion along much of the bridge. Vegetation needs to be sprayed.
[2015] Span #8 (near Pier #7): Concrete repair 6 rows up from encasement is wet from leakage through joints. Span #9 (near Pier #9): 5 rows up from encasement limestone spill is wet and soft. Span #10 (near Pier #10): Drill or hammer bit stuck in block.
[2016/2017] The limestone masonry blocks at the piers (just above the granite blocks) have vertical cracking on the upstream and downstream face (typical at most piers). Many of the tie rod ends on the spandrel walls have paint failure and corrosion. Several tie rod washers have section loss or have fractured (many of the washers fractured prior to the 1993 repainting).
[2018] See Appendix D and E in FC report for details.
<table>
<thead>
<tr>
<th>ELEM NBR</th>
<th>ELEMENT NAME</th>
<th>REPORT TYPE</th>
<th>INSPECTION DATE</th>
<th>QUANTITY</th>
<th>QTY CS 1</th>
<th>QTY CS 2</th>
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<tbody>
<tr>
<td>152</td>
<td>Steel Floor Beam</td>
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<td>396 LF</td>
<td>296</td>
<td>100</td>
<td>0</td>
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</tr>
</tbody>
</table>

Notes: There are 11 floorbeams connecting the two trusses (riveted plate girders with a 60" web depth).
[1993] Jacking stiffeners added to end floorbeams. Hanger for drain trough welded to the bottom flange at the center of Floorbeams 1 - 3, 5, and 9 - 11.
[2012] The floorbeams have some isolated paint failure and surface corrosion - mainly on the bottom flange near the exterior stringers.
[2016] Floorbeam webs have chalking, with some paint failure/surface corrosion at the south (downstream) end.
[2017-2018] No change.

| 515      | Steel Protective Coating | Underwater | 10/15/2018 | 11600 SF | 8110 | 2900 | 580 | 10 |
|          |                   | Fracture Critical | 05/31/2018 | 11600 SF | 8110 | 2900 | 580 | 10 |

Notes: [1993] Floorbeams painted with a Alumapoxy Primer coat (the original red lead primer was not completely removed) and an Urethane Enamel finish coat.
[2016] Painted area on floorbeams estimated at 11,600 SF. See notes for Element #152. Estimate 25% at CS 2, 5% at CS 3, and 10 SF at CS 4.
[2017-2018] No change.

| 162      | Steel Gusset Plate    | Underwater | 10/15/2018 | 40 EA    | 9      | 29    | 2    | 0    |
|          |                   | Fracture Critical | 05/31/2018 | 40 EA    | 9      | 29    | 2    | 0    |

Notes: This element includes the main truss connection gusset plates, including the rectangular connection plates for the truss verticals (20 locations on each truss).
[2010] Gusset plate L1N has minor pack rust that is not distressing the joint. Panel Point U2'S is bowed 1/4" due to fit-up. Panel Point L5N bowed is 1/16" due to pack rust. PPs U0'S, L3N, L1'S, and L2N bowed 1/8" due to pack rust. PP U5N bowed 3/16" due to pack rust. PPs U2'S and L5'S bowed 1/4" due to fit-up.
[2012] North Truss L3' - interior gusset plate has isolated corrosion and pack rust at the U2'-L3' diagonal (CS 2), South Truss L3' - interior gusset plate has areas of minor pitting at the lateral bracing connections.
[2014] North Truss U3' - interior gusset plate has areas of moderate corrosion. South Truss L5' - exterior gusset plate paint system has 1 SF of moderate deterioration with chalking, peeling, & blistering. Exposed steel has minor surface corrosion.
[2016] 28 of the 40 gusset plates are rated as condition state 2 under the new NBE guidelines due to distortion (bowing along the free edges up to 1/8". This distortion appears to be due to fit-up, as there is little or no pack rust along the main truss connection gusset plates. Exterior gusset plates on south truss have faded/chalking paint.
[2017] No change.
[2018] Rate the L3N, and L3'S connections are CS-3 due to pitting at the connection to the upper horizontal plate. The U3N gusset plate has minor corrosion Rate CS-2.

| 515      | Steel Protective Coating | Underwater | 10/15/2018 | 5000 SF | 3996 | 750 | 250 | 4 |
|          |                   | Fracture Critical | 05/31/2018 | 5000 SF | 3996 | 750 | 250 | 4 |

Notes: [1993] Gusset plates painted with a Alumapoxy Primer coat (the original red lead primer was not completely removed) and an Urethane Enamel finish coat.
[2016] Painted area on truss connection gusset plates estimated at 5,000 SF. See notes for element #162. Estimate 15% at CS 2, 5% at CS 3, and 1 SF at CS 4.
[2017] No change.
[2018] The L3N exterior gusset plate has 3 SF of complete paint failure in the interior.

| 210      | Reinforced Concrete Pier Wall | Underwater | 10/15/2018 | 96 LF | 86 | 10 | 0 | 0 |
|          |                   | Fracture Critical | 05/31/2018 | 96 LF | 86 | 10 | 0 | 0 |

Notes: This element includes only Piers #12 & 13 (constructed in 1965 to support the deck truss span). They are reinforced concrete pier walls with a decorative stone veneer.
[2016] Pier #12: the pier base has staining on the east face (near each end below the drains).
[2017] No change.
<table>
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<th>ELEM NBR</th>
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<th>REPORT TYPE</th>
<th>INSP. DATE</th>
<th>QUANTITY</th>
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<th>QTY CS 2</th>
<th>QTY CS 3</th>
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<td>532 LF</td>
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</table>

Notes: This element includes the original granite masonry pier bases (constructed in 1883) at Piers #1-11 and Piers #14-21 (28 x 19 = 532 LF). The granite is below grade (not visible for inspection) on some piers on the west end of the bridge, and is partially below the water on Piers #1-11.

[1965] Pier bases at Piers #5, 6, & 7 encased in reinforced concrete after scour damage (1965 flood).
[1997] Pier #10: iron protection plate is missing from the upstream nose.
[2002/2017] The concrete pier encasement (Piers #5, 6 & 7) has staining, cracking & spalling/scale on the top edges (more severe at the downstream ends) this spalling up to 12” deep in spots, has exposed rebar with moderate section loss.
[2008] Underwater inspection found areas of spall/scale (4” to 9” deep with exposed reinforcement) below the waterline on the concrete encasement on Piers #5, 6 & 7.
[2010] The masonry joints between the granite blocks have minor deterioration including 1/4” to 3/8” gaps.
[2014] Pier #10: granite blocks missing grout. 3 square feet of blocks have vertical cracks (CS 3).
[2016/2017] Piers #9, 10, & 11: Several granite blocks have vertical cracks, and most of the mortar is missing at the waterline.
[2017] All pier walls have some degree of staining and minor deterioration below drains.
[2017] Underwater Inspection - Piers 1-4 and 8-11 exhibited moderate to advanced deterioration of the mortar joints (25%-50% of the mortar joints total). Typical penetration depths were 1 to 3 inches deep with approximately a quarter of the locations having more severe penetration up to 24 inches deep. The mortar loss extended above the waterline to the granite pier collar (spring line) and was generally in worse condition with deeper penetration and widespread loss. Cracks were also observed at random locations throughout, typically ranging from 1/16” to 1/8” wide.
[2016] Underwater Inspection - Piers 1-4 and 8-11 exhibited moderate to advanced deterioration of the mortar joints (25%-75% of the mortar joints total). Typical penetration depths were 1 to 3 inches deep with approximately a quarter of the locations having more severe penetration up to 36 inches deep. The mortar loss extended above the waterline to the granite pier collar (spring line) and was generally in worse condition with deeper penetration and widespread loss above the waterline. Cracks were also observed at random locations throughout, typically ranging from 1/16” to 1/8” wide.

| 217      | Masonry Abutment   | Underwater  | 10/15/2018 | 236 LF   | 0        | 177      | 54       | 5        |
|          |                    | Fracture Critical | 05/31/2018 | 236 LF   | 0        | 177      | 54       | 5        |

Notes: This element includes the base (granite) portions of both abutments as well as the full height of the integral masonry wingwalls (limestone). Base upon plan review, the quantity is 236 LF.

[1965] Approximately 80 blocks on the east abutment wingwalls refaced with concrete.
[1993] Some blocks on the wingwalls refaced with stone veneer.
[2010] Granite blocks on the east abutment have 2 vertical cracks. Granite blocks and mortar joints on both abutments have minor deterioration. Limestone blocks on the wingwalls have minor deterioration.
[2016] East Abutment: several granite blocks on the south face have significant (old) spalling. Southeast wingwall: concrete repairs have some vertical cracking. Limestone masonry below drain has extensive staining.
[2017] No change.
[2018] See Appendix D and E in FC report for details.

| 234      | Reinforced Concrete Pier Cap | Underwater  | 10/15/2018 | 56 LF    | 51       | 0        | 5        | 0        |
|          |                                | Fracture Critical | 05/31/2018 | 56 LF    | 51       | 0        | 5        | 0        |

Notes: This element refers to the exposed concrete bearing caps on Piers #12 & 13 (constructed in 1963).

[2010/2016] There are significant cracks in the caps (two at Pier #12 and three at Pier #13). The cracks are up to 3/4” wide and extend full height vertically as well as across the top to the caps horizontally.
[2017] No change.

| 305      | Assembly Joint without Seal | Underwater  | 10/15/2018 | 60 LF    | 60       | 0        | 0        | 0        |
|          |                                | Fracture Critical | 05/31/2018 | 60 LF    | 60       | 0        | 0        | 0        |

Notes: [1993] Sliding plate joints (with Type 4 strip seals below) installed at both ends of the truss span.
[2018] There is minor ponding in the West end joint at the drain.

| 310      | Elastomeric Bearing | Underwater  | 10/15/2018 | 2 EA     | 2        | 0        | 0        | 0        |
|          |                                | Fracture Critical | 05/31/2018 | 2 EA     | 2        | 0        | 0        | 0        |

Notes: [1993] Elastomeric bearing pads installed at Pier 12. The pads replaced the original (1960) rockernest bearings. The original bearing pin, castings, and masonry plate remain (the original anchor bolts were cut off).
[2012/2016] The elastomeric bearing pads, steel castings, and masonry plates are in good condition and appear to be functioning as intended. The elastomeric pads are approximately plumb, and are set near the east edge of the original masonry plates. The upper castings of both truss bearings are in expansion in relation to the masonry plates (exact measurements should be taken in 2018).
[2017-2018] No change.
<table>
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<th>REPORT TYPE</th>
<th>INSPECTION DATE</th>
<th>QUANTITY</th>
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<th>QTY CS 2</th>
<th>QTY CS 3</th>
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<td>Notes:</td>
<td>[1993] New railings installed - 4,200 LF of ornamental steel railing on exterior (3.5 ft. high), and 122 LF of structural tube railing along the raised sidewalk in Span #13 (2'-10&quot; high). [2012/2016/2017] The ornamental metal railings have some isolated areas of paint failure and surface corrosion (approximately 1% of total rail length).</td>
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<td>Notes:</td>
<td>[2010] The approaches have cracking bituminous and are slightly uneven. [2015] Bituminous cracks have been sealed by MPLS. [2017] No change. [2018] The west approach is uneven and allows minor ponding to occur.</td>
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<tr>
<td>Notes:</td>
<td>The deck truss has lower lateral bracing in each panel and vertical sway frames at each panel point (except the end panel points). The stringers have lateral bracing in the end panels. [1998/2016] There is pack rust at some of the horizontal shelf plates where the bottom sway frame struts (and lower lateral truss bracing) connect to the main trusses. [2017] No change. [2018] The sway frames at the end are holding water and debris at the lower panel points causing minor corrosion.</td>
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<tr>
<td>Notes:</td>
<td>There is a timber (railroad tie) extension on the south side of the east abutment, and a reinforced concrete river side of the west abutment. As these are beyond the end of the bridge, it is unclear if MnDOT is responsible for maintaining these structures. [2012/2016] The timber retaining wall (East Abutment) has areas of severe decay, some of the timber railroad ties have little or no cross-section remaining. The timber wall is slightly undermined. The timber wall is rated as condition state 4. [2016] The concrete retaining wall (West abutment) has some cracking an minor rust staining (condition state 2). [2017-2018] No change.</td>
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<tr>
<td>884</td>
<td>Substructure Settlement &amp; Movement</td>
<td>Underwater</td>
<td>10/15/2018</td>
<td>1 EA</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fracture Critical</td>
<td>05/31/2018</td>
<td>1 EA</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Notes:</td>
<td>[1965] Pier #6 steeled approximately 1 ft. due to scour during record spring flooding. The Piers #5, 6, &amp; 7 were encased in concrete and the arch barrels of Spans #6 &amp; 7 were reinforced with steel beam encased in concrete. The spandrel walls above Pier #6 were leveled at the top (just below the to masonry course) with concrete fill. [2017-2018] No change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Scour 10/15/2018 1 EA
Fracture Critical 05/31/2018 1 EA
Notes: [1965] Severe scour settlement at Pier #6.
[1993] Underwater inspection found scour holes & undermining at Piers #6, 7, 8 & 9.
[2004] Underwater inspection found some undermining of the concrete over pour around Pier #4.
[2008] Special inspection (during drawdown for sewer inspections) revealed some displacement of the riprap around the downstream side of Pier #9 (this area should be watched during future underwater inspections).
[2012] Underwater inspection found no significant scour issues.
[2017-2018] Underwater Inspection - Minor deterioration of scour countermeasures (riprap), but otherwise unchanged.

Load Posting or Vertical Clearance Signing
Underwater 10/15/2018 1 EA
Fracture Critical 05/31/2018 1 EA
Notes: Portland Ave. S. runs below Span #20. Verticals clearance sign reads 10 ft. 1 in.
[2014] Vertical clearance confirmed at Span #20 to be 10’1”.
[2016] Clearance sign in place, post is slightly bent.
[2017-2018] No change.

Other Bridge Signing
Underwater 10/15/2018 1 EA
Fracture Critical 05/31/2018 1 EA
Notes: Stone marker for Minneapolis Union Railway at Pier #18 (north face). (Pier #18) , Stone construction date marker “1883” in Span #20 (north face). Several historic information signs on deck.
[2017-2018] No deterioration noted.

Slopes & Slope Protection
Underwater 10/15/2018 1 EA
Fracture Critical 05/31/2018 1 EA
Notes: [2003] Loose rock riprap (3”+) installed around Spans #14-22 (park of re-grading for Mill Ruins Park).
[2017-2018] No change.

Deck & Approach Drainage
Underwater 10/15/2018 1 EA
Fracture Critical 05/31/2018 1 EA
Notes: [1993] Continuous trench drain along centerline, drains at pier low points. Downspouts on upstream drains.
[2012] Leakage through the arch barrel adjacent to Piers #8 & 14 indicates problems with the arch spandrel drainage system.
[2014] The drain attached to floorbeams in truss Span #12 is leaking.
[2015] Some broken centerline drain covers have been replaced but not bolted down.
[2017] No change.
[2018] The East Abutment downspout extender has washed out and slid down the slope. There is a 2 cubic yard washout behind it.

Sidewalk, Curb, & Median
Underwater 10/15/2018 1 EA
Fracture Critical 05/31/2018 1 EA
[2014] Missing mortar in masonry curb on both sides of sidewalk. [2015] Small spalls repaired with epoxy. (See photo 11) 3 spalls 1 SF each, one with exposed rebar. (see photos 9-10)
[2017] Cracking and spalls in sidewalk at Piers 3, 8-10.
[2018] There are 7 SF of spalls with exposed rebar in the north sidewalk of span 13. The stone curbs under the steel rail have isolated unrepaired spalls. The northeast approach curb has a broken stone.

Miscellaneous Items
Underwater 10/15/2018 1 EA
Fracture Critical 05/31/2018 1 EA
Notes: [1993] 53 ornamental lampposts installed on bridge.
[1998] Weeds growing along top course of masonry (should be sprayed).
[2005/2006] City of Minneapolis installed 2 lights each under arches (spans 1 thru 12) & spans (14 thru 18). 2 lights (truss span 13) at panel points L3, L5 & L3.’
[2014] Light poles on deck of sidewalk have electrical box covers that are open or missing due to rusted or missing screws in covers.
[2015] About 70% of Light pole base covers have been removed (MPLS) one light pole slightly leaning - to the west.
[2016] Lamp at east end of bridge damaged by snooper (lamp removed, post left in place).
**General Notes:**


- [2002] Old Mill Ruins Park adjacent to the bridge at the west end excavated and opened to public, West River Parkway (dead end road to parking lot) constructed below Span #16.

- [2015] Upper St. Anthony Lock permanently closed to river traffic.

- [2016] The Minneapolis Park Board no longer permits tour busses to drive on the bridge (maintenance and police vehicles still drive on the bridge occasionally).

- 1997 Inspectors: P Wilson /K Fuhrman
- 1998 Inspectors: P Wilson /M Pribula
- 1999 Inspectors: P Wilson /K Fuhrman
- 2000 Inspectors: P Wilson /B Kary /Y Guan /R Lane
- 2001 Inspectors: P Wilson /V Desens
- 2002 Inspectors: K Fuhrman /V Desens
- 2003 Inspectors: K Fuhrman /V Desens
- 2004 Inspectors: K Fuhrman /V Desens
- 2005 Inspectors: K Fuhrman /M Palmer
- 2006 Inspectors: K Fuhrman /V Desens
- 2007 Inspectors: K Fuhrman /V Desens
- 2008 Inspectors: K Fuhrman /V Desens /S Maninga /M Pribula
- 2009 Inspectors: K Fuhrman /V Desens
- 2010 Inspectors: S Theisen /K Fuhrman /D Hedeen /C Hoberg /J Zilka
- 2011 Inspectors: K Fuhrman /C Hoberg
- 2012 Inspectors: K Fuhrman /C Hoberg /S Theisen /P Wilson
- 2013 Inspectors: C Hoberg /K Fuhrman
- 2014 Inspectors: R Carter, S Theisen, E Evans, J Fishbein, K Fuhrman and J Lundeen.
- 2015 Inspectors: K Furhman /J Lundeen
- 2016 Inspectors: P Wilson, J Fishbein, B Nelson, J Lundeen, K Furman & F Potter
- 2017 Inspectors: K Fuhrman /J Lundeen
- 2018 Inspectors: S Theisen, J Fishbein, Rodney Carter, Kurt Fuhrman

58. Deck NBI: Spandrel fill and wearing surface installed in 1994 (rated as condition 7 since 1994).

- [2012/2016] Transverse cracking (mostly sealed) and isolated potholes & patches in bituminous. Isolated cracks & spalls in concrete. The Span #13 ballast plate and transverse support beams have corrosion at the joints. The condition doesn't yet warrant lowering the NBI rating
- [2017-2018] No change.

36A. Brdg Railings NBI: As this is classified as a pedestrian bridge, the railing item is coded as "N" (not required). The railings on this bridge would not meet current vehicular crash standards.

36B. Transitions NBI: Pedestrian bridge.

36C. Appr Guardrail NBI: Pedestrian bridge.

36D. Appr Guardrail Terminal NBI: Pedestrian bridge.

59. Superstructure NBI: [2010] NBI Superstructure rating lowered from 7 to 6 due to moderate weathering and cracking of the limestone masonry blocks and minor deterioration of the mortar joints.

- [2016] The limestone blocks have some cracking, weathering, and spalling. The condition doesn't yet warrant lowering the NBI rating.
- [2017-2018] No change.

60. Substructure NBI: Rating lowered from 7 to 5 in 2004 per the 2004 underwater inspection (undermining of concrete at Pier #4 and scaling of concrete at Pier #5).

- [2013] While the 2012 underwater inspection report suggested a substructure rating of 6, the rating will remain at 5 due to the deterioration of the concrete encasement at Piers #5, 6 & 7 (spalling, exposed steel reinforcement has section loss). The undermining at Pier #4 was not found in the 2008 or 2012 underwater inspections.

- [2016] The granite masonry blocks have some cracking and missing mortar. The condition doesn't yet warrant lowering the NBI rating.

- [2017] Underwater Inspection - Substructure moved from 5 to 4 due to advanced mortar loss between the granite blocks at the piers. Detailed measurements were taken at the granite block mortar joints both above and below water and found widespread deterioration. Piers 1-4 had approximately 50% mortar loss, and Piers 8-11 had approximately 25% mortar loss. Detailed drawings mapping grout loss and penetrations have been uploaded to SIMS.
[2018] No change.
[2017 - 2018] Underwater Inspection - Detailed measurements were taken at the granite block mortar joints both above and below water and found widespread deterioration. Piers 1-4 and Piers 8 - 10 had approximately 75% mortar loss, and Pier 11 had approximately 25% mortar loss. Detailed drawings mapping grout loss and penetrations have been uploaded to SIMS.

61. Channel NBI: Channel has been rated as condition 7 since 1994.
   [1996] Underwater inspection recommended a condition 5 rating.
   [1997] Riprap added around some piers (by contract).
   [2010] Scour POA developed (bridge is scour critical).
   [2012] Underwater inspection recommended a condition 7 rating.
   [2017] No change.
   [2017 - 2018] Underwater Inspection - Channel and Channel Protection moved from a 7 to 6 due to area of concrete encasement undermining at Pier 5 northeast corner.

62. Culvert NBI:

71. Waterway Adeq NBI: [2016] There is virtually no chance that the bridge deck (or approaches) will ever be overtopped by high water (rating changed from 7 to 9).

72. Appr Roadway Alignment NBI: [2016] Not applicable, as this is a pedestrian bridge (rating changed from 7 to N).

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Marc Parker
Inspector's Signature

Joseph Fishbein
Reviewer's Signature
Pictures

Photo 3 - Pier 2, Looking West

Photo 4 - Pier 3, Looking West
Pictures

Photo 5 - Pier 4, Looking Northwest

Photo 6 - Pier 5, Looking West
Pictures

Photo 7 - Pier 6, Looking East

Photo 8 - Pier 7, Looking Southwest
Photo 13 - Pier 12, Looking West

Photo 14 - Typical concrete section loss and exposed reinforcement at pier encasements at Pier 5 through 7
Photo 15 - Typical mortar loss at Piers 1 through 4 and Piers 8 through 11. 1 to 3 inches of penetration throughout, with locally higher amounts.

Photo 16 - Missing Ice-Breaker, Pier 10
Photo 17 - Overall View of Downstream Fascia, Looking Northwest.
INSPECTION NOTES:

1. The channel bottom at the downstream ends of Piers II and III consisted of sand allowing a probe rod penetration of 1 to 2 inches. The remainder of the channel bottom around the piers consisted of 5-inch to 4-foot diameter riprap.
2. Concrete section loss with 3 to 9 inches of penetration and exposed reinforcing steel was noted at the top of the pier encasements of Piers 8, 9, 10 and 11, extending up to 1.5 feet below the waterline.
3. Piers 8 through 11 exhibited moderate to advanced deterioration of mortar joints approximately 90%, 70%, 80% and 25% of the mortar joints at Piers 8, 9, 10 and 11 respectively, typically 1/2 to 3 inches deep. Maximum penetration of 15, 36, 21, and 15 inches was observed at Piers 8, 9, 10 and 11 respectively. The grout loss extended above the waterline to the pier spring line and was generally in worse condition with deeper penetration and widespread loss above the waterline. The granite blocks also exhibited vertical cracks from the spring line to 2 feet below the waterline at random locations. Cracks widths typically ranged from 1/16" to 1/8" wide.
4. Partial exposure of an 8-inch-wide concrete step, 11 feet below the waterline, was present around the upstream and downstream ends of Pier II.
5. Steel ice breaker panel missing from upstream nose of Pier 10.
6. A moderate accumulation of timber debris was observed at the upstream noses of Piers 1 and 9. The accumulations consisted of 6 to 18 inch diameter logs and branches extending from the waterline to the channel bottom.

GENERAL NOTES:

1. Piers I through 12 were inspected underwater.
2. At the time of inspection on November 15, 2018, the waterline of the Mississippi River was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at mid-point intervals between the substructure units.
5. Span lengths measured as diameter of arch from front face of pier to front face of pier.
6. An in-depth inspection at each pier was performed to assess the masonry condition from the spring line to the channel bottom. Deflated grout loss measurements, crack locations, and other findings for this portion of the inspection can be found attached to the end of this report.

INSPECTION AND SOUNDING PLAN

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION
STONE ARCH BRIDGE OVER THE MISSISSIPPI RIVER
METRO DISTRICT, HENNEPIN COUNTY

FIGURE N01

INSPECTION NOTES:

1. The channel bottom at the downstream ends of Piers II and III consisted of sand allowing a probe rod penetration of 1 to 2 inches. The remainder of the channel bottom around the piers consisted of 5-inch to 4-foot diameter riprap.
2. Concrete section loss with 3 to 9 inches of penetration and exposed reinforcing steel was noted at the top of the pier encasements of Piers 8, 9, 10 and 11, extending up to 1.5 feet below the waterline.
3. Piers 8 through 11 exhibited moderate to advanced deterioration of mortar joints approximately 90%, 70%, 80% and 25% of the mortar joints at Piers 8, 9, 10 and 11 respectively, typically 1/2 to 3 inches deep. Maximum penetration of 15, 36, 21, and 15 inches was observed at Piers 8, 9, 10 and 11 respectively. The grout loss extended above the waterline to the pier spring line and was generally in worse condition with deeper penetration and widespread loss above the waterline. The granite blocks also exhibited vertical cracks from the spring line to 2 feet below the waterline at random locations. Cracks widths typically ranged from 1/16" to 1/8" wide.
4. Partial exposure of an 8-inch-wide concrete step, 11 feet below the waterline, was present around the upstream and downstream ends of Pier II.
5. Steel ice breaker panel missing from upstream nose of Pier 10.
6. A moderate accumulation of timber debris was observed at the upstream noses of Piers 1 and 9. The accumulations consisted of 6 to 18 inch diameter logs and branches extending from the waterline to the channel bottom.

GENERAL NOTES:

1. Piers I through 12 were inspected underwater.
2. At the time of inspection on November 15, 2018, the waterline of the Mississippi River was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at mid-point intervals between the substructure units.
5. Span lengths measured as diameter of arch from front face of pier to front face of pier.
6. An in-depth inspection at each pier was performed to assess the masonry condition from the spring line to the channel bottom. Deflated grout loss measurements, crack locations, and other findings for this portion of the inspection can be found attached to the end of this report.
INSPECTION NOTES:

1. The channel bottom consisted of sand, allowing probe rod penetration of 1 to 2 inches, around Piers 1 and 2, and along the east face of Pier 3.

2. Channel bottom consisted of 6-inch to 4-foot diameter riprap.

3. Piers 1 through 4 exhibited moderate to advanced deterioration of mortar joints (approximately 75%, 75%, 80% and 60% of the mortar joints at Piers 1, 2, 3 and 4 respectively), typically 1/2 to 3 inches deep. Maximum penetration of 15, 15, 24, and 15 inches was observed at Piers 1, 2, 3 and 4 respectively. The grout loss extended above the waterline to the pier spring line and was generally in worse condition with deeper penetration and widespread loss above the waterline. The granite blocks also exhibited vertical cracks from the spring line to 2 feet below the waterline at random locations. Cracks widths typically ranged from 1/16" to 1/8" wide.

4. Concrete section loss with 3 to 9 inches of penetration and exposed reinforcing steel was noted on the top of the pier encasements of Piers 5 and 6, extending up to 1.5 feet below the waterline.

5. A formed 1.5-foot-wide concrete ledge (overpour), was partially exposed along a portion of the downstream end of the west face of Pier 4, at approximately 8 to 15 feet below the waterline.

6. The northeast corner of the Pier 5 4-foot wide footing was undermined. The undermining cavity extended along the east face 12 feet from the northeast corner and along the north face 2 feet from the northeast corner. The undermining cavity had a maximum vertical dimension of 18 inches with typical penetrations of 16 inches and up to 24 inches.

7. Random accumulations of timber debris consisting of 1-foot diameter and smaller trees and branches were observed in spans 1 through 3 from the channel bottom to the waterline.

8. A moderate accumulation of timber debris was observed at the upstream noses of Piers 7 and 9. The accumulations consisted of 6 to 18 inch diameter logs and branches extending from the waterline to the channel bottom.

Notes:

Refer to Figure 1 for General Notes.
1. Refer to Figure 1 for general notes.
2. Hydrographic survey accuracy ±1.0 feet vertical.
3. Depths shown are in feet.
1. Refer to Figure 1 for general notes.
2. Hydrographic survey accuracy ±0.1 feet vertical.
3. Depths shown are in feet.

GENERAL NOTES:

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION
STRUCTURE NO. 27054
STONE ARCH BRIDGE OVER THE MISSISSIPPI RIVER
METRO DISTRICT, HENNEPIN COUNTY

HYDROGRAPHIC SURVEY PLAN

Drawn By: MBP
Checked By: BRL
Code: 67-8596
Date: Nov. 2018
Scale: 1" = 40'
Figure No.: 4

1599 Selby Avenue
Suite 206
St. Paul, MN. 55104
(651) 646-8502
www.collinsengr.com
GENERAL NOTES:

1. Refer to Figure 1 for general notes.
2. Hydrographic survey accuracy ±1.0 feet vertical.
3. Depths shown are in feet.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

STRUCTURE NO. 27004
STONE ARCH BRIDGE OVER THE MISSISSIPPI RIVER
METRO DISTRICT, Hennepin County

HYDROGRAPHIC SURVEY PLAN

Drawn By: MBP
Checked By: BRL
Date: Nov. 2018
Scale: 1" = 40'
See Figure 1 for General Notes. Bottom of footing locations approximated based on 1996 report since unavailable on given design drawings.
1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

General Notes:

Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Legend:

<table>
<thead>
<tr>
<th>Penetration</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible Penetration (Below Waterline Only)</td>
<td>Green</td>
</tr>
<tr>
<td>1/2&quot; - 3&quot; penetration</td>
<td>Yellow</td>
</tr>
<tr>
<td>3&quot; - 6&quot; penetration</td>
<td>Orange</td>
</tr>
<tr>
<td>6&quot; - 9&quot; penetration</td>
<td>Pink</td>
</tr>
<tr>
<td>9&quot; - 12&quot; penetration</td>
<td>Neon</td>
</tr>
<tr>
<td>12&quot; - 15&quot; penetration</td>
<td>Hot Pink</td>
</tr>
<tr>
<td>&gt; 15&quot; Penetration (As Noted)</td>
<td>Blue</td>
</tr>
<tr>
<td>Crack (Width Noted)</td>
<td>Purple</td>
</tr>
</tbody>
</table>

REF: Figure 2 for general inspection notes.
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 8.2 feet below the bottom of the spring line at the tip of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 230.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to pier and flow velocity at time of inspection.

Legend:
- Negligible Penetration
  - (Below Waterline Only)
- > 15" Penetration (As Noted)
- 12" - 15" Penetration
- 9" - 12" Penetration
- 6" - 9" Penetration
- 3" - 6" Penetration
- 1/2" - 3" Penetration

---

South Elevation

South Elevation

West Elevation

Waterline...90.63

Channel Bottom

Spring Line...100.0

T/Granite...97.95

B/Granite...73.9

B/FDN...71.2

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION
STRUCTURE NO. 27004
STONE ARCH OVER THE MISSISSIPPI RIVER
METRO DISTRICT, HENNEPIN COUNTY

ARCH PIER 1 INSPECTION NOTES

Checked By: BRL
Code: 63-11356
Drawn By: MBP
Date: Nov. 2018
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection notes.

Arch Pier 2 Inspection Notes

Spring Line...100.0
T/Granite...98.02
Waterline...90.63
B/Granite...75.37
B/FDN...72.57

Legend:

- Negligible Penetration (Below Waterline Only)
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (As Noted)
- Cross (Width Noted)

North Elevation

East Elevation

Channel Bottom

4. 1/16" 1/32"

7'-9"
1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

---

**General Notes:**

- Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.
- At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.
- A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.
**General Notes:**

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 3. This corresponds with a waterline elevation of 749.2 feet based on information from the USACE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation varied to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

---

**Legend:**

- **Negligible Penetration** (Below Waterline Only)
- **1/2" - 3" Penetration**
- **3" - 6" Penetration**
- **6" - 9" Penetration**
- **9" - 12" Penetration**
- **12" - 15" Penetration**
- **>15" Penetration (As Noted)**
- **Crack (Width Noted)**

---

**North Elevation**

- Spring Line: 100.0
- T/Granite: 98.05
- Waterline: 90.63
- Channel Bottom
- B/Granite: 79.5
- B/FDN: 74.25

**East Elevation**

- Channel Bottom
- B/Granite: 79.5
- B/FDN: 74.25

---

**Arch Pier 3 Inspection Notes**

**Structure No. 2109**

Stone Arch Over the Mississippi River

**Minneapolis, Hennepin County**

**Minnesota Department of Transportation**

**December 2018**

**Inspection Report**

**Collins Engineers**
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 120.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary ±6 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Legend:
- Crack (Width Noted)
- > 15" Penetration (As Noted)
- 12" - 15" Penetration
- 9" - 12" Penetration
- 6" - 9" Penetration
- 3" - 6" Penetration
- 1/2" - 3" Penetration
- Blow Waterline Only

At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 4. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

At the time of inspection on November 15, 2018, the waterline was located 9.2 feet below the bottom of the spring line at the top of Pier 4, corresponding with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information. Waterline elevation is assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 320.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection notes.

Legend:
- Negligible Penetration (Below Waterline Only)
- 1/16" - 3/32" Penetration
- 1/32" - 1/16" Penetration
- 1/16" - 1/8" Penetration
- 1/8" - 1/4" Penetration
- 1/4" - 1/2" Penetration
- 1/2" - 3" Penetration
- > 3" Penetration (As Noted)
- Crack (Width Noted)
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection notes.

Legend:
- Negligible Penetration (Below Waterline Only)
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 17" Penetration
- > 17" Penetration (As Noted)
- Crook (Width Noted)
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Legend:
- Negligible Penetration Below Waterline Creep
- Less Than 1/2" Penetration
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (As Noted)
- Cross Section Noted

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION
STRUCTURE NO. 27004
STONE ARCH OVER THE MISSISSIPPI RIVER
METRO DISTRICT, HENNEPIN COUNTY

ARCH PIER 5 INSPECTION NOTES

Figure 2: General Inspection Notes.
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection note figures due to insufficient design elevation information.

Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection note figures due to insufficient design elevation information.

Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection note figures due to insufficient design elevation information.
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 15.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection rate figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Underwater Bridge Inspection
Department of Transportation
Minnesota Metropolitan District, Hennepin County
Stone Arch Over the Mississippi River
Structure No. 27004
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Checked By: BRL
Code: 63-11356
Drawn By: MBP
Date: Nov. 2018

Legend:
- Negligible Penetration (Below Waterline Only)
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (As Noted)
- Crack (With Noted)
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 200.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION
STRUCTURE NO. 27004
STONE ARCH OVER THE MISSISSIPPI RIVER
METRO DISTRICT, HENNEPIN COUNTY

ARCH PER 7 INSPECTION NOTES

Legend:
- Negligible Penetration (Below Waterline Only)
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (As Noted)
- Crack (Width noted)
General Notes:

1. Refer to Figure 2 for general inspection notes.
2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.
3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.
4. Waterline elevation assumed to vary ±15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Waterline elevation assumed to vary ±15 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Negligible Penetration
(Below Waterline Only)

Legend:
- Negligible Penetration
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (As Noted)
- Crack (Width Noted)
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line of the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Underwater Bridge Inspection Notes:

Waterline...90.63
Crack (Width Noted)
> 15" Penetration (As Noted)
12" - 15" Penetration
9" - 12" Penetration
6" - 9" Penetration
3" - 6" Penetration
1/2" - 3" Penetration (Below Waterline Only)
Negligible Penetration

Legend:
- Negligible Penetration (Below Waterline Only)
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (As Noted)

North Elevation

Spring Line...100.0
T/Granite...97.84
Waterline...90.63
Channel Bottom
B/Granite...81.57
B/FDN...74.8

East Elevation

10'-0"
General Notes:

1. Refer to Figure 2 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 3.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 2 for general inspection notes.
1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 145.2 feet based on information from the ACOE Lockmaster on November 15, 2018.

3. A local reference elevation of 20.0 was assumed for individual pier inspection rate figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary ±6 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 1 for general inspection notes.
General Notes:

1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 140.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 1 for general inspection notes.

LEGEND:

- Negligible Penetration
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (As Noted)
- Crack (Width Noted)

atuwaterline...90.63

Spring Line...100.0
T/Granite...97.9

South Elevation

B/Granite...81.3
B/FND...75.0

West Elevation

7'-8"
General Notes:

1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 5.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 200.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Refer to Figure 1 for general inspection notes.

Legend:
- Negligible Penetration (Below Waterline Only)
- 1/2" - 3" Penetration
- 3" - 6" Penetration
- 6" - 9" Penetration
- 9" - 12" Penetration
- 12" - 15" Penetration
- > 15" Penetration (Exc Avd)
- Crack (Width Noted)
- Erosion (Erosion)

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Checked By: BRL
Code: 63-11356
Drawn By: MBP
Date: Nov. 2018

St. Paul, MN 55104
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Checked By: BRL
Code: 63-11356
Drawn By: MBP
Date: Nov. 2018
1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the top of the spring line. This corresponds with a waterline elevation of 94.6 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Legend:
- Negligible Penetration (below waterline only)
- 1/8" - 3" Penetration
- 3/16" - 9" Penetration
- 1/2" - 15" Penetration (as noted)
- Crack (Width Noted)

Refer to Figure 1 for general inspection notes.
General Notes:

1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 1.6 inches depending on location in channels, proximity to piers and flow velocity at time of inspection.

Legend:
- Negligible Penetration (Below Waterline Only)
- 1/16" - 3" Penetration
- 1/8" - 6" Penetration
- 1/8" - 9" Penetration
- 5" - 12" Penetration
- > 12" Penetration (As Noted)
- Crack (Width Noted)

Underwater Bridge Inspection
Minneapolis, MN

Inspected
Visually
Ice Breaker
Steel Plate
Bottom
Channel
General Notes:

1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection notes due to insufficient design elevation information.

4. Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Waterline elevation assumed to vary 16 inches depending on location in channel, proximity to piers and flow velocity at time of inspection.

Figure No.: 28

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION
STRUCTURE NO. 27004
STONE ARCH OVER THE MISSISSIPPI RIVER
METRO DISTRICT, HENNEPIN COUNTY

ARCH PIER II INSPECTION NOTES

Drawn By: MBP
Checked By: BRL
Code: 63-11356
Date: Nov. 2018

South Elevation

West Elevation

Legend:

Negligible Penetration
(Below Waterline Only)

1/16" - 3/32" Penetration

3/32" - 1/8" Penetration

1/8" - 1/4" Penetration

1/4" - 3/16" Penetration

3/16" - 1/2" Penetration

1/2" - 1" Penetration

> 1" Penetration (N/A for Piers)

Crock (Wall)

Observed

Step Exposed

Partial Footing

Masonry Block Smooth with
No Vertical Joint Penetration
Observed.

B/FND...74.0

Spring Line...100.0

Waterline...90.63

Channel Bottom

9'-2"

9'-2"
1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was located approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACOE lockmaster on November 15, 2018.

3. A local reference elevation of 100.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 4 inches depending on location in channel, presence of debris and flow velocity at time of inspection.
General Notes:

1. Refer to Figure 1 for general inspection notes.

2. At the time of inspection on November 15, 2018, the waterline was assumed approximately 9.2 feet below the bottom of the spring line at the top of Pier 12. This corresponds with a waterline elevation of 749.2 feet based on information from the ACES lockmaster on November 15, 2018.

3. A local reference elevation of 200.0 was assumed for individual pier inspection note figures due to insufficient design elevation information.

4. Waterline elevation assumed to vary 15 inches depending on location in channel, proximity to pier and flow velocity at time of inspection.

North Elevation

<table>
<thead>
<tr>
<th>Legend</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negligible Penetration</td>
<td>(Below Waterline Only)</td>
</tr>
<tr>
<td>1/2&quot; - 3&quot; Penetration</td>
<td>Concrete typically smooth and sound</td>
</tr>
<tr>
<td>3&quot; - 6&quot; Penetration</td>
<td>Vertical and horizontal joints typically exhibited negligible grout loss</td>
</tr>
<tr>
<td>6&quot; - 9&quot; Penetration</td>
<td>Negligible grout typically exhibited above water</td>
</tr>
<tr>
<td>9&quot; - 12&quot; Penetration</td>
<td>Negligible grout typically exhibited above water</td>
</tr>
<tr>
<td>12&quot; - 15&quot; Penetration</td>
<td>Negligible grout typically exhibited above water</td>
</tr>
<tr>
<td>&gt; 15&quot; Penetration</td>
<td>Negligible grout typically exhibited above water</td>
</tr>
<tr>
<td>Crack (Width Noted)</td>
<td>Crack (Width Noted)</td>
</tr>
</tbody>
</table>

Spring Line...100.0
T/Granite...98.0
Waterline...90.63

Channel Bottom

B/Granite...68.0
B/FDN...61.0

November 15, 2018.