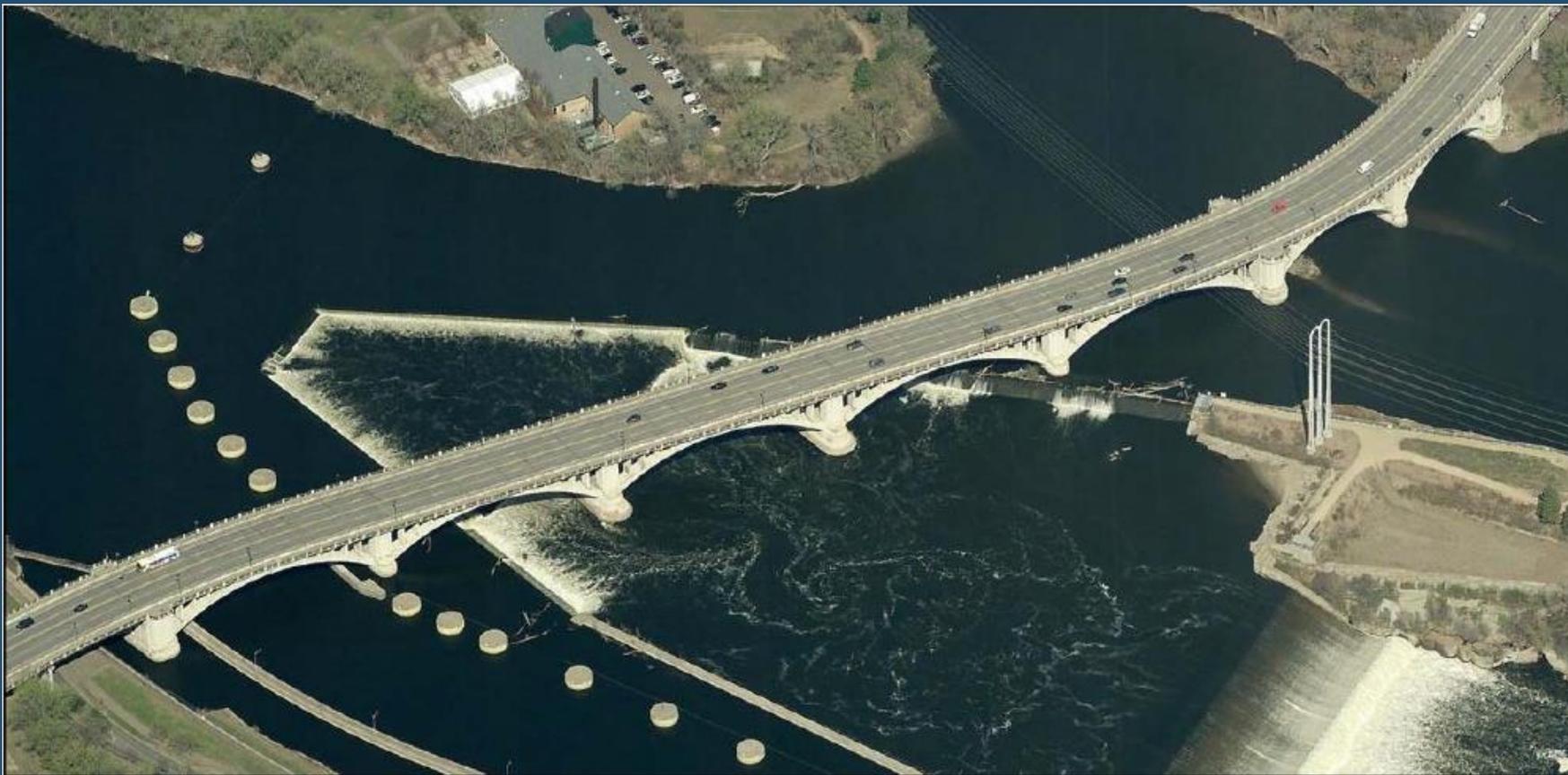




FOR INFORMATION ONLY - THIS IS OUTLINE OF PRELIMINARY DESIGN INFORMATION FOR CURRENT ENGINEER OF RECORD CONTRACT (WITH HNTB) AND IS INCLUDED AS ADDITIONAL PROJECT BACKGROUND INFORMATION WITH UPDATES AS NOTED 8/31/17.

# Third Avenue Bridge 2440

## Request for Proposals Information Meeting – 8/24/16





- Welcome
- Historic Bridge Background/Process
- Scope of Work Outline
  - Project Management
  - Agency and Public Involvement
  - Data Collection Review and Compilation
  - Section 4 of the Scope of Work
- Phase 1 Deliverables/Schedule
- Consultant Selection Process
- Questions and Answers





# Historic Bridge Background/Process

## Bridge 2440 – Historical Bridge Management Plan



One of MnDOT's 24 bridges selected for long term preservation

Must comply with Section 106 of the National Historic Preservation Act of 1966, and Section 4(f) of U.S. Dept. of Transp. Act of 1966

Listed on the National Register of Historic Places





# Bridge 2440 – Historic Bridge Management Plan

## Minnesota Department of Transportation (Mn/DOT) Historic Bridge Management Plan

### I - Project Introduction

**Bridge Number: 2440**

The Minnesota Department of Transportation (Mn/DOT), in cooperation with the Minnesota State Historic Preservation Office (SHPO) and Federal Highway Administration (FHWA), has committed to preserve selected historic bridges in Minnesota that are owned by the state and managed by Mn/DOT. In consultation with SHPO and FHWA, Mn/DOT selected 24 bridges as candidates for long-term preservation. Mn/DOT's objective was to preserve the structural and historic integrity and serviceability of these bridges following the Secretary of the Interior's Standards for the Treatment of Historic Properties (Standards) [36 CFR Part 68], and their adaptation for historic bridges by the Virginia Transportation Research Council as Guidelines for Bridge Maintenance and Rehabilitation Based on the Secretary of the Interior's Standards (Guidelines). The character-defining features of each bridge received special attention. Mn/DOT also hopes to encourage other owners of historic bridges to follow its model for preservation.



# Bridge 2440 – Historic Bridge Management Plan

## Character-Defining Features

Character-defining features are prominent or distinctive aspects, qualities, or characteristics of a historic property that contribute significantly to its physical character. Features may include materials, engineering design, and structural and decorative details.



Feature 1. Melan-system reinforced-concrete arches. The Melan system, patented in 1894, uses steel I-beams bent approximately to the shape of the arch axis and laid in a parallel series near the undersurface of the arch. The Third Avenue Bridge has seven large Melan arches, including two barrel arches and five three-rib arches, including the example in this photograph. It is considered to be the last major reinforced-concrete bridge constructed in the Twin Cities using the Melan system.



# Bridge 2440 – Historic Bridge Management Plan



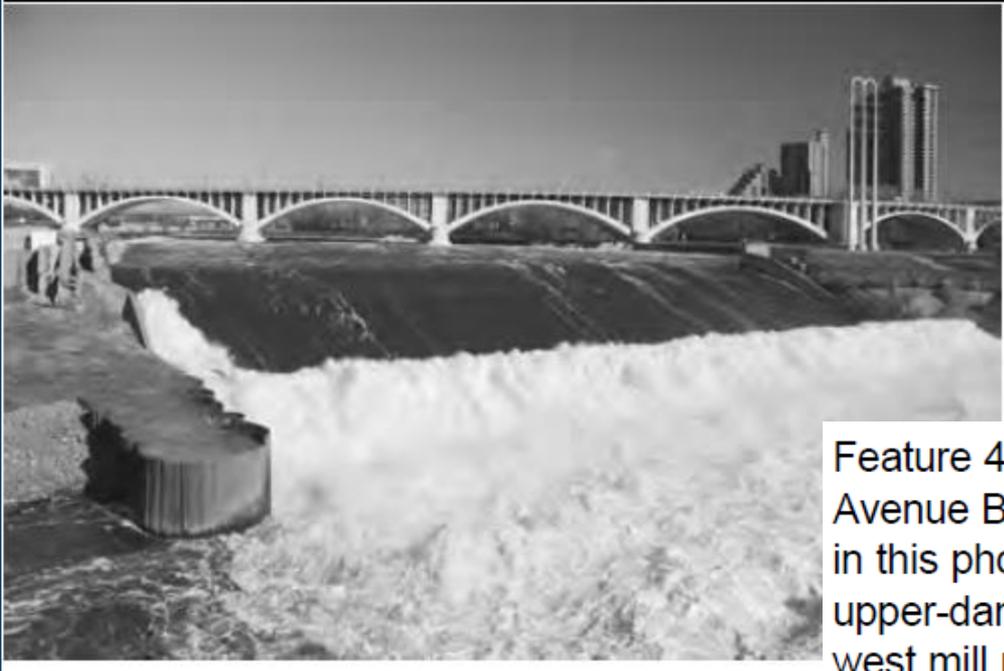
Feature 2. Reverse S-curve alignment. The bridge location lies in an area of the Mississippi River between Nicollet Island and St. Anthony Falls that has an irregular limestone base. The placement of piers and engineering of the spans required considerable engineering analysis to avoid unstable areas. The final plan resulted in a reverse S-curve alignment, which spanned the poor foundation sections and produced an aesthetic form that added to the bridge's overall image as a gateway to downtown Minneapolis.



Feature 3. Classical Revival aesthetic treatment. A gateway structure, the Third Avenue Bridge received a Classical Revival aesthetic treatment. Classical elements include piers and the projecting pedestrian bays, which were restored or reconstructed in the 1979-80 deck-replacement project, and the 1939 ornamental railing.



# Bridge 2440 – Historic Bridge Management Plan



Feature 4. St. Anthony Falls setting. The Third Avenue Bridge is located just above the falls, as visible in this photograph. It spans elements of the V-shaped, upper-dam system that channeled water into east and west mill ponds on the east and west sides of the falls. The ponds provided water to the waterpower canals for the flour-milling district. The bridge is within the St. Anthony Falls Historic District (National Register of Historic Places).





# Bridge 2440 – Background

- Originally constructed 1917
- Rehabilitated 1930's and 1979-80
- Replaced spandrel columns, pier caps
- Replaced approach spans, abutments, approach piers, beam spans, raised grade with new bridge deck, added traffic barrier
- Milan Arches from Original Construction
- Ornamental Railing rehabilitated





# Bridge 2440 - Background

- Additional Past Projects:
  - 2003 Expansion Joint Reconstruction, shotcrete piers
  - 2014 Foundation Repair Project
    - *Bridge 2440 Third Ave Bridge – Summary Engineering Report, March 5, 2015 (with Appendices)*
      - *Includes Geological Summary & Background Information*
      - *Pier 5 Investigation for Foundation Repairs*
      - *1968 Bridge Inspection Report*
      - *Other historic information*





# Scope of Work - Outline

- Project is Divided into 3 Phases:
  - **Phase 1: (Scoping Phase) – this RFP**
    - Task 1: Project Management
    - Task 2: Agency and Public Involvement (support)
    - Task 3: Data Collection, Review, Compilation
    - Task 4: Structural/Geotechnical Evaluation, Load Rating, Inspection, Rehabilitation Alternatives, Scoping Costs
  - **Phase 2: (Preliminary Design Phase)**
    - By future contract amendment
  - **Phase 3: (Final Design Phase)**
    - By future contract amendment





# Scope of Work

- TASK 1: Project Management:

- Bridge Office Project Manager for Phase 1:

- Keith Molnau (Bridge Office), ~~Ron Rauchle (Metro)~~ Christian Hoberg (Metro), as of 8/31/17

Collaboration with CRU, Historians, stakeholders

- Project Meetings – (Assume ½ Day Meetings typ.)

- Phase 1: **Ten (10) meetings**

- Bridge Inspection Planning (Early on)
- MnDOT Bridge Inspection Field Manual
  - » Element Level Condition Ratings

- **Five (5) Workshops (Include in Phase 1 budget)**

- **Five (5) additional Public Outreach Meetings (ditto)**





# Task 1: Project Management Schedule

- Phase 1 Schedule: (Scoping/Inspections/Reports)
  - Kick Off Meeting: Planned for: Oct. 26<sup>th</sup>, 2016
  - Completion of Phase 1: ~~Nov. 15, 2017~~ **February 18, 2018**
- Phase 2: (by amendment): March 15, 2018
- Phase 3: (by amendment):
  - 30% Plans ~~June 2018~~ **September 14, 2018**
  - 60% Plans ~~October 2018~~ **January 22, 2019**
  - 90% Plans ~~February 2019~~ **April 24, 2019**
  - 100 % Plans ~~June 2019~~ **August 7, 2019**





# Scope of Work

## Task 1: Project Management (continued)

- Quality Assurance/Quality Control
  - Project Specific Quality Management Plan (QPM)
  - Focus on both Phase 1 and Phase 2 Activities
  - Living Document to be updated periodically
  - Include CMP Schedule for use as PM Tool, w/ updates
  - Bridge Inspection Forms (Draft for review)
  - Integrated with Project Activities for assuring delivery of Phase 1 and Phase 2 (Plan forward into Phase 2)





# Scope of Work

## Task 1: Project Management (continued)

- Include Development of Reports in CPM Schedule

- *Bridge 2440 Historic Features Report*

Completed, in process of review by MNHPO

- *Bridge Inspection and Condition Evaluation*

Nearing Completion as of 8/31/17

- *Bridge Rating Report*

Work in progress as of 8/31/17

- *Bridge Rehabilitations Alternatives Report*

Work in progress as of 8/31/17

- *Bridge Construction, Cost Estimates, Maintenance Projections, and Annualized Repair Cost Report*





## Task 2: Agency and Public Involvement

- MnDOT Cultural Resources Unit (CRU) Coordination
  - CRU retained services of Project Historian
  - Collaboration with CRU, Project Historian
    - Keep PM informed, but work directly with Historian
  - CONTRACTOR and Project Historian Co-author Reports
    - Technical Evaluations by Engineer (CONTRACTOR)
    - Evaluation of Secretary of Interior Standards by Historian
  - 3D Visualizations of Alternatives: By CONTRACTOR
  - Historian will participate with all Phases 1, 2, and 3





# Task 2: Agency and Public Involvement

- Task 2: CRU Coordination
- Data Collection, Review and Compilation
  - Work Plan Development Phase
  - Historic Management Plan (Review with Historian)
  - Review and Documentation of Historic Elements
  - DELIVERABLE #1:
    - *Bridge 2440 Historic Features Evaluation Report*
      - *Primarily Developed by Historian, with collaboration by CONTRACTOR, CRU – yet still envisioned to be a co-authored report, illustrations, plans, technical input from CONTRACTOR*





- TASK 3: Data Collection, Review, Compilation
- ftp site: [www.mndot.gov/bridge/temp/](http://www.mndot.gov/bridge/temp/)

Item	Description	Date
1	Bridge 2440 Third Avenue Bridge Summary Engineering Report, HDR	3/5/2015
1b	AMI-2014ConstructionDiveInpsection.pdf	2/24/2015
1c	AMI-2015ConstructionDiveInspsection.pdf	9/3/2015
1d	Proposal - as advertised - 2014 Pier Foundation Repair Plans	6/27/2014
1f	Bridge 2440 - 2014 Pier Foundation Repair Plans (included in 1d)	5/23/2104
2	2014 Routine Bridge Inspection Report	10/13/2014
2b	2000 Bridge Inspection Report	7/31/2000
3	MnDOT Structure Inventory Report (2015)	8/17/2015
3b	Structure Inventory Report 2005 (OLD)	3/24/2005
3c	Structure Inventory Report 2001 (OLD)	12/10/2001
4	MnDOT Hydraulics Summary of 3D Scans BR 2440	9/18/2015
4a	Underwater Inspection - October 28, 2012	10/28/2012
4b	Underwater Bridge Inspect Report, 2010	6/20/2010
4c	Underwater Bridge Inspection Report (2008)	6/30/2010
4d	Underwater Inspection Report 2000	10/23/2000
4e	Underwater Bridge Inspection Supplemental Report, 1997	6/18/1997
5	Br 2440 Historic Management Plan (June 2006)	Jun-06
6a	Approach Grading and Traffic Control (4/9/2003)	4/8/2003
6b	Br 2440 Joint Repair and Substructure Surface Repair PLANS (2003)	3/6/2003
6c	Proposal Plans and Specical Provisons for Repair Plans (2003)	5/16/2003
7	Bridge Utility Files 1998	12/8/1998
8a	1979 Rehab Plans - HNTB w/ Drain System shops - 155 Sheets	12/3/1979
8b	Shop Drawings Utility Banks - Lewis Eng 127 Sheets	9/21/1979
9	1940 Rehab with 1916 Bridge Plans - 298 sheets	9/4/1940
10	Br 2440 Foundation Memorandum, and Attachment A, March 7, 2016	8/24/16

**NOTE: FOLLOWING THE RFP MEETING, an UPDATED FOUNDATION MEMO has been released: NO NEW BORINGS ON THE PROJECT TO BE INCLUDED**

**10R Br 2440 Foundation Memo and attachment 8/24/16**



# Task 4 - Outline

- 4.1: Design Standards
- 4.2: Geotechnical Evaluation
- 4.3: Structural Evaluation
- 4.4: Load Rating: *Report*
- 4.5: Bridge Inspection: *Report*
- 4.6: Bridge Rehabilitation Alternatives: *Report*
- 4.7: Construction Cost Estimates: *Report*





# Task 4.1: Design Standards

## 4 STRUCTURAL EVALUATION, BRIDGE LOAD RATING, BRIDGE INSPECTION, AND BRIDGE REHABILITATION STUDY (Source Codes 1800, 2850)

This task includes structural evaluation, bridge load rating, and bridge inspection that are to be performed by Contractor. The activities will be performed in accordance with the following Design Standards:

### 4.1 DESIGN STANDARDS

All design will conform to applicable requirements of the following:

- The current American Association of State Highway and Transportation Officials (AASHTO) Load Resistance Factor Design (LRFD) Design Specifications
- MnDOT LRFD Bridge Design Manual (5-392)
- MnDOT Bridge Details Manual Parts I and II
- Project Specific Bridge Design and Rating Criteria (developed by CONTRACTOR)
- The Manual for Bridge Evaluation, AASHTO, (current edition)
- Foundation Design Memo (Provided by MnDOT)
- MnDOT Bridge Inspection Best Practices \*\*
- MnDOT Bridge and Structure Inspection Program Manual – 2014 \*\*
- MnDOT Bridge Inspection Field Manual – 2016 \*\*
- Bridge Preservation and Improvement Guidelines Fiscal Year 2016 – 2020
- MnDOT Computer Assisted Design and Drafting (CADD) Standards
- Secretary of Interior Standards for Treatment of Historic Properties (SOI Standards)
- Secretary of Interior Standards Interpreted for Bridge Repair, Rehabilitation, and Replacement Situations
- Section 106 of the National Historic Preservation Act of 1966
- MnDOT Management Plan for Historic Bridges in Minnesota
- National Park Service “Preservation Brief No 15, Preservation of Historic Concrete”
- Conformance with Environmental Documentation (anticipated to be Categorical Exclusion to be developed by State)
- Final Bridge Construction and Rehabilitation Recommendations (to be developed by Contractor in collaborative process that will include input from MnDOT CRU, Project Historian, MnDOT Bridge Office, and other stakeholders)
- MnDOT Surveying and Mapping Manual (State will provide bridge surveys)
- Americans with Disabilities Act Standards (ADA)

\*\* Refer to MnDOT Bridge Office Website for Bridge Inspection Manuals and Requirements

<http://www.dot.state.mn.us/bridge/inspection.html>

## Bridge Inspection Field Manual Version 2.0 – February 16, 2016 Minnesota Department of Transportation



\*\* Refer to MnDOT Bridge Office Website for Bridge Inspection Manuals and Requirements

<http://www.dot.state.mn.us/bridge/inspection.html>





## Task 4.2: Geotechnical Evaluation

- Review MnDOT Bridge Foundation Memo
  - Based on river pier site conditions extracted from past projects
  - Intended to relieve Contractor of need for further river pier geotechnical exploration
  - Evaluate the adequacy of ALL existing footings for the proposed rehabilitation
- **REVISED: NO NEW BORINGS REQUIRED (B1 or B2)**
- Evaluate Walls/Provide Recs. (NE and NW on St. Anthony side)





# Task 4.2: Geotechnical Evaluation



## Table of Contents

1	Introduction .....	1
2	Scope of the Report .....	1
3	Geological Setting .....	1
4	Relevant Site History .....	2
4.1	Eastman Tunnel.....	3
4.2	Saint Anthony Falls Spillway Protection .....	3
4.3	Upper and Lower St. Anthony Falls Lock and Dam .....	4
5	Pier 5 Available Data .....	4
5.1	Construction.....	4
5.2	1968 Repair Project and Associated Report.....	5
5.3	1993 Bridge Scour Investigation .....	6
5.4	Underwater Inspections .....	6
6	Subsurface Exploration .....	8
7	Potential Causes of Pier 5 Deterioration.....	9
8	Conclusion .....	10
9	Recommendation .....	11
10	References.....	11
	Appendix A Report Pictures .....	1
	Appendix B 1968 Bridge Inspection Report.....	29
	Appendix C Minnesota Historic Property Record.....	86
	Appendix D Engineering News Article .....	94
	Appendix E AET Subsurface Exploration Report.....	101
	Appendix F Blue View Screen Shots.....	137

- Available on MnDOT FTP SITE (link in RFP)

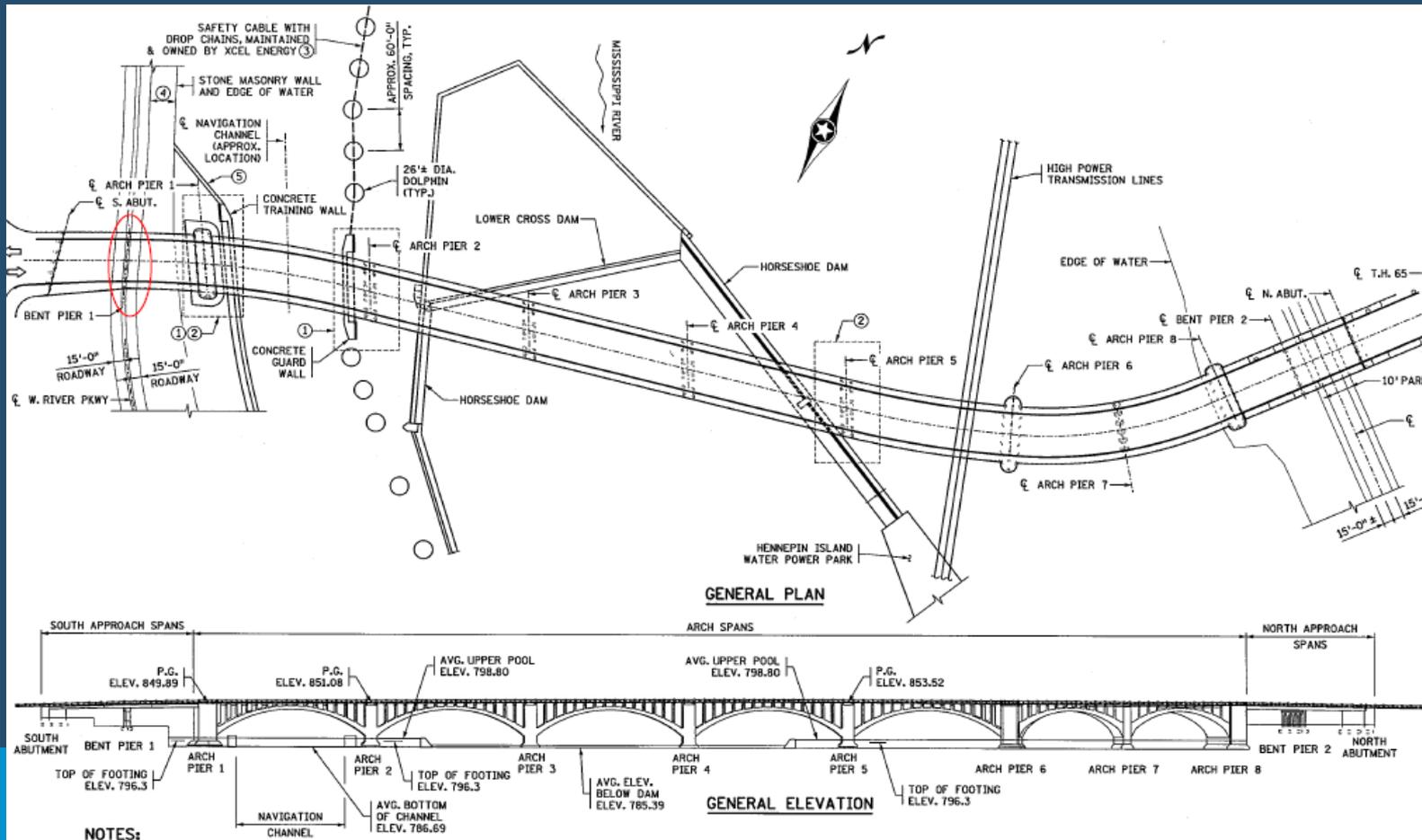




# Task 4.2: Geotechnical Evaluation

Wall Recs. (NE and NW on St. Anthony side)

REVISED: NO NEW BORINGS REQ'D – See updated Foundation Memo 10R



# Task 4.2: Geotechnical Evaluation



Wall Recs. (NE and NW on St. Anthony side)





## Task 4.3: Structural Evaluation

- Develop Structural Analysis Models of Entire Bridge
  - Models to be used for design and Load Rating
  - Include 3D representation of the arch spans, spandrel columns, floor beams, and integral superstructure, including the horizontal reverse S-curve alignment
  - Must include staged construction analysis





## Task 4.3: Structural Evaluation

Include Staged Construction Analysis to check feasibility of construction  $\frac{1}{2}$  at time, vs. closing the bridge to traffic

- Partial structural removals must be rigorously examined using structural analysis to determine permissible unloading sequences of the arch spans, determination of deflections, and review of design stresses for permissible compressive and tensile loads that could occur during staged deconstruction and reconstruction.





## Task 4.3: Structural Evaluation

Thermal analysis study required

review thermal stresses in the structure

assess boundary conditions

Consider data from survey targets (by MnDOT)

Goal: Reduce number of expansion, while allowing for thermal displacements and/or deflection at tops of spandrel columns





## Task 4.3: Structural Evaluation

Contractor must provide an in-house quality assurance check of the structural analysis modeling, staged construction analysis, and thermal analysis

Self-perform independent checks during the preliminary design phase (using separate analysis software) to ensure that the preliminary analysis includes a sufficient level of detail and independent review and confirmation of analysis and rating results.

Separate PEER Review Contract during Final Design Stage





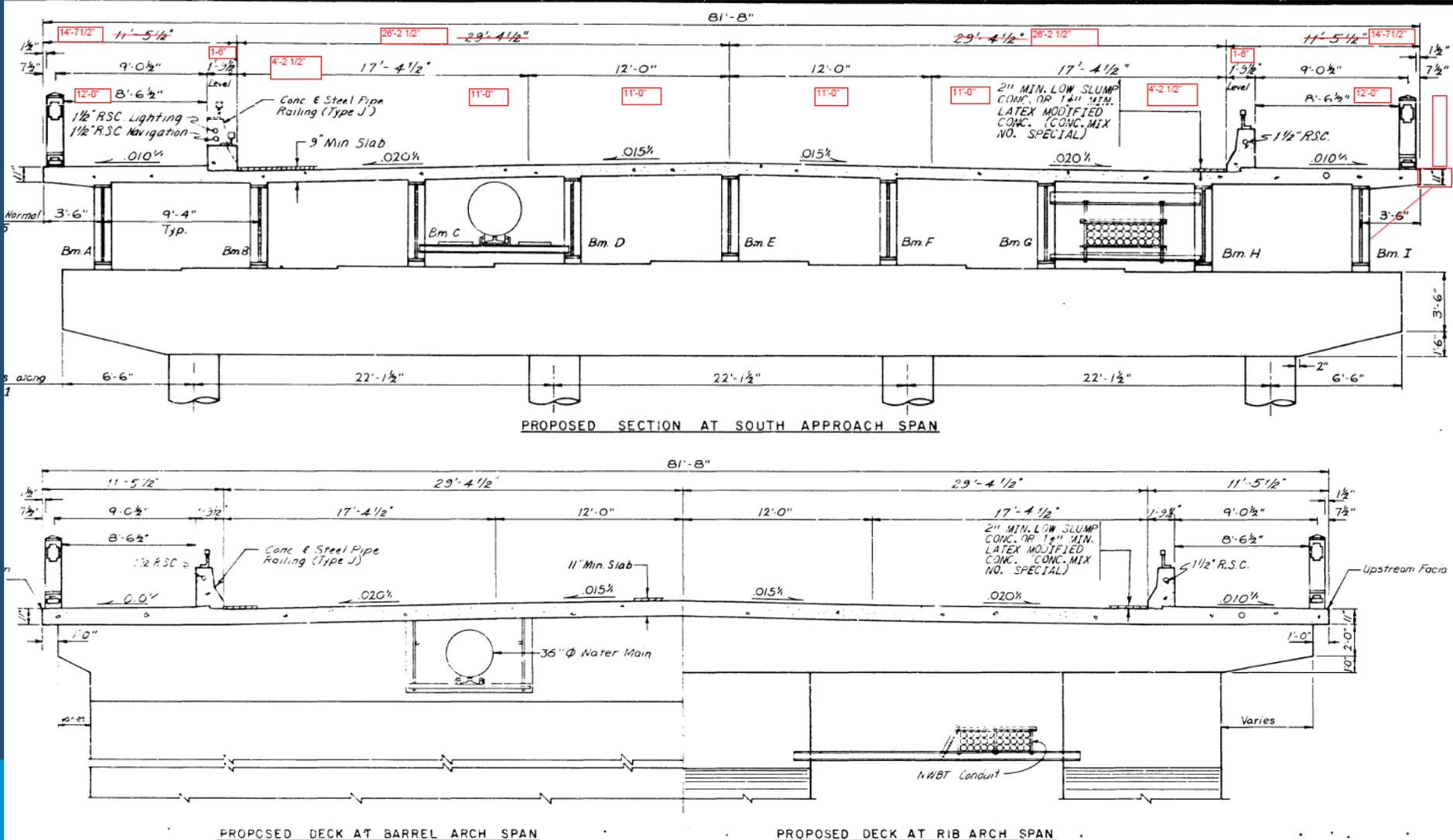
## Task 4.4: Load Rating

- Load Rating Bridge – Up to 3 Cross Sections:
  - 1) Existing Cross Section
  - 2) Modified Cross Section (Type 1)
  - 3) Modified Cross Section (Type 2) – Only upon NTP  
*Rate entire bridge superstructure including main spans and approach spans. Arches, spandrel columns, pier caps, deck slab using LRFR w/ HL-93 per MBE*

Evaluate all permit trucks and ped loading with inspection vehicle on sidewalk – details in SOW



# Existing X-Section and Mod X-Section Type 1



# Existing X-Section and Mod X-Section Type 1



Existing X-section  
Constrained at ends of  
Bridge and re-use of  
railing limits widening  
alternatives

Modified X- Section (Type 1):  
Same width = 81'-8" as  
existing, but consider use of  
11' lanes, 4'-2 1/2" shoulders,  
12' sidewalks



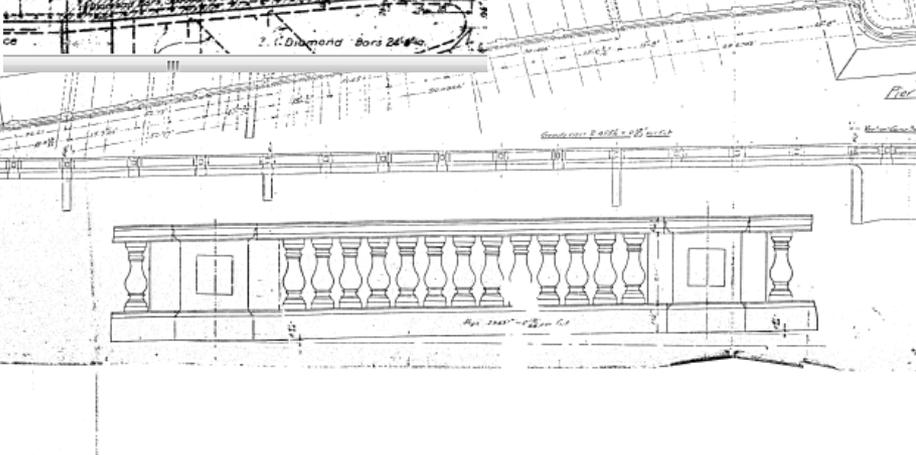
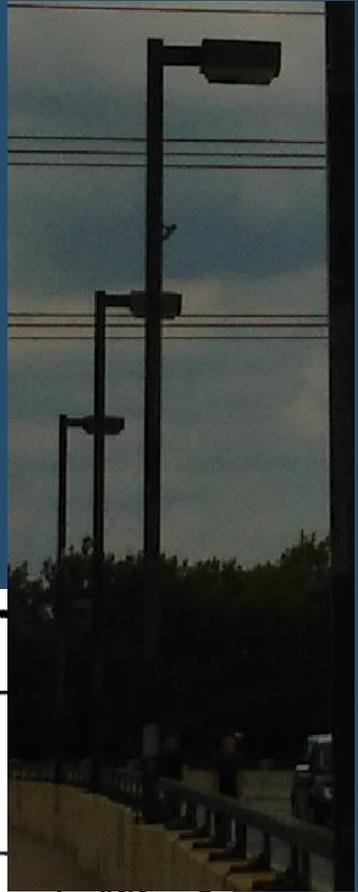
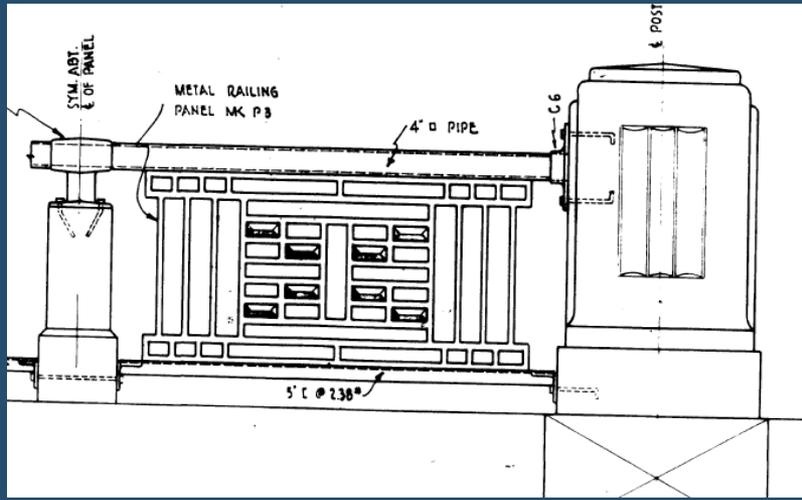
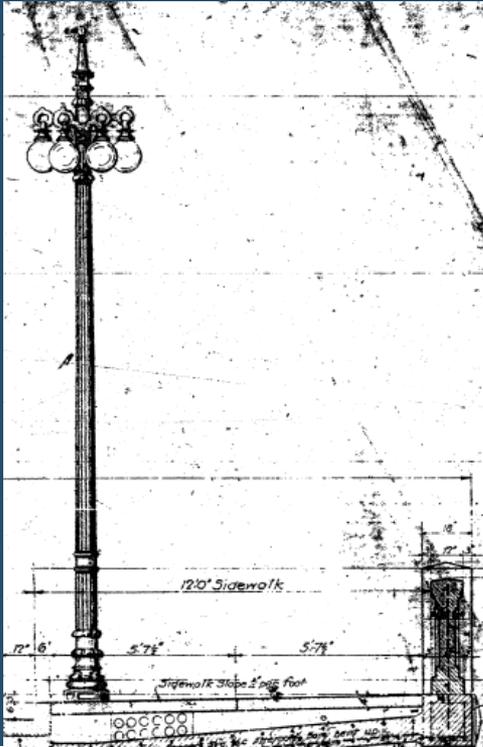


## Task 4.5: In Depth Bridge Inspection

- After Kick-off meeting, Contractor to complete a site visit with the Project Historian
  - General overview of condition of visible elements
  - Gain understanding of historical features of the bridge and obtain guidelines from Project Historian
  - Conduct inspection of Bridge Railing, assess condition, assess railing height and document any code deficiencies
  - Begin development of 3D Visualizations for use in Reports



# Bridge 2440 Historic Features Evaluation Report:



<b>BRIDGE RAILING</b>			
3RD AVENUE SO. BRIDGE OVER MISSISSIPPI RIVER			
DRWN.	E.G.	CITY ENGINEERS OFFICE	
TRCD.	P.O.	BRIDGE DEPT.	MINNEAPOLIS, MINN.
CHKD.	T.J.		
DATE	11-28-38	P.T. PAUL E. GORBERSON	CITY ENGINEER BRIDGE ENGINEER
			SCALE 7/8" = 1'-0" DWG. NO. 1



# *Bridge 2440 Historic Features Evaluation Report:* Entire bridge coated with Special Surface Treatment (previous repair projects)





## Task 4.5: In-Depth Bridge Inspection

- Inspection Planning Effort must precede inspection
  - In Depth Inspection will be developed by Contractor with consultation with State – **Deliverable: Inspection Plan**
  - Element Level Inspection with MnDOT Bridge Inspection Field Manual –(2016) as base line with added elements
  - Inspection will be in-depth hands on inspection of all components of Bridge 2440 above the waterline
  - Ongoing underwater inspection underway is underway by others – to be reviewed by Contractor for repair needs





# Task 4.5: In-Depth Bridge Inspection

"Contractor" references shown below are for Engineer of Record = "Contractor" of Lead Bridge Design Contract (EOR)

- Contractor to provide for all access including rental of snoopers, man-lifts, and all access equipment
- Contractor to provide all equipment for NDT and coring concrete, extracting specimens, materials testing, and costs of preparation of materials testing reports
- Revised (Contractor provided for this)  
~~STATE~~ to provide for temporary traffic Control
- Estimated 3 weeks with 2 snoopers, followed by additional 3 weeks 1 snooper for NDT and follow up





## Task 4.5: In Depth Bridge Inspection

- Sampling/Testing will be focused on original concrete elements, but also include elements reconstructed in 1979-1980.
- Sampling/Testing must include assessment of condition of reinforcement and Internal Melan steel framework within the concrete arch spans for extent of corrosion and condition in the Element Level Insp'n
- List of in-depth field testing is included in the SOW









# Task 4.6: Bridge Rehabilitation Alternatives

"Contractor" references shown below are for Engineer of Record = "Contractor" of Lead Bridge Design Contract (EOR)

- Contractor led workshop, presentation of findings to date, collaboration with PDT and development of Bridge Rehabilitation Alternatives / Feasibility Study
- Contractor will collaborate with the Project Historian to develop rehabilitation alternatives that meet SOI Stds.
- Present DRAFT Reports completed to date, receive comments
- Develop Range of Alternatives (minimal preservation thru major rehab)
- Must include consideration of construction staging requirements, and approximate duration of bridge closures for each alternative (if necessary), vs. stage construction combined with any high level cost for any accelerated bridge construction (ABC) methods proposed





# Task 4.6: Bridge Rehabilitation Alternatives

"Contractor" references shown below are for Engineer of Record = "Contractor" of Lead Bridge Design Contract (EOR)

- Renderings and 3D Visualizations (with Rehabilitation report & others?)

Contractor should assume following renderings are required inclusion in Phase 1:

- 1) 3D model of entire bridge, approach spans, overlooks, architectural features
- 2) 3D model of proposed x-section and supporting pier caps (if modified)
- 3) 3D model of overlooks (if modified)
- 4) Detailed alternatives of existing and proposed pedestrian railings and pilasters
- 5) Detailed evaluation of lighting fixtures and other historical features
- 6) Renderings of the completed structure from 2 daytime views off the bridge
- 7) Renderings of the completed structure from 2 nighttime views off the bridge
- 8) Rendering of sidewalk area (alternatives) with overlook in the foreground





## Task 4.7: Bridge Construction Cost Estimate, Maintenance Projections, Annualized Repair Costs Report

TO BE MODIFIED WITH INPUT FROM CMGC CONTRACTOR AND INDEPENDENT REVIEW BY COST ESTIMATING TEAMS. 8/31/17

- Develop Cost Estimates, Maintenance cost projections, and annualized repair costs for the rehabilitation alternatives developed by Contractor
  - Various concrete surface repairs, extent of coverage, cathodic protection etc.
  - Concrete Deck Repairs vs. deck replacement alternatives
  - Concrete deck replacement, widening sidewalk (Modified Cross section Type 1)
  - Cost of Modified Cross Section Type 2 is EXCLUDED from the Phase 1 Cost proposal, but high level magnitude costs of “widening” should be outlined
- Include life cycle costs over 50 year period – (to be confirmed by State)
- Include Costs of Construction with Bridge Closed to traffic vs. alternatives evaluation for accelerated bridge construction (ABC), with input from State and other stakeholders





# Phase 1 Deliverables

- QMP & CPM Schedule for Phase 1 Work
  - (Focus of QPM and CPM is on Phase 1, but include Phase 2 in Schedule)
- Completion of Tasks identified in Exhibit A (SOW)
- *Bridge 2440 Historic Features Evaluation Report*
- *Bridge Inspection and Condition Evaluation*
- *Bridge Ratings Report with Deck Replacement Study*
  - (Include 200 hours for Mod Cross Section Type 2 ,NTP by State PM, and 1 of the 5 workshops)
- *Bridge Rehabilitation Alternatives Report*
- *Bridge Construction Cost Estimate, Maintenance Projections, and Annualized Repair Costs Report*
- DRAFT Inspection Plan
- FINAL Inspection Plan

TO BE MODIFIED WITH INPUT FROM CMGC CONTRACTOR AND INDEPENDENT REVIEW BY COST ESTIMATING TEAMS.





# Consultant Selection Process

- **Formal RFP process**
  - Technical proposal
  - Quality Management Plan
  - **Cost proposal for Phase 1 activities**
    - Include all project management and QA/QC needs for Phase 1 activities and deliverables
    - For the load rating of Modified Cross Section Type 2, include only 200 hours in the cost proposal as a placeholder fee to be implemented at the direction of State's Project Manager





# Questions

- FTP SITE LINK for Project Information:

[www.mndot.gov/bridge/temp/](http://www.mndot.gov/bridge/temp/)

4 MnDOT Hydraulics Summary of 3D Scans Br 2440

- Pier 1: <https://youtu.be/w4PzjMGCxqw>
- Pier 5: <https://youtu.be/C5RtKTFm58I>

