UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 90608

MINNETONKA BOULEVARD

OVER

ST. ALBAN'S BAY

DISTRICT 5 – CITY OF EXCELSIOR AND CITY OF GREENWOOD

JUNE 6, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

AND

WSB & ASSOCIATES, INC.

JOB NO. 2107

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 90608, Piers 1 and 2, were found to be in satisfactory condition below water with no defects of structural significance observed. There were several areas of section loss with exposed reinforcing steel above the waterline. Minor vertical and horizontal cracks were also observed at random locations above the waterline on both piers. The channel bottom appeared stable with no evidence of significant scour or appreciable changes since the previous inspection.

INSPECTION FINDINGS:

(A) The channel bottom material along Pier 1 consisted of 1 to 2 inch diameter stone with no appreciable probe rod penetration; the channel bottom material along Pier 2 consisted of sand and gravel with up to 2 inches of probe rod penetration.

(B) A spall with associated cracking was observed on the northwest corner of the west end of Pier 1 and was located at the waterline measuring 10 inches high by 18 inches wide with 1 inch maximum penetration.

(C) A 1/16 inch layer of marine growth was observed on all below water surfaces.

(D) Two horizontal cracks up to 1/8 inch wide were observed near the waterline. The cracks extended from the midpoint of the pier to the west end.

(E) A vertical crack along the construction joint was observed near the center of both piers and extended from the top of the pier cap to the channel bottom with 1/8 inch maximum width. Minor section loss and differential moment up to 1/8 inch was observed in the north face crack of Pier 1 from the waterline to the channel bottom.

(F) A spall with exposed reinforcing steel was observed on the southwest corner of east end of Pier 1 extending from the top of the pier cap to 3 feet above the waterline and measuring up to 3 feet in width with penetrations up to 3 inches deep. Exposed reinforcing steel exhibited up to 50% section loss.

(G) A spall with exposed reinforcing steel was observed on the northwest corner of the east end of Pier 1 extending from the top of the pier cap to the waterline and measuring 6 to 18 inches wide with penetrations up to 5 inches deep and 25% section loss of the reinforcing steel.

(H) A spall with associated cracks was observed on the northeast corner of the east end of Pier 1 from 1.5 feet to 3.5 feet above the waterline. Area measured 8 inches wide with 2 inch penetration and with no exposed reinforcing steel.

(I) A spall with exposed reinforcing steel was observed at the southwest corner at the east end of Pier 2 and was located from 2 to 4 feet above the waterline. Area was up to 15 inches wide with a maximum penetration of 1.5 inches. Exposed reinforcing steel exhibited up to 50% section loss.

(J) Three horizontal cracks were observed on the South face of Pier 2 from the waterline up 4 feet. The cracks typically extended along the entire face of the pier and were up to 1/16 inch wide.

(K) The concrete river wall near the west end of Pier 1 was undermined along a 3 foot length with a cavity measuring 6 inches high with up to 2 feet of horizontal penetration.

RECOMMENDATIONS:

(A) To inhibit further, more detrimental deterioration, repair the areas of section loss (spalling with exposed reinforcing steel) by removing all unsound concrete, cleaning the reinforcing steel, and patching with a concrete mix designed to promote high durability and low permeability.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

WSB and Associates

Barritt Lovelace
Registered Professional Engineer
Bridge Safety Inspection Team Leader

Respectfully submitted,

PROFESSIONAL ENGINEER
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Daniel G. Stromberg
Date 6/30/14 License # 21491

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 90608

Feature Crossed: St. Alban's Bay

Feature Carried: Minnetonka Boulevard

Location: District 5 - Hennepin County, City of Excelsior

Bridge Description: The bridge superstructure consists of three concrete deck girder spans supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete piers. The north pier is designated as Pier 2 and the south pier as Pier 1. The abutment and pier footings are supported on timber piles.

2. INSPECTION DATA

Professional Engineer/Team Leader: Barritt Lovelace, P.E. (WSB)

Dive Team: Kasey L. Yoder (WSB), Ryan Breen (Collins)

Date: June 6, 2012

Weather Conditions: Sunny, 75 °F

Underwater Visibility: 5 Feet

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2.

General Shape: The piers consist of oblong rectangular shafts squared off at the ends. The shafts rest on rectangular footings that are founded on timber piles.

Maximum Water Depth at Substructure Inspected: Approximately 6.8 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier shaft near the midpoint of Pier 2.

Water Surface: The waterline was approximately 12.2 feet below reference.
Waterline Elevation = 929.6.

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

Item 60: Substructure: Code 6

Item 61: Channel and Channel Protection: Code 8

Item 92B: Underwater Inspection: Code B/06/12

Item 113: Scour Critical Bridges: Code I/91

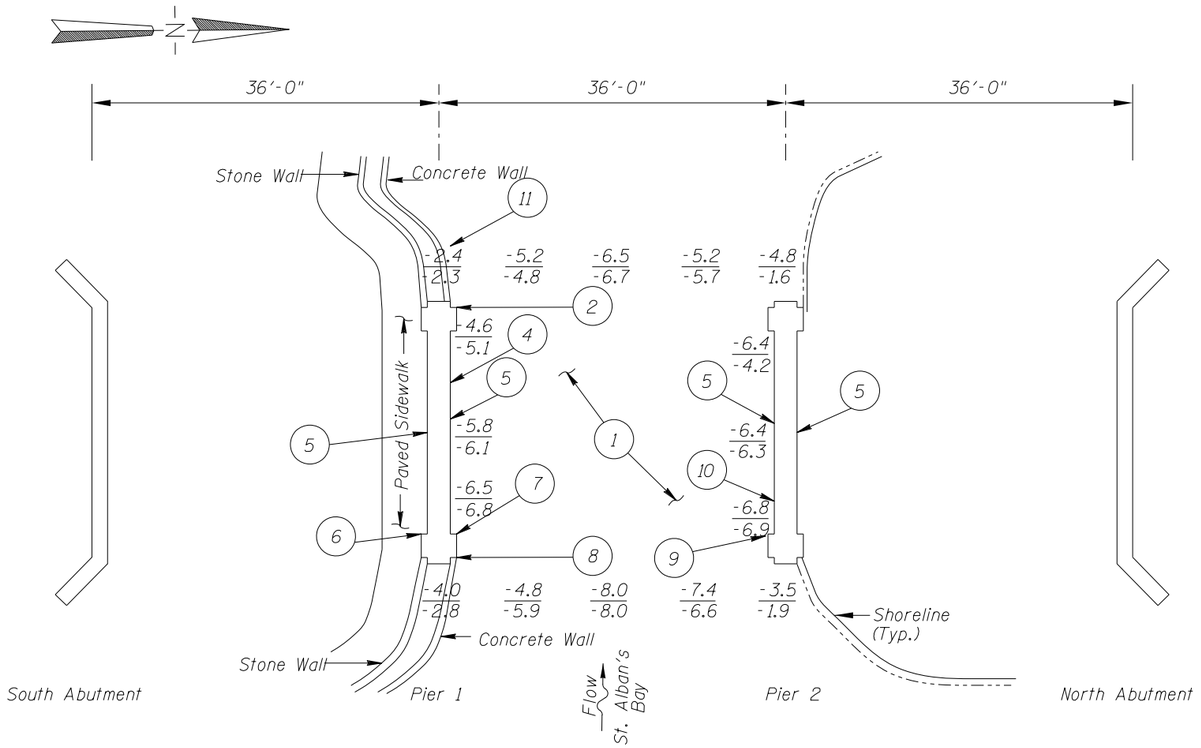
Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

_____ Yes X No

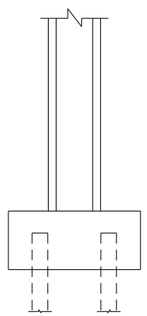
Photograph 1. Overall View of Structure, Looking Northwest.

Photograph 2. View of Spall at the East End of Pier 1 with Exposed Reinforcing Steel, Looking Northeast.

Photograph 3. View of Pier 2, Looking Northwest.



SOUNDING PLAN



TYPICAL END VIEW OF PIERS

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on June 6, 2012, the waterline was located approximately 12.2 feet below the top of the pier shaft near the midpoint of Pier 2. This corresponds with a waterline elevation of 929.6 based on the previous report dated 2007.
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 1/4 point intervals between the substructure units.

INSPECTION NOTES:

1. The channel bottom material consisted of sand with up to 4 inches probe rod penetration. The channel bottom material along Pier 1 consisted of 1 to 2 inch diameter stone with no appreciable probe rod penetration. The channel bottom material along Pier 2 consisted of sand and gravel with up to 2 inches of probe rod penetration.
2. A spall with associated cracking was observed on the northwest corner of the west end of Pier 1 and was located at the waterline measuring 10 inches high by 18 inches wide with 1 inch maximum penetration.
3. A 1/16 inch layer of marine growth was observed on all below water surfaces.
4. Two horizontal cracks up to 1/8 inch wide were observed near the waterline. The cracks extended from the midpoint of the pier to the west end.
5. A vertical crack along the construction joint was observed near the center of the pier and extended from the top of the pier cap to the channel bottom with 1/8 inch maximum width. Minor section loss and differential movement up to 1/8 inch was observed in the north face crack on Pier 1 from the waterline to the channel bottom.
6. A spall with exposed reinforcing steel was observed on the southwest corner of east end of Pier 1 extending from the top of the pier cap to 3 feet above the waterline and measuring up to 3 feet in width with penetrations up to 3 inches deep. Exposed reinforcing steel exibited up to 50% section loss.
7. A spall with exposed reinforcing steel was observed on the northwest corner of the east end of Pier 1 extending from the top of the pier cap to the waterline and measuring 6 to 18 inches wide with penetrations up to 5 inches deep and 25% section loss for the reinforcing bars.
8. A spall with associated cracks was observed on northeast corner of the east end of Pier 1 from 1.5 feet to 3.5 feet above the waterline. Area measured 8 inches wide with 2 inch penetration with no exposed reinforcing steel.
9. A spall with exposed reinforcing steel was observed at the southwest corner at the east end of Pier 2 and was located from 2 to 4 feet above the waterline. Area was up to 15 inches wide with a maximum penetration of 1.5 inch. The exposed reinforcing steel exhibited up to 50% section loss.
10. Three horizontal cracks were observed from waterline up 4 feet. The cracks typically extended along the entire south face of the pier and were up to 1/16 inch wide.
11. The west end of the concrete river wall was undermined along a 3 foot length with a cavity measuring 6 inches high with up to 2 feet of horizontal penetration.

Legend

-2.0	Sounding Depth from Waterline (6/6/12)
-5.2	Sounding Depth from Waterline (10/17/07)

Note:

All soundings based on 2012 waterline location.

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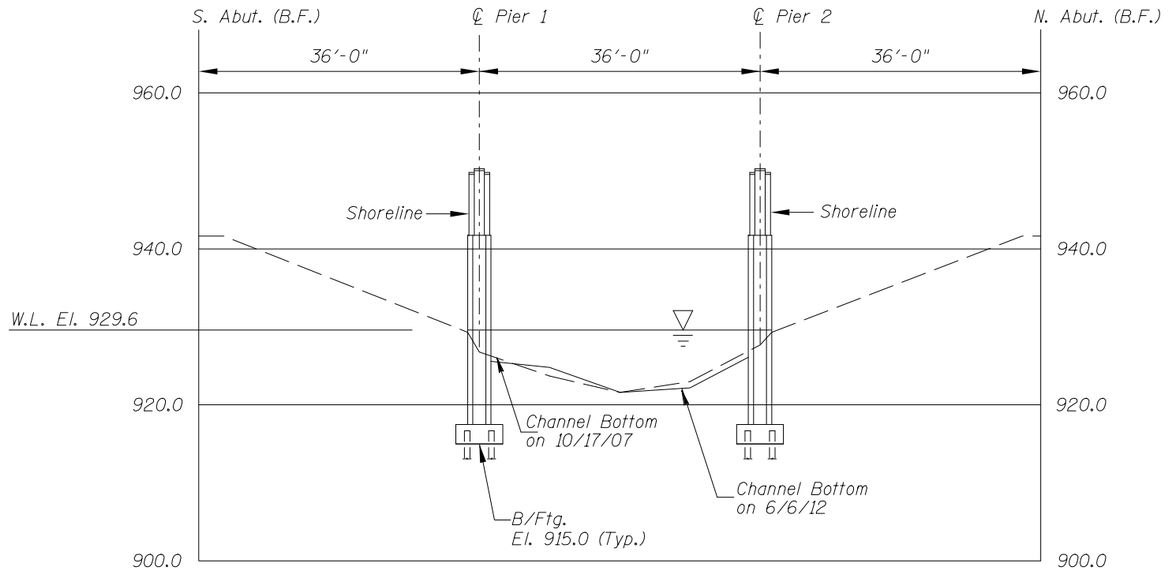
MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

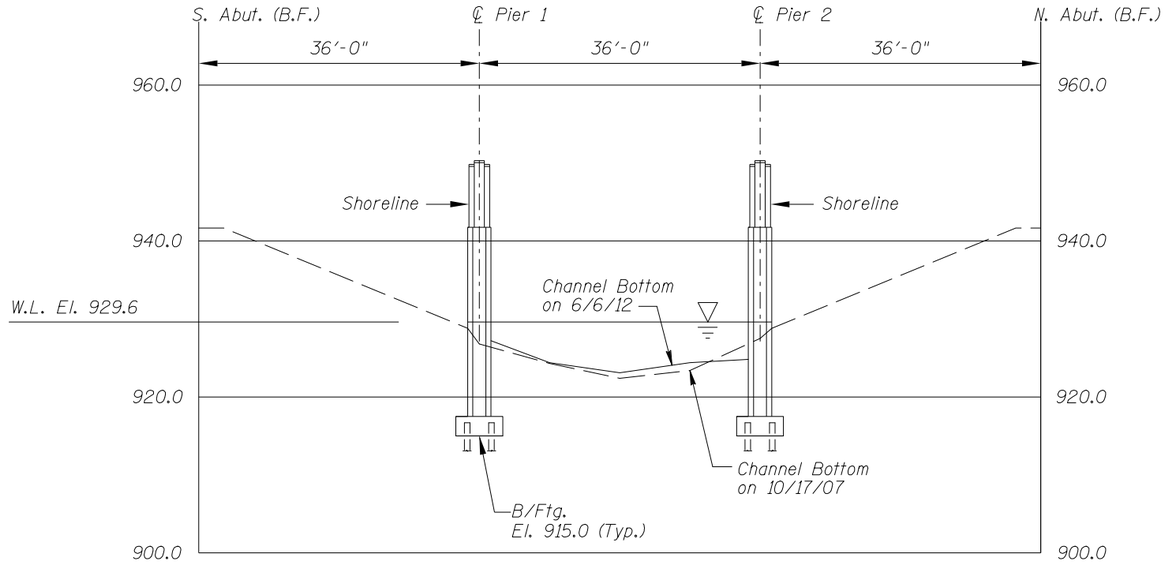
STRUCTURE NO. 90608
OVER THE ST. ALBAN'S BAY
DISTRICT 5, HENNEPIN COUNTY, CITY OF EXCELSIOR

INSPECTION AND SOUNDING PLAN

Drawn By: BJR	COLLINS ENGINEERS, PLLC 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: JUNE 2012
Checked By: BRL		Scale: NTS
Code: 52210113		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

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UPSTREAM AND DOWNSTREAM
FASCIA PROFILES

Drawn By: BJR	COLLINS ENGINEERS INC 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com	Date: JUNE 2012
Checked By: BRL		Scale: 1"=20'
Code: 52210113		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: WSB & Associates and Collins Engineering DATE: June 6, 2012
ON-SITE TEAM LEADER: Barritt Lovelace, P.E. (WSB)
BRIDGE NO: 90608 WEATHER: Sunny, 75°F
WATERWAY CROSSED: St. Alban's Bay
DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR
_____ OTHER
PERSONNEL: Kasey L. Yoder (WSB), Brad Robinson (WSB), Ryan Breen (Collins)
EQUIPMENT: Commercial Scuba, U/W Light, Scraper, Lead Line, Sounding Pole, Probe Rod, Camera
TIME IN WATER: 11:15 A.M
TIME OUT OF WATER: 12:45 P.M
WATERWAY DATA: VELOCITY Negligible/None
VISIBILITY 5 feet
DEPTH 6.8 feet maximum at Pier 2
ELEMENTS INSPECTED: Piers 1 and 2
REMARKS: Overall, both piers were in satisfactory condition with no defects of structural significance below water. Several areas of section loss with exposed reinforcing steel were observed above the waterline on both piers. Minor vertical and horizontal cracks were observed on faces of both piers at random locations above the waterline. The channel bottom appeared stable with no significant scour or appreciable changes since the previous inspection.

FURTHER ACTION NEEDED: X YES _____ NO

Repair the areas of section loss by removing all unsound concrete, cleaning the reinforcing steel, and patching with a concrete mix designed to promote high durability and low permeability.

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 90608
INSPECTORS WSB & Associates, Inc. / Collins Engineering, Inc.
ON-SITE TEAM LEADER Barritt Lovelace P.E.
WATERWAY CROSSED St. Alban's Bay

INSPECTION DATE June 6, 2012

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.		MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
	UNIT DESCRIPTION	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	6.5'	N	6	N	8	N	6	8	8	8	N	8	6	N	N	6	N	N
	Pier 2	6.8'	N	6	N	8	N	6	8	8	8	N	8	6	N	N	6	N	N

*UNDERWATER PORTION ONLY

REMARKS: Overall, both piers were in satisfactory condition with no defects of structural significance below water. Several areas of section loss with exposed reinforcing steel were observed above the waterline on both piers. Minor vertical and horizontal cracks were observed on faces of both piers at random locations above the waterline. The channel bottom appeared stable with no significant scour or appreciable changes since the previous inspection.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.