

UNDERWATER BRIDGE INSPECTION REPORT

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STRUCTURE NO. L6116

MSAS 140 (LAKE AVE.)

OVER THE

SHIP CANAL

CITY OF DULUTH

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SEPTEMBER 26, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 7423

MINNESOTA DEPARTMENT OF TRANSPORTATION  
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. L6116, the sheet pile wall on the north and south banks between 50 feet east and west of the bridge fascia, were found to be in good condition, with no defects of structural significance. The sheet piling exhibited minor corrosion and all interlock seams and joints appeared tight. The channel bottom appeared well armored and stable.

INSPECTION FINDINGS:

- (A) The channel bottom material typically consisted of concrete rubble and stones.
- (B) The steel sheet piling exhibited rust nodules typically 1/2 inch in diameter on approximately 50 percent the surface area with associated pitting up to 1/32 inch deep from 2 feet below the waterline to the channel bottom. A 1/2 inch thick layer of zebra mussels was also observed covering the surface in this area.
- (C) All sheet pile interlock seams appeared tight with no noticeable gaps or separation.

RECOMMENDATIONS:

- (A) Reinspect the submerged substructure at the normal maximum recommended (NBIS) interval of sixty (60) months.
  
- (B) The steel sheet pile wall is over 40 feet away from the substructure and has no interaction with the structure. It is recommended that this structure be taken off the underwater inspection list since there are no submerged substructure elements.

Inspection Team Leader:  
Daniel G. Stromberg, P.E.

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: L6116

Feature Crossed: Ship Canal

Feature Carried: MSAS 140 (Lake Ave.)

Location: City of Duluth

Bridge Description: The superstructure consists of a steel truss aerial lift bridge. The superstructure is supported by two steel truss towers on concrete footings. A concrete capped steel sheet pile wall is located approximately 40 feet from the edge of the concrete footing.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg, P.E.

Dive Team: Marc B. Parker, Clay G. Brookins

Date: September 26, 2012

Weather Conditions: Sunny, 60° F

Underwater Visibility: 5 feet

Waterway Velocity: None / Negligible

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: 50 feet of sheet pile wall to the east and west of the structure fascias.

General Shape: The superstructure consists of a steel truss aerial lift bridge. The superstructure is supported by two steel truss towers on concrete footings. A concrete capped steel sheet pile wall is located approximately 40 feet from the concrete footing closest to the channel.

Maximum Water Depth at Substructure Inspected: Approximately 28.1 feet.

4. WATERLINE DATUM

Water Level Reference: Top of the concrete sheet pile cap at the north bank.

Water Surface: The waterline was approximately 9.5 feet below the reference.  
Waterline Elevation 90.5

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

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 8

Item 92B: Underwater Inspection: Code B/09/12

Item 113: Scour Critical Bridges: Code I/12

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

       Yes   X   No

6. STRUCTURAL ELEMENT CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
988	Miscellaneous Items (Steel Sheet Pile Wall)	280	LF	280	0	0	n/a	n/a



Photograph 1. Overall View of Structure, Looking West.



Photograph 2. View of the North Sea Wall, Looking Northeast.



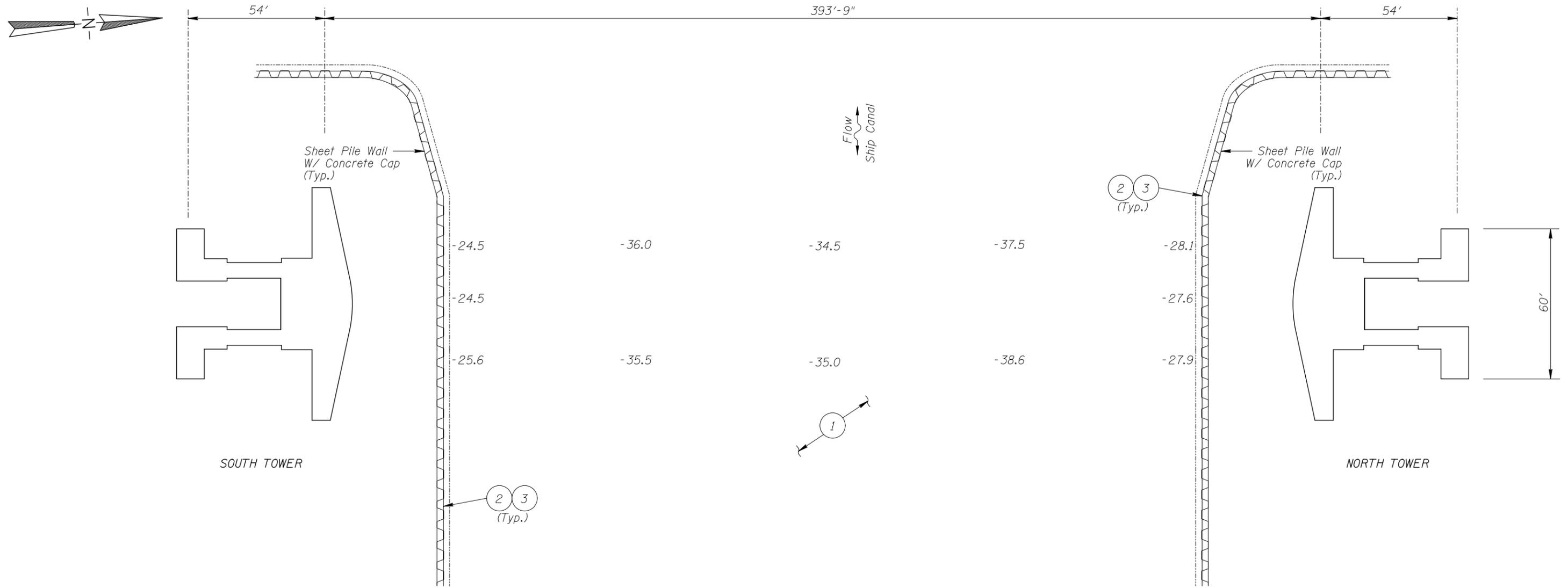
Photograph 3. View of the South Sea Wall, Looking Southwest.



Photograph 4. View of the Typical Steel Sheet Pile Condition Covered in Zebra Mussels, Looking North.



Photograph 5. View of the Typical Steel Sheet Pile Condition without Zebra Mussels, Looking North.



**GENERAL NOTES:**

1. The steel sheet pile wall 50 feet upstream and downstream of the bridge fascias was inspected underwater.
2. At the time of inspection on September 26, 2012, the waterline was located approximately 9.5 feet below the top of the north concrete retaining wall. Since elevation information was not available a reference elevation of 100.0 was assumed. Based on the assumed reference the waterline elevation was 90.5.
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.

**SOUNDING PLAN**

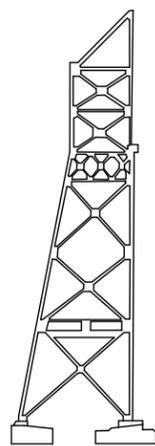
**Legend**

-18.0 Sounding Depth from Waterline (9/26/12)

1 Inspection Note Number

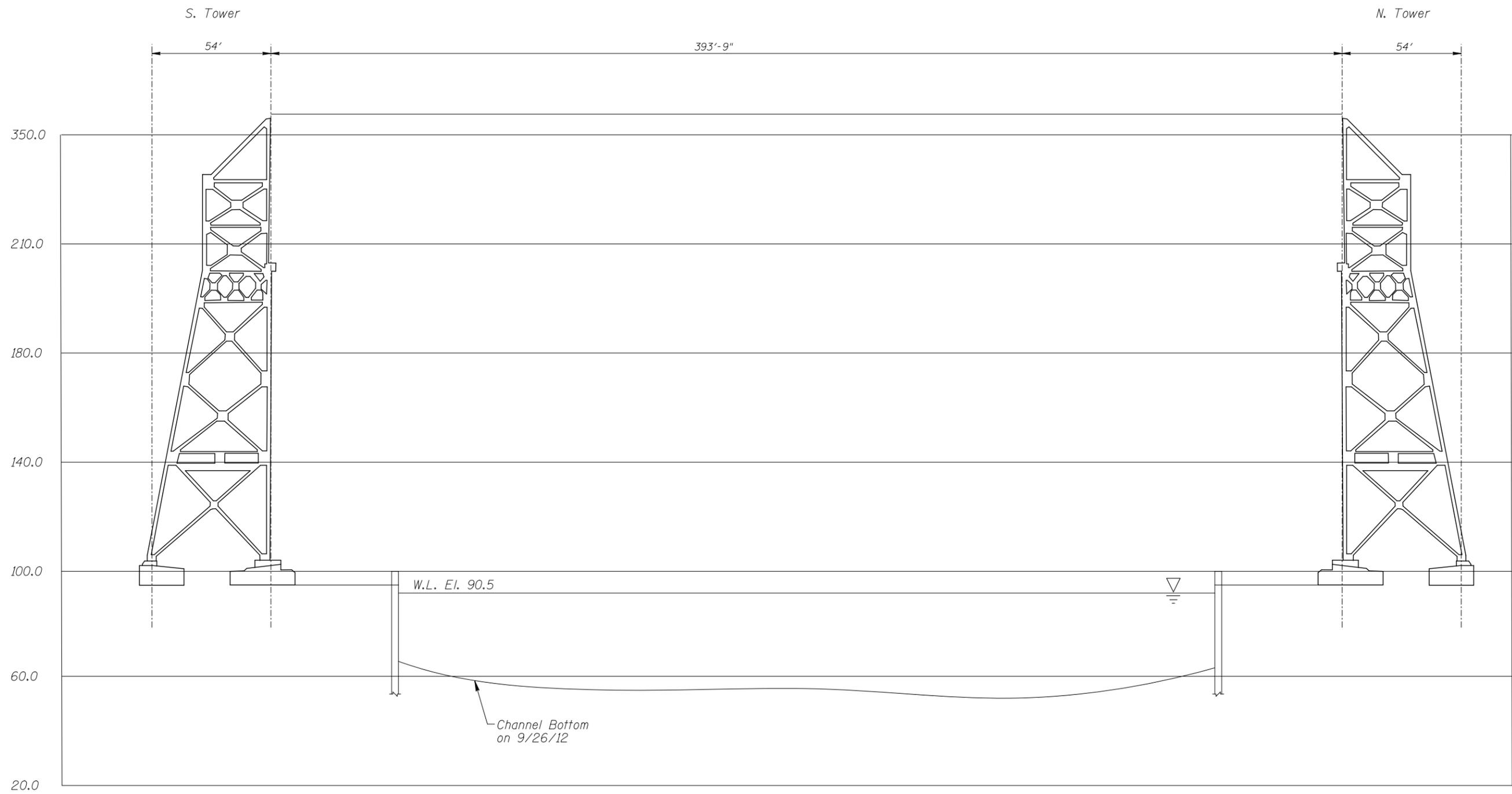
**INSPECTION NOTES:**

- 1 The channel bottom material typically consisted of concrete rubble and stones.
- 2 The sheet piling exhibited rust nodules typically 1/2 inch in diameter on approximately 50 percent of the surface area with associated pitting up to 1/32 inch deep from 2 feet below the waterline to the channel bottom. A 1/2 inch thick layer of zebra mussels was also observed covering the surface in this area.
- 3 All sheet pile wall interlock seams appeared tight with no noticeable gaps or separation.



**TYPICAL END VIEW OF TOWERS**  
(N.T.S.)

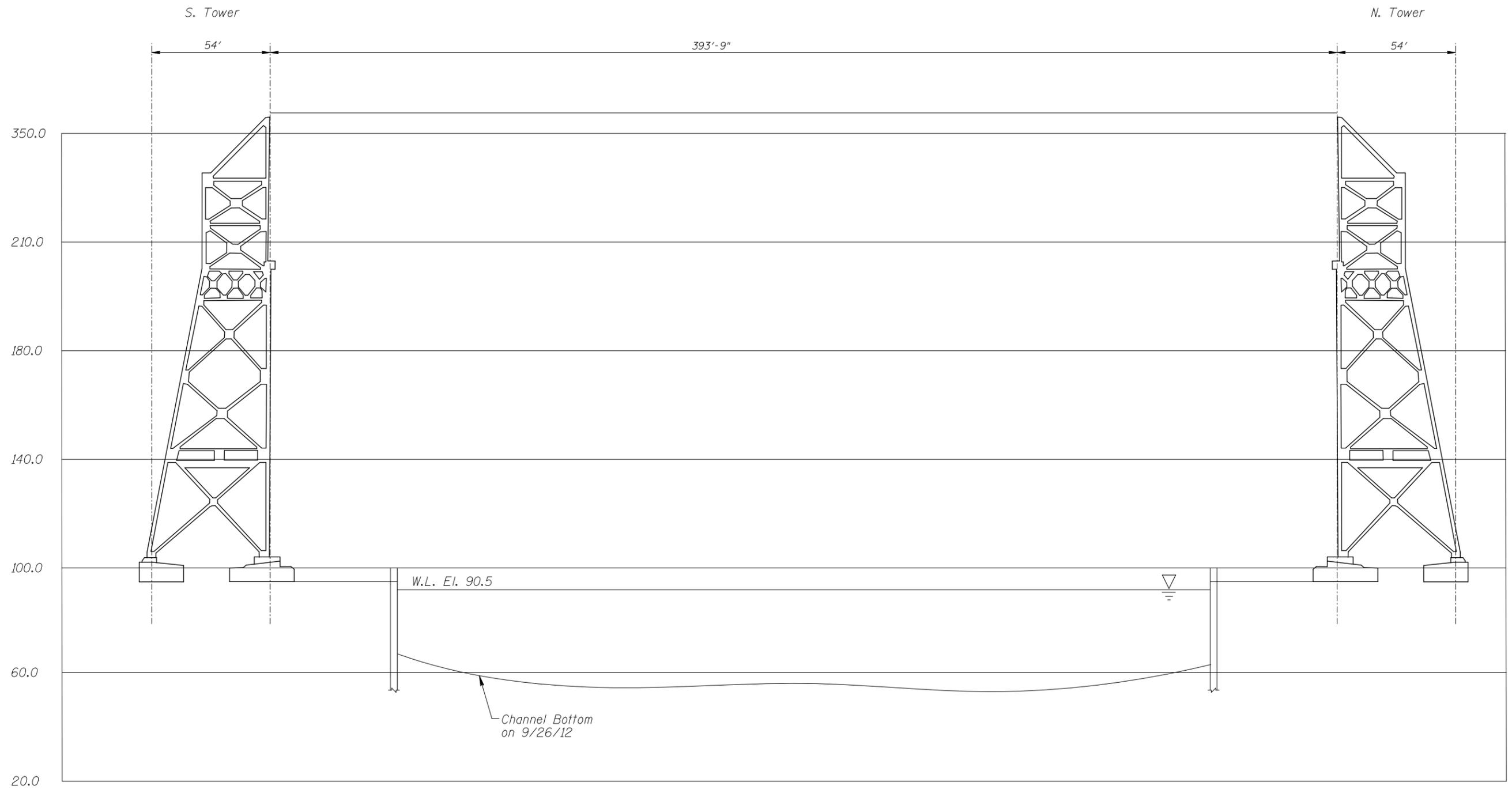
<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. L6116 MSAS 140 OVER THE SHIP CANAL CITY OF DULUTH		
<b>INSPECTION AND SOUNDING PLAN</b>		
Drawn By: MBP	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: NOV. 2012
Checked By: LJ		Scale: 1"=40'
Code: 7423L6116		Figure No.: I



EAST FASCIA PROFILE

*Note:*  
 Refer to Figure 1 for General Notes.

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. L6116 MSAS 140 OVER THE SHIP CANAL CITY OF DULUTH		
<b>UPSTREAM AND DOWNSTREAM FASCIA PROFILES</b>		
Drawn By: MBP	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: NOV. 2012
Checked By: LJ		Scale: 1"=40'
Code: 7423L6116		Figure No.: 2



WEST FASCIA PROFILE

<b>MINNESOTA DEPARTMENT OF TRANSPORTATION UNDERWATER BRIDGE INSPECTION</b>		
STRUCTURE NO. L6116 MSAS 140 OVER THE SHIP CANAL DULUTH COUNTY		
UPSTREAM AND DOWNSTREAM FASCIA PROFILES		
Drawn By: MBP	<b>COLLINS ENGINEERS</b> <small>123 North Wacker Drive Suite 900 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com</small>	Date: NOV. 2012
Checked By: LJ		Scale: 1"=40'
Code: 7423L6116		Figure No.: 3

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

INSPECTORS: Collins Engineers, Inc. DATE: September 26, 2012

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E.

BRIDGE NO: L6116 WEATHER: Sunny, 60° F

WATERWAY CROSSED: Ship Canal

DIVING OPERATION:  SCUBA  SURFACE SUPPLIED AIR  
 OTHER

PERSONNEL: Marc B. Parker, Clayton G. Brookins

EQUIPMENT: Commercial Scuba, Probe Rod, Camera, Hand Tools

TIME IN WATER: 12:50 P.M.

TIME OUT OF WATER: 1:40 P.M.

WATERWAY DATA: VELOCITY None / Negligible

VISIBILITY 5 feet

DEPTH 28.1 feet maximum

ELEMENTS INSPECTED: The Steel Sheet Pile Wall

REMARKS: Overall, the sheet pile wall on the north and south banks 50 feet east and west of the bridge fascia, was found to be in good condition, with no defects of structural significance. The sheet piling exhibited minor corrosion and all interlock seams and joints appeared tight. The channel bottom appeared well armored and stable.

FURTHER ACTION NEEDED:  YES  NO

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

The steel sheet pile wall is over 40 feet away from the substructure and has no interaction with the structure. It is recommended that this structure be taken off the underwater inspection list since there are no submerged substructure elements.

MINNESOTA DEPARTMENT OF TRANSPORTATION  
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. L6116  
 INSPECTORS Collins Engineers, Inc.  
 ON-SITE TEAM LEADER Daniel G. Stromberg, P.E.  
 WATERWAY CROSSED Ship Canal

INSPECTION DATE September 26, 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

UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	SUBSTRUCTURE					CHANNEL					GENERAL						
			PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER (SHEET PILE WALL)	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
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	North Wall	28.1'	N	N	N	N	7	7	N	N	8	N	8	N	7	N	N	N	N
	South Wall	25.6'	N	N	N	N	7	7	N	N	8	N	8	N	7	N	N	N	N

\*UNDERWATER PORTION ONLY

REMARKS: Overall, the sheet pile wall on the north and south banks 50 feet east and west of the bridge fascia was found to be in good condition, with no defects of structural significance. The sheet piling exhibited minor corrosion and all interlock seams and joints appeared tight. The channel bottom appeared well armored and stable.

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.