

**Underwater Inspection of
SFN - 2800152
State Route 44 over the La Due Reservoir
(GEA-44-0135)
October 20, 2014
for
Ohio Department of Transportation
District-12**



(West Elevation of Structure)

By
GPI/Greenman-Pedersen, Inc.

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Reviewer

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Structure Inventory Data

Structure Data - General Information

Superstructure Type:	Reinforced Concrete Slab
Number of Spans:	Three
Total Length:	105.6 Feet

Substructure Data - General Information

Abutments:	Reinforced concrete Stub Abutments. Both Abutments are supported by 14" Cast-In-Place, steel jacketed, reinforced concrete Piles.
Piers:	Reinforced concrete caps supported by 16" Cast-In-Place, steel jacketed, reinforced concrete Piles.
Slope Protection:	Minimal stone riprap is placed between fascia to fascia, and extending beyond structure limits on both North and South Abutments.

Channel Description - General Description of Channel

The La Due Reservoir flows Northwest to Southeast under this structure. The thalweg of the reservoir runs between Pier 1 and Pier 2. A maximum depth of 12.4 feet was found under the structure in the thalweg. Flow at this structure was less than 1 foot per second.

Inspection Report

Inspection Inventory and Appraisal Information

Structure Location Information

Structure File Number:	2800152
Facility:	State Route 44
Feature:	La Due Reservoir
County:	Geauga

Inspection Data

Team Leader-Diver:	James Henry
P.E. Reviewer:	Eric Thorkildsen, P.E.
Type of Equipment Used:	SCUBA/Wading/Probing
Inspection Team:	Daniel Castrigano, PE Douglas Hedrick, PE,PS

Date:	10/20/2014
Water Temperature:	50 Degrees F
Waterway Velocity (Current):	Less than 1 Foot/Second
Depth Turbidity (Visibility):	Less than 1 Foot

Type of Material of Streambed:	Typically gravel and soft silt-mud bottom with up to 3 inches of penetration between the Piers at mid-span. Rock has been placed around both piers and extends to both shorelines.
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Presence & Condition of Riprap or Scour Countermeasures:	Typically there is 4 to 6 inch diameter rock around all piles with larger 12 to 18 inch diameter rock in some areas. Both embankments have minimal slope protection consisting of 4 to 6 inch diameter rock with some larger 12 to 24 inch diameter rock.
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Extent of Marine Growth on Substructure Elements:	There is no aquatic growth on the substructure elements.
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Substructure Inspection Data

Substructures Inspected:	Pier 1 and Pier 2, South and North Abutments.
General Shape:	Reinforced concrete caps supported by 16" cast-in-place, steel jacketed, reinforced concrete piles.
Maximum Water Depth at Substructure Inspected:	Approximately 12.4 feet along the centerline of the bridge at the midpoint of the channel, between Pier 1 and Pier 2.

Waterline

Water Level Reference:	The underside of cap at the West end of Pier 2.
Water Surfaces:	The waterline was approximately 6.8 feet below the reference. Reference elevation = 1129.76 feet Waterline Elevation = 1122.96 feet

Description of Structure

Bridge GEA-44-013 (2800152) carries two lanes of State Route 44 over the La Due Reservoir south of Auburn Corners, OH. The bridge was constructed in 1960 to replace the existing structure at this site. The two piers and both abutments of this structure were inspected during this underwater inspection, No other SSU's were underwater. The numbering convention will follow that previously established by ODOT with the South Pier as Pier 1.

Inspection Operations

The underwater inspection was performed by Greenman-Pedersen Inc. on October 20, 2014. This regularly scheduled Underwater Dive Inspection included a 100% Level I inspection and a 10% Level II inspection. Inspector started inspection at Pier 1 and continued in order to Pier 2. SCUBA, wading, probing and tactile methods were used to complete the inspection. Soundings were taken along all substructure units, mid span and up to 30 feet upstream and downstream of the structure using a survey rod.

Inspection Findings

Channel

- The channel alignment is satisfactory and appears to be unchanged from the 2009 report. The channel bed profile appears to be relatively unchanged from the prior inspection, with the exception of a localized area approximately 20 feet east of Pier 2 that appears to be approximately 8 feet deeper than the previous report.
- Penetrations taken during soundings were typically 1 to 3 inches within 10 feet of the upstream and downstream nose of Piers 1 and 2. The composition of the channel around the piles is 4-18 inch stone riprap. The stone riprap slope protection surrounds the piles extending and dropping in depth abruptly toward the center of the channel. The riprap is relatively loose and gives way under contact. The composition of the channel bottom at mid-span consists of gravel and soft silt –mud material.

Pier 1

- All pile casings have typical moderate corrosion with 1/4 to 3/8 inch layers of delaminating scale (See photo 8). This corrosion has appeared to have slightly advanced in severity since the last inspection. The corrosion occurring appears to be an anaerobic corrosion condition. This was detected when the layers of scale were removed at the presently exposed below waterline length of the piles. All piles were sounded with a hammer from the waterline to the rock line and were found to be sound, with no perforations.
- All of the piles are surrounded by 4 to 6 inch diameter rock with larger 12 to 18 inch diameter rock in some areas.
- As noted in the previous inspection report, the pier cap exhibits moderate spalling. This condition exists on both the East and West ends of the cap.

Pier 2

- All pile casings have typical moderate corrosion with 1/4 to 3/8 inch layers of delaminating scale (See photo 9). This corrosion has appeared to have slightly advanced in severity since the last inspection. The corrosion occurring appears to be an anaerobic corrosion condition. This was detected when the layers of scale were removed at the presently exposed below waterline length of the piles. All piles were sounded with a hammer from the waterline to the rock line and were found to be sound, with no perforations.

- All of the piles are surrounded by 4 to 6 inch diameter rock with larger 12 to 18 inch diameter rock in some areas.
- As noted in the previous inspection report, the pier cap exhibits moderate spalling. This condition exists on both the East and West ends of the cap. (See photo 10).

South Abutment

- The abutment concrete has moderate spalling of up to 1/2-inch depth. The concrete is partially painted with a coating that stops at what appears to be the previous elevation of the slope protection.
- Both the East and West ends of the abutment exhibit corner spalling that has exposed the reinforcing steel (See photo 11). This spalling does not appear to have advanced in severity since the last inspection.
- The abutment has been undermined along its' entire width. The most severe undermining is located approximately ten feet from the West end and has dimensions of approximately 14 inches high by 44 inches deep (See photos 5 and 6). This undermining does not appear to have materially advanced in severity since the last inspection.

North Abutment

- The abutment concrete has moderate spalling of up to 1/2-inch depth with some localized areas of up to 2-inch depth. The concrete is partially painted with a coating that stops at what appears to be the previous elevation of the slope protection.
- Both the East and West ends of the abutment exhibit corner spalling that has exposed the reinforcing steel (See photo 12). This spalling does not appear to have advanced in severity since the last inspection.
- The abutment has been undermined for a distance of approximately 38 feet from the West end of the abutment. The most severe undermining is located approximately ten feet from the West end and has dimensions of approximately 6 inches high by 36 inches deep (See photo 7). This undermining has advanced in severity since the last inspection. In 2009, the distance of undermining was approximately 22 feet from the West end.

Comparison to Previous Report and Summary of Inspection

Compared to the previous inspection report of 2009, it appears that the bottom topography, channel alignment, slope and pier protection have all remained relatively stable, with no material changes.

Corrosion of pile casings has minimally progressed since the last inspection. It was not possible to determine total section loss of the jackets via only visual inspection. This operation can be performed as detailed in “Conclusions and Recommendations”

The condition of the concrete of both abutments has not materially advanced in deterioration since the last inspection report. The undermining of the South abutment has slightly advanced since the 2009 inspection. The undermining of the North abutment has moderately advanced since the last inspection, increasing in length from 22 feet to 38 feet in length. The most severe location has increased in height from 4 inches to 6 inches and increased in depth from 33 inches to 36 inches.

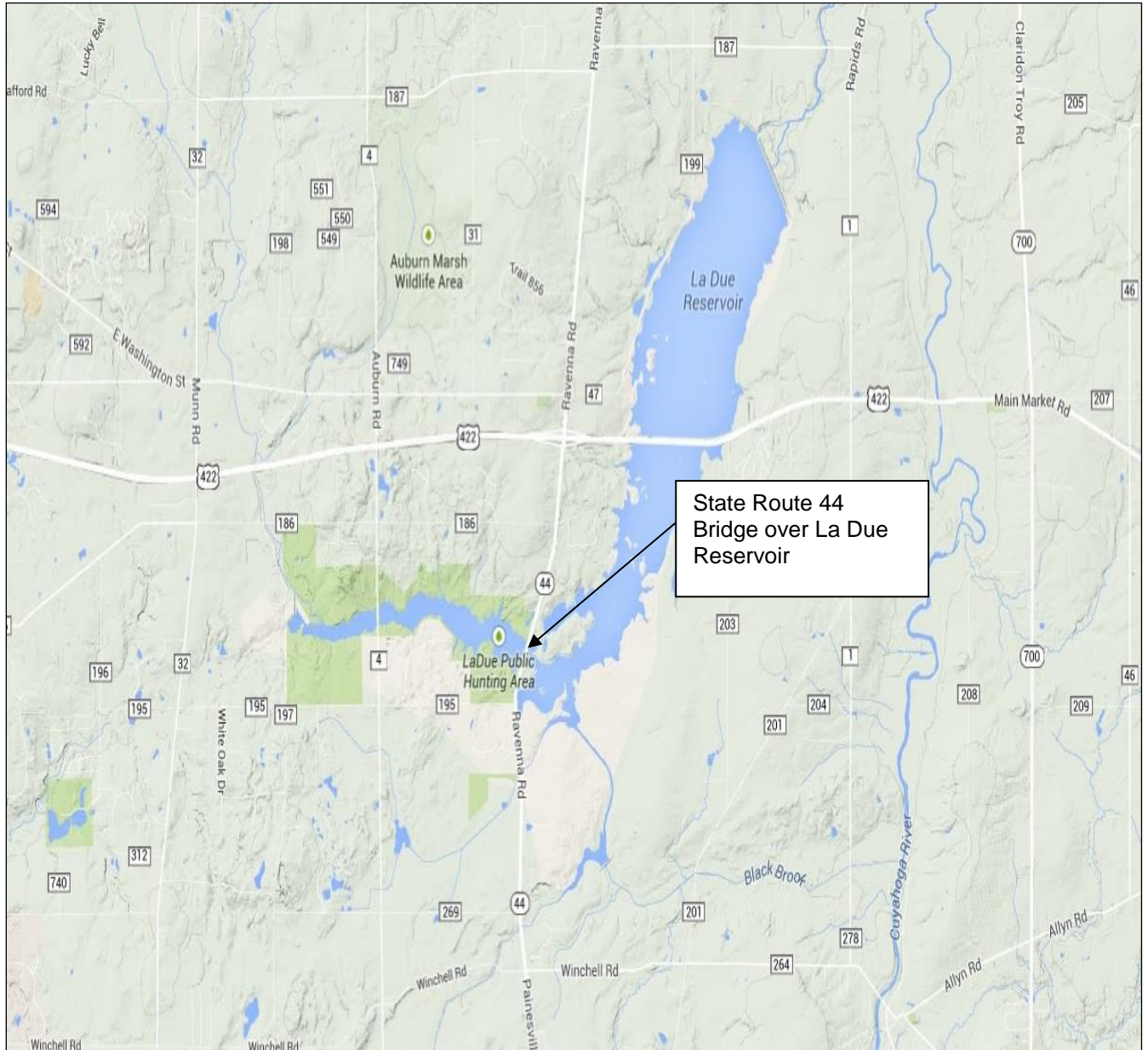
Conclusions and Recommendations

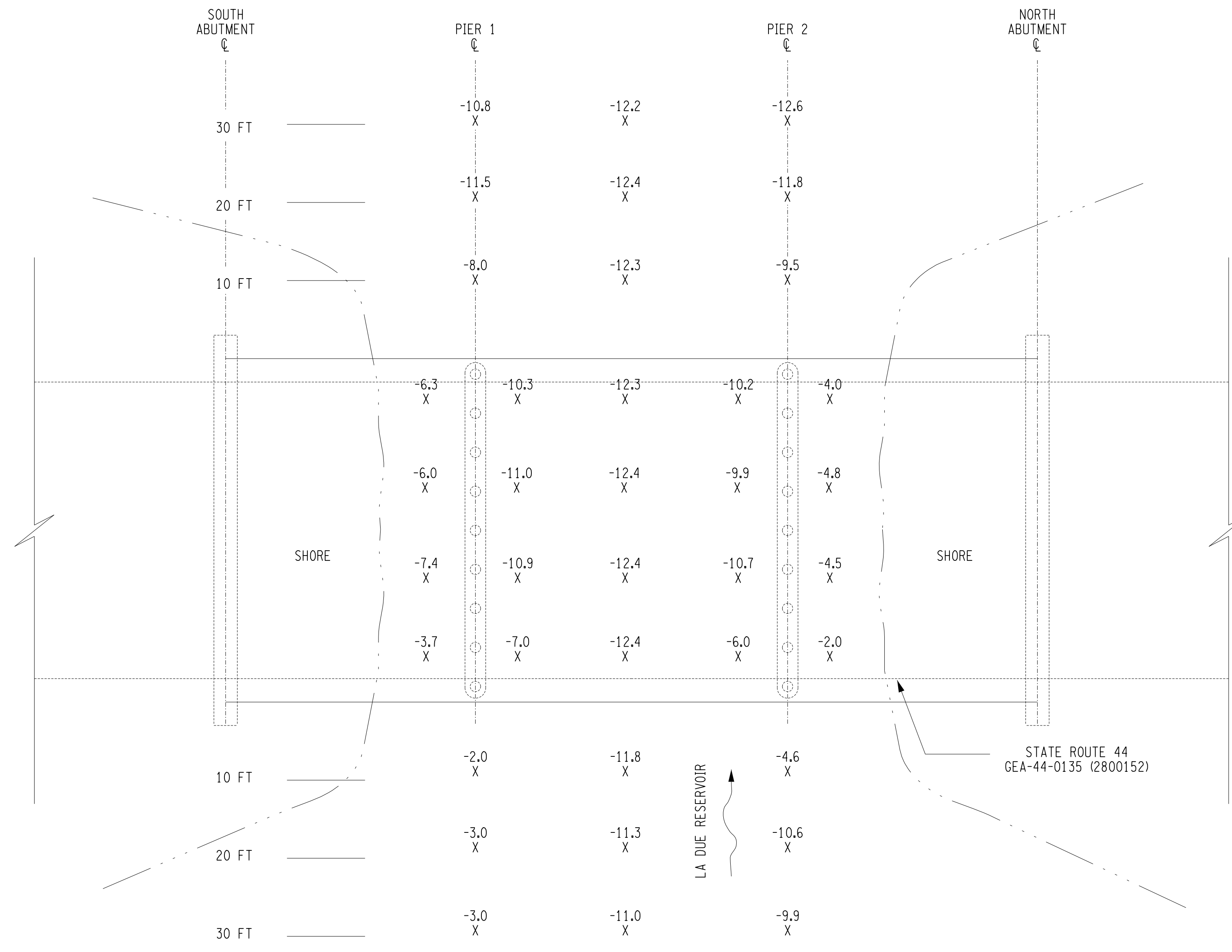
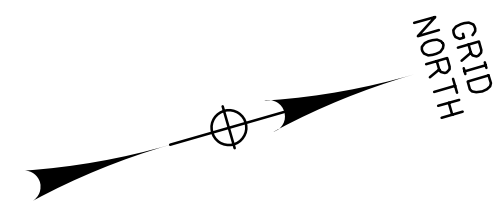
- Re-inspect the submerged substructure units at the normal maximum recommended interval of five (5) years and after a significant event such as flood, impact or other phenomenon that could affect the structural integrity of the bridge.
- Undermining of abutments may have compromised the backfill. Above water bridge inspectors should be cognizant of any potential settlement of the bridge approach.
- Slope protection should be placed at both abutments to prevent further undermining.
- Consideration should be given to performing ultrasonic thickness measurement of the pile jackets. If so desired this work can be performed by GPI dive personnel.

GPI/Greenman-Pedersen, Inc.

Appendix A

Location Map and Soundings





SOUNDING PLAN
NTS

NOTES

1. WATER LINE REFERENCE ELEVATION WAS TAKEN AT UNDERSIDE OF CAP AT THE WEST END OF PIER 2 ON OCTOBER 20, 2014 THIS DISTANCE WAS 6.8 FEET.
2. SOUNDINGS TAKEN AT PIER AND 10 FEET INCREMENTS AWAY FROM PIERS TO 30 FEET.

LEGEND

WATER DEPTH IN FEET -12.5 X

Appendix B

Photographs



Photograph 1

Overall View of
the West
Elevation.

Looking East



Photograph 2

Overall View of
the East
Elevation.

Looking West



Photograph 3

East approach
(upstream)

Looking
Northwest.



Photograph 4

South approach
(downstream).

Looking
Southeast.



Photograph 5

Undermining of
South Abutment

(looking East)



Photograph 6

Detail of South
Abutment
undermining.



Photograph 7

Undermining of
North Abutment

(looking East)



Photograph 8

Pier 1, East pile.
Typical ¼-inch
thick corrosion.

(looking North)



Photograph 9
View of Pier 2,
West pile.
Typical ¼-inch
thick corrosion.

(looking South)



Photograph
10

View of Pier 2,
Pile cap South
Face. Concrete
spall

(looking North)



Photograph
11

View of South
abutment, West
end.

(looking South)



Photograph
12

View of North
abutment, West
end.

(looking North)