

# Underwater Inspection Report



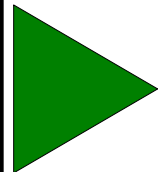
South Carolina Department of Transportation

**US 701**

**Over**

**Yauhannah Lake**

No Significant  
Action Required



Bridge ID No. 2220070100400

Developed by:

Georgetown County, South Carolina  
**April 25, 2013**



**INFRASTRUCTURE  
ENGINEERS, INC.**

Job No. 12264SC00.00 - 3

This Underwater Inspection Report was Developed for:

**Bridge No. 2220070100400**  
carrying  
**US 701 over Yauhannah Lake**  
in  
**Georgetown County, South Carolina**

Infrastructure Engineers • 1460 John B White Sr. Blvd, Ste 1C • Spartanburg, SC 29306

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**2013 UNDERWATER INSPECTION REPORT EXECUTIVE SUMMARY**

Inspection Date: April 25, 2013

NBIS Rating:

- The bridge's submerged components are in **good** condition.

Significant Conditions Observed:

- None

Repair Recommendations:

- None

## 1.0 INTRODUCTION

### 1.1 Purpose and Scope

SCDOT Bridge No. 2220070100400 carries US 701 over Yauhannah Lake in Georgetown County. On April 25, 2013, Infrastructure Engineers, Inc. performed a routine underwater investigation at the bridge to evaluate the condition of all substructure units (SSUs) located in the water. This report includes a general description of the structure and the method of investigation, as well as a detailed description of the conditions noted. In addition, this report contains a condition assessment of the evaluated bridge components and presents recommendations for structural repairs.

The scope of the investigation included a visual inspection of all accessible SSUs located in the water from the high water mark to the channel bottom. Depth soundings were also taken along the bridge's upstream and downstream fascias to assist in scour identification and documentation.

### 1.2 General Description of the Structure

The report cover photograph shows an overall view of the bridge's upstream fascia, and Photograph 1 in Appendix B shows a downstream fascia view.

The bridge consists of forty-seven reinforced concrete girder spans. The superstructure over the waterway is supported by nine bents in Yauhannah Lake and thirty-four bents in the additional floodplain. Bents 8 through 23, 26 through 34, 37 through 39, and 42 through 56 consist of four 18-in. square reinforced concrete piles and a reinforced concrete pile cap. Bents 24, 25, 40, and 41 consist of six 18-in. square reinforced concrete piles and a reinforced concrete pile cap. Bents 35 and 36 consist of the original four 18-in. square reinforced concrete piles, a reinforced concrete pile cap and an additional six steel H-piles with a steel pile cap extension assuming the load of the bents. Refer to Photograph 2 in Appendix B for a view of a typical four pile bent.

The report's labeling convention designates the bents following the SCDOT design drawings dated February 1952. The bents are labeled numerically from east to west; the piles are labeled numerically from north to south. Refer to Figures 1 through 4 in Appendix A for a bridge plan and elevation sketches.

### **1.3 Method of Investigation**

A dive team, led by a South Carolina-registered professional engineer-diver, conducted the underwater inspection. The inspection team accessed the bridge site by boat, which was launched at the Gator Alley boat ramp.

The underwater investigation generally consisted of a Level I “swim-by” visual inspection over 100 percent of the accessible SSU surfaces from the high water mark to the channel bottom. Divers performed a Level II visual/tactile inspection on at least 25 percent of the SSUs, which included cleaning marine growth at the waterline, mid-depth, and channel bottom to facilitate an evaluation of the underlying surfaces. Inspectors paid particular attention to any observed areas of excessive deterioration or apparent distress while noting the condition of any repairs.

The inspection team also assessed the waterway and streambed conditions in the bridge vicinity, noting the type of channel bottom material, as well as the location and extent of any observed scour, riprap, or debris.

Inspectors noted the waterline location with respect to a fixed reference on the bridge at the time of the inspection. Depth soundings were taken along the bridge fascias and around each SSU using a sounder.

## **2.0 INSPECTION FINDINGS**

At the time of inspection, the waterline was located 20.1 ft below the top of the deck at Bent 47. Based on the available SCDOT drawings dated 1952, this translates to

a waterline elevation of 2.4. Yauhannah Lake flowed with negligible velocity during the inspection. Bridge soundings indicate that the maximum water depth was 18.4 ft at the upstream fascia at Bent 50. Refer to Table 1 in Appendix A for a listing of the sounding measurements relative to the bridge deck.

The banks along Yauhannah Lake in the bridge vicinity are in stable condition. Embankment protection in the form of riprap is present on the east and west banks. There is no sign of active erosion. Refer to Photographs 3 and 4 in Appendix B for a view of the east and west embankments, respectively. The channel bottom in the bridge vicinity primarily consists of sand.

The SSUs located in water at the time of inspection included Bents 10 through 53. All of the SSU's exhibit light, 1/4-in. scaling on all inspected piles. Refer to Figure 1 in Appendix A for detailed inspection notes and a plan view showing the existing conditions at each of the inspected bents.

### 3.0 EVALUATION AND ASSESSMENT

Overall, the submerged components of the bridge SSUs are in **good** condition. The substructure of this bridge was recently replaced and shows minimal wear.

The inspected SSUs are rated as **good, Code 7**, in accordance with the FHWA National Bridge Inspection Standards (NBIS) Coding information. Appendix C contains condition rating forms in both NBIS and Bridge Management System (BMS) formats for this bridge.

#### 4.0 RECOMMENDATIONS

There are no repair recommendations at this time. In accordance with NBIS recommendations, the next routine underwater inspection for this bridge should be conducted on an interval not to exceed 60 months. In addition, bridge soundings should be taken as part of biennial above-water inspections, as well as following significant flooding events.

Respectfully submitted,

**INFRASTRUCTURE ENGINEERS, INC.**



Jeffrey B. Rowe, P.E.

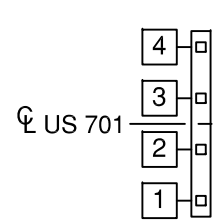
**Table 1**  
**Bridge Soundings**

Bent	Upstream Fascia			Downstream Fascia		
	Waterline To Channel Bottom (ft)	Top of Deck To Waterline (ft)	Top of Deck To Channel Bottom (ft)	Waterline To Channel Bottom (ft)	Top of Deck To Waterline (ft)	Top of Deck To Channel Bottom (ft)
<b>44</b>	0.5	20.1	20.6	0.5	20.1	20.6
1/2	1.0	20.1	21.1	0.5	20.1	20.6
<b>45</b>	2.0	20.1	22.1	1.0	20.1	21.1
1/2	2.6	20.1	22.7	1.0	20.1	21.1
<b>46</b>	4.3	20.1	24.4	2.0	20.1	22.1
1/2	9.5	20.1	29.6	4.6	20.1	24.7
<b>47</b>	13.0	20.1	33.1	7.5	20.1	27.6
1/2	16.2	20.1	36.3	12.9	20.1	33.0
<b>48</b>	16.9	20.1	37.0	14.2	20.1	34.3
1/2	17.1	20.1	37.2	14.4	20.1	34.5
<b>49</b>	16.0	20.1	36.1	16.2	20.1	36.3
1/2	17.9	20.1	38.0	18.1	20.1	38.2
<b>50</b>	18.4	20.1	38.5	17.7	20.1	37.8
1/2	17.4	20.1	37.5	17.6	20.1	37.7
<b>51</b>	16.1	20.1	36.2	16.0	20.1	36.1
1/2	16.6	20.1	36.7	17.8	20.1	37.9
<b>52</b>	13.8	20.1	33.9	17.1	20.1	37.2
1/2	6.0	20.1	26.1	8.9	20.1	29.0
<b>53</b>	4.0	20.1	24.1	9.0	20.1	29.1
1/2	Dry	Dry	13.1	Dry	Dry	18.1

NOTE: The numbers listed in this table represent distances and not elevations. The waterline elevation at the time of the readings was 2.4 based on a measurement taken in the field and calculations using the existing plans.

Bents 10 to 43 were in less than 2 feet of water at the time of inspection.

DOWNSTREAM FASCIA



2.4 0.4 2.1 0.4 2.1 0.4 2.1 0.4 2.1 0.4 2.1 0.4 2.1 0.4 2.1 0.4 2.1 0.4 2.1 0.4

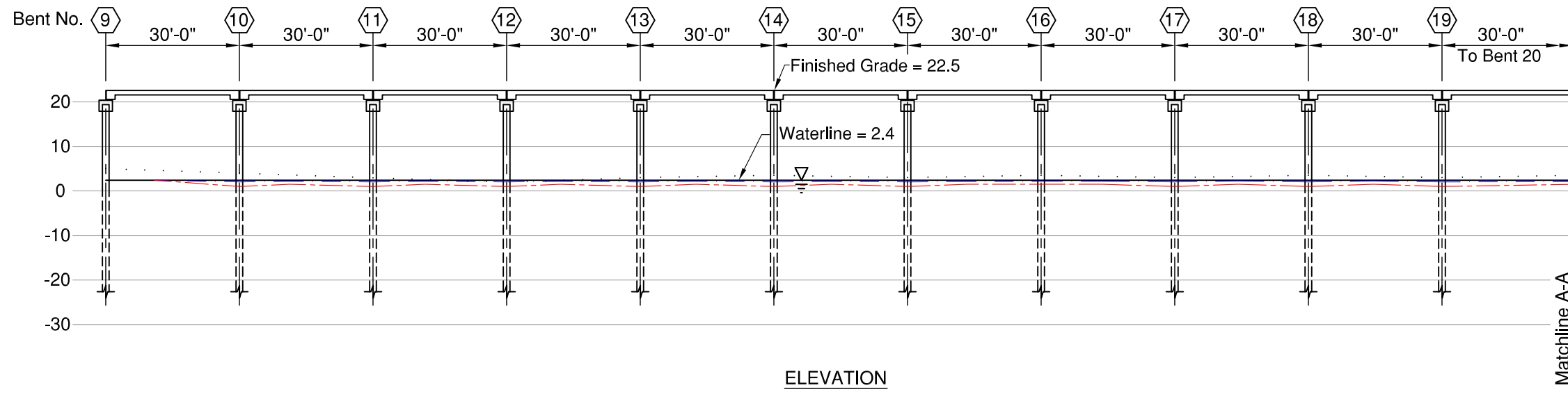
Matchline A-A



UPSTREAM FASCIA

2.4 0.1 1.5 0.1 1.5 0.1 1.5 0.1 1.5 0.1 1.5 0.1 1.5 0.1 1.5 0.1 1.5 0.1 1.5 0.1 1.5

PLAN



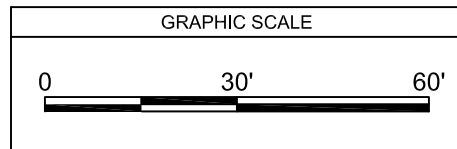
ELEVATION

Legend

- (GN) General Note
- (3) Inspection Note
- 15.7 Channel Bottom Elevation
- Original Channel Bottom Profile
- Upstream Fascia
- Downstream Fascia
- Timber Debris
- Riprap
- 9 Photograph

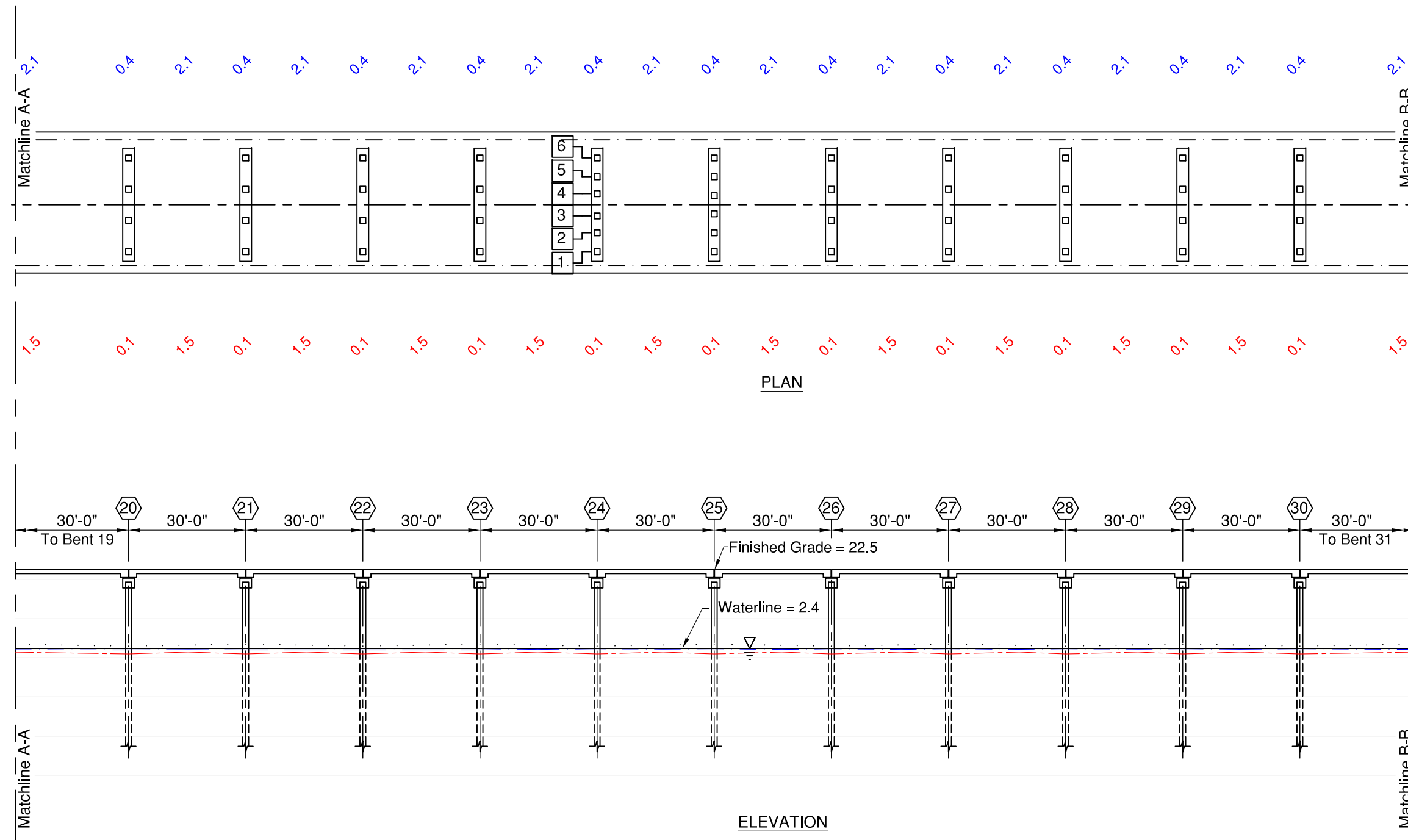
Figure Notes:

- At the time soundings were taken on April 25, 2013 the waterline was approximately 20.1 ft below the top of the deck at Bent 47. This translates to a waterline elevation of 2.4.
- Soundings across the channel were taken parallel to the bridge at the bents and are actual channel bottom elevations in feet determined on April 25, 2013.
- This figure was developed from field notes, sketches, and South Carolina Department of Transportation drawings dated 1952.



DATE April 2013	1460 John B. White Sr. Blvd. Ste. 1C Spartanburg, SC 29306 PH: 864.595.8030 FAX: 864.595.8034 INFRASTRUCTURE ENGINEERS, INC.	 SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION Bridge ID: 2220070100400	US 701 over Yauhannah Lake Plan and Elevation	FIG NO. 1
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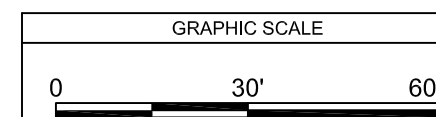


#### Legend

- (GN) General Note
- (3) Inspection Note
- 15.7 Channel Bottom Elevation
- Original Channel Bottom Profile
- Upstream Fascia
- Downstream Fascia
- Timber Debris
- Riprap
- 9 Photograph

#### Figure Notes:

1. At the time soundings were taken on April 25, 2013 the waterline was approximately 20.1 ft below the top of the deck at Bent 47. This translates to a waterline elevation of 2.4.
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DATE  
April  
2013

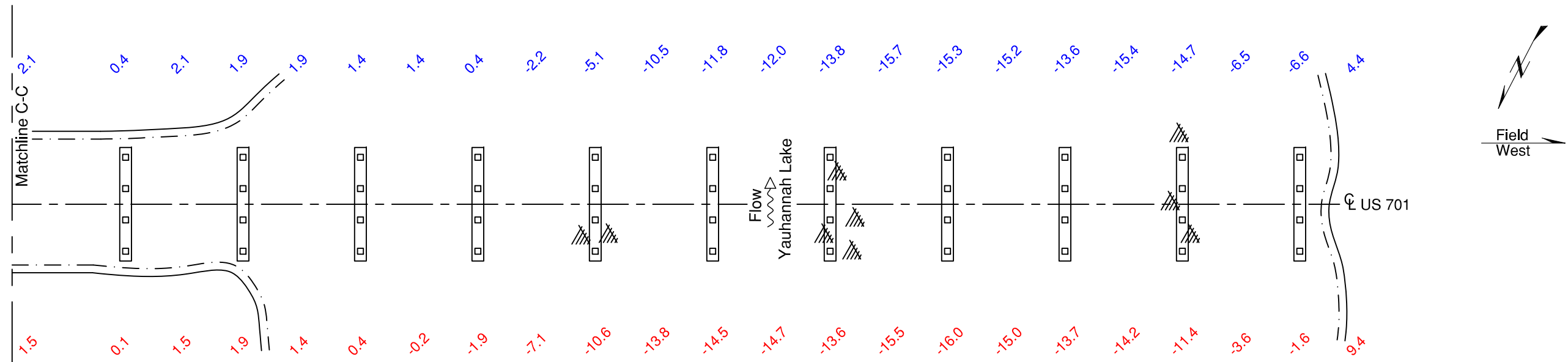


US 701  
over Yauhannah Lake

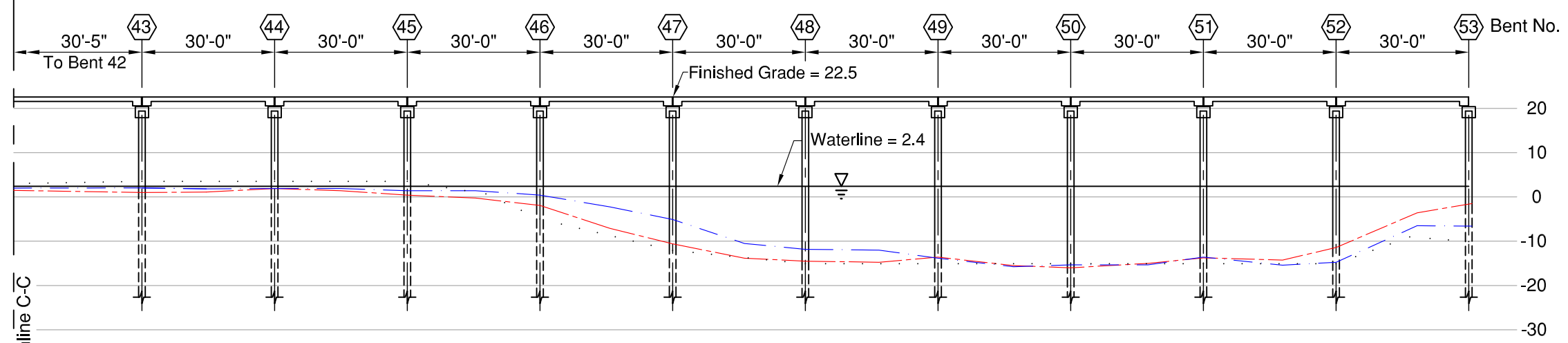
Plan and Elevation

FIG NO.  
2





PLAN



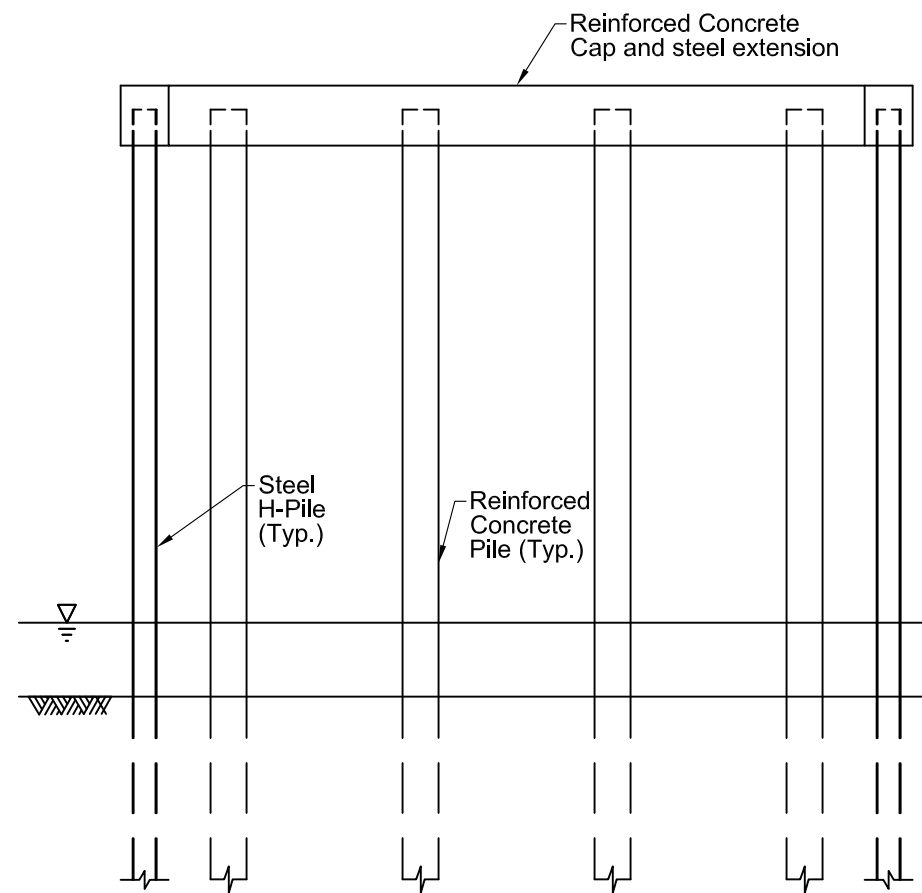
ELEVATION

- Legend**
- (GN) General Note
  - (3) Inspection Note
  - 15.7 Channel Bottom Elevation
  - ..... Original Channel Bottom Profile
  - Upstream Fascia
  - Downstream Fascia
  - Timber Debris
  - Riprap
  - 9 Photograph

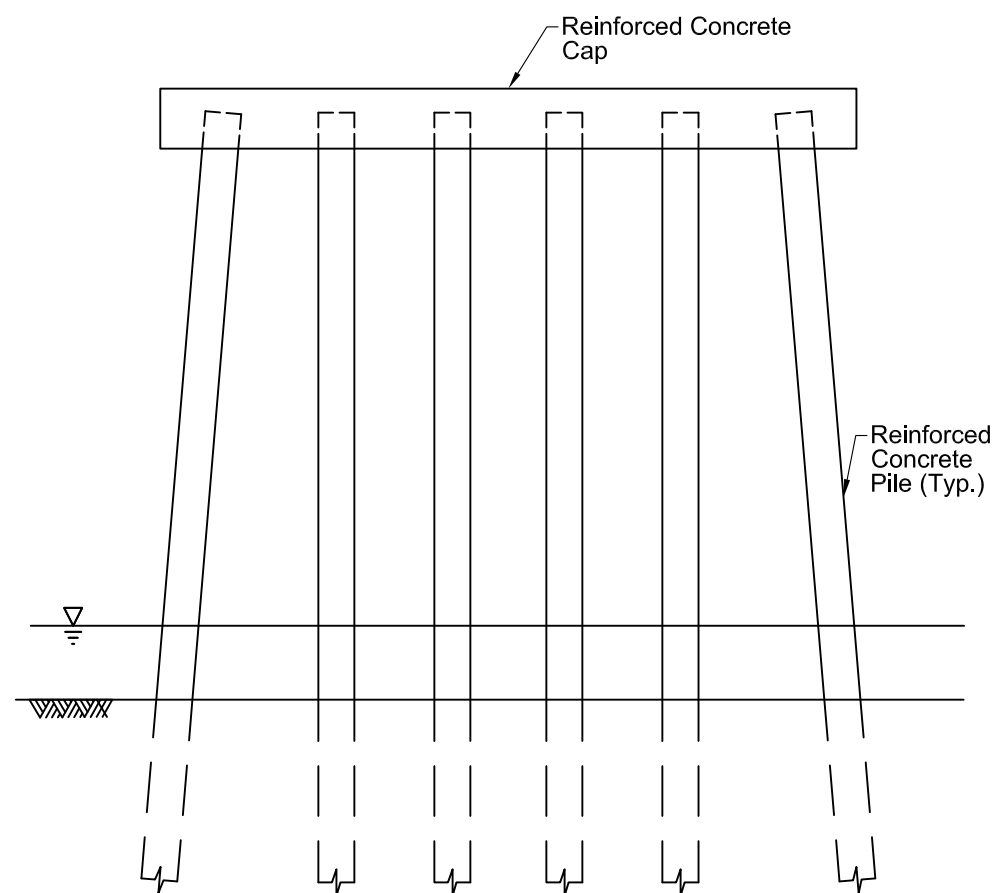
**Figure Notes:**

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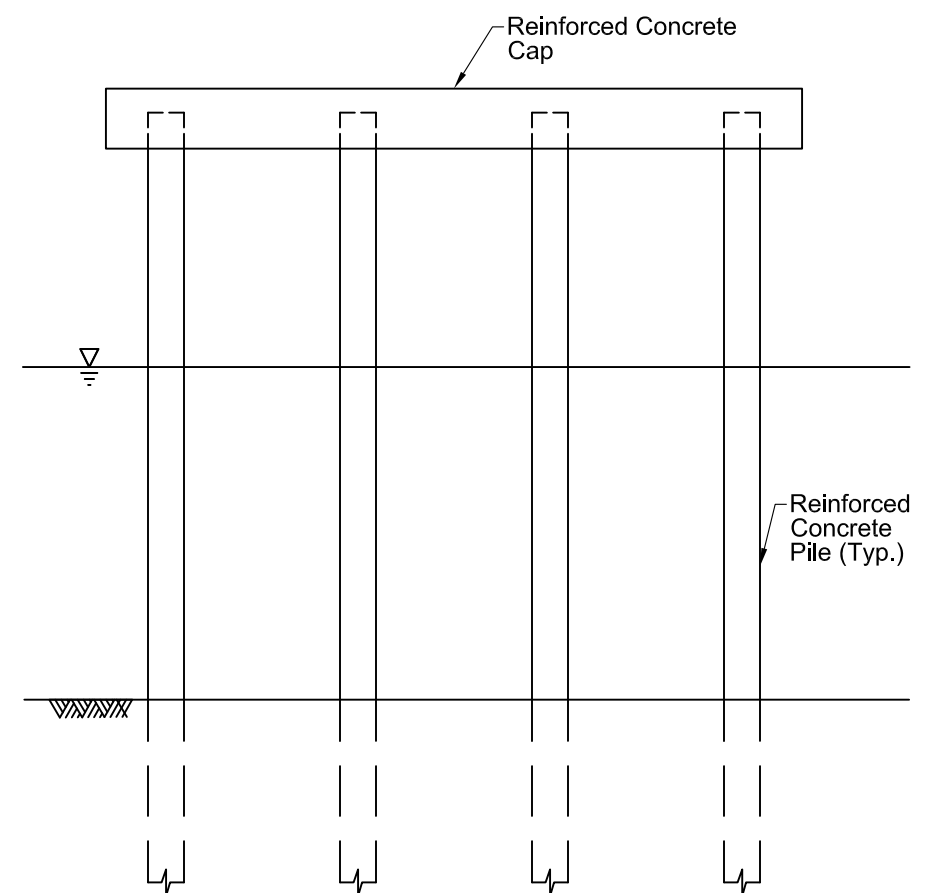
<b>GRAPHIC SCALE</b> 0 30' 60'		DATE April 2013	 1460 John B. White Sr. Blvd. Ste. 1C Spartanburg, SC 29306 PH: 864.595.8030 FAX: 864.595.8034 <b>INFRASTRUCTURE ENGINEERS, INC.</b>	 SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION Bridge ID: 2220070100400	US 701 over Yauhannah Lake Plan and Elevation	FIG NO. 4
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Elevation (Bents 35 and 36)



Elevation (Bents 24,25,40, and 41)



Elevation (Bents 8 - 23, 26 - 34, 37 - 39, and 42 - 56)

GRAPHIC SCALE	DATE			US 701 over Yauhannah Lake	FIG NO.
Not to Scale	April 2013				
		INFRASTRUCTURE ENGINEERS, INC.	SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION Bridge ID: 2220070100400	Typical Bent Elevation	5



**Photograph 1. Downstream Fascia.**



**Photograph 2. View of Bent 10 Typical of Bents 8-23, 26-34, 37-39, and 42-56.**





**Photograph 3. East Embankment and Flood Plain.**



**Photograph 4. West Embankment.**



Photograph 5. View Upstream from Under Bridge.



Photograph 6. View Downstream from Under Bridge.

## UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 2220070100400  
WATERWAY: Yauhannah Lake  
INSPECTORS: INFRASTRUCTURE ENGINEERS, INC.  
INSPECTION DATE: April 25, 2013

**NOTE:** Condition ratings are assigned in accordance with the National Bridge Inspection Standards (NBIS) Coding Information, as presented in Federal Highway Administration Report No. FHWA-PD-96-001 "Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges," dated December 1995 (revised April 27, 2001).

### CONDITION RATING

Unit	Substructure Code (Item 60)	Channel and Channel Protection Code (Item 61)	Underwater Inspection Code (Item 92B)	Scour Critical Bridge Code (Item 113)
Bents 9-44	7	8	Y60	6
Bent 45	7	8	Y60	6
Bent 46	7	8	Y60	6
Bent 47	7	8	Y60	6
Bent 48	7	8	Y60	6
Bent 49	7	8	Y60	6
Bent 50	7	8	Y60	6
Bent 51	7	8	Y60	6
Bent 52	7	8	Y60	6
Bent 53	7	8	Y60	6

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site: \_\_\_\_\_ Yes \_\_\_\_\_ ☒ No

(Note: Bridges may also be scour critical if abutment or pier foundations are rated as unstable due to scour potential as determined by a scour evaluation study)

REMARKS: As the result of an underwater inspection, for Item 113, a structure may only be rated as 0, 1, 2, 4, or 6. Other ratings may be assigned only as the result of a scour analysis.

Whenever a rating factor of 2 or below is determined for Item 113 - Scour, the rating factor for Item 60 - Substructure needs to be the same to reflect the severity of actual scour and resultant damage to the bridge.



**UNDERWATER INSPECTION  
BRIDGE MANAGEMENT SYSTEM  
CONDITION REPORT FORM**

BRIDGE NO. 2220070100400  
WATERWAY: Yauhannah Lake  
INSPECTORS: INFRASTRUCTURE ENGINEERS, INC.  
INSPECTION DATE: April 25, 2013

NOTE: Element Condition ratings are assigned in accordance with the AASHTO "Guide for Commonly Recognized (CoRe) Structural Elements", dated December 2010.

**BMS CONDITION REPORT**

Element	Total Quantity	Unit	Quantities in Condition State				
			1	2	3	4	5
205 R/C Column or Pile Extension	CoRe Elements (Deck/Super/Sub)						
	184	EA	184				
	Smart Flags						