

Underwater Inspection Report



NC306 Ferry (North Terminal)

On

Pamlico Sound



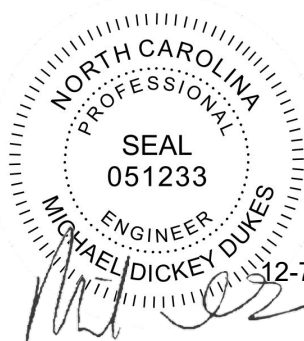
Bridge: 060322
Upstream Fascia

Developed by:



40 Concourse Way
Greer, SC 29650
(864) 595-8030

Bayview, North Carolina
November 1, 2023





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1.0 INTRODUCTION

1.1 Scope of Inspection

A routine underwater inspection was performed by a dive team consisting of four ADCI certified commercial divers. A Level I visual and tactile inspection was performed at all steel H-piles, steel splash wall, steel retaining wall, and timber dolphins from the high watermark to the channel bottom. A Level II detailed inspection was performed among 10% of the steel substructure units using an ultrasonic thickness gauge to determine remaining thickness of the steel flanges and webs.

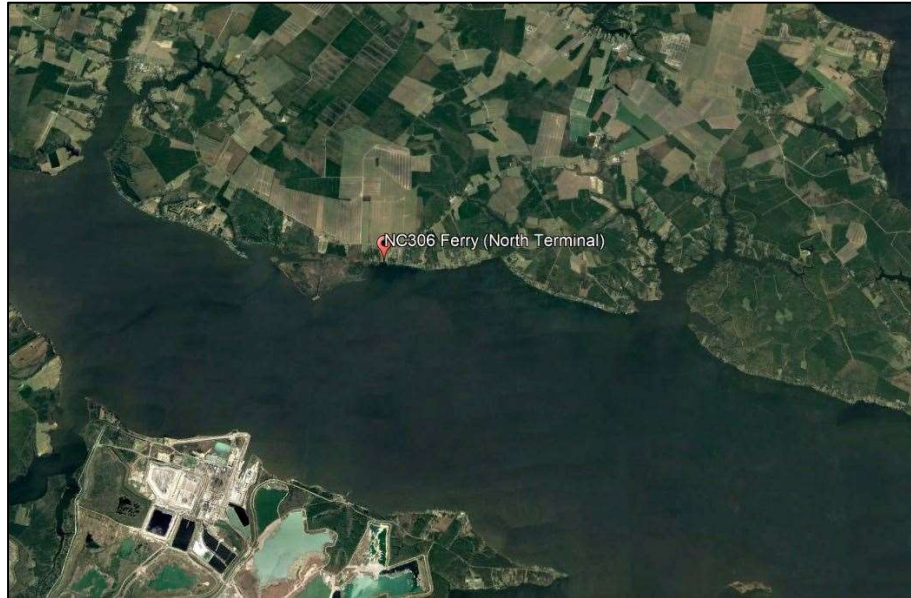
1.2 General Description of the Structure

Table 1: Bridge and Inspection Information

Date of Inspection:	November 1, 2023
Date of Design Plans:	Not Available
Length of Bridge:	73 ft.
Number of Spans:	3
SSUs Inspected:	Bent 2 and End Bent 2
Superstructure Type:	Steel Girders
Substructure Type:	Steel Piles
Foundation Type:	Steel Piles
Direction of Stationing:	North to South
Dive Method:	Surface-Supplied Air from Boat
Maximum Water Depth:	25.0 ft. @ End Bent 2, Pile 1
Weather:	Sunny, 48°F
Max Current Flow:	0 FPS
Inspection Team Leader:	Scott Rowe, PE
Inspection Team Members:	Wes Trescott, Steven Henry, Brandon Rot
High Watermark:	1 ft. above Waterline

Location Map

Coordinates: N 35.428167°, W 76.740767°



2.0 INSPECTION FINDINGS

2.1 Item 61: Channel

Based on the Underwater Inspection, NBI Item 61 condition rating is 8.

- The embankment appears stable and protected by a steel sheet pile bulkhead and riprap slope protection.
- Bent 2 and the sheet pile bulkhead beneath Span 2 are protected from ferry prop-wash by a steel sheet pile splash wall.
- The channel bottom primarily consists of silt and organic material.

2.2 Item 113: Scour

At End Bent 2, there are areas of local scour, up to 15 ft. deep, due to prop-wash from the ferry. Refer to Table 2 for the sounding measurements.

2.3 Item 60: Substructure

Based on the Underwater Inspection, the NBI Item 60 condition rating is 5 (Fair).

General Notes:



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- All inspected piles, extending from the waterline to channel bottom, have light marine growth, consisting of barnacles, up to 1/2 in. thick.
- Steel sheet pile bulkhead, extending from cap to channel bottom, have corrosion with pitting up to 1/16 in. deep.
- Steel sheet pile splash wall, from top of wall to 1 ft. below waterline, corrosion with pitting up to 1/16 in. deep.

Bent 2:

- All piles, from 2 ft. above waterline to channel bottom, all flanges and web, corrosion with section loss, with isolated areas of knife edging (Photo 12). Refer to Table 4 for representative steel section measurements at Pile 1.
- All piles, from cap to channel bottom, protective coating is peeling.
- Pile 1, northeast and southeast flanges, from waterline to channel bottom, isolated areas of section loss confined to the edge of the flange, up to 3 in. high x 1/2 in. wide (Photo 13).

End Bent 2:

- Piles have been repaired with steel repair plates since the previous underwater inspection. Refer to Table 3 for the locations and dimensions of the repair plates.
- All piles, from 2 ft. above waterline to 1 ft. below waterline, all flanges, corrosion with 1/16 in. section loss. Refer to Table 4 for representative steel section measurements at Piles 2 and 3.
- Pile 1, northeast flange, from 2 ft. above waterline to waterline, section loss with knife edging, 0.387 in. remaining section (Photo 14).
- Pile 5, northeast flange, from 1.2 ft. above waterline to waterline, section loss, 0.418 in. remaining section (Photo 15).

Dolphins:

- All dolphin fenders, bottom 3 ft., decay, up to 100% loss (Photo 17).
- Dolphin 3, north quadrant, north pile, at waterline, decay, 1 ft. high x 10 in. wide x 3 in. deep (Photo 18).
- Dolphin 8, northeast quadrant, at waterline, broken pile (Photo 19).



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2.4 Repair Recommendations

- Clean and coat or encase all piles in Bent 2 and End Bent 2.
- Replace broken pile at Dolphin 8.
- Replace all decayed dolphin fenders.



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Table 2: Ferry Terminal Soundings

Upstream Fascia	
SSU	Waterline to Channel Bottom (ft)
Bent 2, Pile 4	7.4
Splash Wall	20.7
End Bent 2, Pile 2	24.5
End Bent 2, Pile 5	19.2
End Bent 2, Pile 6	17.0
Dolphin 2	16.9
Dolphin 4	17.1
Dolphin 6	16.9
Dolphin 8	16.6
Dolphin 10	15.5

Downstream Fascia	
SSU	Waterline to Channel Bottom (ft)
Bent 2, Pile 1	7.6
Splash Wall	19.4
End Bent 2, Pile 1	25.0
End Bent 2, Pile 3	19.1
End Bent 2, Pile 4	20.1
Dolphin 1	19.3
Dolphin 3	16.4
Dolphin 5	17.0
Dolphin 7	14.6
Dolphin 9	16.1

Note: The numbers listed in this table represent depth and not elevations. The waterline elevation at the time of the readings was 0.7 based on the available USGS gage height. The soundings were taken on November 1, 2023 at 11:30.



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Table 3: Repair Plate Locations

Bent	Pile	Location	Height (in.)	Width (in.)
End Bent 2	1	SW Flange	31	6
	2	NW Flange	20	6
	3	N Flange	18	6
	3	SE Flange	12	6
	5	NW Flange	17	6
	6	NW Flange	20	6
	6	SW Flange	17	6

Note: The only repair plates noted in this table were those within the scope of the Underwater Inspection.



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Table 4: Steel Thickness Measurements

Bent	Pile	Flange or Web	Depth Below Waterline (ft.)	Original Thickness (in.)	Remaining Section (in.)	Remaining Section (%)
Bent 2	1	NE Flange	0.0	0.515	0.415	80.6%
		SE Flange	7.6	0.515	0.430	83.5%
		Web	0.0	0.480	0.458	97.5%
		Web	7.6	0.480	0.467	99.3%
End Bent 2	1	NE Flange	0.0	0.515	0.387	75.1%
	2	NE Flange	0.0	0.515	0.415	80.6%
		NE Flange	12.2	0.515	0.443	86.1%
		NE Flange	24.5	0.480	0.448	87.1%
		Web	0.0	0.480	0.480	100.0%
		Web	12.2	0.480	0.492	100.0%
		Web	24.5	0.515	0.488	100.0%
	3	NE Flange	0.0	0.515	0.460	89.3%
		NE Flange	9.5	0.515	0.483	93.9%
		NE Flange	19.1	0.480	0.487	94.5%
		Web	0.0	0.480	0.478	100.0%
		Web	9.5	0.480	0.477	100.0%
		Web	19.1	0.515	0.482	100.0%
	5	NE Flange	0.0	0.515	0.418	81.2%

Note: Original steel thickness was taken from field measurements. All flange measurements were taken 1 in. from the edge of the flange using an ultrasonic thickness gauge. Three readings were taken in the field and the average was used to determine remaining steel thickness.

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Photo 1: Overall View Looking North



Photo 2: View of Ramp Looking North

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Photo 3: Upstream/West Fascia



Photo 4: Downstream/East Fascia

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Photo 5: Bent 2, South Face



Photo 6: Steel Shet Pile Bulkhead East of Terminal

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Photo 7: Typical Dolphin, Dolphin 8 Shown

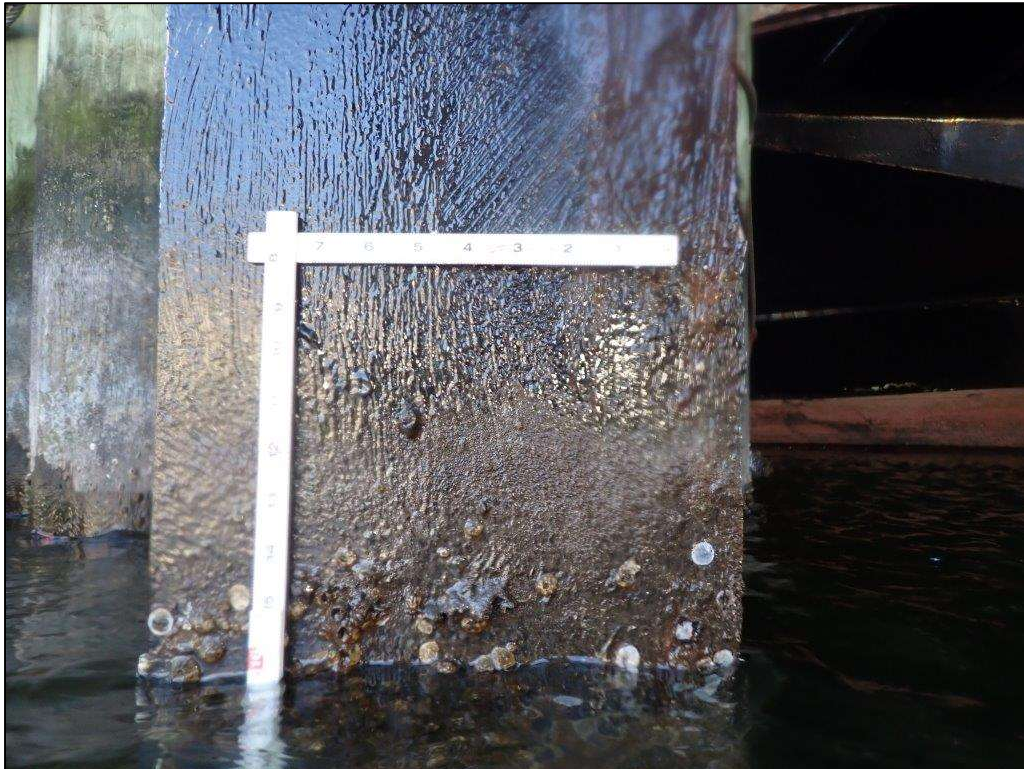


Photo 8: Typical Steel Pile Condition Above Waterline, End Bent 2, Pile 4

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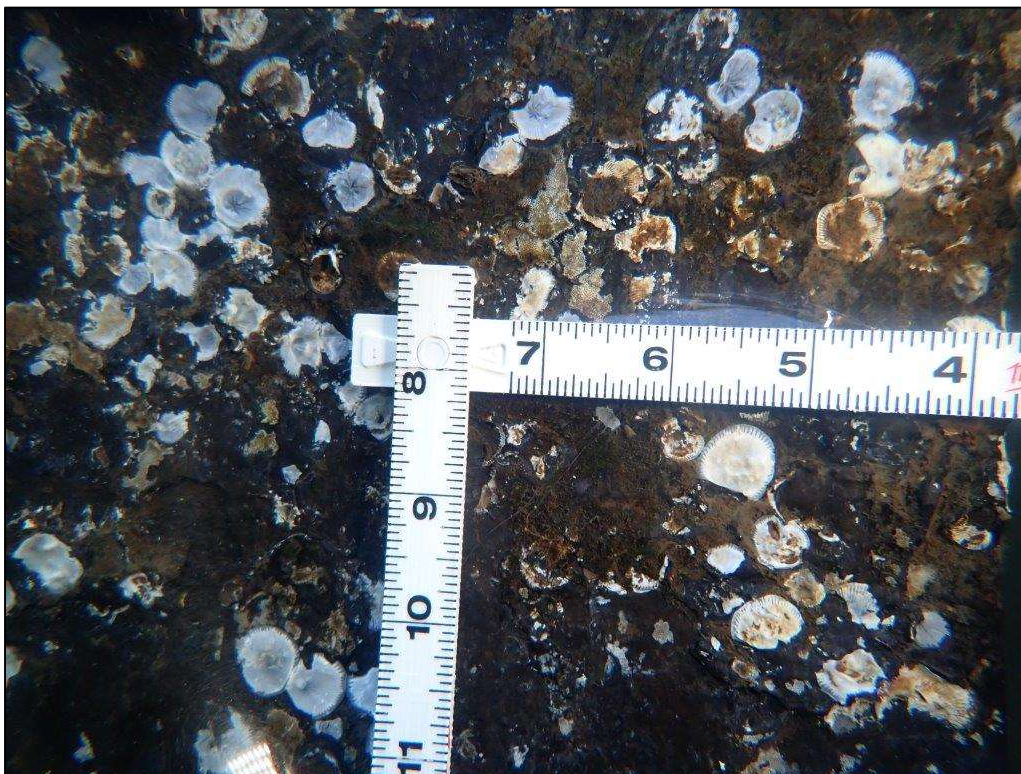


Photo 9: Typical Steel Pile Condition Below Waterline, End Bent 2, Pile 3



Photo 10: Typical Timber Dolphin Condition Above Waterline, Dolphin 7

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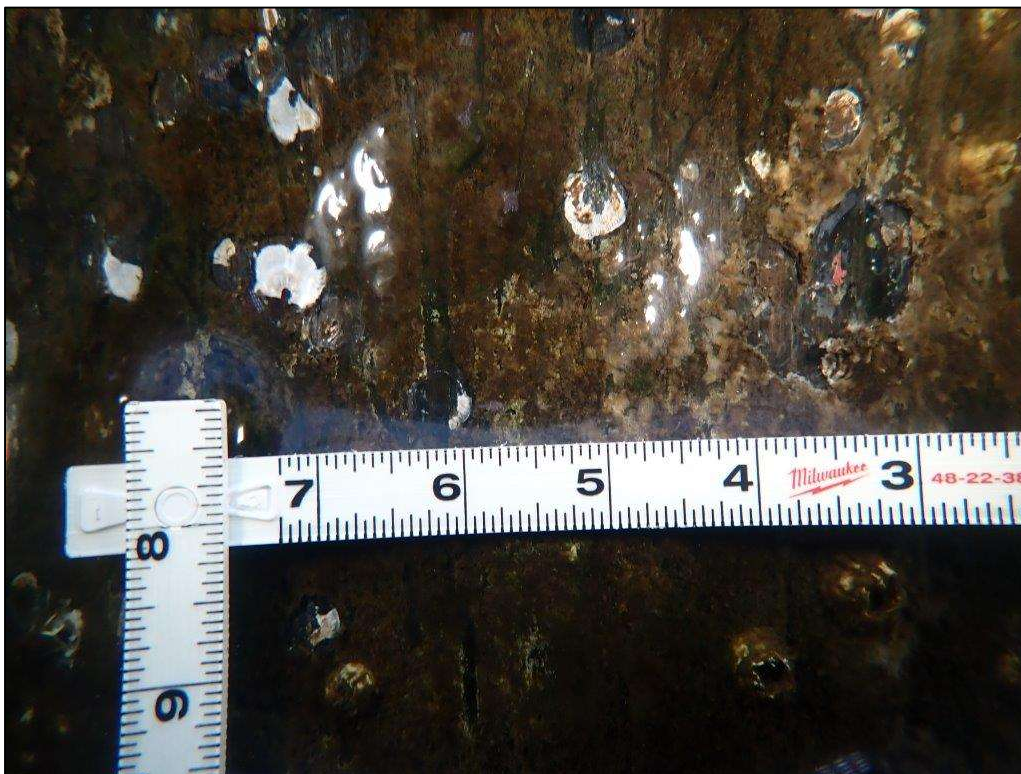


Photo 11: Typical Timber Dolphin Condition Below Waterline, Dolphin 7



Photo 12: Typical Section Loss on Flange Edges

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Photo 13: Bent 2, Pile 1, Areas of Section Loss Confined to the Flange Edge

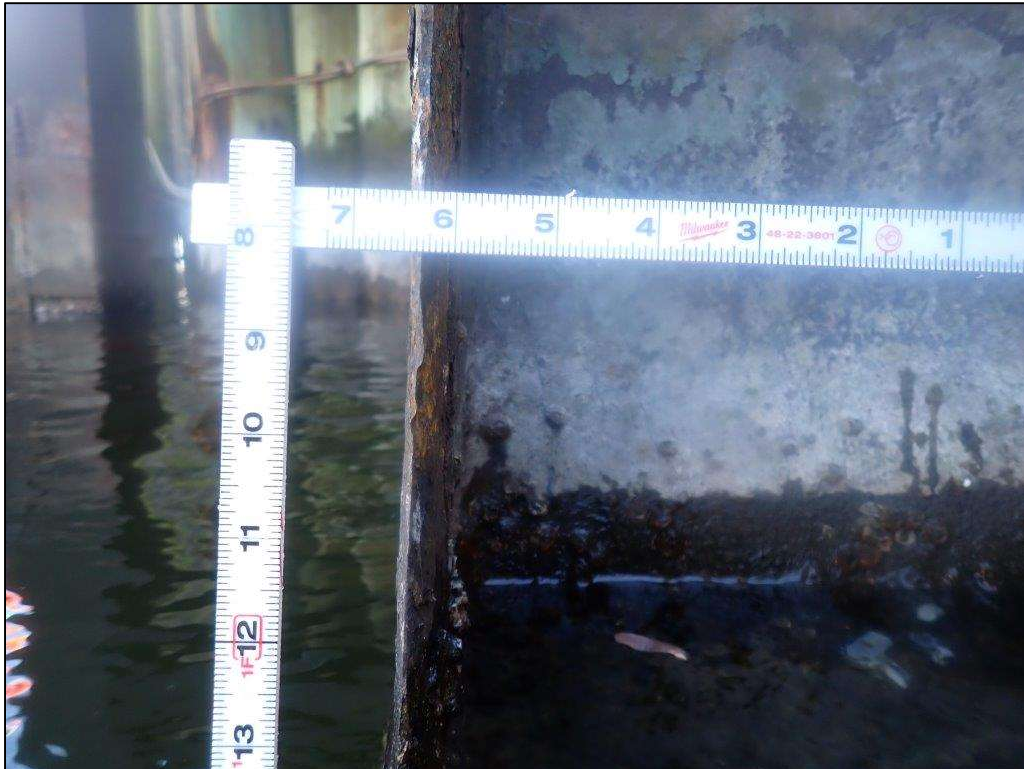


Photo 14: End Bent 2, Pile 1, Section Loss

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Photo 15: End Bent 2, Pile 5, Section Loss



Photo 16: Typical Repair Plate, End Bent 2, Pile 3 Shown

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Photo 17: Dolphin Fender, Typical Section Loss



Photo 18: Dolphin 3, Decay

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Photo 19: Dolphin 8, Broken Pile