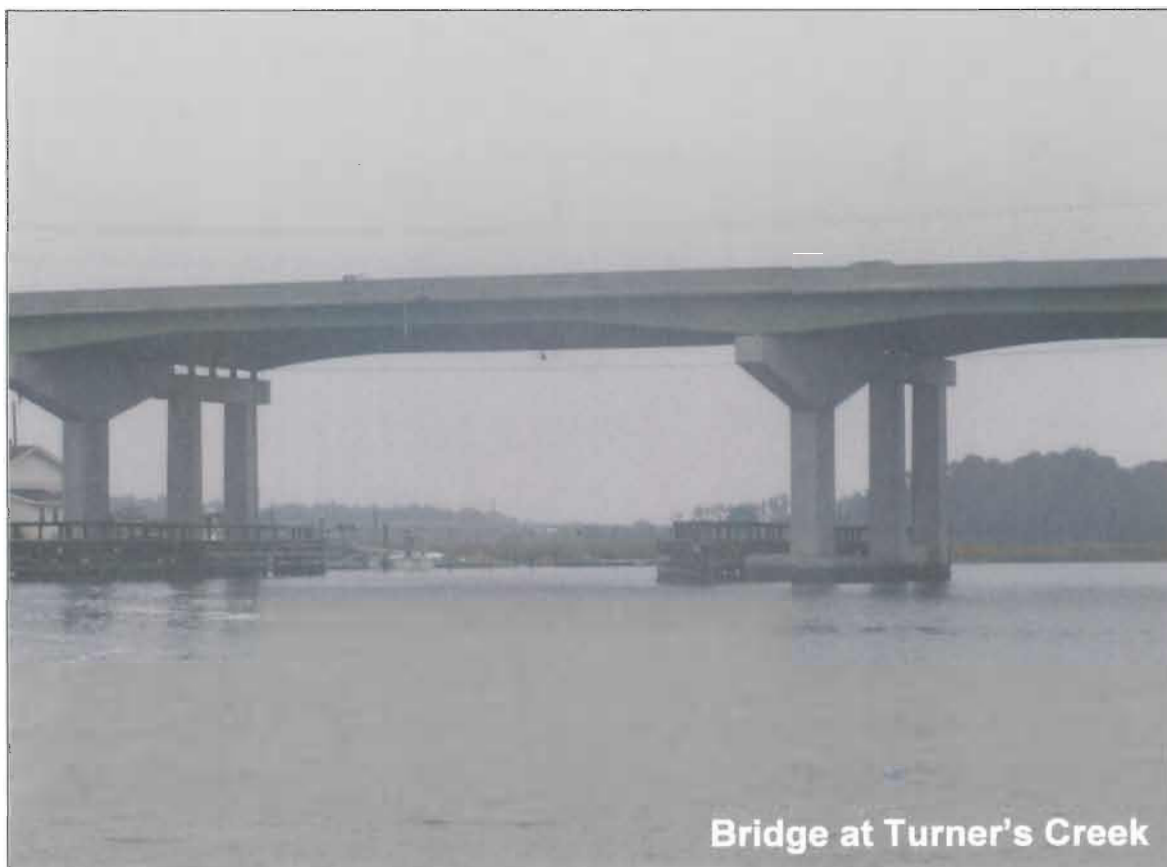




Above and Below Water Evaluation of

The Fender Systems at the Causton Bluff Bridges and the Bridge at Turner's Creek on Johnny Mercer Boulevard

Chatham County, GA



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**Above and Below Water Condition Assessment of
The Fender Systems at the Causton Bluff and Turner's Creek Bridges
Chatham County, Georgia**

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SIGNIFICANT FINDINGS SUMMARY

Inspection Date: November 24, 2009

Observations:

Causton Bluff Bridges

- The west fender is in good condition and can remain in place with only minor repairs.
- The east fender is in poor to fair condition and will require replacement of the three southernmost dolphins and 44 timber wales.
- The estimate of probable cost for the recommended repairs of the fenders at the Causton Bluff Bridges is \$556,000.

Bridge at Turner's Creek on Johnny Mercer Boulevard

- The west fender is in poor condition and should be replaced.
- The east fender in good condition and can remain in place with only minor repairs.
- The estimate of probable cost for the recommended repairs and replacement of the fender at this bridge is \$680, 000.



1.0 INTRODUCTION

1.1 Purpose and Scope

On November 24, 2009, Collins Engineers, Inc. performed an above and below water condition assessment of the fender systems at the Causton Bluff bridges and the bridge over Turner's Creek on Johnny Mercer Boulevard in Chatham County, Georgia. The purpose of the assessment was to evaluate the existing condition of the fender systems and to provide a report detailing recommendations for either the repair or replacement of the structures. This report includes a description of the structures and the method of investigation, as well as a detailed description of the conditions observed. In addition, this report contains recommendations for the repairs and replacement of portions of the fender systems as well as the estimate of probable costs associated with the recommendations.

The scope of the investigation included a visual assessment of the readily accessible above water portions of the fender systems for both bridges performed during low tide. Additionally, a Collins engineer diver performed a below water visual assessment of approximately 50 percent of the foundation piles for both fender systems. Depth soundings were also taken along the face of each of the fender systems to identify any potential scouring of the pilings.

1.2 General Description of the Structures

Figure 1, in Appendix A, indicates the locations of the Causton Bluff bridges and the bridge over Turner's Creek on Johnny Mercer Boulevard, respectively. Figures 2 and 3 in Appendix A show the Fender Plans and Typical Elevations for both fenders. The photographs contained in Appendix B of this report provide overall views of the fender system for each of the bridges as well as detailed photographs taken during the assessment.



Causton Bluff Bridges

The west fender of the Causton Bluff Bridges consists of 24-in. square prestressed concrete piles spaced at approximately 5 to 8 ft on center. A total of six courses of 12"x12" CCA treated timber wales span the clear distance between each of the concrete piles. A 12-ft. diameter, steel sheet-pile cofferdam dolphin is present at both the north and south ends of the fender system. The cofferdams are capped with a concrete slab and a treated timber catwalk traverses the fender system between the two cofferdams. No plans for the fender system were available and the embedment depth of the steel sheet piling and concrete piles is unknown at this time. Refer to Figure 2, in Appendix A of this report for a plan and typical elevation of the fender system.

The east fender of the Causton Bluff consists of 14-in. diameter timber piles, spaced approximately 5 feet center to center, and 10"x10" timber wales fastened to the channel side of the piles. Nine dolphins, all comprised of 14-in. diameter timber piles strapped together by steel cables are located along the fender system. The two end dolphins located (designated D-NA and D-SA on Figure 2 in Appendix A) consist of 13-pile clusters, while the remaining 7 dolphins consist of 7-pile clusters. A timber catwalk traverses the fender system. No plans for the fender system were available and the embedment depth of the timber piling is unknown at this time. Refer to Figure 2, in Appendix A of this report for a plan and typical elevation of the fender system.

Additionally, it appears that the east fender has received several repairs in the past. The northernmost 5 dolphins and 170 linear feet of timber wales, piles, and catwalk decking consists of newer, CCA treated timber members. The remaining 4 southernmost dolphins and approximately 100 running feet of timber walers, piles, and catwalk decking consist of older creosote treated timber.



Bridge at Turner's Creek on Johnny Mercer Boulevard

Both the east and west fenders at the Turner's Creek bridge consist of 14-in. diameter creosote treated timber piles spaced approximately 5 ft on center and 10"x10" creosote treated timber wales fastened to the channel side of the piles. The wale to pile, bolted connections, are sealed with an coal tar sealant. Five dolphins, all comprised of 14-in. diameter piles strapped together by steel cables are located along the fender system. The two end dolphins consist of 5-pile clusters and the remaining three interior dolphins consist of 3-pile clusters. A timber catwalk traverses each fender. No plans for the fenders were available and the embedment depth of the timber piling is unknown at this time. Refer to Figure 3, in Appendix A of this report for a plan and typical elevation of the fenders.

1.3 Method of Investigation

An inspection team consisting of engineers led by a Georgia-registered Professional Engineer conducted the above and below water underwater investigation. Access to the bridge fenders was obtained by vessel. The readily accessible, above water portions of each fender system were visually assessed. No plans were available at the time of the investigation; consequently, field measurements were taken and used to develop the figures included in Appendix A of this report.

The underwater portion of the investigation generally consisted of a Level I "swim-by" visual inspection over approximately 50 percent of the accessible SSU surfaces from the high-water mark to the channel bottom. A Level II visual/tactile inspection was performed on up to 25 percent of the inspected piles, which included cleaning marine growth at the waterline, mid-depth, and channel bottom to facilitate an evaluation of the underlying surfaces. Particular attention was given to any observed areas of excessive deterioration.



The location of the waterline with respect to a fixed reference on the bridges was noted at the time of inspection. Depth soundings were taken along the length of the fenders using a digital handheld sounder. The soundings are included on the corresponding figures located in Appendix A of this report.

2.0 EXISTING CONDITIONS

Causton Bluff Bridges

The west fender at the Causton Bluff bridges is in significantly better condition than the east fender and only minor defects were observed. The steel sheet pile cofferdams exhibited light to moderate corrosion on approximately 50 percent of the surface located within the tidal zone. Approximately 50 percent of the steel connections for the treated timber wales exhibited light to heavy surface corrosion. Additionally, the two lowest courses of wales exhibited light to moderate deterioration with awl penetrations up to 1/4 in. noted. Evidence of minor impact damage was observed on the channel side of the north cofferdam. The damage is limited to peeled reflective striping, chafed timber wales, and a failed connection at the end of one wale.

The east fender consisted of creosote and CCA-treated members. The CCA treated timber appears newer and is in significantly better condition the creosote treated timber. Hour-glassing with up to 50 percent loss of section near the low water line is present on the creosote-treated piles including the four dolphins located south of the bridge. A total of 19 timber wales are missing and the lower three courses of wales exhibit moderate to heavy deterioration with awl penetrations up to 1/4 in. noted. See Figure 2 in Appendix A for notes made during the inspection.



Bridge at Turner's Creek on Johnny Mercer Boulevard

Significant deterioration was observed at the west fender for this bridge. Heavy hour-glassing with up to 100 percent loss of cross sectional area was observed on all of the fender and dolphin piles along the northernmost 55 feet of this fender. The remaining southern portion of the fender appears to be newer. However, the fender and dolphin piles on the southern portion of this fender exhibit minor hour-glassing near the low water line with a maximum loss of section on the order of 20 percent. While walking the catwalks, a lateral sway of up to 1-ft. was noted. The lower three courses of wales exhibit moderate to heavy deterioration with awl penetrations up to 1/4 in. noted.

The east fender at this bridge is in significantly better condition than the west fender. No major defects were observed on the piles, dolphins, or catwalks. The lower two courses of timber wales exhibit moderate to heavy deterioration with awl penetrations up to 1/4 in. noted. See Figure 3 in Appendix A for notes made during the inspection.

3.0 EVALUATION AND RECOMMENDATIONS

The condition of the four fenders assessed varies significantly from fender to fender. No plans or historical information for the fenders were available at the time of this report. However, it appears that the fenders have received repairs and in some cases, complete replacement in the past. Therefore, the recommendations included in this section will address each individual fender. An itemized estimate of probable cost for the recommended repairs for each fender are included in Appendix C of this report.

Causton Bluff Bridges

Overall, the west fender is in good condition and can remain in place with only minor repairs. Within the next five years, the steel sheet-pile cofferdams should be cleaned, the corrosion removed, and the exposed steel recoated with an approved epoxy rich surface coating. Heavily corroded hardware may require full replacement.



Additionally, the lower two courses of wales should be removed and replaced within five years.

Overall, the east fender is in fair to poor condition and will require some repairs as well as replacement of the older creosote treated timber section of the fender. A total of 19 timber wales are missing and should be replaced within the next year. Many of the missing timber wales are located in the lower three courses. The remaining wales in the lower three courses (a total of 25 wales) exhibit deterioration and should be replaced within 5 years. The three southernmost dolphins and 10 fender piles that are consist of creosote treated timber are approaching the end of their practical service life and should be replaced within 2 years. The estimate of probable cost of the recommended repairs at the Causton Bluff Bridges is \$556,000.

As is typical with marine construction projects of this size and nature, the cost to mobilize repair crews and equipment will be a significant portion of the overall repair costs. Therefore, we recommend that the minor repairs recommended for the west fender as well as the more significant repairs and replacement of portions of the east fender be performed as part of the same construction contract. An itemized estimate of probable cost for the recommended repairs for each fender is included in Appendix C of this report.

It is our understanding that the Causton Bluff Bridges are scheduled to be replaced in the near future. No time frame for the construction has been announced by the Georgia Department of Transportation; however, it is our understanding that qualifications for a design contract are currently being solicited. It is very likely that the new bridge will incorporate a new fender system as well. Depending upon the time frame of the construction for the bridge replacement; our recommendations for bridge fender repairs may be an unnecessary expense. If the bridges are to be replaced within five years, it is our recommendation that no repairs be made to the fenders. If the bridges are to be replaced within 5 to 10 years, then we recommend that the three



southernmost dolphins as well as the corresponding fender piles and wales be replaced.

Bridge at Turner's Creek on Johnny Mercer Boulevard

The west fender at this bridge is in poor condition. Given the number of fractured piles and noticeable decreased lateral stability of the fender, we recommend that this fender be completely removed and replaced. The cost associated with replacing only the damaged members of this fender would not be significantly less than a complete removal and replacement.

Overall, the east fender at this bridge is in good condition. The only significant defect noted was the deteriorated bottom two courses of timber wales. We recommend that the two bottom courses of timber wales at this fender be replaced within 5 years. The estimate of probable cost of the recommended repairs of this bridge is \$680,000.



Respectfully submitted,
COLLINS ENGINEERS, INC.

A handwritten signature in blue ink, appearing to read "David Seitz".

David Seitz, P.E.
Project Manager

Originated by:
Joshua Lindstrom, E.I.