

Inspection and Monitoring of Fabrication and Construction for the West Halls River Road Bridge Replacement

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TASK 4 Deliverable: Two-Year Report
(Visual inspection of bridge)

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CHAPTER 1

INTRODUCTION

See Task 2 Part A report for a brief narrative on the Halls River Bridge layout and construction.

This phase report provides photos and summary of the inspections performed by the research team at 20 months and two years after the bridge construction was completed. The inspection dates for the research project are below:

End of Construction	September 2019
Three-Month Inspection	January 12, 2020
Six-Month Inspection	April 19, 2020
Nine-Month Inspection	July 23, 2020
One-Year Inspection	October 18, 2020
Eighteen-Month Inspection	July 2, 2021 (at 20 months instead of 18 as originally planned)
Two-Year Inspection	November 20, 2021

The inspections described herein were only visual observations and were not intended to replace regular inspections that Florida Department of Transportation (FDOT) performs.

CHAPTER 2

20-MONTH INSPECTION

Midday on July 2, 2021, a visual inspection was conducted on the twenty-month-old Halls River Bridge. Photos of the bridge, showing Spans 1-2, 3, and 4-5, are shown in **Figures 1, 2, and 3**, respectively. A boat was used to perform the work. The underside of the bridge deck and beams, bent caps, end bents, and the portion of the piles above water were observed. The water level was slightly lower (by about 3 inches) than it was for the three-month inspection.



Figure 1: Halls River Bridge, Spans 1 and 2, looking northwest



Figure 2: Span 3, looking north



Figure 3: Spans 4 and 5, looking northeast

Overall, the prestressed carbon fiber composite cable (CFCC) piles appeared to be in good condition. The bent caps exhibited minor staining from drainage at the beam locations. (**Figure 4**).



Figure 4: Bent 2, looking northeast, minor staining on bent cap from water drainage

The hybrid composite beams (HCBs) exhibited no apparent damage or cracking on the fiberglass shell and no flaking of the gel coat (**Figures 5 and 6**).

The HCB lid did not have a gel coat applied during fabrication. The noticeable gap between the lid and the vertical face of the HCBs does not appear to have changed since the first visit at 3 months after construction. The lid edge appeared to be in adequate condition, with no noticeable deterioration, bucking, or further separation from the beam (**Figure 7**).

The underside of the slab is visible between two of the beams in each span, as a result of the connection between construction phases that was constructed without stay-in-place decking, and the slab appeared to be in good condition (**Figure 8**). There is some staining, but it appears to be original from construction.



Figure 5: Span 2, looking southwest at Bent 2



Figure 6: Span 4, gel coat patches on HCB beams



Figure 7: Small gap between HCB lid and vertical face of HCB



Figure 8: Bottom of slab where connection between construction phases was made, at Bent 2, looking west

No changes in the end bents were noticed from the last inspection (**Figure 9**). The abutment walls were in good condition (**Figure 10**).



Figure 9: End Bent 1, looking west



Figure 10: End Bent 1, looking northwest

Additional photos showing the overall condition of the bridge are in **Figures 11 and 12**.

Additional documentation from the twenty-month visit was taken by photographs and videos and provided to FDOT.



Figure 11: Span 5, looking north



Figure 12: Span 4, looking south

CHAPTER 3 TWO-YEAR INSPECTION

A visual inspection was conducted at midday on November 20, 2021 – approximately two years after end of construction. The water level was lower than it had been for all five previous inspections performed, which exposed more of the walls at the end bents. It was windy and cool (high sixties).

Of particular interest during this inspection were the patches on the bottom of the beams. The patches were made at the conclusion of a recent load test, performed on Spans 1 and 5 on October 6, 2021. The patches were made to repair the beams where strain gages had been adhered. **Figures 13 and 14** show photos of several of the patches. The patches appear to be holding up well, with no signs of flaking or debonding.



Figure 13: Patches on beams where strain gages were placed for load test

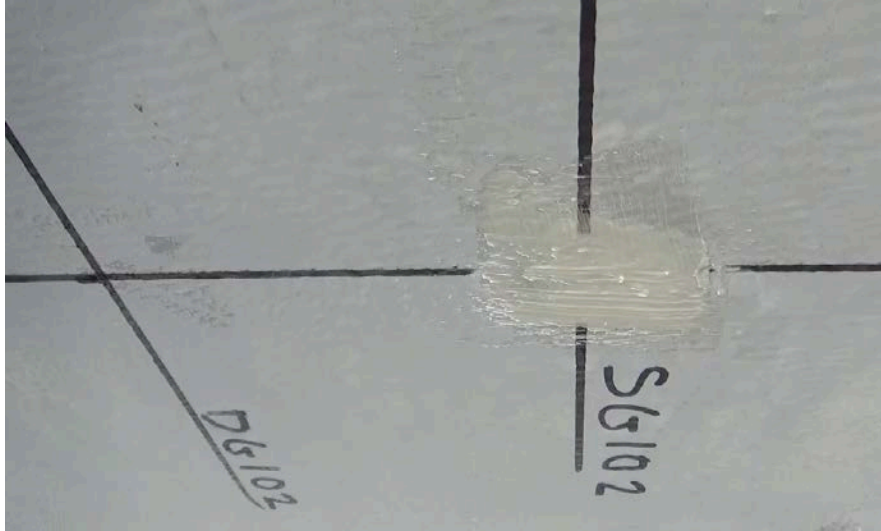


Figure 14: Patch on beam where strain gage SG102 was placed for load test

Another area of interest was the underside of the slab that was exposed from the joint between construction phases (where stay-in-place forms were not used). During the load test, the truck wheels were placed along the joint, in Spans 1 and 5, and some high strains were detected, making this an area of interest during the inspection. A crack (see **Figure 15**) was noticed in Span 1, about 2 feet east of where strain gage SG112 had been placed for the load test. The crack runs transverse to the bridge (perpendicular to the beams). For another view of the crack, see the videos with *Slab1_Slab-Construction-Joint* in the filename.



Figure 15: Bottom of slab at construction joint, Span 1, crack near SG112 (at two years)

No open cracks were visible from underneath in Span 5. However, a crack (see **Figure 16**) with efflorescence was noticed about 2 feet east of where strain gage SG512 had been placed for the load test. The crack runs transverse to the bridge (perpendicular to the beams). For another view of the crack, see videos with *Slab5_Slab-Construction-Joint* in the filename.



Figure 16: Bottom of slab at construction joint, Span 5, crack near SG512 (at two years)

The end bent sheet pile walls were inspected from the water and by walking along the cap. No noticeable cracks were seen on top of the cap (**Figures 17 and 18**).



Figure 17: End Bent 1, top of sheet pile wall cap at corner, no cracks (at two years)



Figure 18: End Bent 6, top of sheet pile wall cap at corner, no cracks (at two years)

However, there were some cracks on the vertical face of the sheet pile wall caps. A large crack with efflorescence was noticed on End Bent 6 (**Figure 19**), but several other cracks were open, particularly at the corners (**Figures 20-23**). Some of the cracks were also noticed and documented during previous visits. **Figure 24** shows some missing joint filler at one of the corners.



Figure 19: End Bent 6, sheet pile wall cap, vertical crack with efflorescence



Figure 20: End Bent 6, sheet pile wall cap, vertical crack on northernmost corner



Figure 21: End Bent 6, sheet pile wall cap, vertical crack on north corner of front face



Figure 22: End Bent 6, sheet pile wall cap, vertical cracks at two locations on front face



Figure 23: End Bent 6, sheet pile wall cap, vertical crack on south corner of front face



Figure 24: End Bent 6, sheet pile wall cap, joint filler missing on southernmost corner

Several of the beams above End Bent 1 are covered with graffiti, as shown in **Figure 25**.



Figure 25: Graffiti on beams above Bent 1, looking southwest (at two years)

Barnacles have found residence on the sheet pile walls and caps (**Figures 26 and 27**).



Figure 26: Barnacles on end bent sheet pile wall and cap (at two years)



Figure 27: Barnacles on end bent sheet pile wall (at two years)

Additional documentation from the two-year visit was taken by photographs and videos and provided to FDOT.

CHAPTER 4

CONCLUSIONS

In this chapter, photos are provided to make comparisons over time, from the first inspection at three months (**Figures 28(a)-33(a)** and **35(a)-36(a)**) or nine months (**Figure 34(a)**) to the last inspection at two years after construction (**Figures 28(b)-36(b)**). The most noticeable differences over time are the growth of barnacles on the end bent sheet pile walls and caps (**Figure 29**) and the additional staining and growth on the intermediate bent piles (**Figures 30-33**).



(a)



(b)

Figure 28: Slab at construction joint in Span 1, near SG112 from load test; (a) at three months, (b) at two years



(a)



(b)

Figure 29: End Bent 6, looking southeast; (a) at three months, (b) at two years



(a)



(b)

Figure 30: Bent 2; (a) looking northwest, at three months, (b) looking northeast, at two years



(a)



(b)

Figure 31: Span 2, looking northeast at Bent 3; (a) at three months, (b) at two years



(a)



(b)

Figure 32: Bent 4; (a) looking east, at three months, (b) looking northeast, at two years



(a)



(b)

Figure 33: Bent 5; (a) looking east, at three months, (b) looking northeast, at two years



(a)



(b)

Figure 34: Bottom of slab at construction joint, Span 1; (a) looking northwest, at nine months, (b) looking east, at two years



(a)



(b)

Figure 35: Bottom of slab at construction joint, looking east; (a) Span 4, at three months, (b) Span 5, at two years



(a)



(b)

Figure 36: End Bent 6, crack in sheet pile wall cap; (a) at three months, (b) at two years