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

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TASK 2 Deliverable: Six-Month Report
(Part A – Visual inspection of bridge)

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CHAPTER 1
INTRODUCTION

The existing Halls River Bridge built in 1954 had a bridge deck width of 30 ft, with two 12-ft-wide lanes. The new bridge consists of six CFRP prestressed concrete piles in each intermediate bent, GFRP reinforced pier caps, nine hybrid composite beams per span, and a GFRP reinforced deck width of 57 ft 9 ¾ in. as shown in **Figure 1**. The two 12-ft travel lanes with 8-ft shoulders are separated from a 5-ft sidewalk by a concrete barrier. The bridge, 185 ft 10 in. long, has five spans each at 37 ft 2 in. long. From the centerline of the middle beam, the northern beams are spaced at 6 ft 7 $^{5}/_{8}$ in., and the southern beams are spaced at 6 ft 4 $^{5}/_{8}$ in. The bridge deck is reinforced with GFRP 6S2 bars on top and bottom spaced at 4 ½ in. longitudinally, GFRP 4S1 bars on top and 6S1 bars on bottom at end bents, and GFRP 5S1 bars on top at intermediate bents.

The bridge replacement occurred in stages to allow for continual traffic flow; the northern half (westbound traffic lane) of the existing bridge was demolished, and both lanes of traffic were moved to the southern half of the bridge (Phase II-Stage 1). After construction of the northern section of the new bridge (Phase II-Stage 2), consisting of four beams per span and a deck width of 26 ft, traffic was shifted to the newly constructed structure, and the southern half (eastbound traffic lane) of the existing bridge was demolished (Phase III-Stage 1). The southern section of the new bridge includes five beams per span with a deck width of 31 ft 9 ¾ in. During the final phase of construction, traffic was relocated to the newly constructed southern section of the bridge (Phase III-Stage 2). After completion of the post-installed traffic barrier and pedestrian/bicycle railing on the northern section of the new structure, traffic was shifted to the final position.

The original contractor for Halls River Bridge was Astaldi Construction Corporation, but the contractor defaulted in March 2019 during construction of the southern section of the new structure (Phase III-Stage 1). In April 2019, Watson Civil Construction assumed responsibility for completing Halls River Bridge construction.

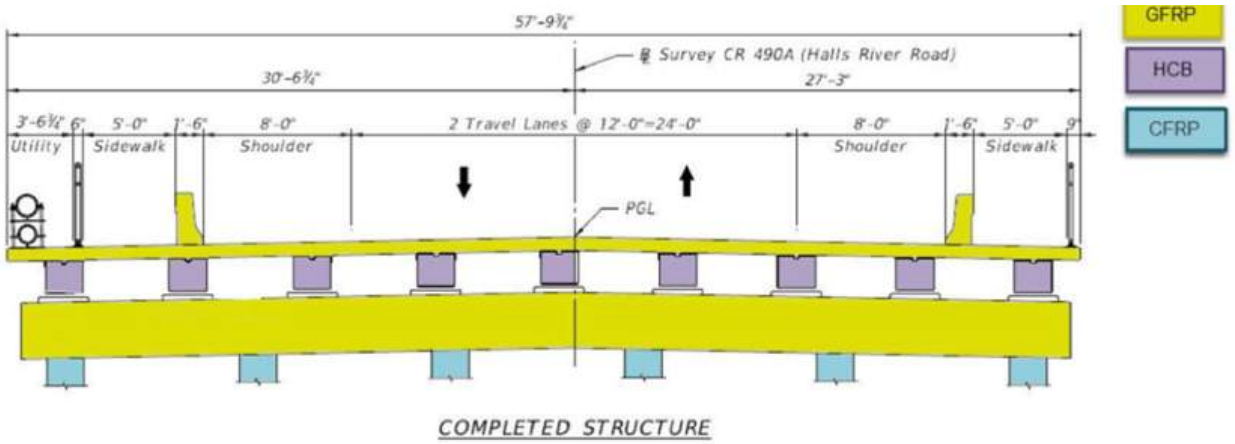

Figure 1: Profile view of Halls River Bridge replacement (FDOT 2016)

This phase report provides photos and summary of the inspections performed by the research team, three and six months after the bridge construction was completed. The inspection schedule, including past and future dates, for the research project is below:

End of Construction	September 2019
Three-Month Inspection	January 12, 2020
Six-Month Inspection	April 19, 2020
Nine-Month Inspection	June 2020 (anticipated)
One-Year Inspection	September 2020 (anticipated)
Eighteen-Month Inspection	March 2021 (anticipated)
Two-Year Inspection	September 2021 (anticipated)

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

CHAPTER 2
THREE-MONTH INSPECTION

Midday on January 12, 2020, a visual inspection was conducted on the three-month-old Halls River Bridge. 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 inspected. The water level was at high tide, and there had been recent precipitation. The high tide limited the length of pile that was visible. The water depth under span 1 of the bridge was approximately 5.9 ft during the inspection.

Minor cracking was observed on a few prestressed carbon fiber composite cable (CFCC) piles (**Figure 2**). Overall, the piles appeared to be in good condition with no signs of distress.

Figure 2: Crack on CFCC pile

The bent caps exhibited minor cracks and staining from drainage at the beam locations (**Figure 3**).

Figure 3: Staining from water drainage

The bearing pads did not display any excessive lateral deformation. The hybrid composite beams (HCBs) exhibited no apparent damage or cracking on the fiberglass shell and no flaking of the gel coat. A handful of the beams had ripples on the bottom of the fiberglass shell (**Figure 4**), and most of the beams had areas where the gel coat was a different color or patched (**Figure 5**).

The hybrid composite beam lid did not have a gel coat applied during fabrication, and there was a noticeable gap between the lid and the vertical web of the beam (**Figure 6**). The lid edge appeared to be in adequate condition, though, with no deterioration or bucking. The lid of beam 5-2, which was patched during construction, does not appear to have changed (**Figure 7**).

Where the underside of the slab is visible from the connection between construction phases, the slab is in good condition. The slope pavement, retaining walls, and sheet pile walls were all undamaged (**Figure 8**). Rough patches and low areas were noted on the roadway near the construction joint from the phases of construction (**Figure 9**); no large cracks were visible on the sidewalks.

Figure 4: Ripples on underside of HCB

Figure 5: Gel coat patch on HCB

Figure 6: HCB lid separation

Figure 7: Beam 5-2 patch

Figure 8: Slope pavement and sheet pile wall

Figure 9: Rough area on roadway

Additional documentation by photographs and videos were taken and provided to FDOT.

CHAPTER 3
SIX-MONTH INSPECTION

Another visual inspection was conducted at midday on April 19, 2020 – approximately six months after end of construction.

Figure 10 shows a view from the north side of the bridge, looking southwest towards Spans 1-4. Photos of the end bents are shown in **Figures 11-15**. Intermediate bents are shown in **Figures 16-23**. Photos of the underside of the beams are in **Figures 24-28**.

Figure 10: Spans 1-4, looking southwest, view from north side

Figure 11: End Bent 1, looking west, view from north side

Figure 12: End Bent 1, looking southwest, view from north side

Figure 13: End Bent 1, looking west

Figure 14: End Bent 1, looking west

Figure 15: End Bent 6 and Span 5, looking northeast, view from south side

Figure 16: Bent 2, looking north, view from south side

Figure 17: Span 1, looking northwest at End Bent 1 and Bent 2, view from south side

Figure 18: Span 2, looking northwest at Bent 2, view from south side

Figure 19: Span 2, looking southwest at Bent 2, view from north side

Figure 20: Span 2, looking southeast at Bent 3, view from north side

Figure 21: Span 3, looking southwest at Bent 3, view from north side

Figure 22: Span 4, looking northwest at Bent 4, view from south side

Figure 23: Span 5, looking northwest at Bent 5, view from south side

Figure 24: Span 2 underside, looking west

Figure 25: Span 3 underside, looking east at Bent 4

Figure 26: Span 3 underside, looking northwest, view from south side

Figure 27: Span 4 underside, looking west at Bent 4

Figure 28: Span 4 underside, looking southeast at Bent 5, view from north side

CHAPTER 4
CONCLUSIONS

In both the three- and six-month inspections, there were no signs of distress visible to the naked eye. No noticeable deterioration was noticed between the two inspections. Particular areas of interest were the ripples on the bottom of the fiberglass shell (Figure 4) and the gel coat patched areas (Figure 5) that were noticed at the 3-month visit; those areas had not visibly changed at the 6-month visit.

A few photos are provided in this chapter to make comparisons of the bridge's appearance between the three- and six-month inspections. The photos were taken from a similar vantage point.

End Bent 1 (Figures 29-31):

Figure 29: End Bent 1 at 3 months

Figure 30: End Bent 1 at 6 months, view from north side, looking southwest

Figure 31: End Bent 1 at 6 months, looking west

End Bent 1 diaphragm crack (Figures 32-33):

Figure 32: Diaphragm in End Bent 1 at 3 months, looking west

Figure 33: Diaphragm in End Bent 1 at 6 months, looking west

Bent 2 (Figures 34-35):

Figure 34: Bent 2 at 3 months, looking southwest

Figure 35: Bent 2 at 6 months, view from north side, looking southwest

Bent 5 (Figures 36-37):

Figure 36: Bent 5 at 3 months, looking northwest; pile discoloration

Figure 37: Bent 5 at 6 months, view from south side, looking northwest; pile discoloration (third pile from foreground)

End Bent 6 (Figures 38-39):

Figure 38: End Bent 6 at 3 months, looking northeast

Figure 39: End Bent 6 at 6 months, view from south side, looking northeast