

WEKIVA TRAIL PD&E STUDY

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EXISTING AND PROPOSED BRIDGE MEMO

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Prepared for:

Lake-Sumter MPO

FDOT District 5

Inwood Consulting Engineers

Prepared by:

Florida Bridge and Transportation, Inc.

633 Dartmouth Street

Orlando, FL 32804

407-513-9709

COA #26379

EOR: Mark Niedermann, PE

FL PE #45957

This memo addresses the existing and proposed conditions at the two bridge sites within Segment 1.

Existing Conditions at Bridges

Tremain Street Bridge

The existing bridge over Tremain Street consists entirely of timber members. The longest span is approximately 14'-3", and the overall bridge length is about 69'-2" consisting of six spans. See Sheets B-1 and B-2 for details of the site. The Tremain Street Bridge was originally built in the 1880's, but the individual members have been replaced in-kind over the years. The timber piles vary in size and cross section shape with most piles being round and some piles being square. The timber piles extend from an unknown penetration depth below ground to the pile caps. There is no guardrail or barrier protection at any of the timber bents. The minimum horizontal clearance for the vehicular lanes under the bridge is about 10'-2" and the minimum vertical clearance is about 9'-6". There is evidence of vehicular scrapes on the piles and the beams. A cursory inspection revealed the timber members appear to be in good shape with typical areas of splitting, checking, and soft spots (possible decay). The timber members appear to have been chemically treated with an unknown preservative, and testing should be performed to determine if the preservative is environmentally hazardous.

The slope under the east end of the bridge is experiencing sloughing and erosion. The timber soldier pile retaining wall is leaning toward the roadway and pushing on the timber piles in one of the intermediate bents. The load imparted into the timber pile bent has resulted in slight movement and rotation of the pile cap. It appears some spikes have been added to strengthen the connection between the top of the piles and the pile cap in order to minimize additional rotation and movement. There is evidence that the soil in the front slope is being transported by runoff through holes and slots in this retaining wall. The front slopes are not covered with any type of erosion protection material such as slope pavement or sand cement riprap. The southwest quadrant nearest the adjacent intersection appears to have been "cut-back" to make room for a SB to WB turn movement. The slope is supported with sand cement bags stacked nearly vertical. The approaches to the bridge along Tremain Street include a sidewalk along the west side of the road. The abutments of the bridge currently do not provide space for a sidewalk. Pedestrians were observed sharing the roadway under the bridge with vehicles during our site visit.

US 441 Bridge

The existing bridge over US 441 consists of steel plate girders with a concrete tub supporting soil, timber railroad ties and steel rails. The substructure consists of large concrete columns. The bridge consists of four 59'-0" spans for a total length of approximately 236'-0". See Sheets B-3 and B-4 for details of the site. The clear width inside the concrete tub is about 12'-4" and the top of the concrete curbs (the top of the sides of the tub) measures 8 ½" each. The plaque on the bridge indicates it was constructed in 1960. The superstructure has two main girders. A system of transverse floor beams and longitudinal stringers support the concrete tub and transfer the loads into the two plate girders. The bridge is classified as fracture critical since it only has two main girders and lacks redundancy in the number of beams. A cursory inspection revealed the structure is in good shape with minimal rust. The coating

system is peeling and failing throughout the bridge. FDOT performed testing of the existing coating system and found lead based paint. There are several areas where the underside of the superstructure has been impacted by vehicles. In some locations, the bottom flange is bent and some cross bracing has broken loose by these impacts. The minimum vertical clearance under the bridge is about 14'-5". The bridge piers are protected by guardrail along US 441.

The railroad grade is at the original ground surface. US 441 was constructed in a cut section (depressed) in the vicinity of the bridge. The southeast and southwest quadrants at the bridge appear to have been excavated for commercial property development along US 441. The side slope in the southwest quadrant is extremely steep. There is concrete slope pavement immediately under the bridge to protect the front slopes from erosion. There are no pedestrian facilities along US 441 at the bridge site.

Proposed Condition at Bridges

Tremain Street Bridge

The existing bridge over Tremain Street consists entirely of timber members. The local residents have stated they want the bridge to maintain its original characteristics. As a result, the proposed typical section consists of a timber superstructure which will be constructed on top of the existing timber stringers and cross-ties. Longitudinal timber supports such as 2x4's or 2x6's can be placed longitudinally to span from tie to tie, and transverse timber decking will be placed consisting of 2x6's (or similar decking) with ¼" gaps between the boards. The attached Tremain Street Typical Section (Sheet 5) shows the proposed bridge typical section. This alternative will provide a clear trail width of 8' to 10' since the rail posts must be connected to the existing cross-ties in order to provide structural stability of the railing. The ends of the existing cross-ties will need to be cut flush with each other in order to provide a uniform width. The cross-ties were constructed with a placement tolerance of about 6 inches transversely on the bridge. The existing timber substructure will remain and the deteriorated elements will be replaced prior to constructing the new decking and supports. The existing bridge plans are not available so approximate methods will be required to estimate the bridge capacity. It is anticipated the new dead and live load will be less than the train loading in the existing conditions so a pre versus post loading comparison may be required to verify the bridge capacity. A Cultural Resources Committee will be assembled as part of the final design phase to recommend final aesthetic details and provide input into material and color selection. The attached Tremain Street Bridge Railing Elevation shows one concept which was considered.

To provide sidewalk connectivity under the Tremain Street Bridge, the existing front slope on the west side of the bridge can be removed in the span adjacent to the roadway by constructing a new retaining wall under the bridge. This will allow the missing section of sidewalk to be completed along the west side of Tremain Street to pass under the bridge. The existing retaining wall at the east abutment will be replaced in order to alleviate the earth pressure loads acting on the existing pier which is causing rotation of the pier cap next to the roadway.

Depending on the final funding source, there may be a need to process Variations or Exceptions for lane widths, lack of pier protection and shoulders, and horizontal and vertical clearances. FDOT stated that a

formal process for design criteria including exceptions based on AASHTO standards would be necessary for the LAP process.

The existing bridge will require screening for contamination and hazardous materials during the final design phase to determine the handling and disposal requirements for the final contract documents.

US 441 Bridge

The existing bridge over US 441 consists of steel plate girders with a concrete tub supporting soil, timber railroad ties and steel rails. The substructure consists of large concrete columns. The bridge was built in 1960. The bridge consists of four 59'-0" spans for a total length of approximately 236'-0". The attached Trail Bridge Over US 441 Typical Section (Sheet 4) shows the existing bridge being raised approximately 3 feet to provide the required 17.5' vertical clearance for pedestrian bridges. Raising the bridge will require modifications to the existing walls and potentially additional retaining walls at the bridge abutments. Widening of US 441 is not currently in the MPO long range plan through 2040. This indicates the existing piers and guardrail pier protection can remain in place. The improvements will include cleaning and painting the existing bridge, and repairing or replacing the damaged members of the bridge which have been struck by vehicles due to the existing substandard vertical clearance. The bottom flanges over the roadway will require heat-straightening to repair the damage, and various cross frames and braces will require replacement or repair due to the impact damage or rust deterioration. The final design engineering team will need to perform a detailed bridge inspection to identify and document the elements which will require repair or replacement. Based on testing performed by FDOT, the existing bridge coating system contains lead based paint. The final design phase will require screening and testing to determine if there are any other hazardous materials present such as asbestos. The existing bridge plans are not available so approximate methods will be required to estimate the bridge capacity. It is anticipated the new dead and live load will be less than the train loading in the existing conditions so a pre versus post loading comparison may be required to verify the bridge capacity. The existing concrete tub under the railroad bed will require a piped drainage system to carry runoff from the spans to the abutments. The clear width for the trail in this alternative will be restricted to approximately 12' based on the clear width inside the existing concrete tub and the proximity of the top flanges of the steel girders preventing a wider trail width. The top of the 8.5" wide concrete curbs (the top of the sides of the tub) will provide the anchoring point for the new pedestrian enclosure system.

Design Criteria

As a minimum, the bridges shall be designed in accordance with the AASHTO LRFD Bridge Design Specifications and the AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges (latest editions at the time of the final design phase). Depending on the final funding sources, the bridges may also have to be designed in accordance with the FDOT Structures Manual. As a minimum, the pedestrian bridges will have to be designed for a minimum uniform live load of 90 PSF and checked for the H10 design vehicle. The final design engineering team shall coordinate with the local emergency service providers and the maintaining agency to verify if the H10 design vehicle should be modified to

represent the design load effects of the vehicles used by the emergency providers and the maintaining agency.

Estimate of Probable Construction Cost

The estimates of probable construction costs are shown in the tables below.

US 441 Bridge

The costs in the table below include raising and rehabilitating the existing bridge, constructing a pedestrian surface and handrails, and approach concrete with walls due to the change in grade. It is estimated a replacement bridge will have an approximate initial cost of \$1,400,000 but the life cycle cost will likely make the replacement bridge the preferred alternative.

US 441 Bridge Estimate of Probable Cost				
Description	Unit	Quantity	Unit Price	Probable cost
Jacking existing bridge	LS	1	\$375,000.00	\$375,000.00
Abutment improvements and walls for raised grade	LS	1	\$80,000.00	\$80,000.00
Bridge paint and rehab	LS	1	\$325,000.00	\$325,000.00
New slab at top of RR bed with rebar and drainage	LS	1	\$80,000.00	\$80,000.00
Aesthetic fencing with letters and other features	LS	1	\$90,000.00	\$90,000.00
Subtotal				\$950,000.00
Mobilization	LS	1	10%	\$95,000.00
Maintenance of Traffic	LS	1	10%	\$95,000.00
Total				\$1,140,000.00

Tremain Street Bridge

The costs in the table below include repairing the abutment walls, rehabilitation of the existing structure to replace decayed timber members, construction of the timber deck and rails, and construction of retaining walls and sidewalk under bridge.

Tremain Street Bridge Estimate of Probable Cost				
Description	Unit	Quantity	Unit Price	Probable cost
Replace decayed timber members	LS	1	\$40,000.00	\$40,000.00
Replace the east timber retaining wall	LS	1	\$45,000.00	\$45,000.00
Timber deck and longitudinal support 2x4's	LS	1	\$15,000.00	\$15,000.00
Retaining wall and sidewalk at west abutment	LS	1	\$60,000.00	\$60,000.00
Aesthetic railing and other features	LS	1	\$40,000.00	\$40,000.00
Subtotal				\$200,000.00
Mobilization	LS	1	10%	\$20,000.00
Maintenance of Traffic	LS	1	10%	\$20,000.00
Total				\$240,000.00