



**Consulting Engineers**

Boca Raton  
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May 18, 2012

Chris Bridges, P.E.  
Hillsborough County Public Works  
Design and Engineering Support Section (DESS)  
601 E. Kennedy Blvd., 23rd Floor  
Tampa, FL 33602

RE: Friendship Trail (Old Gandy Bridge)  
Pinellas and Hillsborough Counties  
Review of "A VISION BEYOND DEMOLITION, A PLAN TO TRANSFORM THE  
FRIENDSHIP TRAIL BRIDGE INTO AN ICONIC LINEAR PARK FOR ALL OF  
TAMPA BAY TO ENJOY"

Dear Mr. Bridges:

At the request of Hillsborough County, E.C. Driver & Associates, Inc. (EC Driver), has reviewed the technical aspects of the referenced document (herein referred to as the proposal) including the proposed repair and reconstruction concepts and associated cost estimates. Attachment A to this letter includes review comments referenced by page in the document.

In general, we find the cost estimates in the proposal to be incomplete and to underestimate the cost of initial repairs, reconstruction and future repairs. Regarding the proposed reconstruction (i.e. replacement of the superstructure of the low-level spans), we find the solution presented in the proposal lacking with regard to meeting industry standards, economy and sustainability. We don't disagree with the concept that replacement is more economical than repair. However, it is our professional judgment, based upon conceptual cost estimates prepared following FDOT procedures, that replacement of both the substructure and superstructure with a modern concrete structure is more economical than reconstructing the superstructure on the existing substructure. The following summarizes specific technical shortcomings in the proposal (all cost figures presented in 2012 dollars):

- The poor condition of the existing substructure is grossly underestimated, as are the projected costs for repair and, in particular, future maintenance. Even if only half the existing piles of the low level spans needed to have pile jackets installed over the next 30 years, the cost in current dollars would exceed \$7 million, exclusive of mobilization and soft costs. The estimated construction costs of \$1,508,000 (initial) and \$250,000 (per year) presented in the proposal to repair and maintain the entire structure respectively, are not adequate to extend the service life for 30 years. The fact is that the existing low level span substructure and the remaining high level substructure and superstructure will continue to deteriorate and do so at an accelerating rate.

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- The proposed reconstruction concept builds an expensive metal superstructure on an old deteriorated substructure that is in the twilight of its service life. The concept lacks in compliance with design criteria, economy, function and sustainability. The width of the proposed reconstruction is marginal. The 8-foot wide shared zone in the middle of the trail for runners and bikers traveling in opposite directions is less than the 12-foot minimum required by FDOT for shared paths. The superstructure height is less than required by FDOT for wave crest clearance and durability. The reconstruction is proposed as prefabricated metal trusses or steel beams and framing. A metal structure is a poor choice in the extremely aggressive environment, only 8 feet above the water. If well detailed and constructed, an aluminum or galvanized steel structure may last 30 years, but it would do so with regular and expensive maintenance.
- The cost estimates presented in the proposal are incomplete. Significant cost factors including mobilization, contingencies, and inflation are not addressed. The scope of work is incomplete as items such as the deck, bearings, joints, handrails and others are omitted from the estimates. If the elements left out of the estimate are accounted for (approximately \$4.7 million), 10 percent is factored in to account for mobilization, and 10 percent is factored in for contingencies, the resulting reconstruction cost estimate is \$21.5 million rather than the \$13.2 million shown. This includes the proposer's cost for amenities shown on page 59 of the proposal. An additional \$1.3 million is required to repair the substructure.
- Our estimate of the cost of the proposed reconstruction, modified to increase the useful path width from 16 to 20 feet, and adjusted to account for omitted items, mobilization (10%) and contingency (10%) is \$26.2 million with amenities. Adding the \$1.3 million for substructure repairs brings the total cost to \$27.5 million.

EC Driver does not find the proposed concept to repair the existing substructure and reconstruct the superstructure of the low level spans to be technically sound or economically justifiable. The resulting structure would have a limited service life and require continued, costly repair. If funding is available to support a Friendship Trail Bridge, full replacement of the low level spans, including substructure, with a modern concrete bridge would be more economical and sustainable. Such a structure would meet current standards for bridge and multiuse trails and have a design service life of 75-years. Our conceptual level estimate of the cost for a replacement low-level concrete structure is as follows:

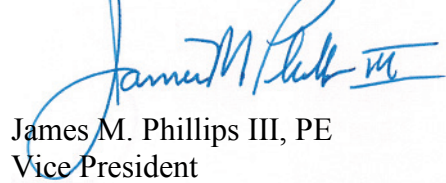
<b>Conceptual Estimate of Low-Level Bridge Replacement</b>		
Cost Element	Trail Width (Clear)	
	16 feet	20 feet
New Low-Level Structure	\$15.0 million	\$17.3 million
Demolition of 252 Existing Low-Level Spans	\$4.8 million	\$4.8 million
Soft Costs (Engineering, Permitting, CEI)	\$1.5 million	1.7 million
Repair of 23 High-Level Spans	\$0.6 million	\$0.6 million
Total Project Estimate	\$21.8 million	\$24.3 million

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The above estimate covers replacement of the 252 low-level spans, demolition of the existing 252 low-level spans and repair of the 23 high-level spans. Engineering, permitting construction inspection and other soft costs necessary to implement the new construction are estimated at 10% of construction. Demolition cost estimates were prorated from American Bridge's demolition bid assuming a uniform cost to demolish per lineal foot of bridge. Repair costs for the 23 high level spans were estimated at \$500,000 as shown in the proposal, plus 20% to account for mobilization and soft costs.

Respectfully Submitted

**EC Driver & Associates, Inc.**

A handwritten signature in blue ink, appearing to read "James M. Phillips III", is written over a light blue rectangular background.

James M. Phillips III, PE  
Vice President

FL PE No. 36865

Certificate of Authorization No. EB3838

Attachments

## Attachment A

### Review of “A VISION BEYOND DEMOLITION, A PLAN TO TRANSFORM THE FRIENDSHIP TRAIL BRIDGE INTO AN ICONIC LINEAR PARK FOR ALL OF TAMPA BAY TO ENJOY”

#### Report Page

#### Review Comment

- 4 The document inaccurately implies that the existing bridge substructure is in better condition than the superstructure. In fact, the substructure is in poor condition and has suffered heavy deterioration due to corrosion induced by the saltwater environment. Prior reports include recommendations for repair of deteriorated piles and caps. Inspection reports classify the substructure condition as 4 (poor) and indicate widespread deterioration, failed prior repairs, and failed pile jackets.
- 6 Repair/construction is not scheduled to begin for another 4 to 5 years. This is approximately 10% of the service life of the existing bridge. During that time
- The bridge will continue to be a hazardous condition
  - Continued monitoring of the bridge will be required
  - Condition of existing substructure will continue to deteriorate
  - Construction costs will increase
- 14 The document incorrectly states that “the bridge was not closed due to issues with the pylons, piers, or any parts of the substructure”. In fact, the condition of the beams necessitated closure of the bridge to the public, but comprehensive repair costs for the entire bridge justified demolition of the bridge.
- 18 The document incorrectly states that the prior study reports “make little mention of the piles and pile caps”. The prior inspection reports include detailed listings of substructure deficiencies and included substructure repairs in all cost estimates.

With the exception of movable bridges, steel superstructures are not approved by FDOT for use in extremely aggressive, coastal environments (especially in the splash zone). The span replacements for the trail bridge are proposed to be prefabricated trusses consisting of thin walled tubes, angles, rods, etc., or steel beams and framing (see Florida Structural Quote). Details of the prefabricated spans promote collection of moisture and debris. Corrosion will propagate in these areas and quickly deteriorate the thin components. Repairs would be extremely difficult and costly. It is unlikely the manufacturer would warranty the product for the proposed conditions it would be used in.

- 20 The proposed 16-foot wide trail width is narrow for the proposed activities. The 8-foot wide shared zone in the middle of the trail for runners and bikers traveling in opposite directions is less than the 12-foot minimum required by FDOT for shared paths. The remaining 4-foot wide areas (which are less than a standard 5ft wide sidewalk) along the edges of the trail are proposed for benches, people carrying coolers to the picnic areas, and fishermen carrying rods, bait and tackle to the fishing areas. This does not appear to be adequate and presents a

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potential conflict with activities in the 8-foot wide shared zone. FDOT and national guidelines for shared paths recommend a 2-foot wide clear zone either side of the path.

The proposed new superstructure would not meet the requirements specified in the FDOT Structures Manual for bridge superstructures to be a minimum of 12 feet above mean high water.

The proposed new superstructure would not meet the requirements specified in the FDOT Structures Manual for wave crest clearance. The elevation of the superstructure is in the wave crest zone; therefore the structure would need to be designed for wave forces. It is unlikely that the existing substructure has adequate capacity to resist wave forces.

21     Amenity spans are estimated at a \$35,000 increase in cost over standard spans. Many of the types of amenities shown on page 21 of the document are likely to require extensive structural modifications and/or new foundations that cost more than has been allocated in the cost estimate.

44     The Bridge Development Plan should address permitting. There are risks that the amenities would not be permitted because they shade protected seagrass.

55     There are risks that the amenities would not be permitted because they shade protected seagrass.

57     The report does not correctly calculate life-cycle costs. The time-value of money is neglected.

The costs for repair and reconstruction are incomplete. See discussion below.

The cost estimate for repair does not reflect the poor condition of the existing substructure or historic unit costs for repairs such as pile jackets.

58     The proration of AB's demolition cost by scope days to estimate partial demolition and superstructure replacement is questionable.

The correct number of piles in the low level approaches is 1182, not the 1008 shown.

The cost estimate of \$5000 per pile jacket is well below the historical unit prices for this type of work. This project requires structural pile jackets with cathodic protection. The average FDOT bid price for this type of jacket over the past 4 years is \$1,348 per linear foot. A typical jacket is 10 feet long and therefore has a unit cost per pile jacket of \$13,480.

The cost to repair piles and caps does not appear to include contingencies typically required for this type of bridge repair work. There is also no cost shown for mobilization. Typically on projects of this nature, mobilization runs about 10% of construction cost. Contingencies vary, but 20% to 30% of construction cost would be a typical value used for budget estimating. If 10 percent is added to the repair costs for mobilization and 20 percent added

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for contingencies, the adjusted estimate would be \$1.3 million rather than the \$1.0 million shown.

Per the 2009 inspection report by SDR, there were 23 pile caps requiring repair and 51 piles requiring jacketing at that time. The estimated cost for these repairs in 2010 was \$1,632,000 including 10% mobilization and 30% contingency.

It is now 3 years since the last inspection and it would be another four years (2016) until repairs are made per the schedule on page 65. The number of caps and piles that require repair will have increased by then.

The existing low level span substructure and the remaining high level substructure and superstructure will continue to deteriorate and do so at an accelerating rate. For the purpose of estimating the 30 year costs of maintaining the existing bridge, it would be prudent to assume that all existing piles of the pile bents, including those previously jacketed with non-structural jackets, will require structural pile jackets with cathodic protection at some point. Statewide average cost per foot for this type of pile jacket ranges from \$1,727 in 2008 to \$1,050 in 2011. At an average of \$1,348 for the past 4 years, and neglecting mobilization and contingency, this alone would add approximately \$15.3 million to the maintenance costs. If only half the piles were jacketed over the next 30 years the cost would be approximately \$7.6 million.

- 59 The estimate of the bridge cost shown on this sheet is less than the estimate prepared by the proposer's engineer and presented in Appendix A of the proposal (i.e. \$75/sf).

The construction cost estimate uses the quote from Florida Structural Steel (FSS) for the superstructure cost. Per Appendix H, FSS's quote does not include many costly items required to provide a complete facility including: deck concrete, deck concrete grooving, timber decking, bearings, hand rails, anchor bolts, deck joints, light poles, conduit and wiring, and bent cap bearing seats. The cost of these items is estimated to be in excess of \$5 million.

The installation cost is derived from the demolition cost. This method is questionable as the construction of a new superstructure is significantly different than demolition work (equipment, risk, skill, etc.)

Cost estimates do not include contingencies for design or construction. Cost estimates do not include mobilization other than what is embedded in that proportioned from AB's demolition bid.

If the FSS quote and "amenity increase" are factored by 10 percent to account for mobilization, the major elements left out of the estimate (see above) are added (approximately \$4.7 million for deck, bearings, railings, anchor bolts and joints), and the entire price is increased by 10 percent for contingencies, the resulting reconstruction cost would be \$21.5 million, rather than the \$13.2 million shown. Our estimate assumes that the

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contingency factor covers lighting, conduit and other miscellaneous items not explicit in the cost estimate.

Ref 1: Comments on bridge replacement

EC Driver examined conceptually the concept of replacing the entire low level structure (252 spans), superstructure and substructure, with a modern concrete structure. We believe this could be accomplished for less than the proposed cost of reconstructing the superstructure only. A new concrete structure could be designed and constructed for a 75 or even 100 year service life and constructed for approximately \$65 to \$75 dollars per square foot, depending upon amenities. In comparison, the cost of the proposed reconstruction, adjusted to account for mobilization, contingencies and the basic components that were omitted as noted above, is approximately \$89 per square foot, without amenities. All new low level bridge sections could be constructed to meet the FDOT requirements for the low member of the superstructure to be at least 12 feet above mean high water and for the wave crest clearance. This would reduce the effects of the saltwater and increase the structure's life.

The estimated cost of a new concrete structure providing 16 feet of clear width for the shared use path and fishing is \$15.0 million exclusive of amenities. This includes 10 percent for contingencies and 10 percent for mobilization. Cost estimate is in 2012 dollars.

The estimated cost of a new concrete structure providing 20 feet of clear width for the shared use path and fishing is \$17.3 million exclusive of amenities. This includes 10 percent for contingencies and 10 percent for mobilization. Cost estimate is in 2012 dollars.

Ref 2: Cost adjustments to modify reconstruction proposal to meet current standards

The estimated cost of the proposed reconstruction adjusted to account for omitted items, mobilization (10%) and contingency (10%) is \$21.5 million including amenities as estimated by the proposer (shown in the proposal, page 59). Adding the \$1.3 million for substructure repairs brings the total cost to \$22.8 million.

The estimated cost of the proposed structure adjusted to account for omitted items, mobilization (10%) and contingency (10%) is \$19.4 million if amenities (shown in the proposal, page 59) are deducted. Adding the \$1.3 million for substructure repairs brings the total cost to \$20.7 million.

The estimated cost of the proposed structure, modified to increase the useful path width to 20 feet and adjusted to account for omitted items, mobilization (10%) and contingency (10%) is \$23.7 million if amenities (shown in the proposal, page 59) are deducted. Adding the \$1.3 million for substructure repairs brings the total cost to \$25.0 million.

The estimated cost of the proposed structure, modified to increase the useful path width to 20 feet and adjusted to account for omitted items, mobilization (10%) and contingency (10%) is \$26.2 million with amenities (shown in the proposal, page 59). Adding the \$1.3 million for substructure repairs brings the total cost to \$27.5 million.