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Mr. Roger Houck
City Manager
101 Hicks Street
Clinton, Tennessee 37716

Subject:
Possible Reuse of Old SR 9 "Green" Bridge

ENVIRONMENT

Dear Mr. Houck:

It was enjoyable meeting with you and your team in April 2014 to discuss options for the Green Bridge and exploring the potential for utilizing steel from it for construction of a pedestrian bridge upstream on the existing old piers. We believe these types of discussions are very important to strategize potential reuse of these historical structures. As we discussed during our meeting, it would benefit everyone to summarize the main alternatives such that they can be compared related to initial cost, liability, and long-term maintenance cost such that the City of Clinton is armed to make an informed decision on how to proceed. First some background is summarized below.

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May 30, 2014

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State Route 9 Bridge

The Honorable William Everett Lewallen Memorial Bridge was constructed from plans dated 1938 by the Department of Highways and Public Works. The plans are labeled "standard continuous truss bridge." The plaque on the bridge indicates that it was built by the Bethlehem Steel Company in 1939. According to the Tennessee Department of Transportation (TDOT) records, it opened to traffic in 1940. The bridge was officially named the Honorable William Everett Lewallen Memorial Bridge by a House Joint Resolution in the 1967-1968 Session. Many of the residents of Clinton simply call it the "green" bridge.

Our ref:
66008882.0000

The bridge on State Route 9 over the Clinch River is a standard example of a three-span Warren continuous truss bridge with one thru truss flanked by two deck trusses. Thirteen concrete deck girder approach spans leads onto the Warren truss. The center truss length is 224.6 feet with a total bridge length of 983.3 feet. The out-to-out width of the deck is 55 feet. The bridge was rehabilitated in 2000.

TDOT is proposing to replace the historic bridge with a new bridge immediately adjacent to it. The historic bridge is rated in fair condition and is substandard in load carrying capacity and has section loss due to corrosion, contaminated and weakened concrete, and possible loss due to metal fatigue. Because of substandard condition

Imagine the result

of the bridge, TDOT proposes to replace it with a safe, modern structure that meets current standards. Typically, a bridge replacement project results in the demolition of the existing bridge. However, because the demolition of the bridge would adversely affect this National Register eligible structure, federal law mandates that alternatives to the action be considered.

Historic Bridge Marketing Program

The TDOT is proposing to replace the existing bridge on State Route 9 over the Clinch River in Anderson County, Tennessee. The Honorable William Everett Lewallen Memorial Bridge is being offered for reuse at its existing location or at a new location. TDOT has a Historic Bridge Marketing Program and through this program, a number of the state's historic bridges that were originally scheduled for demolition due to replacement have been preserved in place.

Through this program, bridges have been preserved on-site either as a pedestrian bridge or as a historic ruin. Bridges have also been moved to new locations. Additionally, several bridges have been abandoned, closed permanently to vehicular traffic, and preserved by local governments or preservation organizations. Another preservation option would leave the historic bridge as a ruin in its existing location.

The Honorable William Everett Lewallen Memorial Bridge on State Route 9 over the Clinch River is eligible for listing in the National Register of Historic Places under Criterion C as a representative example of a Warren continuous truss bridge built by the state highway department.

The Lewallen Memorial Bridge is available to interested groups or individuals for reuse at its existing location. TDOT is currently proposing to build a new standard bridge adjacent to the historic bridge which will allow for the preservation of the historic structure in place. A party or individual must present TDOT with a feasible plan for reuse and that party must agree to maintain and accept responsibility for the historic bridge.

If a feasibility proposal is submitted to TDOT and is subsequently accepted for the preservation of the bridge in-place, the bridge will be donated to the approved recipient. The recipient will then be asked to sign a contract agreeing to preserve the historic bridge. Any work that TDOT agrees to do up to but not exceeding the cost of the bridge's demolition (estimated demolition cost is \$500,000) would then be written into the construction contract for execution by the project's contractor.

Federal regulations pertaining to the funding of this project stipulate that if the bridge is abandoned it cannot remain in service as a facility for public vehicular traffic after the replacement structure is built.

Three Alternatives for Reuse

Three alternatives are currently being proposed for the historic structure. One option would leave the historic bridge in its existing location, correct for deficiencies, and open it to the public for pedestrian traffic. Another option would be to leave it in its current location as a historic ruin. The third option would allow a qualified recipient to remove the bridge from its existing location and move it to a new location.

A. Reuse at Existing Location

One option for reuse at the existing location would include rehabilitating the historic bridge for use as a pedestrian facility. TDOT has gathered cost figures and some requirements for changing the historic structure from a vehicular bridge to a pedestrian bridge. Some costs associated with it include painting the truss, replacing the bridge deck (when needed) with pedestrian-friendly materials, and installing fencing on the structure that meet safety standards for pedestrians. These costs would be approximately \$2.5 million. Additionally, the Clinch River is a navigable waterway and the U.S. Coast Guard would need to be petitioned in order to leave the structure in place. Operational navigation lighting would need to be maintained by the new owner 24/7/365 as required by the Coast Guard. Finally, the expected maintenance costs would be in the neighborhood of \$60 to \$75 thousand annually. This would include the cost of a biannual inspection of the structure for deterioration or problems and prorating of the repainting cost over a twenty-to thirty-year period (the life of a paint job), as well as some minor concrete repairs required as needed.

B. Historic Ruin at Existing Location

A second option for the historic structure would be to leave it in its existing location as a historic ruin. A qualified recipient that submits an acceptable feasibility proposal could keep the historic structure as a ruin. Under this option, the approaches and deck of the truss could be removed and the truss could be left on the existing piers. The cost of preparing the structure to be left in-place as a ruin would cost approximately \$2.4 million. Additionally, the Clinch River is a navigable waterway and the U.S. Coast Guard would need to be petitioned in order to leave the structure in-place and the navigation responsibilities mentioned above are also incurred.

C. Reuse at New Location

Another alternative that would allow for the preservation of the historic bridge is to relocate the truss span for reuse at a new location. Generally, truss spans could be used at a site for numerous purposes including in a small park, pedestrian trail linkage, or as a fishing bridge. However, the reuse at a new location may present feasibility issues due to the type of truss. With a continuous, long-span truss, the only possible way to move the bridge would be to support the truss spans with false-work, disassemble the truss members, move the bridge in pieces to the new site, erect new false-work and then reassemble the bridge. It could be cost-prohibitive to reuse this structure at a new location. There is also the issue of whether or not the bottom chord of the side spans would clear existing grade at the new location.

A literature review reveals that although small truss bridges are often moved and repurposed, large, multilane truss bridges are normally demolished. Most likely this is due to the fact that the entire truss either must be moved as a unit or it must be supported on temporary shoring to be disassembled. In the case of continuous truss spans, disassembly in the opposite order of erection may well be the only option.

A quick search turned up one similar example (with cost information) of a Warren truss bridge that was disassembled for reuse at another site. The Belgium Bridge in New York is a 2-lane, 310-foot long through-truss bridge constructed in 1949. Due to a replacement project, the bridge was shored, disassembled, repaired, and re-erected at another site in 2005 for a cost of approximately \$1.5 million. Given that this bridge was roughly half as wide and half as long as the Lewallen Bridge, the cost would need to be escalated by a factor of at least 4, not including inflation and the increased difficulty of having a larger bridge (i.e. the cost increase may not be linear). This adjustment would indicate the cost to move the Lewallen Bridge would be at least \$6 million and possibly double that amount. Additionally, the Clinch River is a navigable waterway and the U.S. Coast Guard would need to be petitioned in order to leave the structure in-place and the navigation responsibilities mentioned above are also incurred.

Funds for relocation costs are available up to the estimated demolition cost for the bridge (estimated demolition cost is \$500,000). The recipient will be responsible for the development of a plan to move the bridge and should include such a plan in any proposal submitted to TDOT. The feasibility proposal for moving the bridge should include detailed information on moving the structure out of its current location, a preservation plan at its new location, and rehabilitation plans for the structure depending on the reuse plan.

D. New Pedestrian Bridge

For perspective, consideration is also given to not reusing the existing bridge, but rather purchasing a new pedestrian foot bridge designed and fabricated precisely for its new location on the upstream piers. At this location, the bridge is assumed to be 10-feet wide with a center span length of 225 feet and two side spans, each 150-foot long. The bridge would be of similar configuration as the one shown on the Studio Four Design drawing A301 dated 2005, although it could be a basic, “off-the-shelf” model. A major manufacturer of these bridges is located in Fort Payne, AL; this could help to reduce shipping cost. For durability and low maintenance costs, the bridge could be provided with unpainted weathering steel and a concrete deck surface. Conversations with the manufacturer indicate the basic cost for the bridge would be approximately \$1 million, with shipping and installation costs generating a total in-place cost of roughly \$3 million. A study of the existing piers will be needed to determine their suitability for supporting the new bridge, as well as planning for installation, hydraulic, and navigation issues. Ownership of the existing piers would also need to be determined prior to their evaluation.

Comparison of Alternatives

The following table provides a quick overview of the three alternatives:

Three Reuse Alternatives

Option	Initial Cost	Annual Cost	Extended Cost*
Reuse in Place	\$2.5 million	\$75 thousand	\$4,750,000
Ruin in Place	\$2.4 million	\$75 thousand	\$4,650,000
Move Upstream	\$6 to \$12 million	\$75 thousand	\$8,250,000-\$14,250,000
New Bridge	\$3 million	\$10 thousand	\$3,300,000

Note: assumed duration is 30 years, not considering inflation.

Scope for Investigation of Upstream Bridge Piers

Whether locating the Green bridge at the upstream location utilizing existing bridge piers or constructing a new pedestrian bridge, the assumption is made that the old piers are competent and adequate for receiving the bridge load, as well as being in the appropriate position (both vertically and horizontally) for the intended purpose. Because not much information is available about the piers, an investigation program is needed to measure, inspect, and test the piers to determine if they are appropriate for this reuse.

The investigation scope includes the following items:

- A survey will be performed to determine the size and location of the piers. This is critically important since very little is known about the piers. The corners of the piers will be located using reflector-less technology to establish overall size of each pier. The piers and end abutments will also be located to establish the span lengths that will be used to price and order the new pedestrian bridge. Cost: \$3,000.
- A diving inspection will be performed to observe the underwater condition of the piers and river bottom. Divers will inspect the surface of the concrete below water level as well as look for debris and scouring of the river bottom adjacent to the piers. A brief letter-report will summarize the diver’s findings. Cost: \$10,000.
- Destructive testing of the pier concrete will be performed to help determine strength and suitability for future use. Ownership of the piers needs to be determined prior to performing sampling of the concrete. It is proposed that six concrete cores be taken and tested to determine concrete compressive strength for the piers and abutments. The compressive strength values obtained will help to provide an indication of the suitability of the concrete piers to be repurposed for the proposed use of supporting the new pedestrian bridge. Cost: \$9,500.
- A visual structural inspection (with photographs) of the above-water portion of the piers and abutments is to be performed to help complete the preliminary condition assessment. Close-up photos will help document the surface condition of the concrete, as well as identify and locate areas of deterioration or damage. A letter-report summarizing the results of all four parts of investigation, along with recommendations, will be provided. Cost: \$5,000.

Existing Upstream Pier Evaluation

Task	Cost
Survey	\$3,000
Diving Inspection	\$10,000
Concrete Sampling and Testing	\$9,500
Visual Structural Inspection	\$5,000
Total Project Cost	\$27,500

Again, we appreciate the opportunity to discuss options for the Green Bridge and future upstream pedestrian bridge. Hopefully the information provided herein will help Clinton with moving forward this project in a manner that will compliment your Master Plan to

revitalize your downtown, open up the riverfront, and connect downtown to South Clinton. Please let us know if you have questions or would like to discuss further.

Sincerely,
ARCADIS U.S., Inc.



Berny D. Ilgner
Vice President



Mark Stevenson
Principal Engineer

Copies:
Jerry Shattuck