

MOVABLE SPAN BRIDGES

Bridge of Lions, St. Augustine, Florida

Location and Description of Setting:

The Bridge of Lions crosses Matanzas Bay (part of the Intercoastal Waterway) and connects the city of St. Augustine with the resort communities of Anastasia Island, St. Johns County, Florida. It is located in an urban setting, with its western approach in the historic district of St. Augustine.

Description of Bridge:

The Bridge of Lions was designed by John E. Greiner and constructed in 1927. The bridge has a total length of 1,545 feet. The main span is a 95 foot double-leaf rolling lift bascule. Approach spans are steel arched girder-floorbeam spans with cantilevered overhanging sections.

Figure 7. Bridge of Lions



Figure 8. Bridge of Lions

Figure 9. Bridge of Lions



Figure 10. Bridge of Lions



Rehabilitation Project Information

Date/Cost for Rehabilitation:

The project was officially completed in January 2011, at a cost of around \$20 million.

Project Designer:

Reynolds, Smith and Hills / Lichtenstein Consulting Engineers, Inc.

Bridge Owner/Client:

Florida Department of Transportation

Source for Additional Information:

Roy A. Jackson
State Cultural Resources Coordinator
Florida Department of Transportation
roy.jackson@dot.state.fl.us

Project Information

1. **Significant issues associated with project (e.g., bridge condition, reasoning behind decision to rehabilitate versus replacement, reasoning behind selected maintenance activity).**

This architectonic bridge is a significant feature of the historic streetscape of St. Augustine and is a gateway to the old city. The bridge was rehabilitated in order to retain its historically significant architectural features, while solving the bridge’s structural problems. This was accomplished by constructing a “bridge within a bridge.” Enough of the old bridge was retained to classify the project as a rehabilitation and not new construction. New construction would have required use of all modern design criteria.

2. **Project description, including purpose and need.**

Prior to rehabilitation, the bridge was in fair to poor condition, particularly in terms of the fracture critical girder-floorbeam approach spans and the substructure units. At many locations, crutch bents had been previously installed in order to provide additional support.

As part of the rehabilitation, the bridge’s two fascia girders were retained for visual appearance, while new steel stringers were installed inside the girders. The fascia girders, which were removed, repaired, and then reset in place, were relieved of most of the loads and the new stringers now carry the majority of the dead load and the traffic loads. The stringers are hidden from view and will not distract from the architecturally significant arched girders. In addition, the approach spans were widened in order to improve the roadway geometry.

The bascule piers and associated towers were left in place and repaired. This included replacing the existing concrete piers within the splash zone with new concrete, as the existing concrete contained high levels of chlorides. The bascule piers were strengthened by the addition of drilled shafts, and a new footing was placed below the existing waterline footing in order to provide sufficient strength for a modern design scour event.

Several features original to the bridge, but previously removed or replaced, were replicated. These included the pedestrian railing (with the height increased to meet modern standards), light standards, and rotating traffic gates. The bridge steel was painted to match the original bridge color.

3. **Section 106 effects finding (no adverse, adverse). Major issues discussed with State Historic Preservation Officer, and how issues were resolved.**

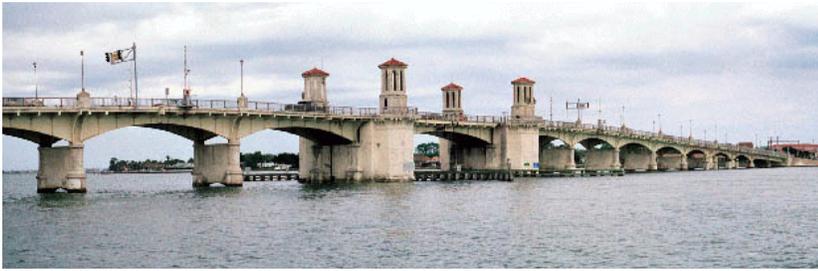
The original bridge was recognized as important for its high artistic merit, rather than its technological significance. This made it possible to focus the rehabilitation on its historic character and appearance. This resulted in Florida DOT making a finding of No Adverse Effect. The Florida SHPO concurred with this finding.

4. **Lessons Learned.**

By retaining a sufficient amount of the existing bridge, this project was considered a rehabilitation. New construction would have required use of all modern design criteria, such as widening the navigable channel from the existing 84 foot to the 125 foot width now required for the Intracoastal Waterway.

To maintain the bridge's historic character, it was extremely important to retain the design of the piers and the arch-shaped fascia beams, in addition to the cantilevered end sections of the girder-floorbeam approach spans. The fascia girders were reused on the slightly wider stringer approach spans, supported on substructure units that were rebuilt in-kind to the new geometry. The reused fascia girders support themselves and part of the bridge's sidewalks.

HISTORIC BRIDGE REHABILITATION CASE STUDY



Bridge Information

Name: Bridge of Lions

Location and Description of Setting: Downtown St. Augustine, FL adjacent to a historic district and a public park along the waterfront.

Description of Bridge: Constructed in 1927 with a total length of 1,545 ft. Main span is a 95 ft. double-leaf rolling lift bascule. Approach spans are steel arched girder-floorbeam spans with cantilevered overhanging sections.



Rehabilitation Project Information

Date/Cost Rehabilitation: expected completion date 2010; \$20 million

Designer: Reynolds, Smith and Hills / Lichtenstein Consulting Engineers, Inc.

Client/Owner: Florida Department of Transportation

Contractor:

Source for Additional Information: Steven Shaup, P.E., TranSystems (954) 200-8242

Significant Issues Associated with Project:

Solve structural problems while retaining historically significant architectural features by constructing a "bridge within a bridge." Retain enough of the old bridge to classify project as a rehabilitation, not new construction. This architectonic bridge is a significant feature of the historic streetscape of the city and it is a gateway to the old city.

Project Description:

The bridge was in fair to poor condition. The fracture critical girder-floorbeam approach spans and the substructure units were in poor condition. At many locations, crutch bents had been previously installed to provide additional support.

The two fascia girders were retained for visual appearance but relieved of most of the loads by installing new steel stringers inside the girders that carry the majority of the dead load and the traffic loads. The stringers are hidden from view and will not distract from the architecturally significant arched girders. The approach spans are being widened in order to improve the roadway geometry. The fascia girders are being removed and repaired, then reset in place to provide the wider roadway section while retaining the same visual profile once completed. The approach substructure units are being replaced. The bascule piers and associated towers are being left in place and repaired, including cover replacement of the concrete within the splash zone to remove the existing concrete that contains high levels of chlorides. The bascule piers are being strengthened by the addition of drilled shafts and a new footing below the existing waterline footing to provide sufficient strength for a modern design scour event.

Several features original to the bridge, but previously removed or replaced, are being replicated, including the pedestrian railing (with the height increased to meet modern standards), light standards, and rotating traffic gates. The bridge steel will be painted to match the original bridge color.

Lessons Learned:

Retaining a sufficient amount of the existing bridge allowed this project to be considered a rehabilitation. New construction would have required use of all modern design criteria, such as widening the navigable channel from the existing 84 ft. to the 125 ft. width now required for the Intracoastal Waterway.

Recognition that the original bridge was important for its high artistic merit, rather than its technological significance, made it possible to focus rehabilitation means on historic character and appearance. This resulted in a finding of no adverse effect from SHPO. When completed, the bridge will be restored to its original appearance but with slightly wider approach spans.

Retaining the arch-shaped fascia beams with cantilevered end sections of the girder-floorbeam approach spans was extremely important to maintain the historic character, as was retaining the graceful design of the piers. The fascia girders were reused on the slightly wider stringer approach spans, supported on substructure units that were rebuilt in kind to the new geometry. The reused fascia girders support themselves and part of the sidewalks.