Location

Main Street over the Ausable River
Clinton & Essex Counties

Description

The Historic Civil Engineering Landmarks Program of the American Society of Civil Engineers (ASCE) was established to bring public recognition to projects, structures and sites that represent significant facets of civil engineering history. In 1987 the ASCE designated the historic bridges of Keeseville "National Historic Civil Engineering Landmarks."

The "Keystone Arch Bridge" was constructed in 1843 by contractor/builder Solomon Townsend. This 110-foot arched sandstone masonry bridge is one of the oldest stone arch bridges in the United States, in service to this day transporting the village's Main Street over the Ausable River. Immediately upstream is a rare suspension "Swing Bridge," erected in 1888, one of a small number of suspension foot bridges built by the Berlin Iron Bridge Company. One half mile upstream is a unique Dougal-built (circa 1878) pin-connected Pratt truss bridge, a richly ornamented "catalogue bridge." Only one other bridge constructed by this company remains in the U.S. today. These three bridges, representing three distinct engineering solutions, are unique within the Adirondack Region of New York State.
Today, the National Register Stone Arch Bridge stands as the centerpiece of a uniquely intact historic district along Main and Front Streets. Other native sandstone structures within the District include the original Ausable Horse Nail Company building (1847), the Old Brewery (1850), the Grange Hall (1856), and the Masonic Lodge (1852). The nominated project entails the rehabilitation of the Main Street (Keeseville Stone Arch Bridge) over the Ausable River, including the reconstruction of the approaches between Front and Ausable Streets. The project was initiated to address deficiencies which resulted in a ten-ton load posting, compromised user safety, and threatened the integrity of this historic structure. Deficiencies included a non-standard bridge and pedestrian rail system, which consisted of a wrought iron lattice fence (circa 1910) and a post and rail which was not adequately anchored to the bridge; a deteriorated concrete sidewalk; severe water infiltration; cracked and deteriorated stone masonry; scour damage to the riverbank and rock outcrops; and the deterioration of the bonding mortar.

These deficiencies are reflected in the NYS Condition Rating of 3.583 and Federal Sufficiency Rating of 14.5.

**Coordination, Community Outreach & Partnering**

With the initiation of the Stone Arch Bridge project, the Region inaugurated an aggressive outreach plan, partnering with the community, the Office of Parks, Recreation, and Historic Preservation (OPRHP), and the Adirondack Park Agency (APA). While a replacement alternative was developed for evaluation, it was determined early on that the preservation of this historic resource was of paramount importance. Accordingly, the decision was made to progress the Rehabilitation Alternative.

Two early decisions guided the development of the recommended design alternative: the decision to retain all of the design features of the existing bridge and the decision to retain the existing posting limit. Village of Keeseville officials embraced the proposal to retain the existing posting limit, noting that the load posting has the beneficial effect of reducing heavy truck traffic through the community's historic district. The State Historic Preservation Officer from OPRHP worked closely with the Region, the consultant (TVGA Engineering), and the community to ensure the architectural, visual, and historical preservation of the bridge. Ultimately, the SHPO granted a No Adverse Effect Determination, satisfying the Section 4(f)/106 process. The Adirondack Park Agency was equally concerned that the bridge be preserved and fully integrated into the community. Their counsel and concerns were addressed to the extent that the Agency exempted the project from the Section 814 process.
Project Highlights, Accomplishments & Success

Masonry Repairs

The existing pointing mortar is a Portland cement and sand mortar, which is not compatible with the softer original bedding mortar or the stone masonry. Because the Portland cement is impervious, moisture is trapped within the wall, accelerating the deterioration of the bedding mortar and stones through repetitive freeze-thaw cycles. Repointing the arch barrel and walls consisted of removing all Portland cement mortar to the specified depth, cleaning the joints, and placing new pointing mortar by hand. Although this work was not required to preserve the structure, it was performed to restore the historical integrity of the bridge. The new pointing and bedding mortar was designed to be compatible with the original lime or natural cement bedding mortar, with the adjacent historic stone masonry buildings used as a guide for acceptance of the pointing work.

Ashlar Block Repairs

Existing deteriorated stones within the arch barrel were repaired by injecting a low viscosity epoxy into cracks and delaminations, and by means of drilling and grouting anchors. These repairs arrested the deterioration of the ashlar blocks, restoring the original appearance of the structure.

Bridge Railing

While not original components of the Stone Arch Bridge, the SHPO identified the railing and pedestrian fencing as contributing elements which should be preserved. Based upon this finding, the decision was made to restore these railings to their original condition, with the new sidewalk designed as a structural slab to properly anchor the railing posts.

Sidewalk
During construction, Keeseville Mayor Ed Bezio suggested that the bridge sidewalk be embossed, matching the walks within the Front Street Central Business District. Todd Townsend, Project Engineer-in-Charge, suggested that the embossing replicate the pattern and color of the sandstone utilized in the bridge and adjacent historic buildings. Tony Opalka, SHPO, gave prompt approval, as did the APA. The embossed concrete sidewalk was installed from Ausable to Front Street, across the bridge, to include the entryways to the historic sandstone buildings.

**Chimney Drains and Weeps**

"Chimney" drains and weeps were constructed behind the arch abutments to block the flow of ground water toward the arch barrel. These drainage columns and weeps, in combination with a waterproof barrier with underdrains, will prevent the infiltration of roadway drainage into the arch fill without altering the appearance of the structure.

The nominated project is an outstanding example of partnering to select the appropriate alternative to protect an irreplaceable historic resource, and to pursue a context sensitive design which integrates this resource into the community. The Department and Consultant developed a design which responded to the established preservation and enhancement goals, and the Contractor implemented the design in a conscientious and innovative manner.

**Responsible Individuals**

**NYSDOT**
Anna Forbes, *Project Manager*
Jeffrey Grill, *Job Manager*
Martin Percy, *Consultant Liaison*
Robert Curtis, *Regional Structures Engineer*
Gary McKinney, *Construction Supervisor*
Todd Townsend, *Engineer-in-Charge*
Renee Garrison, *Environmental Coordinator*

**Consultant**
TVGA Engineering, Surveying, P.C
Preston Halstead, *Project Manager*
Glenn Klein, *Project Designer*

**Contractor**
Reale Construction Co.