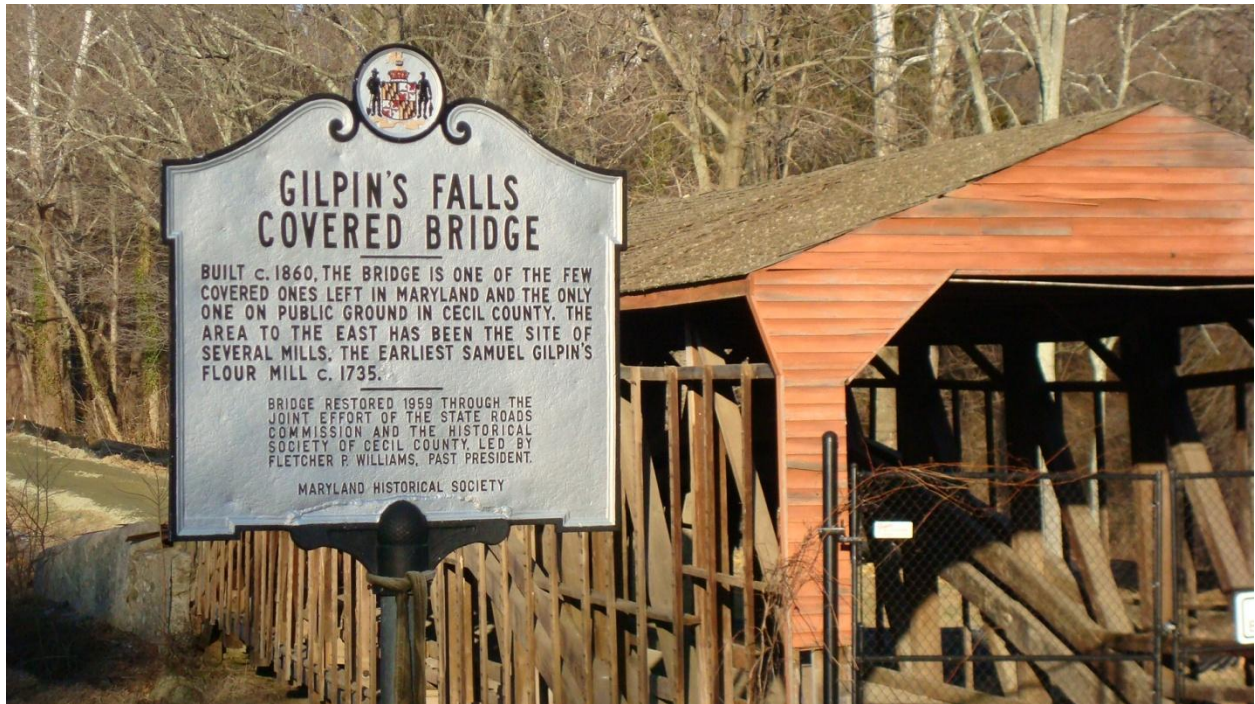


Gilpin's Falls Covered Bridge

Cecil County, Maryland

2009 Rehabilitation



The Gilpin Falls Covered Bridge is located east and adjacent to Maryland Route 272, approximately one mile north of the Maryland Route 272 and Interstate Route 95 interchange. The bridge, situated near Bayview, Maryland, has a southwest to northeast alignment over Northeast Creek, which flows in a general northwest to southeast direction in a rural setting. This crossing was at the former location of the Northeast Road, the predecessor to the present day highway.

The bridge is located in a small county park, which includes those features associated with the Gilpin Falls; namely, the falls itself and an adjacent wooded glen, a mill and race, a stone dam, and a former hydroelectric plant. The immediate setting of the structure is rural, but the outlying area has developed over the years. The bridge is presently closed to pedestrian traffic but still serves the County as one of its prime tourist attractions and favorite recreational and social areas.

There is no formal trail leading to the bridge, although there is evidence of a worn pathway. Northeast Creek, in the vicinity of the bridge, is approximately 85 feet wide with a somewhat wider embankment at the north side of the bridge than at the south. The Creek is approximately $3\frac{1}{2}$ feet at its deepest point. The embankment areas have been classified as wetlands.

The Gilpin Falls Covered Bridge is a timber, single span, Burr Truss structure built in 1860 by Joseph George Johnston. The architectural style of the bridge is Federal. The bridge is 119 feet \pm long, the longest covered bridge in the State of Maryland. Some carvings in the bridge date to the Civil War era.

The Burr arch is the support system patented in 1817 by the Connecticut bridge builder Theodore Burr, who added an arch to triangular trusses to make a bridge stronger. Inside its sheltering clapboard walls, the arched timber beams, encased in multiple king-post trusses, stretch from bank to bank.



Until 1936, the bridge accommodated highway traffic. At that time, the State Roads Commission realigned the highway and the bridge was abandoned. Its repair and maintenance was left to the care of the farmers in the area near the bridge. A severe snowstorm in 1958 caused the deteriorated roof of the abandoned structure to collapse. The roof, sides, and several of the structural members of the truss and sections of the arch were replaced or repaired in 1959.

The present condition of the bridge can be termed as a state of structural collapse. Several inspections by various consulting structural engineers were made of the bridge in March and July 1999 resulted in the closing of the bridge to the public in July 1999. There was a consensus among those who examined the bridge that its current state was critical and significant near term work was necessary to avoid further irreparable deterioration.

It is noteworthy that Hurricane Floyd (September 16, 1999) brought an estimated 15 inches of rain to the area in twelve hours and the Northeast Creek rose to several feet above the bottom of the bridge. It was feared that the pounding stream flow, coupled with considerable large floating debris, would collapse the bridge. It is perhaps fortuitous that the gradual collapse of the bearing members has resulted in a horizontal camber that resists forces from upstream.

Since 1999, Cecil County Government made three attempts to begin comprehensive stabilization and restoration, but competing limitations from the various funding agencies proved unmanageable until 2008, when the project was successfully procured. Work will continue through 2009.

The magnitude of this work should not be underestimated. Because of the historical nature of the structure, modern materials and methods of rehabilitation are not permitted. As such, specialty artisans and craftsmen experienced in historical restoration must be employed and replacement materials must be specially constructed from specific materials and in a specific manner. Hence, the cost of the work is higher than normal and the time to complete the work is longer.





The preceding two pages show bridge details from 2001. The degraded condition of the siding, the internal structure of the Burr arch, and the 1959 addition of steel stabilizer rods can be seen. Notice the embedded timbers within the masonry abutment and how the arch has lost proper bearing (the arch should bear on the embedded timbers).

Then the bridge is seen here in February 2009 with the siding removed. The stabilization and restoration project are expected to continue through 2009.



It is difficult to reflect in photographs, but the bridge has lost its vertical camber as its bearing has degraded and it has meanwhile developed a horizontal camber or skew that points it in the upstream direction. Ironically, this may be a contributing factor in its resistance to abusively high flow conditions from a number of severe storms, the most recent of which was 1999's Hurricane Floyd.



*These pictures
 begin to
 illustrate the
 (mostly) bucolic
 setting
 immediately
 east of the
 Gilpin's Falls
 Covered Bridge.
 The dam is still
 largely intact
 and remnants of
 the hydroelectric
 plant remain as
 well. On a clear
 day such as this,
 the dam creates
 something akin
 to a reflecting
 pool.*



In these photos you can see the considerable deterioration at the south abutment, the resulting settlement of the bridge deck, and the temporary supports at the north abutment (installed circa April 2009). Notice also the super silt fence installed in the high risk areas where active work could threaten the Northeast Creek.



In April 2009, bearing pads were poured at four offset locations. These will support the temporary bridge support beams that will span the North East Creek and be used take up bridge forces as various compression members are removed, one at a time, for repair or replacement. A truss structure distributes forces among a collection of compression and tensile members and the removal of even one member can cause a catastrophic failure; hence, the temporary supports require a great deal of care and the details matter when a nearly 150 year old bridge depends on them.



Special care for drainage was necessary at the northwest abutment to ensure that a storm drainage channel did not undermine the critical footing for the temporary supports.



The erosion controls protecting the perimeter of the site were essential elements of the construction to ensure that sensitive environmental receptors were protected.



As with any bridge work, the importance of establishing survey control points and protecting them throughout construction was important to ensure the integrity of the bridge during restoration.



More examples of deterioration at the north abutment. Members typically suffer from water and insect damage at their interface with or near the abutments and as the more critical elements lose bearing and shift, other members begin to fail under increased loads for which they were not designed. As part of the initial work leading up to restoration, the contractors have constructed makeshift supports to impede further migration of the timbers and better ensure the safety of workers on and under the structure. [April 2009]



The skew and deflection of the bridge can be seen to some degree in these photographs of the bridge prior to the initiation of the 2009 restoration work.



The steel for the temporary support frame, together with the crane, arrives on-site in early May 2009



The temporary supporting steel have been placed. Twin I-beams on each side of the bridge rest on temporary concrete supports. The twin beams then support all thread connections with are used to incrementally adjust the elevation of each node in the bridge truss, as well as support the structure while individual members are removed for repair or replacement. The all thread will also enable correction of the skew and camber of the bridge. In this last photograph, the bridge has been stripped to its bare skeleton. (May 2009)



The beginning of replacement and repair of members can be seen in these photographs.

Each replacement member is meticulously hand-crafted by the Barns and Bridges master craftsmen.

[Early September 2009]



Each member is categorized for condition and cataloged for replacement, if possible. Some members must be replaced, in whole or in part, but the Secretary's (Department of the Interior) Guidelines require that as many members be saved as is practically achievable and where portions of members can be saved, they are usually joined with new material. [Late June 2009]