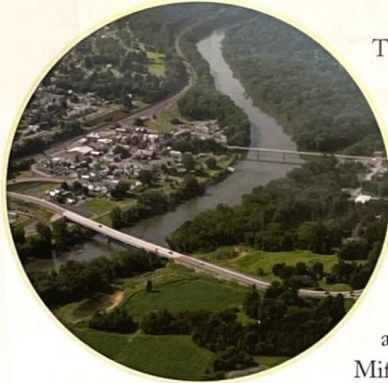


Bridging Communities

by Robert Leonard, Principal Associate, Erdman Anthony



The four-span, truss bridge that spanned the Juniata River provided the sole transportation link between the Pennsylvania boroughs of Mifflintown and Mifflin, and was vital to community cohesion. The bridge was used daily for both vehicular and pedestrian traffic to access a popular community park in Mifflin, the county seat, and commercial establishments in Mifflintown, and school facilities, and emergency services in both communities. The bridge also carried regional truck traffic using PA Route 35 to access the U.S. Route 322 expressway.



The bridge had been flood prone for years, and when it became structurally deficient and functionally obsolete PennDOT

and the consultant team began design for its replacement. But ultimately the project would prove to be more complex than a typical bridge replacement and called for: two river bridges, a railroad bridge, an underpass, a roundabout, a ramp to the local street network, and various riverfront enhancements.

Working with a citizen advisory committee (CAC) formed at the outset of the project, engineers evaluated the concerns of community representatives and local officials. Issues at the forefront included addressing the substandard horizontal curves, improving traffic flow and safety, and maintaining a pedestrian connection between the two communities.

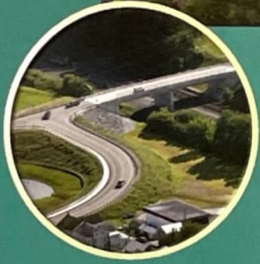
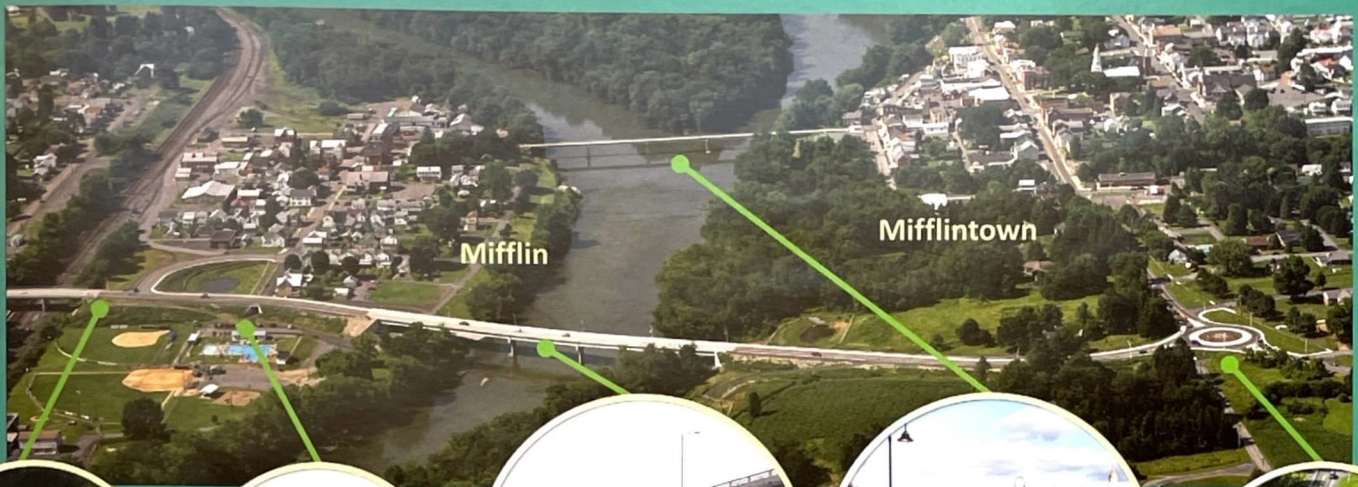
One of the single, most-important factors in this project's acceptance by the public was the decision to build a 676-foot-long pedestrian bridge at the location of the truss bridge slated for demolition.

Solution

Engineers presented four bridge replacement options to the public and the CAC. Using formal surveys, information was collected on how each of the alternatives would impact residents and businesses. The alternative most preferred by the community entailed relocating the bridge 1,500 feet downstream and realigning PA 35. That solution meant that traffic would no longer need to navigate narrow streets in Mifflin where curb and building damage was evident and pedestrian safety was a concern. It also enabled the existing bridge to remain in use while its replacement was constructed.

As the project evolved, a number of design challenges were addressed and solved. Due to safety and traffic concerns, the preferred alternative was refined to tie into S.R. 3002 in front of the middle and high schools in Mifflintown. The design team worked with school officials to provide a safe intersection that benefited the schools, accommodated bus traffic, and moved traffic to the bridge. The ultimate roundabout solution enabled school buses to avoid left turns into traffic by instead turning right into the roundabout to head in any direction needed. It also more safely accommodated students walking or using car transportation to get to school.





Railroad Bridge and Access Ramp



Pedestrian Underpass



Vehicular Bridge



Pedestrian Bridge



Roundabout

Flood Protection

Water resources specialists on the design team were focused on improving the hydraulic performance of the new bridges without increasing the local flooding potential. The old truss bridge did not pass the 50-year flood event criteria. Flooding from Hurricane Ivan in 2004 had reached the bridge's low chord. A detailed hydraulic and hydrology analysis helped the team select the optimal bridge types and elevations for the new river bridges. Both bridges were designed to pass the 100-year flood event without overtopping and without the risk of project-area flooding.

Green Plan Pilot

The construction phase of the Juniata Bridge replacement project was used as a pilot project for PennDOT's Green Plan Policy, serving as a model for future projects supporting this initiative. Material recycling was promoted in various ways:

- Using sandstone from a local quarry for fill around an abutment
- Taking additional fill from a nearby school property from a slope behind the school, which created much-needed additional parking
- Providing plantings in detention pond areas
- Using the same fill material that was used for the vehicular bridge causeway to construct the pedestrian bridge causeway, then recycling it.

Community Enhancements

Central Juniata Park, located just south of the bridge approach, is an important community hub with ball fields, a concession stand, a public pool, and a picnic pavilion. To provide convenient access to the park, an underpass was included in the elevated highway approach to the bridge. The underpass was sized to accommodate emergency vehicle access to the local wastewater treatment plant. Another dual-use feature is a ramp providing river access for both the fire department and sportsmen. Park benches and tree plantings were also placed along the riverfront.

Cost Savings

The value-engineering process helped reduce costs by nearly \$400,000. One example was at the pedestrian-access culvert under the PA 35 bridge approach. Due to the steepness of the slope, a cast-in-place cantilevered retaining wall was originally designed. But a value-engineering workshop concluded that a reinforced soil slope would suffice given site conditions, saving \$60,000.

The final construction cost of \$16.12 million was well under the \$22.1 million-design estimate. Thanks to efficiencies during construction, the project opened to traffic almost six months ahead of schedule. Welcomed by the public and local civil leaders, the completed bridges now enhance the daily lives of local residents, including their access to the Juniata River view shed, while preserving the overall cohesiveness of this rural community.

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Erdman Anthony was recognized with a Diamond Award in the 2015 American Council of Engineering Companies (ACEC) Pennsylvania Engineering Excellence Awards Competition. The firm received the Honor Award in the Transportation category for the Juniata River Bridge Replacement Project in Juniata County.

The ACEC/PA Diamond Awards for Engineering Excellence recognize engineering firms for projects that demonstrate a high degree of achievement, value, and innovation. A distinguished panel of judges with backgrounds in engineering, architecture, state and federal government, media, academia, and the military, selects the winners from projects submitted from around the globe.