Bypass Prevails Despite Public Resistance

When commuter traffic overtakes a small town main street, local residents tend to get concerned. The village of Round Lake in upstate New York was no exception. With a total population of less than 1,000 residents, Round Lake is a historic community founded by Methodists in 1869 adjacent to the circular lake that gave it its name. The village is listed on the National Register of Historic Places.

Preservationists note the local architecture's distinct Gothic, Second Empire influence and the number of buildings devoted to philosophical, religious, and cultural purposes. Round Lake is also environmentally sensitive due to extensive local wetlands that support numerous protected species, including the endangered Karner Blue butterfly first identified by novelist and lepidopterist Vladimir Nabokov.

In recent years, Round Lake's unique attributes have been threatened by rapid growth in surrounding areas, resulting in new traffic patterns that clog the village center and threaten the wetlands. These challenges accelerated when Advanced Micro Devices began plans to construct a $4.6-billion manufacturing plant in the nearby town of Malta. To alleviate traffic congestion and provide for event and incident management, a bypass was needed to link I-87 and U.S. Route 9.

The New York State Department of Transportation (NYSDOT) awarded the bypass design contract to M.J. Engineering and Land Surveying (www.mjels.com). The project goals included preserving Round Lakes historic district; rerouting traffic passing through the village center; increasing safety for motorists, pedestrians, and bicyclists; minimization of environmental and socioeconomic impacts; and improving the overall quality of life in Round Lake. These goals required substantial infrastructure—a 1.5-mile road, two concrete box culverts, vehicular and pedestrian bridges, and two roundabouts. Ultimately, 170,000 cu yd of rock would need to be blasted.

M.J. Engineering realized that a project of this scope would invite resistance from community members and special interest groups, so effective community outreach was vital. Several visualization techniques were used to maximize communication. One of the most effective was an InRoads (www.bentley.com) digital terrain model (DTM) developed early on in the design process that was made available at public hearings and information meetings. The model featured a dynamic drive-through that simulated a driver's experience traveling through the bypass.

In the drive-through, the preservation of wetlands and mitigation of construction impacts were emphasized, and numerous alternatives were developed and rejected based on community feedback before final routes and layouts were approved. Designs were not finalized until all revisions to roadway grading and alignments, bridge designs, and trail alignment were incorporated. Models and visualizations of alternate designs were created and offered for feedback throughout the design and approval process.

Good communication with NYSDOT was also essential. “To foster collaboration between M.J. Engineering and NYSDOT, our team used ProjectWise [www.bentley.com] to share project design drawings and documents throughout the entire design process,” explained M.J. Engineering’s Director of Engineering Brian Cooper. “Both M.J. Engineering and NYSDOT have used ProjectWise successfully in the past, making it a particularly effective collaboration tool.”

Ballston Creek was one area of concern in which collaboration especially paid off. The creek is modestly sized so a culvert crossing alternative was technically possible. But due to the environmental importance of this riparian corridor and the existing clay soils, it was determined that a bridge crossing was the best option. The resulting bridge design does not fragment the creek and allows for wildlife passage beneath the roadway.

Wetlands were preserved, and total acreage even increased. Working with NYSDOT, the U.S. Army Corps of Engineers and the New York State Department of Environmental Conservation (NYSDEC), M.J. Engineering identified a total of 100 acres of surrounding land that included wetlands and forested property for acquisition and preservation in perpetuity, and more than six acres of wetlands were created during construction. To protect the Karner Blue butterfly, the team conducted a thorough evaluation of available habitat to avoid any impact on this species. The firm also worked with the U.S. Fish and Wildlife Service and NYSDEC to ensure that no other rare or endangered animals, plants, or habitats were located in the project corridor.

To minimize and mitigate the impact of bridge construction, a temporary causeway was built. This facilitated and contained construction vehicle traffic and allowed M.J. Engineering to create detailed plans for causeway removal and creek restoration after construction. Geotextile fabric was used to preserve the original grade for later restoration. Stormwater retention facilities were designed with wetland preservation in mind and included roadway treatment swales, four stormwater management ponds, and a stormwater wetland—all of which treat stormwater and control peak flows before release into surrounding wetlands and waterways.

Since space was limited and roadway alignments were constrained by the need to preserve wetlands, minimize other environmental impacts, and preserve the historic character of the area, utility coordination emerged as a major design challenge. Cooper explained, “Careful subsurface utility exploration, surveying, and the use of InRoads created 3D utility features that allowed for resolution of utility conflicts prior to construction. This was an important tool in achieving time and cost savings.”

Limited space also forced the project team to make tough decisions about alignment locations. Working within the narrow corridors that would best preserve wetlands and minimize other environmental impacts meant that a large quantity of rock would have to be excavated and removed. This meant blasting. “To facilitate the required geometric design parameters, 170,000 cu yd of rock earthwork was removed by up-to-date blasting methods that included strict safety code protocols,” Cooper said. “Impacts to surrounding residents and business owners were carefully monitored during each blasting operation.”

He continued, “Techniques used during design included the utilization of InRoads horizontal control lines, cogo point generation, and ASCII file creation from the cogo information for use by the project surveyors. The same techniques were also used during construction to make field changes on the fly and avoid impeding contractors and delaying construction. The physical constraints of the project site made it important for construction to be accurate and on time, and field adjustment helped us to do that.”

A final review meeting was held with John Nolan, the NYSDOT engineer in charge of the project. This meeting revealed that utilizing the designed InRoads model, relative geometric information, and GPS, the NYSDOT construction inspection team created InRoads DTMs for contractor payment during various stages of construction. A final InRoads or as-built model was also created for final payment. Comparing the design DTM to the as-built DTM resulted in the overall project quantities being within five percent of the original total design InRoads estimated quantities.

As a complex project in a historically significant and environmentally sensitive area, the Round Lake Bypass faced substantial design and approval challenges. Using an InRoads-based model to simulate the experience of a driver traveling through the bypass proved to be an especially valuable tool when explaining the project to the community. This visual communication won over the cohesive and highly involved community, allowing a much-needed infrastructure project to proceed.

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