

Natural connection

A pedestrian bridge links city residents to nature.

By Jim Hofmann, P.E.

With its crashing waterfalls and meandering path to Lake Ontario, the Genesee River has long been a main attraction for the city of Rochester, N.Y. In fact, the river, which cuts through the middle of the city, catapulted Rochester's growth as an industrial hub and is still at the center of much of the city's activities.

It's not surprising then, that in the early 1980s the city envisioned a multi-use trail adjacent to the Genesee River that would connect the Erie Canal Heritage Trail, located to the south, to Lake Ontario, located to the north, thus taking full advantage of the river's route and recreational popularity.

This 15-mile trail, named the Genesee Riverway Trail, is now nearly complete, thanks to the addition last year of an 86-span, 3,572-foot-long bridge that crosses over a serene river basin. With that bridge in place, bikers, walkers, and joggers can now continue along the trail from its southern sections to enjoy the scenery and surroundings on their way to the lake.

From industry to scenery

Like much of the Genesee River, the river basin area had been used primarily for industrial purposes. For more than 100 years, railroad cars transported coal from the mines in Pennsylvania to the steep banks of the Genesee River near the river basin. The coal was then loaded onto ships and barges destined for ports along the St. Lawrence River and Lake Ontario.



An 86-span, 3,572-foot-long pedestrian bridge helps complete the 15-mile Genesee Riverway Trail near Rochester, N.Y.

During this time period, construction of the coal docks required significant infrastructure, including wood trestles and ferry slips, to transfer more than 1 million tons of coal per year from land to water transportation modes. In time, however, these industries either closed up shop or relocated to other ports, removing the majority of their trestles and piers.

With less activity in the basin, the spot became increasingly remote, used occasionally by fishermen or as a late-night hang-out for local teenagers. When some abandoned docks burned down, area officials and residents took a renewed interest in what was happening in the basin and the safety hazards the neglected structures might pose.

When the continuous Genesee Riverway Trail was proposed, it sounded like a perfect solution to the problem. But designing and constructing the connecting pedestrian bridge would be no simple task. Access, security, safety, and environmental concerns all posed enormous challenges to even conceptualizing realistic alternatives. To get the process started, the design team — which included engineering consultant Stantec, the

city's Architecture and Engineering Services department, the New York State Department of Environmental Conservation, the New York State Department of Transportation, and the U.S. Army Corps of Engineers — met regularly at the site, discussing the myriad constraints, possibilities, and alignments for the bridge.

When the project first began to take shape, the city was interested in creating a “rails with trails” corridor to coexist with the adjacent railroad. After considering that kind of alignment, however, the team determined the steep slopes along the train tracks would be difficult to work with and expensive to maneuver around. The railroad company was also apprehensive about the arrangement, since the railroad corridor was very narrow and the trail alignment would require bringing people very close to the tracks, which could create safety, security, and liability issues. With so many potential issues and complexities in creating a rail-with-trail alignment, the project team ruled out that idea.

With countless limitations still facing them, the team continued to look at the river basin itself for an extended pedes-

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trian bridge. Ultimately, they came up with a matrix of alternatives that identified various alignment permutations for evaluation purposes, thus ultimately creating a viable final solution.

Working with nature

Encircled by wetlands as the river is, accessibility and permitting were the biggest challenges to finding the perfect combination. Sandwiched between a Coast Guard navigation channel and fragile wetlands, the space available for the bridge was limited. And with such a sensitive environment surrounding the basin, constructing the bridge without severely impacting the vegetation would be tricky, not to mention locating it so that it would not impede the ecosystem's processes or destabilize the riverbanks.

After rounds of public consultation meetings, the project team settled on a bridge alignment that circles the rim of the basin. This way, the bridge avoids the navigation corridor but is far enough away from the vegetation to minimize environmental impacts.

In fact, the contractor had to clear very little vegetation once construction began since they did much of the preparatory work during the winter when the plants were dormant. Using crane mats with geo-fabrics, the contractors worked on top of the dormant plants and avoided vegetation as much as possible. By the next growing season, the plants were right on schedule, indicating no real impacts.

Another method for minimizing those impacts was using a helicopter to reduce the amount of time heavy equipment was needed in the river channel. The bridge was designed to allow the contractor (Crane-Hogan Structural Systems, Inc.) to use repetitive sequences, meaning different sections could be built off-site and pieced together in the river. With a helicopter, the contractor was able simply to put those segments in place, one by one. More than half of the bridge was placed in only three days by helicopter, while the remaining portion was placed via barge and crane. Without the helicopter, the crew would have had to spend much more time

in the river channel using barges and cranes, which would have, in turn, had many more negative impacts on the surrounding environment.

It was still necessary, of course, to make some adjustments to the channel bottom to accommodate the bridge's construction and stability. Dredging, however, was not an option since contamination from the past industrial uses would have meant removing the contaminated soils and transporting them on barges, which was too costly. Working with the U.S. Army Corps of Engineers and the New York State Department of Environmental Conservation, the project team instead displaced sediment left and right to make a path for equipment in shallow areas. With approximately 4 inches of sediment accumulating per year in that area, the soils naturally settled back once the bridge was constructed.

While the sediment provided a flexible path for equipment access, it also created some structural challenges for the project team since so much sediment meant an unstable foundation. To find a stronger base, the team did

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PEDESTRIAN BRIDGE ►



soil borings to 100 feet in some areas, where they finally hit rock. The selected pier foundations were determined by the depth of rock. Two-foot-diameter concrete drilled shafts with 1-foot-diameter columns were used where rock was reasonably near the surface (13 pier locations). Where rock was deeper, 6-inch-diameter steel pipe piles were driven and used to construct simple pier bents (72 pier locations).

Once many design challenges were settled, the team was able to get to the details of the bridge itself, using materials intended to reduce the need for frequent maintenance. The bridge is composed of galvanized steel beams for

the superstructure, as well as pressure-treated wood planks for the deck to better match the natural surroundings. The railings are black powder-coated galvanized steel with black vinyl-coated steel mesh between the rails to protect people from falling into the water. With such durable materials, the city only needs to keep up with maintaining the decking itself.

Safe travels

As if these environmental challenges weren't enough, the project team was also faced with a number of safety and security issues. The trail runs directly next to a marina, making

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The bridge superstructure is composed of galvanized steel beams. Sections were built off-site and, for about half of the bridge, placed by helicopter.

the security of the boats docked there a top concern. To discourage trail users from entering into the marina, the design team started a natural fence of nearly 1,000 different plant varieties. As those plants mature, they will eventually take over the riverbank and provide a natural barrier between the trail and the marina.

Access to the adjacent railroad tracks was also a design consideration. Although the trail was no longer aligned directly next to the railroad as first proposed, the on-land portion does run parallel to the tracks. To help prevent people from veering toward the tracks, the trail was constructed at a lower elevation, with steep slopes between the two. This elevation also leaves the trail about midway up the bank, providing viewsheds of the river and creating a more attractive and appealing experience.

Community connection

Now that this section of the trail and the bridge are complete, residents and visitors to the Rochester area use it on a daily basis. In fact, it's rapidly becoming one of the city's most popular attractions. In several letters to the editor of the local paper, for instance, residents continue to praise the new trail, even going so far as to deem it one of the best trails in the Northeast.

With the creativity and cooperation of the entire project team, the people of Rochester can now experience the beauty of the river and its surroundings, right from their own downtown.

Jim Hofmann, P.E., was Stantec's project manager for the Genesee Riverway Trail project and is a principal in the firm's Rochester, N.Y., office. He can be contacted at jim.hofmann@stantec.com.