The Pochuck Quagmire Bridge engineer specified CCA.40 #1 KDAT 19% SYP for the dimensional lumber. This specialty item cost the Pochuck Quagmire Bridge $10,479. The SAB used CCA.40 #2 SYP from five different lumber companies donating 50 percent of the lumber.

Both projects had significant foundation expenses. Interestingly, concrete costs the same in Maine as in New Jersey. This may be explained by the fact that the higher density of concrete plants in New Jersey results in more competitive pricing and lower transportation costs. The extremely poor subsurface Pochuck Quagmire Bridge soil conditions led to an innovative but extensive foundation system made up of the reinforced concrete snowshoe, geogrid, helical piers, and helical anchors. As previously explained, these innovations saved the project at least $14,000 in concrete costs. But the Pochuck Quagmire Bridge foundation system still cost $8,000. The SAB appears to have had more suitable subsurface conditions and, therefore, utilized a more conventional system with approximately 200 tons (100 CY) of concrete. This had a market value of $7,500, but 50 percent was donated. Both sides of the SAB river were accessible by vehicles, so the SAB project did not have to rent a concrete pumper as did the Pochuck Quagmire Bridge.

Due to the construction codes in New Jersey, the Pochuck Quagmire Bridge is built to a more restrictive standard. The Pochuck Quagmire Bridge was designed for a live load of 78 PSF, while the SAB utilized a live load of 22.6 PSF. The higher standard led to higher material costs. For example, the SAB utilized 4-inch by 4-inch cross stringers, while the Pochuck Quagmire Bridge used 6-inch by 6-inch. The cost difference is significant.

To wrap up this line of thought and to provide some practical meaning to the array of figures provided, based on the Pochuck Quagmire Bridge, a concept “ballpark” project market cost can be estimated as follows:

- Identify the superstructure material costs based on the span, the bridge width, cablework, and towers. Double this figure for the completed value. Call this (A).
- Sitework, foundation cost, erosion control, and cleanup will equal (A) above. Call this (B).
- Engineering, survey work, soil borings, environmental studies, and project administration may equal at least 20 to 40 percent of A + B.

Planning purposes cost estimate = 1.2 to 1.4 x (A + B).

This is a simplistic estimate. It is up to the project planner to add in the additional costs for the normal and expected challenges.

Project Volunteers

Following is a full listing of the project volunteers. Photo 87 on page 92 is a partial group picture.

NY-NJ Trail Conference
Barry Beaver, Allen Bell, Paul Bell, Peter Bidoglio, Gene Bove, Allan Breach, Bob Busha, Bob Boyle, Paul Campbell, Doug Castellana, Jonathan DeCoste, Paul DeCoste, Dave Dougert, Joe Dowling, Rob Eldridge, Ann Fitzgerald, Terry Gallagher, Ron Geredien, Dave Giordano, Rudy Haas, Tom Hass, Hank Hagedorn, Doug Henckl, Rob Hill, Bob Jonas, Robert Kirchmer, Steve Klein, Andrew Latincsics, Bernadette Latincsics, Shauna Latincsics, Tibor Latincsics, George Lightcap, Harold Lott, Gregory Ludwig, Kevin Maher, Tom Majenski, Chris Mazza, Jason Meissner, Bob Messerschmidt, Martha Olsen, Jim Palmer, Walt Palmer, Sandy Parr, Steve Petshaft, Charles Rosien, Glenn Scherer, Helmut Schneider, Bill Shapiro,
Dean Shemenski, Bev Shuppon, John Siebert, Steve Steele, William Stoltzfus, Jim Walsh, Dick Warner, and St. Thomas Episcopal Church of Vernon

GPU Energy

Saint Benedicts Prep School - Newark, New Jersey

Students: Carlos Alvarez, Matt Coleman, Terrance Eason, Kevin Harris, Boris and David Moyston, Peter Muniz, Terence Rivera, David Rodriguez, Jose Rosado, Jose Suarez, and Hector Vasquez
Faculty: Mike Friedman and Matt Higgins

Mountainview Correctional Facility
at High Point State Park; Detail 11 (Inmate Work Program)

Assistance and Support

NJ Assemblyman Walter J. Kavanaugh, Jack Penn, John Mulvihill, Mary Esposito, Anne Lutkenhouse, Herbert Schlesinger, P.E., the Appalachian Trail Conference, and the National Park Service

New Jersey Department of Environmental Protection

State Park Service - Region III
Judy Babcock, Bill Hamilton, Charlie McCurry, Wes Powers, and Jimmy Scholts

NJ Forest Fire Service - Division A
Harold Lott

Occupational Health & Safety
Don Gates, Mary Rudakewych, and Lisa Weitz

Bureau of Inland Regulation
Sandy Adapon, Paul Drake, Steve Jacobus, and Gene McColligan

State Forestry Services
Edward Lempicki

New Jersey Treasury Department - Division of Building and Construction
Dale Smith, R.A.

USDA Forest Service
Dave Benevitch, Ed Cesa, Kasey Russell, Lanny Simmons, William Talley, and Terry Smith

Corporate Partners

20-20 Hindsight

As with most complex projects, all the project partners had a greater appreciation of the project upon its completion. Following is a listing of post construction “20-20 hindsight” comments as well as thoughts on improvements for future designs.

- A common question by reviewers of draft copies of this case study was why were the tower poles embedded in the soil as opposed to being mounted on concrete pedestals atop a concrete footing. The second alternative, as used in the USDA White Mountain National Forest, may result in a more durable structure or at least the concrete foundation can be re-utilized as is the case with the Hastings Trail Bridge. The answer is that the construction of the towers and foundation was performed by volunteer workers from GPU Energy and the NY-NJ Trail Conference. The construction was centered around a very short construction window utilizing GPU Energy standard procedures. Mounting non-uniform circular poles on an elevated concrete pedestal or wall is not standard utility company practice. Embedded utility poles have an effective life of 25 years or more. A concrete pedestal system should be considered if project resources allow.

- Attaching a 30-inch or 36-inch diameter reinforced concrete septic tank cover to the base of the tower poles with a lag screw would have increased the basal bearing area of the poles in the soft soil. This would have assisted when the poles were installed on a temporary basis.

- The exposed end grain at the top and bottom of the poles should have been sealed. This could be something as simple as bituminous roof tar with a plastic bag or more sophisticated like the coatings used on marine pilings.

- It should be investigated to see if a bridge socket can be attached directly to the square shaft of a Chance® Helical Anchor. This would simplify the anchorage attachment.

- The pros and cons of the various suspender configurations or combinations thereof as discussed on pages 60-63 should be considered.

- If a swaged threaded rod is used in the suspender assembly, such as in the Pochuck Quagmire Bridge, incorporating the rod as a component of the stiffening truss would be a major improvement.

- The Pochuck Quagmire Bridge stiffening truss does not act as an ideal load distribution member when a point load is directly over a cross-stringer. This could be remedied by making the suspender connections at the top of the stiffening truss, but this would be at the expense of the simple and effective cross-stringer connection.