

Bridge

DESIGN & ENGINEERING

INSIDE:
Bergmann Associates
takes a Walk Back in Time

Ravine rendez-vous



WALK BACK IN TIME

Rendering of how the trail bridge will look
by Bergmann Associates

A campaign to save an historic bridge over the Hudson River in the USA will come to fruition next year when the former railway bridge is planned to reopen as a dramatic river crossing for cyclists and pedestrians. Eric DeLony reports on the work so far, and what has still to be achieved

Next year will mark the 400th anniversary of Henry Hudson's journey up the river that now bears his name, and the non-profit organisation Walkway Over the Hudson is intending to mark this historic event by reopening the Poughkeepsie-Highland Railroad Bridge for walkers and cyclists (*Bd&e issue no 41*).

Abandoned and derelict since 1974, conversion of the 120-year-old Poughkeepsie Bridge from a railway bridge to a trail bridge demonstrates the need for a local volunteer effort to transform itself into a professional organisation if it is to succeed. Many historic bridge preservation projects start as a singular vision and grow into a community effort, but for a rehabilitation project of this scale, a professional approach and subsequent large-scale fundraising process are required if there is any chance of success.

The 2,063m-long former railway bridge will offer an unprecedented view of the Hudson River Valley from a height of almost 65m above the water, and is located approximately 130km north of New York City. The bridge originally formed part of the most direct rail route between New England's industrial cities, Pennsylvania's coal supplies, and grain from midwestern states. The design for the refurbished crossing includes three overlooks – one at each end and one at mid-span – from which pedestrians will be able to view the trestles of the impressive cantilever bridge.

The scheme which is now under way is one of the largest historic bridge rehabilitation projects in the USA – so far funds of US\$23 million have been raised, but the total estimated costs are US\$35.5 million. Following inspection of the super- and substructure in autumn 2007, demolition of the rail bed started in spring of this year. A new deck of 950 precast reinforced concrete panels is being installed along the bridge's length, and the walkway is planned to be dedicated in the first week of October 2009.

Walkway Over the Hudson has been a work in progress for nearly two decades, but during the last three years, significant progress has been made. Keys to success of the project, which began with one man's vision and was shared by the communities on both sides of the river, were funding commitments from public and private sources; identifying someone to take responsibility of the bridge once it was finished; and appointing a qualified engineering company, experienced in historic bridge rehabilitation.

Preservation projects for historic bridges have the highest success rate - within existing law - when partnerships are forged among transportation planners, preservationists, engineers, state and local governments and the interested public. Creative planning, innovative design solutions, modern technologies, and possible financial savings over new construction, offer the best hope to ensure that historic bridges remain in active use.

The original charter to construct the bridge, which was the first span erected between

Albany and New York City, called for it to be completed within three years, despite the fact many observers believed the depth of the river and the length of the span posed impossible challenges. But in 1888 the first train rumbled across, right on schedule, something of an engineering miracle.

One hundred and twenty years later, it was a lobbying miracle that made things happen. Getting the funds seemed not only feasible, but essential to anyone who cared about the future of the mid-Hudson Valley. Things started happening when Fred Schaeffer became chairman of the Walkway Over the Hudson organisation in 2004. He noted that the 'great connector', as it was known a century ago, would be the longest pedestrian bridge in the world, potentially giving it the mythic status and worldwide recognition of San Francisco's Golden Gate Bridge.

Federal transportation funding from the Federal Highway Administration demonstrated that the local organisation was serious, enabling it to leverage additional private funds that were used to initiate design and construction work; local charity the Dyson Foundation is funding a significant portion of the design and inspection; the NYS Office of Parks, Recreation & Historic Preservation will assume responsibility for administering public use of the bridge once rehabilitated and the NYS Bridge Authority and National Park Service are contributing technical advisory support.

The Dyson Foundation kicked in with US\$1.5 million after US\$874,000 in federal funds was obtained by politician Maurice Hinchey, including a 20% match by Walkway Over the Hudson. The Dyson Foundation's decision to support the project was swung in part by what they recognised as the 'incredibly hard-working, incredibly directed, good-spirited board of directors. They represent all that is best of volunteerism in the city and the Hudson Valley. It was an impossible dream, but they sold us on it,' the foundation said.

The Dyson and Hinchey grants paid for the inspection of the steel structure and the design of the walkway. The continuing fundraising needs to achieve a minimum of US\$12.5 million to complete construction of the walkway, which will fund a 7.6m-wide walkway and three overlooks. Schaeffer says that ideally, the walkway should be 10.3m wide, the total width of the bridge, at least for the section that spans the river. Once the bridge is opened in autumn 2009, the promoters hope that additional amenities such as shelters, lighting, benches and an elevator from the waterfront can be added if further funding can be raised.

Consulting engineer Bergmann Associates was selected because the firm's proposal demonstrated that rehabilitation of the bridge could be fast-tracked, enabling it to serve as centrepiece for the State of New York's 2009 Henry Hudson quadricentennial celebration.

The fast-track process involved concurrent work on several stages of project development and also included sequencing field work through multiple contracts; pre-



Above: Panels being placed on the bridge. Right: View of the bridge

purchase of a portion of the deck panels; and use of a modified design-build procurement process for the major construction/rehabilitation operations. The prime contracting team of the Fort Miller Company and Harrison & Burrowes Bridge Constructors was appointed in June of this year, and one month was shaved from the ambitious schedule that had been established in autumn 2007.

Inspection of the massive cantilever structure, which had been originally built and subsequently strengthened for railway traffic, revealed that it easily met load requirements for rail-trail service and emergency vehicles, should adjacent vehicular bridges ever go out of service. Repairs were needed on the east bank spans, where fire-damage had been responsible for the final discontinuation of rail service in 1974.

The extent of the fire-related structural steel damage – some 274m – was not known until the full inspection was carried out. Bergmann was able to substantially reduce steel repair costs by using a slab design that did not rely on the fire-damaged steel for support, so this is being left in place for now.

Another concern was the caissons of the main piers; in 1969, an underwater inspection identified a large linear void on the outside of the wooden caissons in two of the four river piers. Subsequent inspections verified the void, but poor river conditions made it difficult to determine the extent of damage. McLaren Engineering Group carried out a thorough dive

inspection of the river piers, and used sonar technology to see inside the voids in the outside weighting chamber - the voids were too narrow at the chamber face for divers to enter safely. The 3D images produced showed that the damage was limited to an outside chamber, and that they could be repaired under a future maintenance contract since the piers are very robust for the intended use. In addition, the inspection showed that scouring is not an issue for this bridge.

According to Schaeffer, construction will take a year to complete. As *Bd&e* went to press, some 150 of the total 950 precast concrete panels, 7.6m by 1.8m and 280mm thick, had been placed since September, but the end of the 2008 construction season was fast approaching. When construction restarts next year, the intention will be to complete the deck and approaches in time for the quadricentennial dedication in October. Although 1.3m-high railings will be added to protect the public, the bridge will not be painted, a significant cost saving. Walkway Over the Hudson executive director Amy Huston says, "Raising the additional funds is doable. It depends on the commitment of the state." She adds: "It's a good thing there is time pressure – it will make the project less expensive because we're forced to be efficient." The bridge walkway will connect at both ends with rail trails and if all the links are assembled, people will be able to bike or walk all the way from New Paltz to Hopewell Junction, a distance of some 32km ■



our people and our passion in every project



Bergmann
associates
architects // engineers // planners

www.bergmannpc.com

When you hire Bergmann Associates,
you're hiring our **people**.
As a result, you'll get our **passion**,
our expertise
and our outstanding service,
on each and every **project**.

To explore a career with us please call:

1.800.724.1168

Albany, NY // Buffalo, NY // Elmira, NY
Ft. Lauderdale, FL // Jacksonville, FL // Philadelphia, PA
Lansing, MI // Pittsburgh, PA
Rochester, NY // Syracuse, NY



Ford Street Bridge Rehabilitation // Rochester, NY
Project of the Year // Historic Preservation – National APWA

our **people** and our **passion** in every **project**



 **Bergmann**
associates
architects // engineers // planners

www.bergmannpc.com