

## Rehabilitating and beautifying an aging bridge

Engineering evaluation identified the most critical repairs to save the 107-year-old Market Street Bridge.

By Kari Moosmann

**Throughout the country**, communities are challenged with rehabilitating and replacing deteriorating bridges. The cities of Follansbee, Wellsburg, and Weirton in Brooke County, W.V., recently worked with the West Virginia Department of Transportation (WVDOT) to save a bridge. They have long been connected by three bridges over the Ohio River to the city of Steubenville, Ohio. In early 2009, the Ohio Department of Transportation decided to close the Fort Steuben Bridge, leaving only two bridges. Although the Veterans Memorial Bridge can handle most of the traffic demand and heavy loads, the Market Street Bridge also serves as a vital link for commuters, light commercial traffic, and emergency vehicles.

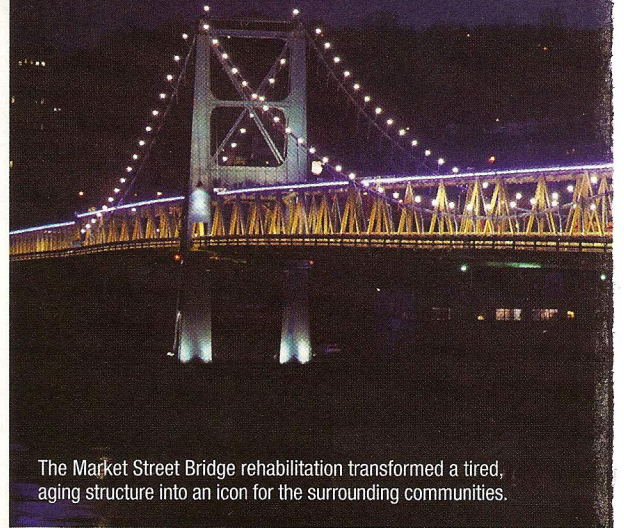
When local community leaders learned that the bridge might be closed, they reacted quickly by contacting officials at the WVDOT who could make decisions to save the bridge. After careful evaluation, the decision was made to invest in a rehabilitation project to preserve the structure, at least until a new bridge could be constructed. Bridge designers from Burgess & Niple took on the challenge to evaluate the most critical needs and design repairs to rehabilitate the Market Street Bridge in a very aggressive timeframe. Completion of design work for the 107-year old structure was accelerated to position the project to receive American Recovery & Reinvestment Act (ARRA) funding.

Recently, Matthew Lewellyn, P.E., M.ASCE, project manager at Burgess & Niple in Parkersburg, W.V., and David Whited, project manager at the WVDOT in Charleston, W.V., discussed the success of the recent rehabilitation of the Market Street Bridge and its positive impact on the surrounding community.

### **What is the history behind the Market Street Bridge?**

**Lewellyn:** The Market Street Bridge was built in 1904 to transport workers from their homes in Ohio to the tin mill in West Virginia. There have been several modifications over the years. One of the more significant changes was the replacement of the stiffening truss in 1941. Also, decorative finials were removed from the towers and plates were added to the columns, which modernized the bridge, taking away its look of a delicate, riveted and laced structure. Famous bridge engineer D.B. Steinmen later inspected and repaired the bridge.

**Whited:** It also went from a trolley structure (its original purpose) to a vehicular toll bridge at that point.



The Market Street Bridge rehabilitation transformed a tired, aging structure into an icon for the surrounding communities.

### **Project info**

**Bridge length:** 1,794 feet

**Bridge type:** Three-span cable suspension

**Main span length:** 700 feet

**Tower height:** 210 feet from cut stone piers

**Number of lanes:** Two lanes of traffic on an open steel grid deck. A cantilevered sidewalk provides pedestrian access on the downstream side of the trusses.

### **Participants**

**Owner:** West Virginia Department of Transportation

**Civil, structural, and electrical engineer:** Burgess & Niple, Columbus, Ohio

**Construction firm:** Ahern, a division of Kokosing Construction Co., South Charleston, W.V.

**Construction manager:** Joseph Juszczak, P.E., WDOH District 6, Moundsville, W.V.

**Painting subcontractor:** Panthera

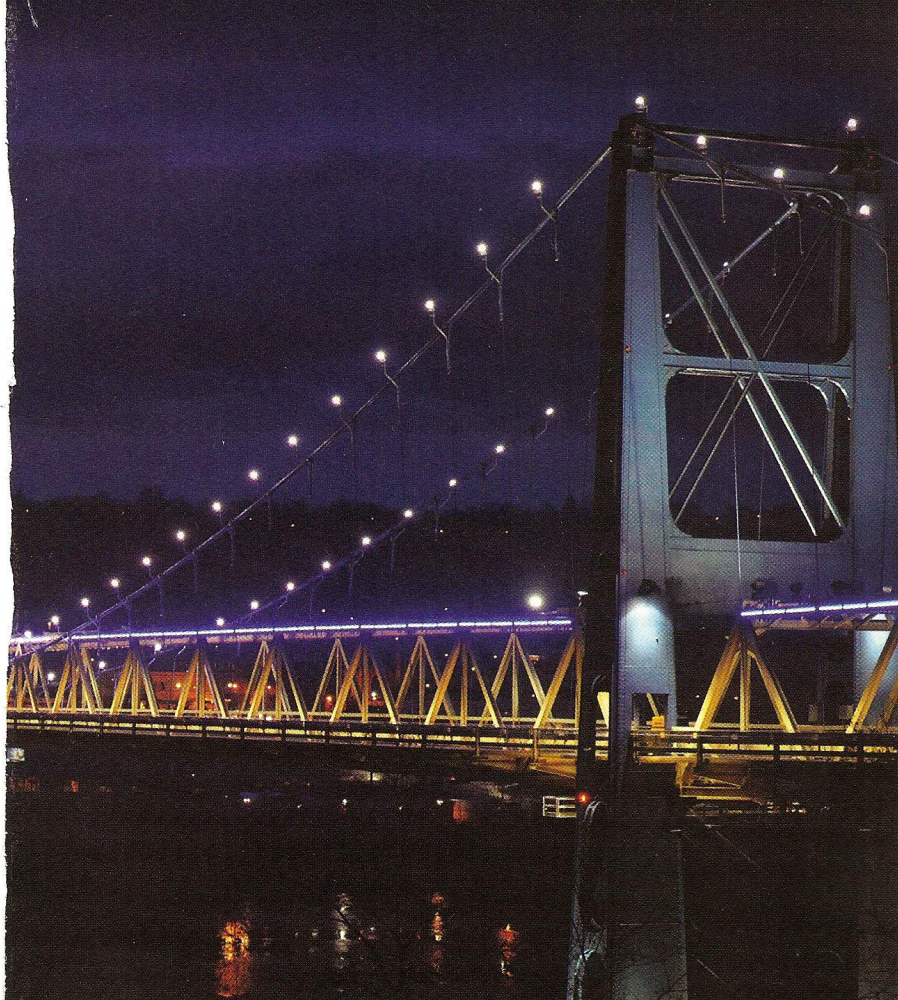
**Paint supplier:** Terma-Rust



**Steel fabricator:** Beverly Steel

**Electrical subcontractor:** Bayliss and Ramey

**Construction inspection:** WVDOT/Greenhome & O'Mara



**What were some of the major issues in the rehabilitation?**

**Lewellyn:** With age and condition of the structure, we had to limit the amount of weight the contractor could have on the structure. The project had to keep track of the total weight of the equipment, materials, and the containment in critical work areas.

**Whited:** The contractor could only put up 100 feet of containment at a time due to the weight restrictions.

**Lewellyn:** Repairs to the suspension bridge presented unique challenges. We had to test our minds for repair solutions.

**Whited:** In many cases, we had to leave elements in place because we couldn't remove them.

**Lewellyn:** Older bridges like this have crevice corrosion, where rust occurs between two plates, and that was a concern. We wanted to stop it and control it. We used a specialized paint in conjunction with a penetrating sealer — something new we initiated that should stop the growth by wicking into the crevices. The calcium sulfonate paint stays plastic and is pliable so it can heal itself over time. The contractor had some growing pains in using it. He could paint it while it was still drying, which sped up the application process. Problems occurred when blasting in the next location; dirt and spent shot would leak through the tarps and would stick to the paint.

**What were the reasons for the rehabilitation?**

**Lewellyn:** The bridge hadn't had many repairs since the 1980s. With the open grid, the roadway salt accelerates deterioration. The necessary repairs were determined through inspection. We had seen the deterioration through the years. The ability to repair the bridge now was due to the available ARRA funds. When the nearby Fort Steuben Bridge was demolished, that put more traffic on the Market Street Bridge, and the public supported the rehabilitation.

**Whited:** A new bridge is being planned about 10 miles away from the Market Street Bridge, but not for at least another 10 years. We couldn't wait that long and needed the Market Street Bridge fully functioning for the public.

**Who initiated the rehabilitation?**

**Whited:** It came partly from a result of Burgess & Niple's inspection. As a result of ARRA — having the funds available — upper management made the decision to make more of a complete rehab. That's when lighting was added and a complete cleaning and painting.

**Why was rehab chosen instead of building a new bridge?**

**Lewellyn:** The funds were not available for building a new structure of this magnitude. Plus, there are environmental clearances for a new structure that take time. They needed something now.

**Whited:** And being a border bridge, there are agreements that would have had to be made on a new structure. It would have involved not only West Virginia's funding issues, but Ohio's as well, since they would have been a participating agency.

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