

## MERIT AWARD

# BLUFF'S EDGE BRIDGE



**T**he Bluff's Edge Bridge is a 140'-long steel arch bridge that spans a deep ravine along Lake Michigan in Lake Forest, IL. The primary structural system consists of three riveted steel arches supported by large stone abutments. Inclined (radial) steel columns support the deck structure above the three main arches. The original 20' wide deck structure consisted of 7 longitudinal (S10) stringers encased by an arched

brick deck. Wide concrete railings along each side of the bridge included decorative planter boxes Historic Background.

The Bluff's Edge Bridge served the main approach to Cyrus H. McCormick, Jr.'s lakefront estate home. McCormick, Jr. was president of the McCormick Harvesting Machine Co. beginning in 1884 which later became International Harvester. His father, Cyrus McCormick Sr., invented the reaper in 1831. McCormick, Jr. conceived the

unusual bridge design "...in which the curve of the arch was like the rim of a great wheel" with supports at right angles to the arch rather than perpendicular to the roadway. Constructed from 1897 to 1901 by J. H. Grey, an early skyscraper engineer, the bridge carried traffic until 1972, when it was deemed unsafe due to deck deterioration.

The bridge became the property of the City of Lake Forest in 1957 and was listed on the Lake Forest National Register District



in 1978. From 1972-1997 the bridge was restricted to only pedestrians and bicyclists due to its state of disrepair. As a result of deterioration, the city added a narrow wooden deck and fencing for safety in about 1988.

In March 1996, the Bluff's Edge Bridge was named one of the "10 most endangered historic places in Illinois" by the Landmarks Preservation Council. In April 1997, the Preservation Foundation and the City of Lake Forest proceeded with the restoration of the bridge.

#### **RESTORATION**

The City of Lake Forest elected to restore the bridge as a pedestrian bridge using both private contributions and municipal funding. The design-build project was awarded to Wiss, Janney, Elstner Associates, Inc. (WJE). Following notice to proceed, WJE

updated their condition assessment, braced the three primary steel arches, and began deck and railing removal. Due to advanced deterioration of the bracing members and the remote site limitations, the demolition work was very labor intensive requiring all handwork without any heavy equipment. The 27"-thick bridge deck consisting of brick arches, gravel fill, and two asphaltic wearing courses, was removed.

All structural steel members, except for the original steel arches were replaced, which included all bracing members, columns, and deck framing. From field measurements, shop drawings were developed and replacement members were fabricated. In total, 35 tons of steel was placed. Lifting equipment was limited to a small 25-ton crane due to the heavily wooded site and narrow access roads. All structural steel,

except the deck stringers, was painted with a three coat Valspar and Ameron overcoat system. The seven lines of deck stringers were hot-dipped galvanized for an initial saving of \$3,000, with the potential for future maintenance savings on these difficult to access members. The structural steel restoration attempted to match the original geometry of built-up riveted shapes by using modern steel shapes and galvanized A325 bolts. Only about one percent of the boltholes required reaming to complete the connections.

To complete the 20' wide deck, 3" x 6" pressure-tested timber planks were installed over the steel deck stringers. A combination wood and steel railing to match the deck and bridge structure was installed.

Throughout this project, the City of Lake Forest; Wiss, Janney, Elstner Associates, Inc.;





and the Preservation Foundation worked closely during the restoration from May 1997 to April 1998. The final cost of the project was \$380,000. The historic Bluff's Edge Bridge with its "rim of a great wheel" has been preserved for future generations.

## **BLUFF'S EDGE**

### **BRIDGEOWNER:**

The City of Lake Forest (IL)

### **DESIGNER:**

Wiss, Janney, Elstner Associates,  
Northbrook, IL  
(AISC Professional Firm Member)

### **GENERAL CONTRACTOR:**

Wiss, Janney, Elstner Associates,  
Northbrook, IL  
(AISC Professional Firm Member)

### **DETAILER:**

M.C. Detailers, Inc  
Merrillville, IN

### **FABRICATOR:**

Tri State Steel & Fabricating Co.,  
Inc., Tefft, IN (AISC Member)

### **ERECTOR:**

S & J Construction Co., Inc.,  
Holland, IN