

# ILLINOIS TOLLWAY

Illinois easily transitions from concrete bridge pioneer to state-of-the-art designs

by Paul Kovacs, Illinois Tollway

**T**he Illinois Tollway pioneered the use of prestressed concrete bridge beams during construction of the state's original tollway system in the late 1950s. Concrete bridge beams—both standard and unique designs—continue to be preferred for the tollway's bridge structures. Across its 286-mile system of four interstates in Northern Illinois, the Illinois Tollway favors the durability and constructability of concrete bridges, as well as the engineering advances in the construction techniques for concrete bridges.

In 2007, the Illinois Tollway completed the 12.5-mile expansion of the Veterans Memorial Tollway (I-355) featuring the Des Plaines River Valley Bridge described in the Spring 2008 issue of *ASPIRE*<sup>TM</sup>. This bridge spans 1.3 miles over the Des Plaines River, the Illinois and Michigan Canal, the Sanitary and Ship Canal, several railroad lines, and forest preserve land. This was the first bridge in the state of Illinois to use post-tensioned, precast, prestressed concrete bulb-tee girders.

In 2009, reconstruction of the Reagan Memorial Tollway (I-88) twin bridges over the Fox River was completed. Structural arch members of the twin bridges support a prestressed concrete beam superstructure to reflect the design of the original bridges built in 1958. See *ASPIRE* Summer 2009 for more details.

Today, the Illinois Tollway continues to lead the way with innovative concrete bridge designs as part of its 15-year, \$12 billion capital program, Move Illinois: The Illinois Tollway Driving the Future. Move Illinois will:

- address the remaining needs of the existing tollway system,
- rebuild and widen the Jane Addams Memorial Tollway (I-90) as a state-of-the-art, twenty-first century corridor,
- construct a new interchange to connect the Tri-State Tollway (I-294) to I-57,
- build a new, all-electronic Elgin-O'Hare Western Access, and
- fund planning studies for the Illinois Route 53/120 project and the Illiana (Illinois-Indiana) Expressway.

Move Illinois will include the reconstruction of more than 70 mainline and crossroad bridges as part of the I-90 Rebuilding and Widening Project. The Elgin-O'Hare Western Access Project will provide more than 80 new and improved bridge structures. Shallow depth beams are being used on the Illinois Tollway for the first time, and U-shaped girders are being considered for accelerated construction of longer spans.

In addition, as part of Move Illinois, the Illinois Tollway is extending the expected service life of major bridges out to 100 years.



*Reconstruction of the Fox River Bridge on the Reagan Memorial Tollway (I-88) was completed in 2009. Photo: Henry G. Russell Inc.*

This has prompted the Illinois Tollway to design several of the mainline bridges along the I-90 corridor with stainless steel reinforcement in the concrete bridge decks. This is expected to provide a long-term cost benefit.

Another long-term cost benefit is the incorporation of integral abutments in bridge designs. This design feature minimizes the bridge joints, which have shown to be the weakest link in the tollway's bridge performance chain.

The Illinois Tollway is also adopting the use of a performance-based deck concrete specification to reduce shrinkage cracking that often appears in bridge decks. The Illinois Tollway's approach is not to specify how the mixture proportions are to be developed, but to specify the end-result requirements for the plastic and hardened concrete.

Allowing concrete producers to evaluate the various tools available to reduce deck shrinkage will enable them to choose the approach that coincides with the construction contractors' activities. Options selected by local concrete producers to achieve the specification requirements have included shrinkage-reducing admixtures and lightweight fines to provide internal curing.

From its pioneering roots to the incorporation of state-of-the-art technology, the Illinois Tollway will continue to incorporate concrete bridges into its roadway infrastructure.



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*Traffic on the Des Plaines River Valley Bridge on the Veterans Memorial Tollway (I-355). Photo: Illinois Tollway.*