Steel Bridge NEWS
NATIONAL STEEL BRIDGE ALLIANCE
JUNE 2008

# On Opposite Coasts

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This rendering shows the MIC-MIA bridge, which will provide access to Miami International Airport's rental car facility.

The redesign of the Estero Parkway Flyover project replaces twin, cast-in-place concrete box girders with with a design using four steel box girders.

**Two Florida bridges—on either side of the state—will deliver multiple benefits to their owners and users, thanks to value engineering redesign.**

**LOCATED ON OPPOSITE COASTS OF FLORIDA, TWO CURRENT BRIDGE PROJECTS WILL SERVE VASTLY DIFFERENT PURPOSES.**

The Estero Parkway Flyover, near Fort Myers on Florida's west coast, will ease traffic congestion on the parkway and offer travelers an alternate east-west route on the Tamiami Trail and I-75. The Miami Intermodal Center Terminal Access Roadway Project—nicknamed MIC-MIA—will provide access to a rental car facility as part of a major upgrade of Miami International Airport.

But both projects have one thing in common (besides being in Florida): they were both initially designed to use concrete for the superstructure. Both were redesigned in steel by Finley Engineering Group in a value engineering process. And both will now be built faster and will save their respective owners approximately $2.5 million combined.

## Out of the Comfort Zone

Tampa Steel is the steel fabricator on both the Estero and the MIC-MIA projects. Robert "Bob" Clark, Jr., the company's president, says that most bridge superstructures are designed in concrete because many bridge engineers are more comfortable and experienced with concrete than they are with steel. "Most colleges teach concrete design in their core courses, whereas steel design is an elective in advanced courses. So many engineers choose concrete because of an absence of knowledge about steel."

Not every project benefits from a conversion to steel from concrete, of course. And despite what some may think, the savings aren't strictly linked to the material costs of the former versus the latter. Donald Deberry, P.E., public works operations manager for Lee County, notes that the recent cost fluctuation for all kinds of construction materials underscores the need for good, solid engineering design, because chasing material prices is a losing game.

"It might look like you're saving money when you evaluate price during development of the project or the bridge development report," he says. "But later, when you actually go to buy it, you might find that you would have been better off using something else because of price fluctuations in the materials market."

On both the Estero and MIC-MIA projects, three factors other than material price dictated that steel was the better choice:

**Site conditions.** The original design for the MIC-MIA project called for a cast-in-place concrete-on-falsework section combined with concrete U-beam superstructure to make up the 584-ft-long bridge. As designed, the construction would have been excessively complicated and labor-intensive. The value engineering redesign included only one superstructure type. And by converting the superstructure to steel, the redesign eliminated the need for falsework, greatly simplifying construction and minimizing the impact on ongoing operations and construction projects at the rental car facility.

According to one of the subcontractors working on the FDOT MIC-MIA project, the original design would have required substantially more temporary shoring towers on the site, thereby impeding the principal access to the site. As such, the shift to steel box girders

significantly reduced the amount of shoring required.

The Estero site had similar site restrictions—and design solutions. The redesign replaces twin, cast-in-place concrete box girders with a single bridge using four steel box girders.

This eliminates a large falsework support system, reduces foundation design requirements, and simplifies construction. The overall result is a shorter time frame to complete the bridge, an obvious benefit to the traveling public.

Falsework in the original design would have also more significantly affected a design-build project to widen I-75, which runs beneath the bridge site. It would have created more safety hazards for motorists, and the falsework erection and cast-in-place pours would have slowed traffic far more often than will occur with the placement of steel girders on the superstructure.

**Contractor means and methods.** Value engineering redesigns are often driven by the preferences and experiences of the contractor chosen for the work. Some contractors are simply better with one material than the other.

Contractors also prefer designs that are not overly complex and that allow them to make money on the job. On both the MIC-MIA and the Estero projects, elimination of the falsework reduced the complexity and the amount of labor that would be required to complete the work. Particularly in a construction climate where qualified workers have been difficult to find, this is a welcome change for the contractors.

Material cost did play some role in the Estero project. Jovan Zepcevski, president of Estero contractor Zep Construction, says steel prices were relatively high during the initial design period, but that they eventually receded enough to make steel the clearly better choice during the value engineering portion of the project.

The less complex construction process will also help the contractors meet their schedules. For example, in the case of the Estero project, Zep must finish the job in less than two years. For the Miami project, completing the structure quickly alleviates coordination issues associated with large, integrated construction projects.

**Owner requirements.** Lee County will pay a minimum of $1.85 million less for the redesigned Estero Parkway Flyover than it budgeted under the original design. The county coffers may get even more back, as the contractor and the county will split any additional savings.

The redesigns saved money in a number of ways. On the Estero project, the conversion to steel resulted in a reduced superstructure depth. This shortened the required approach embankment height, so the project won't need as much fill on each approach. A reduction of about 4 ft in the fill height at the beginning and end of the bridge, tapered over the length of the nearly 700-ft-long approach embankments, means massive savings in mechanically stabilized earth (MSE) fill.

In both projects, the change to steel reduced the number of piles required, and in the case of the MIC-MIA project, one of the piers could be eliminated. Because the steel boxes produce a lighter superstructure, the redesign resulted in a more efficient substructure design, meaning that fewer piles were necessary. In the Estero project, the number of 24-in. precast piles dropped from 130 to 76. On the MIC-MIA, the redesign increased the precast piles from 18 in. to 24 in., but reduced the number of piles from 163 to 60.

## A New Perspective

An important lesson to take away from both projects is that value engineering provides the opportunity for a new look at a project by involving the contractor. That new look may very well uncover a better way to build the bridge—as it did in these two cases. Taking the opportunity to look at a project, with the engineer and contractor both contributing ideas on how to best accomplish the project's objectives, can add *better*, *faster*, and *less costly* to the overall project accomplishments. By incorporating a value engineering redesign, the project team is loudly and clearly stating that the client's needs are paramount. MSC

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*For more on the Estero Parkway Flyover project, see December 2007's Steel Bridge News, available online at* ***www.modernsteel.com/archives****.*

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