Miami Intermodal Center – Earlington Heights Connector

Photo Courtesy of URS Corporation

The Miami Metrorail Airport Link or MIC-EH Connector is a 2.5 mile dual track-light rail elevated guideway structure that connects the Miami Intermodal Center (MIC) to the existing Metrorail Earlington Heights Station (EH). The project is located in the Greater Miami area just northeast of the Miami International Airport (MIA). The MIC facility connects local and regional transportation networks to MIA, including Tri-Rail, Amtrak, Intercity bus, Metrobus, taxis and tour buses. It also houses the airport's rental car facilities. A link between the MIC Metrorail Station and MIA is provided via an automated people mover sponsored by MIA. The MIC-EH Connector, also called Airport Link, has become part of the 25 mile Metrorail system in Miami-Dade County and is owned and maintained by Miami Dade Transit (MDT). The Airport Link project eases the severe congestion on adjacent expressways from increasing passenger travel to and from MIA and offers an alternative transportation mode between downtown Miami and MIA which is convenient, rapid and safe.

Innovation of Design and/or Construction

The innovation in the design and construction of the segmental portion of the guideway can be considered as follows:

- The integration of the superstructure and substructure as well as the use of variable sections allowed to comply with the project design criteria related to vibration control as well as it provided a slender and aesthetically pleasant structure,
- Special analysis were carried out to address issues of interaction between the train and the structure and the interaction between the continuous welded rail and the structure,
- The connection between the superstructure and substructure needed to carry large reactions due to train derailment loads and project required wind loads (120% higher than AASHTO loads) were especially challenging,
- Live loads as well as allowable stresses are more stringent that the ones for highway bridges and required an optimum arrangement of the post-tensioning tendons to accommodate the design forces.
- The use of a precast shell for the pier segments which are integral with the superstructure and only casting in place the diaphragms for connecting with the substructure was allowed to expedite the construction process.

Photo Courtesy of URS Corporation

Jury Comments

A segmental bridge / structure that leverages all of the advantages of precast segmental construction.

Aesthetics and/or Harmony with Environment

There are several factors that make the MIC-EH connector guideway aesthetically very pleasant. At the highly elegant new Metrorail Station at MIC, the single guideway segmental box girders blends perfectly with the U-beam portion of the guideway and the station. For the long span units crossing the Miami River and SR 112 the slender piers integrated with the segmental superstructure, which is parabolically hunched, provide a sense of continuity between the superstructure and the substructure creating a aesthetically pleasant structure. Moreover, at the SR 112 crossing, the bridge reverse curvature enhances even further the aesthetics of the bridge.

Cost Competitiveness

The segmental system was selected because of its economy in direct construction cost and future maintenance cost in addition to its aesthetic value. The project bid and awarded cost (guideway structure and terminal building) was $358 million, only 1% smaller than the Engineer's estimate. The construction cost of the segmental portion of the guideway was $60.5 million not including the plinth pads and rail system or approximately $415 per square foot. This cost is very competitive for mass transit projects in which long span structures are required.

Minimization of Construction Impact on the Traveling Public

All the segmental units were designed and built using the balanced cantilever method of erection. The precasting yard was located at approximately 5 miles from the job site. The segments were delivered to the site on trucks and erected using a mobile lifting frame (beam and winch) system along with ground based cranes where possible. Either erection method accommodated the FAA's airspace requirements. Stability towers were used around columns supported on foundations and temporary footers. The selected erection scheme allowed the rapid construction of the bridge with minimum disruption to highway or railroad traffic.

CREDITS

Owner: Miami-Dade Transit

Owner's Engineers: **AECOM** / **Atkins** / EAC / **PB Americas**

Designer: **URS Corporation Southern**

Contractor: Odebrecht / Tower / Community JV

Construction Engineering Services: **McNary Bergeron & Associates**

Constructability Review/Estimating Services: Construction Engineering Consultants

Precast Producer: **Rizzani de Eccher USA, Inc.**

Formwork for Precast Segments: **Deal**

Erection Equipment: **Deal**

Segmental Specialty Engineer: **McNary Bergeron & Associates**

Construction Engineering Inspection: Pistorino & Alam, **HNTB Corporation**

Post-Tensioning Materials: **DSI**

Bearings: **R.J. Watson**

Expansion Joints: **D.S. Brown Company**

Epoxy Supplier and Prepackaged Grout: **Sika Corporation**

Photo Courtesy of Rizzani de Eccher