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Miami's true intermodal center



A true intermodal center

Miami Airport's rental car center becomes a reality

By Gary S. Rider, P.E.

Commuters traveling to Miami International Airport can't help but notice the huge concrete structure rising up on the east side of Le Jeune Road near 25th Street. The 27-acre site is the location of the Rental Car Center (RCC), which is part of the long-planned Miami Intermodal Center (MIC) Program.

The MIC Program is sponsored by the Florida Department of Transportation and consists of five major components: roadway improvements to Le Jeune Road (now complete), the RCC, the Miami Central Station, the MIA Mover, and future joint development.

The completed program will offer significant benefits to Miami-area

commuters, providing connectivity for all forms of transportation at the Miami Central Station, including light and heavy rail systems, buses, taxis, rental cars, bicycles, and pedestrian. It will link all of these transportation modes to the Miami International Airport via the MIA Mover automated people mover system. In addition, by consolidating all rental car activities off-site at the RCC, traffic congestion will be significantly reduced leading to and from the airport, which is the Miami Dade area's number one economic generator. The program will also give a significant boost to the surrounding area by promoting commercial redevelopment.

The consolidated RCC garage facility, which is now under construction,

will accommodate approximately 16 rental car companies that are currently spread all around the perimeter of the airport (with future build-out capacity for a maximum of 20 companies). The facility consists of more than 3 million square feet on four levels, and costs an estimated \$370 million. Funding for the MIC Program is derived from a variety of federal, state, local, and private sources, and the RCC construction cost will be paid in part by a daily customer facility charge placed on each rental car transaction completed at the facility. The Florida Department of Transportation is overseeing the construction of the center, but it will

The Rental Car Center's garage helix slab sections are ready for concrete placement.



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eventually be operated by the Miami Dade Aviation Department. AECOM is the program manager and conceptual designer for the MIC Program, while the RCC production architect of record is Sequeira & Gavarrete (Heery/S&G) in Coral Gables, Fla. Structural engineering is being performed by Walker Parking Consultants out of Tampa, Fla. The construction manager is Turner Construction Company of Miami.

Planning the program

Planning for the MIC has been underway since the mid 1990s, and design of the RCC began in 2002 with an early bid package for foundations. By 2004, more than \$60 million had been spent to install foundations and utilities on the site. Deep foundations consisted of 18-inch-diameter, auger cast piles with a capacity of 200 tons each. Although the early foundation package provided a significant jumpstart to the project schedule, it also

Design and Construction Team

The Florida Department of Transportation is overseeing construction of the entire Miami Intermodal Center, but the RCC will eventually be operated by the Miami Dade Aviation Department.

Program manager and conceptual designer for the MIC Program

AECOM, Miami

RCC production architect of record

Sequeira & Gavarrete (Heery/S&G), Coral Gables, Fla.

Structural engineer

Walker Parking Consultants, Tampa, Fla.

Construction manager at risk

Turner Construction Company, Miami

had its subsequent challenges. As the remainder of the superstructure design firmed up, the already installed foundations had to be taken into account when considering value engineering items and proposed changes. In the end, minor foundation modifications and additions were incorporated into the final design.

The garage is the first rental car facility in the United States to provide fueling and car wash capabilities on each level of the garage so that vehicles are returned to service quickly. There are a total of 120 fueling pumps and 42 car wash bays spread out over three levels of the garage. In addition, facilities for other vehicle maintenance operations such as vacuums, air pumps, and vehicle fluids are provided. These amenities, especially fueling on elevated levels, created some complicated structural issues, such as the four-hour fire rating required for all of the framing in the Quick Turnaround Area (QTA). This requirement resulted in thicker floor slabs and larger beams, as well as more elaborate expansion joints and sealants. All of the framing in this area consisted of cast-in-place, post-tensioned concrete. Fuel piping

to elevated levels had to be routed in enclosed concrete trenches that significantly increased the complexity of the floor framing in this area. Extensive mechanical systems were also required for the elevated fueling. The systems included several safety features such as fire deluge systems, double-wall piping, leak sensors, fire sprinkling, and ventilation. There is also a 200,000-square-foot steel-framed roof deck over the upper level of the QTA to provide weather protection for top level fueling and maintenance operations.

The Ready Return Area (RRA) portion of the garage is where customers return rental cars and freshly prepped vehicles are parked for subsequent rental. This portion of the garage can accommodate approximately 6,500 cars. The structural framing in this area is a unique combination of cast-in-place columns and post tensioned inverted tee beams along with precast, double-tee floor members. More than 1 million square feet of double tees were used in this portion of the garage. The combination of cast in-place and precast components is not commonly used in parking garage construction, but was chosen due to fire rating

In this aerial view of the Rental Car Center, the Customer Service Lobby under construction on the top garage level is visible at right.



Aerial Photography, Inc.

requirements, speed of construction, and the large column grid spacing of 60-foot by 60-foot bays, which provides maximum flexibility for the rental car companies.

A 130,000-square-foot Customer Service Lobby was constructed on the top level of the RRA. Passengers arriving at Miami International Airport will be transported to the lobby, where they will complete their rental car transactions and proceed to the appropriate garage level. Initially, passengers will be transported to and from the lobby via buses, but the final plan calls for the use of a 1.25-mile, elevated, automated people mover system that will transport more than 3,000 passengers per hour between the Customer Service Lobby, adjacent to the Miami Central Station, and the airport terminal.

The Customer Service Lobby has a large central atrium with a three-dimensional space frame roof and clerestory glass to welcome travelers to Miami. The remainder of the lobby is fabricated with structural steel and approximately 35,000 square feet of architectural precast concrete wall panels around the perimeter. The lobby's location on the top level of the garage created many structural design and constructability challenges, but two tower cranes and small lifting cranes on the deck allow construction of the building to proceed smoothly.

Construction is under way

With the extremely large footprint of the garage, constructability and sequencing had to be closely coordinated between the construction manager and the structural engineers. The lateral load-resisting system for

the garage consists of moment frames, but these frames had to be discontinued at several locations to create crane "runway" bays through the center of the structure, allowing crane access to all areas to install forming, rebar, concrete, and double tees. Because of the project's proximity to airport flight paths, permits were required from the Federal Aviation Administration for all crane locations and movements. Concrete pour and post-tension sequencing was carefully reviewed and coordinated prior to finalizing the structural design. The facility is also designed for future expandability — both horizontally and vertically.

Most parking garages are designed for 40 to 50 pounds per square foot (psf) of live load to accommodate standard parked vehicle loads. Large portions of this garage are designed for that same loading condition, but many areas of the top level are designed for AASHTO HS-20 lane loading to accommodate temporary conditions in which buses will transport passengers between the Customer Service Lobby building and the airport. In addition, framing in the area of the lobby was designed for 100 psf of live load, while the lobby atrium floor area was designed for 300 psf loading to support large planters and displays. Column grids in the lobby do not align with the garage column grid below in all instances, so transfer girders were required to support some lobby columns.

In all, more than 130,000 cubic yards of cast-in-place concrete were used in the garage framing, excluding the precast double tees. During the peak construction period, the contractor has averaged 500 cubic yards of concrete placement per day, with peak

amounts of 800 cubic yards per day.

Due to the extremely large scale of the building, architectural curtain walls are being considered as an addition to the face of the two major access ramp systems, mitigating the visual impact of the massive concrete façade. Metal wing foils with screening will also be added strategically around the perimeter to offset the building's mass. Other architectural treatments include full-height, tensioned screen panels at all open perimeter stair towers and architectural elements at the west end of the garage to mask the façade.

The structural concrete portion of the project topped off in September 2008, with final completion scheduled for April 2010. Rental car companies will have approximately six months to build out and occupy their spaces before the facility opens.

Once the MIC Program is completed, it will offer a significant improvement to the region's growing transportation network by providing a true intermodal link between all forms of transportation. The consolidation of rental car operations will clean up the maze of rental companies spread out adjacent to the airport. Additionally, the facility will offer major relief to the ever-increasing traffic congestion at the MIA terminal and surrounding roadways, while also providing economic redevelopment opportunities for the area. ▼

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