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The New MIA: Countdown to Completion



Completing Miami's CIP



Miami International Airport's North Terminal is almost finished – Carroll McCormick reports.

Above: The modern linear design of Miami International's rebuilt North Terminal allows up to 10 turns per gate per day and the simultaneous movement of over 30 aircraft. (Heery S&G)

One of the last pieces in the Capital Improvement Program (CIP) mega-puzzle at Florida's Miami International Airport – the transformation of its Concourses A through D into what is now called the North Terminal, is nearly complete: 44 of the North Terminal's 50 gates were open by late 2010 and the last six will open this year. In August, 2010, American Eagle's Regional Commuter Facility, complete with 12 hard stands and two full contact gates, officially opened. On September 15 passengers started using the Skytrain, built on the North Terminal's roof.

The US\$2.94 billion North Terminal Development Program (NTDP), part of the biggest CIP for the airport since the 1950s, has involved replacing the 'finger' type concourse configuration with a more

efficient, mile-long (1.6km) linear terminal. The work includes nine additional gates, 20 refurbished jet bridges and 28 new jet bridges from Thyssen-Krupp Airport Systems, 1,800,000ft² (167,185m²) of renovated space and 1,900,000ft² (176,472m²) of new construction, including a 400,000ft² (37,152m²) federal inspection facility. Current passenger throughput is about 36 million a year and the airport can now handle up to 56 million passengers a year.

The NTDP has doubled passenger capacity and more than doubled aircraft turns per gate: restricted to an average 4.5 turns a day with the finger configuration, turns can now exceed ten a day. "The NTDP was not about adding more gates (we did go from 41 to having 50 gates) but

to maximize the capacity: changing the design from the 1950's finger configuration to the new airport design paradigm of a linear terminal, where several planes may depart or arrive at the same time," explains NTDP Director Juan Carlos Arteaga. With the linear design 30 or more planes can be in motion at the same time.

The North Terminal was logging 311 flights a day by late 2010, but it is designed for 500 flights and over 100,000 passengers a day. By incorporating swing gates, all 50 gates can serve both domestic and international flights. With a capacity now of nearly 40 million a year, the airport predicts the North Terminal will serve until at least 2030.

To reflect the 21st Century reality of passenger security procedures and waiting times, the pre-and

post-security concession mix was radically shaken up: Coming into the NTDP there were about 14 pre-security concessions with about 29,000 sq ft (2,695m²) of floor space. There were about 20 post-security concessions occupying about 30,600 sq ft (2,842m²) of floor space. Now there are only eight pre-security concessions occupying 7,000 sq ft (650m²) of floor space, but 72 post-security concessions with a joint footprint of 110,000 sq ft (10,217m²). Seven Master Concessionaires now operate in the North Terminal: three speciality retail Master Concessionaires: AMS TEI JV, Newslink/Adler, and Newslink of South Florida; and four food and beverage Master Concessionaires: Global Concessions, HMS Host, Areas USA MIA, and Concessions Miami.

Coordination and Challenges

More than 100 architectural/engineering/speciality companies were involved with the NTDP at various stages of the project. For example, the overall design involved seven major architectural firms. One of them, Leo A Daly, an Omaha, Nebraska company with an office in Miami, served as prime architect for the A-B Concourse Infill Project and its interior fit-out, as well as the fit-out of existing adjacent spaces between Concourses A and B.

"We worked with other design and programme management teams to coordinate a seamless design and we were given approval on what our part looked like," notes Keith Mawson, Director of Aviation Services, Leo A Daly.

The Leo A Daly team worked at least nine

years on the project. "Ours was the last project to start and all the lessons learned, and ever-evolving changes and systems trickled down to us. Technological changes, aircraft evolving ... all this had to be developed on the fly, considering that the design was eleven years old before the build. It was a complete evolution of the process over the years," says Eddie Alvarado, Associate-Project Manager, Leo A Daly. The original design for the checkpoints alone, which pre-dated 9/11 and the creation of the US Transportation Security Administration, changed at least three times.

Heery S&G was an integral part of the Master Architect team responsible for the terminal and airside expansion concept and in developing a master design for the project in its entirety. It assumed the role of Programme Manager (design management, design integration and project management) in 2006.

Heery S&G Vice President Fernando Gavarrete explains that: "Design continuity could have been



Above: A large rotunda in each place where the North Terminal changes direction softens the linear design for passengers. (Heery S&G)

Right: Extensive artwork and an architectural motto of efficiency and easy-to-clean design are signature features of the North Terminal. (Heery S&G)

Main: A new apron control tower monitors the North Terminal's 50 gates. (Heery S&G)



a major challenge, but we set a clear expectation up front that the owner wanted a single unified design to define the entire terminal rather than sections reflective of the individual architectural styles."

Recognising that the project would take shape over a period of years, Gavarrete knew the team also had to look at the project in its entirety to pre-select and specify items such as light fixtures, for design continuity. They selected all materials, finishes; systems and even master planned the entire amount of electricity that would be required. "It's common for manufacturers to change their systems over the years. We didn't want one portion of the terminal to have one type of storefront or escalators when another section contained another, hence the reason so many parts were pre-purchased. Consistency was critical," Gavarrete explains.

Marrying new structures and old, portions of which dated back 40 or more years, was an ever-present challenge. "The main challenge, summarised, is the relationship to the existing terminal. Our portion interfaces to the existing terminal for 1,000ft (304.8m). There were unforeseen conditions in the existing Concourse A," explains Jay Beattie, Senior Associate-Project Architect, Leo A Daly.

Lucas Prado, the Odebrecht project executive in charge of the North Terminal Consolidation Programme, under an Odebrecht-Parsons joint venture as managing general contractor, speaks as well to the challenges with marrying new and old structures: "Approximately 50% of construction is on top of an existing terminal building. This brought significant challenges associated with the integration of systems and unknown existing conditions. The solution was to face

these challenges as a team and cut bureaucratic red tape. For instance, the team implemented table top meetings and joint site visits to deal with coordination of mechanical, electrical and plumbing systems and resolution of conflicts created by unknown existing condition."

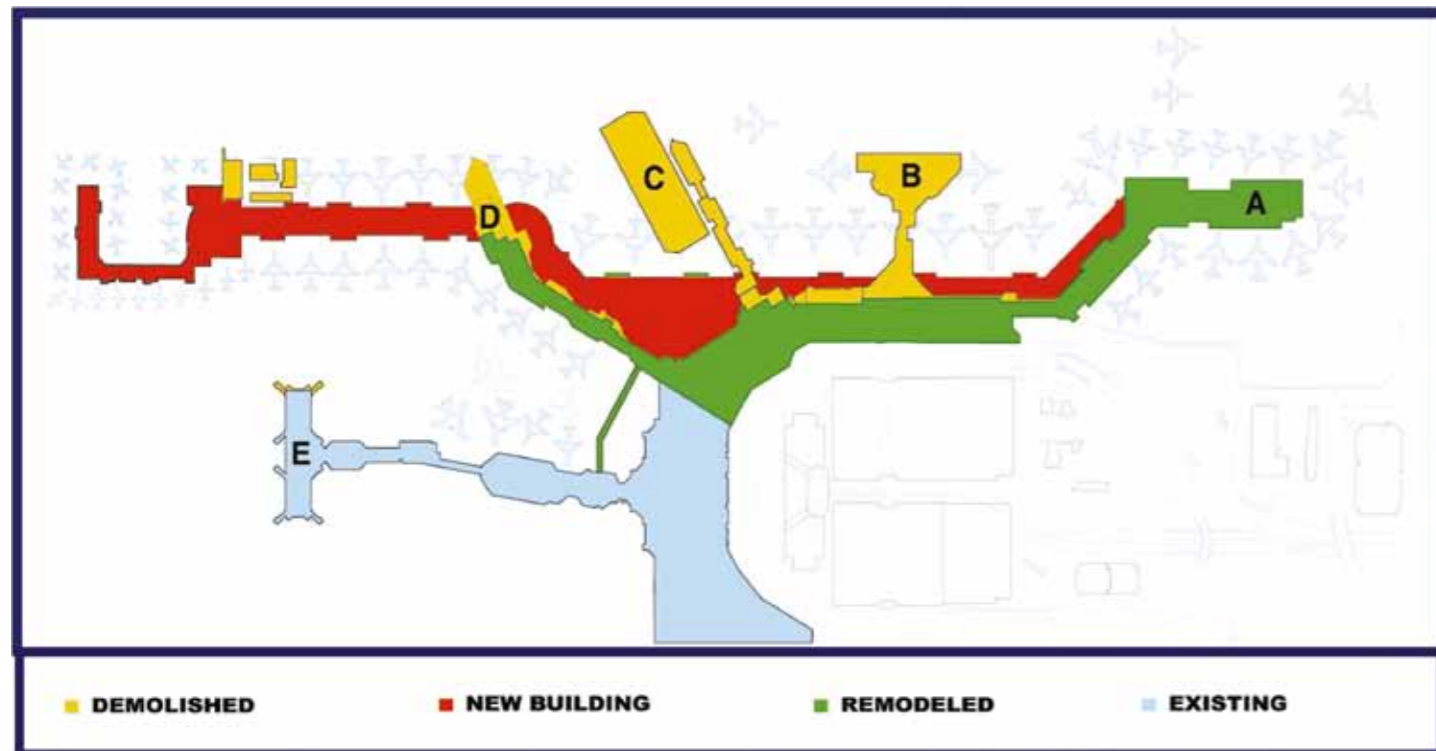
Another challenge, Beattie notes, was accommodating the rooftop Skytrain, officially known as the Automated People Mover. "Imagine carrying tens of thousands of tons of material over the existing terminal."

The Skytrain, which runs the length of the North Terminal on over 5,000ft (1,524m) of train guide way, was built by Odebrecht-Parsons. It consists of five four-car trains provided by Sumitomo Corporation of America and Mitsubishi Heavy Industries. There are four Skytrain stations and a train arrives at each station every three minutes. A train takes just four minutes to go from one end of the North Terminal to the other.

Working in an operational terminal was arguably the most difficult challenge, Prado thinks. "We had to comply with a very demanding and fast-paced schedule that required construction to occur within the footprint while surrounded by an existing active terminal and without impacting airport operations."

Take the new and existing baggage handling systems (BHS). "We built a whole new BHS [around the existing one] without touching the existing one," says Arteaga. "Only when the new BHS is ready to go, by about the end of February, 2011, will the old one be demolished."

Siemens Industries was the manufacturer and integrator of the baggage screening and delivery system. The new BHS will be fully automated, have 9.5 miles (15.3km) of conveyors, be capable of handling 8,400 bags per hour and have early bag



The North Terminal Project, an orchestra of demolition, remodelling and new structures, handles 72% of Miami Airport's and will serve to at least 2030.



The rebuilt North Terminal has 72 post-security concessions. (Miami-Dade Aviation Department)

Miami forms a dramatic backdrop to the rooftop Skytrain. (Miami-Dade Aviation Department)



storage and cruise line connections.

Gavarrete discusses the behind the scenes work that passengers never saw. "We had to construct over \$50 million worth of temporary facilities – by-pass corridors, exit stairs, passenger check points which required being air conditioned and equipped with all life and safety systems. We built strong relationships with the building and fire departments, including them on our team because we had to keep permits, inspections flowing to make sure the phasing, which had been so carefully orchestrated, could move forward as planned. And we had to work around airplanes and people and their baggage. Because the airport had to be kept fully functional, maintaining safety and security was most critical."

Of the temporary facilities, notes Arteaga: "The most challenging was building temporary ticket counters in front of where the permanent counters will be located to maintain the construction schedule while the baggage system gets built."

Among many successes, says Prado, "All milestones were achieved on or ahead of schedule, many gates were opened ahead of schedule and there were no major disruptions to airport operations." There were no claims or liquidated damages and, not insignificantly, contractors were paid promptly and on time. Noteworthy too is that the project won the 2010 Best Vertical Transportation Project: North Terminal

Development Consolidation Project Phase 1, Miami, submitted by Parson-Odebrecht JV and awarded by Southeast Construction magazine for construction and design excellence.

Prado also adds: "Airport revenue bonds improved to an A rating early on in the project. This rating has been sustained due to, among other things, enhanced management oversight of the CIP, of which the North Terminal is the largest project by far. MIA's annual numbers for passenger and cargo service in 2010 are up 4% and 33% respectively, while nearly every other US airport's numbers are down."

One way of summing up the changes incorporated in the NTDP is efficiency, according to Arteaga. "Efficiency is the most important design element of the NTDP." The Skytrain, for example, can move 9,000 people an hour. Other features that aid passenger movement along and between levels include the use of intuitive way-finding signage and providing moving walkways, escalators and lifts/elevators at strategic locations.

Arteaga speaks highly of the North Terminal's architectural features. "The building is contemporary, with bright architectural features that create the feeling of openness and amplitude. This is accomplished by the use of high ceilings, wide passenger circulation areas and natural light by way of clerestory windows."

Art in public places gracing the North Terminal

includes thousands of brass inlays in the terrazzo floors. "There are seashells, starfish, coral. It all creates an indigenous, local look," says Alvarado.

Although the North Terminal was not intended to be Leadership in Energy and Environmental Design (LEED) certified, the terminal followed various LEED standards in its construction. Miami Dade has registered the North Terminal for LEED certification and is currently working towards this goal.

"The MIA team made a huge effort to select sustainable materials, such as low volatile organic compounds products, low formaldehyde carpets and granite cladding. We specified and built [the North Terminal] as sustainable as we could make it: energy-efficient glazing, light-coloured roofs – the standard things you would expect to see in LEED," says Beattie.

"We used low maintenance material, like stainless steel outside, column covers and bases," Alvarado adds. Prado notes: "Many of the requirements of LEED were followed, such as use of low-emitting materials, erosion control measures, regional materials, indoor air quality management, etc. In addition we established a recycling programme at the field offices."

"It has been a very challenging project," Arteaga says. "We wanted to do something beautiful, efficient, without grandeur or superfluous architecture."

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