

Life Safety Systems: Construction of Miami Intermodal Center

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Abstract

The Miami Intermodal Center (MIC) will consist of the following buildings: the Rental Car Facilities (4 million square feet); the Miami Intermodal Center Connector Building; the Metro Rail Station; the Tri Rail Station; and the Bus Station Building. An elevated enclosed glass bridge will connect all the buildings. Due to the high density of this mega-structure, 5 large buildings, and the existing buildings around plus the future buildings to be built, the life safety systems for the Miami Intermodal Center is one of major design issues. 160 gasoline pumps cannot be placed in the building according to the building codes and fire codes, as the 160 gasoline pumps inside the rental car facility makes this building an extra high hazard structure (NFPA 30, 2003). However, computer modeling simulation performance based designs are used to provide equivalence to the code. Foam fire extinguisher systems, Ultra Violet/Infrared detectors, smoke control systems, fire sprinkler systems, fire alarm systems, and heat detectors are incorporated into the life safety systems to eliminate life safety hazards and make the Miami Intermodal Center a successful project (SFPE).

Keywords

Intermodal, Transit, Planning, Buses, Trains, Airports, Life Safety, Smoke Control, Fire Sprinklers, Fire Alarm

1. Introduction

The Florida Department of Transportation (FDOT) sponsors the Miami Intermodal Center (MIC). The United States Department of Transportation (USDOT) has designated the MIC as a "Mega-Project". This program will be developed in phases. The entire program is scheduled for completion within the next 15 to 20 years. The first phase is scheduled for completion by 2009 at an estimated cost of \$1.3 billion (July 2005 estimate) and will consist of: Right of Way Acquisitions (ROW), Access Improvements (Roadways), Consolidated Rental Car Facility, MIC/MIA Connector, Central Station (MIC Core)-Phase I, Joint Development.

The Rental car facility will have a lobby for 5,000 people, 160 gasoline dispensers, quick turn around area for cleaning and fueling the cars plus amenities for the customers. The rental car companies like Alamo Rental Car; Hertz Rental Car, E-enterprise Rental Car, and other companies will provide services to the customers. On the fourth floor will be capacity for the buses from the Port of Miami to bring the passengers from the cruise ships back and forth.

The Miami Intermodal Center Connector Building will be the station for 2 elevated Automatic People Movers that will go back and forth to the Miami International Airport transporting passengers to alleviate the congestion of cars traffic at the airport.

The Metro Rail Station will connect the MIC to the existing system taking passengers to many places in Miami Dade County, including Downtown Miami. From the MIC the Metro Rail will go to Florida International University via Le Jeune Road, NW 7th Street and NW 107th Avenue. The Metrorail Station has a length approximately of 800 ft by a width of 120 ft. The area has about 100,000 square feet. The station has 2 independent tracks. The parking has a capacity for 16 buses including articulated buses. The building has continuous (ADA compliant) grates, irrigated and uplift.

The Tri Rail Station will house 2 trains to make the connection from the MIC to Fort Lauderdale (Broward County) and Palm Beach County.

The Bus Station will house the buses of Miami Dade County (Metro buses) and Greyhound buses and other private companies.

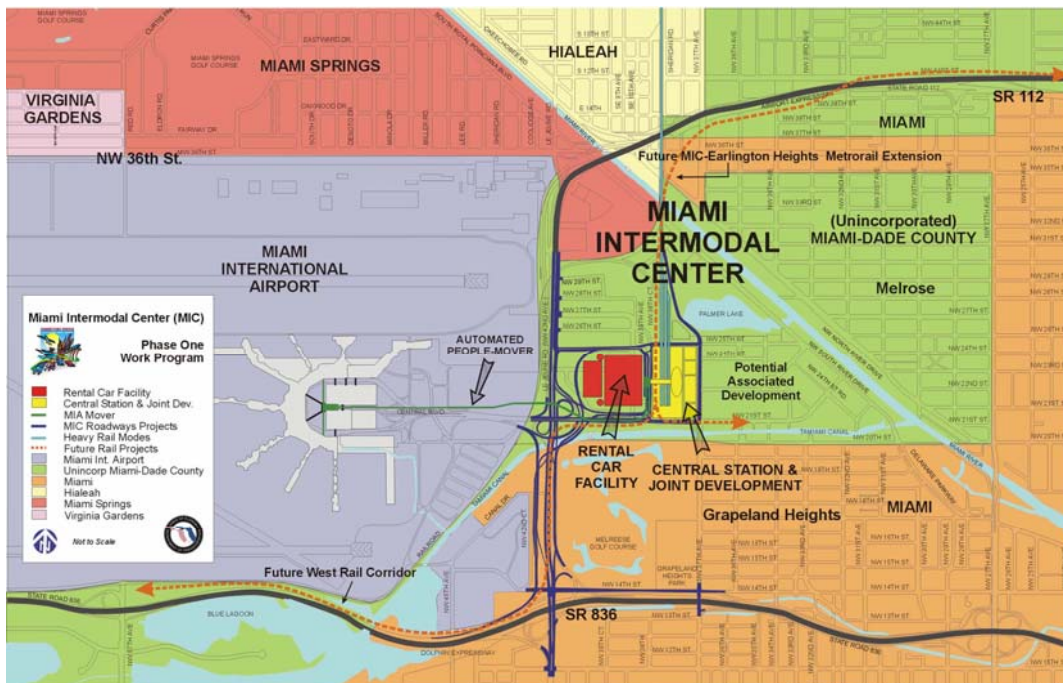


Figure 1

2. The Reasons for the Construction of the Miami Intermodal Center

The reasons for the construction of the Miami Intermodal Center are:

- The actual population of Miami Dade County is about 2 million people. The projected population for the year 2020 is about 3 million people.
- The passenger traffic at Miami International Airport (MIA) in 1999 was 33.8 million and is expected to grow to 39 million by 2015. On 2006 the number of passengers is above the number of September 11 events.
- The cruise line passenger activity at the port of Miami in 1999 was 2.9 million and is projected to be 6.8 million by 2020.
- In November 2002, voters adopted a half-cent sales tax as a new, local, dedicated funding source for transportation thus enabling expanded and new rail and bus services that converge at the Miami Intermodal Center.

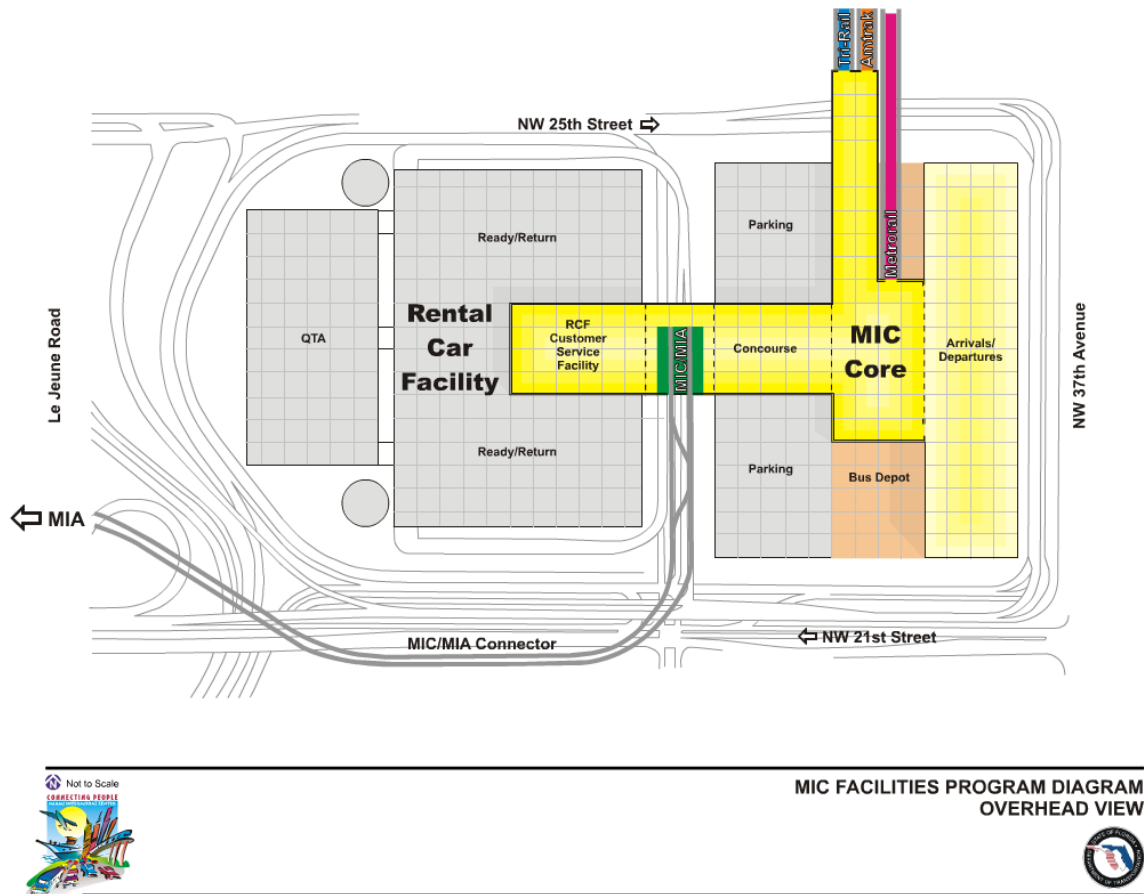


Figure 2

3. Benefits of the Miami Intermodal Center

The Miami Intermodal Center will be similar in function to New York City's Grand Station and to other multimodal facilities found in major cities around the world.

The Miami Intermodal Center will provide many benefits to the area’s transportation customers. It will offer safe and efficient transfers for users of various rail systems, buses, taxis, rental cars, privately –owned automobiles, bicycles and for pedestrians. The Miami Intermodal Center will also absorb a much of the vehicular traffic that presently congests the Miami International Airport terminal roadways and will increase terminal curb capacity at the airport.

The APM (Automated People Mover) Station, also called MIC-MIA Connector, will be build next to the Lobby of the Rental Car Facility. It has an area of 60,00 square feet at the level of the 4th floor of the Rental Car. For life safety evacuation has 3 stairs, one corridor to the Lobby and one corridor to the Metro Rail Station. It has a capacity for 3,500 people with two guideways to the Miami Intl Airport.

The MIC –MIA Connector has a length of about 400 ft by 100 wide at a height of 60 ft. It has 2 Automated People Mover vehicles going west in one track and 2 Automated People Mover vehicles going east in a separated track. Each vehicle is 10 ft wide by 70 ft long.

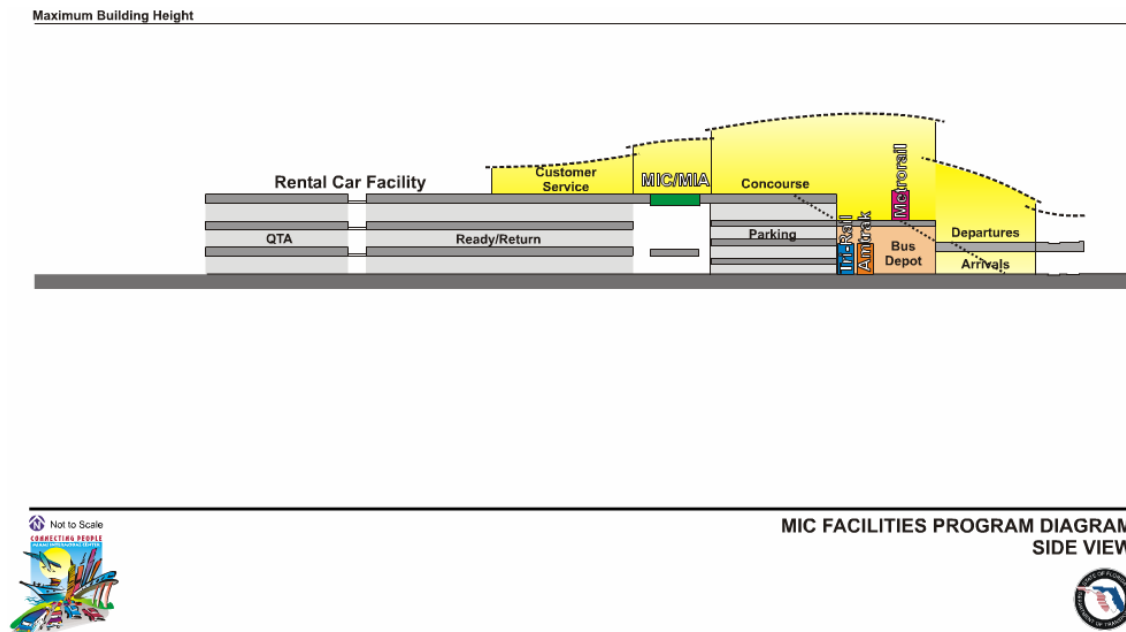


Figure 5

4. Discussions

Due to the high density of this mega-structure, 5 large buildings, and the existing buildings around plus the future buildings to be built, the construction of a fire station is recommended. The 160 gasoline pumps inside of the rental car facility makes this building an extra high hazard structure. Due to the millions of square feet of construction, smoke detectors in all areas are recommended for early detection of smoldering fires [for example, fires produced by cigarettes thrown into trash cans]. This would be in line with the policy at Miami International Airport. The smoke detectors should be connected to

the Operation Control Room at the Miami International Airport. Smoke detectors as per NFPA 72.

The installation of fire sprinklers in all areas is recommended at 100 square feet per sprinklers head coverage and ordinary hazard group 2 with a density of 0.18 gallons per minute per square feet over an area of 2,500 square feet as per NFPA 13 Fire Sprinklers Standard. The fire alarm system in all areas should be as per NFPA 72 [Fire Alarm Standard] using Class A, Style 7 circuitry; addressable, intelligent system. Separated circuits in metal conduits. Minimum separation 20 feet if proved hardship.

The finish of the materials should be Class a, interior wall and ceiling finish; flame spread 0 to 25; smoke developed 0 to 450. Class I interior floor finish, critical radiant flux, minimum 0.45 watts per square centimeter. The finish of the interior of the vehicles should be the same as above or better [compare with NFPA 130, Annex D, Suggested Test Procedures for Fire Hazard Assessment].

The voice evacuation through speakers should be in all the areas as per NFPA 72 and NFPA 101. The speakers should be in separated conduits: circuit A and B; system class A, style 7. The speakers to be Underwriters Laboratories Listed for fire use, 2hours fire rating.

The installation of fire hoses as per NFPA 14 (Standpipes standard) should be provided; with 100 feet hoses in cabinets to wet all areas (NEPA 14, 1996).

Roof manifolds as per NFPA 14 in all the roofs with 100 feet hoses to wet all areas. Additional stairs in all areas in accordance with NFPA 101 to comply with travel distance of 200 ft, common path 20 ft and dead end 20 ft (NEPA 101, 1994).

1. Sprinkler piping to be black steel pipe schedule 40 [A-53] painted red as per ANSI A. 13.1.
2. Provide life safety plans and calculations by a Professional Engineer in Fire Protection. Provide a holistic approach considering the population of all the buildings. Each building to have their own exits as standing alone building and not to discharge to the other buildings. Robust computer modeling should be utilized. All areas should have smoke control as per NFPA 92A, 92B, ASHRAE 5, Florida Building Code, Florida Fire Prevention Code.
3. Provide calculations as per NFPA 130 [Standard for Fixed Guideway Transit and Passenger Rail Systems] including the use of section C.1.2. Calculating Evacuation Time, Table C.1.3. The calculation of walking times T1, T2, T3, T4, T5, etc. should be included.
4. One authority should oversee the 5 buildings and adjacent areas with the responsibility of coordination of all the trades. All the building should be designed and coordinated as whole. No building or part of a building should be designed and built as separate structure or entity without regard with the rest of the buildings. A third party should implement sound regulation, prudent oversight and honest accounting.

5. Provide one fire command center [strobe lights, fire alarm panels and voice evacuation systems] for all the 5 buildings. The fire command center should be a room as per the NFPA 72 and not a narrow corridor interconnecting rooms.
6. In areas with electronic equipment, electrical rooms, telephone rooms, switchgear rooms, generators areas, etc. comply with NFPA 2001 (clean agent fire suppression systems).

5. Conclusions

In summary, the Miami Intermodal Center is a Mega structure to relieve the traffic congestion in the Miami International Airport, Miami Dade County, City of Miami, Hialeah, Doral, Miami Springs and other areas surrounding the Miami International Airport. The construction of the Miami Intermodal will have a lot of potential benefits.

- The prompt finishing of the project (the whole of the 5 main buildings) is essential for the healthy growth of the area and the improvement of the quality of life.
- The completion of Miami Intermodal Center will also increase business activities in the area, which will generate thousands of jobs in the community.
- The Miami Intermodal Center will serve as a means of achieving the intermodal goals set forth in the Federal Transportation Equity Act for the 21st Century (TEA21).
- The Miami Intermodal Center will enhance long-term viability of the Miami International Airport by consolidating rental cars functions offsite and locating all the rental car companies in one point making it easy for customers.
- The Miami traffic is the sixth worst in the United States: the Miami Intermodal Center will make this unfavorable distinction to go away.
- The life safety systems in the Miami intermodal center will eliminate fire hazards and make the project a great success.

6. References

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