

Palmetto Corridor Light Rail Transit Feasibility Study



MPCD METRO-DADE
METROPOLITAN PLANNING ORGANIZATION

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January 1997



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1. EXECUTIVE SUMMARY

Rail transit service is needed within the Palmetto Expressway corridor in the area from approximately Dadeland North to the Miami International Airport (MIA), per the Metro-Dade Long Range Plan (LRTP) Update to the Year 2015. Metrorail-type technology has been determined not to be cost-feasible at this time. This report is to determine the feasibility and characteristics of service on existing tracks within the corridor to serve as an interim means of meeting the need for additional capacity on the corridor. Issues regarding highway crossings, safety, and insurance are discussed in the report.

A portion of one of the potential alignments for this service parallels the proposed East-West Metrorail corridor. When the Metrorail service is in place, this east-west portion of the subject service can be discontinued, and the remaining north-south service can "feed" the Metrorail system. In the meanwhile, this interim service will aid in creating a market for rail transit in the area, ultimately enhancing ridership on the future East-West leg of the Metrorail system.

Technology - Electric vehicles and Diesel Multiple Units (DMUs), both standard-sized and the new, lighter models, were examined as potential technologies for operating relatively low-cost rail transit service on existing tracks. Electrification is not recommended in this study because of (1) the cost of the messenger wire and substations, (2) the potential conflict between the messenger wire and glide paths around the airport, and (3) the unsightliness of the messenger wire, particularly within the City of South Miami, where residences are in close proximity to the subject tracks.

Standard-sized DMUs are not recommended, as they are high-floored and would require relatively expensive and intrusive (particularly in the City of South Miami) construction of platforms. Their relatively slow rate of acceleration would slow their overall speeds to below that for which ridership was modeled for this study. In addition, their relatively larger size probably would make them less acceptable within the City of South Miami.

The light DMU is the recommended technology in this corridor. Unlike electric vehicles, it does not require a messenger wire, with the associated cost, glide path interference, and unsightliness. It is low-floored, so unlike standard sized DMUs it does not require the construction of platforms. The light DMU accelerates as quickly as an electric vehicle, so would have a relatively fast speed, enhancing ridership. It is the smallest, and therefore least obtrusive of the three potential technologies.

The light DMU's one potential drawback is that, because it is relatively small and lightweight, it cannot operate in a mixed-freight environment. Thus, a sole occupancy agreement would have to be negotiated among the impacted parties.

Alignment - Two potential alignments were developed to increase capacity in the Palmetto corridor through the utilization of existing tracks. They are Alignments A and B. The southern terminus of both alignments is the Dadeland North Station. Alignment A proceeds northward and then utilizes the tracks that run south and east of the airport. Alignment B also proceeds northward from

Dadeland North, but passes to the west of the airport, then proceeds northward to the Okeechobee Tri-Rail Station.

Alignment A is the recommended alignment for rail transit service in this corridor for two reasons: (1) the FEC tracks that comprise the northern leg of Alignment B could *not* be used for this service because they are too busy, and (2) ridership on this northern leg (Alignment B) was lower than for Alignment A, presumably because of the land use in the area, which is typified by rail switching yards, vast parking lots, and industrial uses.

Ridership - Estimates of ridership were conducted using the Florida Standard Urban Transportation Modeling Structure (FSUTMS) that was developed for the LRTP. Projections were developed for the Year 2000 for Alignments A and B. **Estimated daily ridership for Alignment A is 5,600 passengers/day, and for Alignment B is 4,300 passengers/day. Alignment A can be expected to carry about 1,300 more passengers/day.**

Costs - Capital costs for vehicles, track and crossing upgrades, and amenities are estimated to be about \$40 million.

Maintenance costs are estimated to be about \$132,000/yr. plus the cost, if any, for the shared use of a maintenance facility. Fuel and Operations Personnel are estimated to cost about \$53,000 and \$476,000, respectively, for a total cost of \$529,000/yr. Insurance costs are estimated to be \$1.2 - \$2 million/yr., and Payments to Railroads are estimated to be \$1 - \$2 million/yr. Thus, total Operating and Maintenance costs (when the high ends of the ranges are used) are conservatively estimated to be about \$5 million/yr. plus the additional marketing and administrative costs that are incurred by the agency operating the service.

Implementation/Timeframe - The following are critical items in the implementation of the project, given the use of only state and/or local funds. These items are projected to take about two and a half years, and are shown chronologically.

- (1) Agreements with FEC and FDOT must begin to be negotiated and executed,
- (2) planning and financing studies should be done *concurrently* with the start of negotiations with the railroads. The planning study would fine-tune stop and parking locations and would make recommendations as to the administration of the operation and maintenance of the service. A "Negative Declaration" for environmental impacts should be drawn up. The financial study would fine-tune costs (insurance, operations, etc.) and would recommend revenue sources,
- (3) an engineering study should be undertaken as soon as concurrence is obtained from track owners to assess need for track/crossing upgrades,
- (4) an operator should be advertised for and selected,
- (5) the funding (per the aforementioned financial study) should be obtained, and track/crossing upgrades begun as soon as funding is in place, and
- (6) the vehicles should be ordered, manufactured, and delivered.

Recommendation - This study shows that the use of a light DMU on the Alignment A tracks has merit. It is recommended that a detailed study be undertaken, utilizing these assumptions, to begin to fine tune the design of such a system.

2. Needs Analysis

The purpose of this study is to determine the feasibility of implementing rail transit service in the SR 826 (Palmetto) corridor in Dade County, Florida. **Figure 1** depicts the study area. SR 826 is a north-south roadway located in the central portion of Dade County. About a mile east of SR 826, are existing Florida East Coast (FEC) railroad tracks. These meet CSX/FDOT¹ tracks under SR 836. At that point the FEC tracks continue north, while the CSX/FDOT tracks lead to the site of the proposed Miami Intermodal Center (MIC), just east of Miami International Airport. Track ownership in the area of the airport is illustrated in **Figure 2**.

2.1 Background - This study evolved from a previous effort - the Metro-Dade Long Range Transportation Plan (LRTP) Update to the Year 2015. The LRTP is a plan that depicts the transportation facilities that will be needed to accommodate travel demand in Dade County through the Year 2015. New federal legislation, the Intermodal Surface Transportation Efficiency Act (ISTEA), mandated that for the first time, this plan update had to be "cost feasible." In other words, only facilities for which funds could be projected to be available could be included in the LRTP. Those transportation improvements (both highway and transit projects) that were projected to be needed, but not affordable, were relegated to an "unfunded" list.

The following rail projects were cost feasible, and were included in the Year 2015 LRTP:

- ▶ SR 836 (East-West) premium transit corridor.
- ▶ North Corridor premium transit.
- ▶ Miami Intermodal Center (MIC).

The following rail projects were found not to be affordable, and were added to the unfunded list:

- ▶ US 1: Downtown to Broward County Line premium transit corridor.
- ▶ Kendall Corridor: Dadeland North to SW 147 Avenue premium transit.
- ▶ SR 836 Corridor: Downtown to Miami Beach premium transit.
- ▶ SW 42/37 Avenue: MIC to Douglas Road station premium transit corridor.
- ▶ SR 826: Dadeland to NW 74 Street.

In determining whether all of the above projects were cost feasible it was assumed that they would be of a heavy rail technology similar to the existing portions of the Metrorail system. In fact, these projects are footnoted within the LRTP as follows, "The highest level of urban transit technology was assumed to develop these cost estimates. Future studies will determine the most

¹These tracks were sold by CSX to FDOT, although CSX retains operating rights and is responsible for maintenance. Issues of ownership are discussed in **Section 4** of this report.

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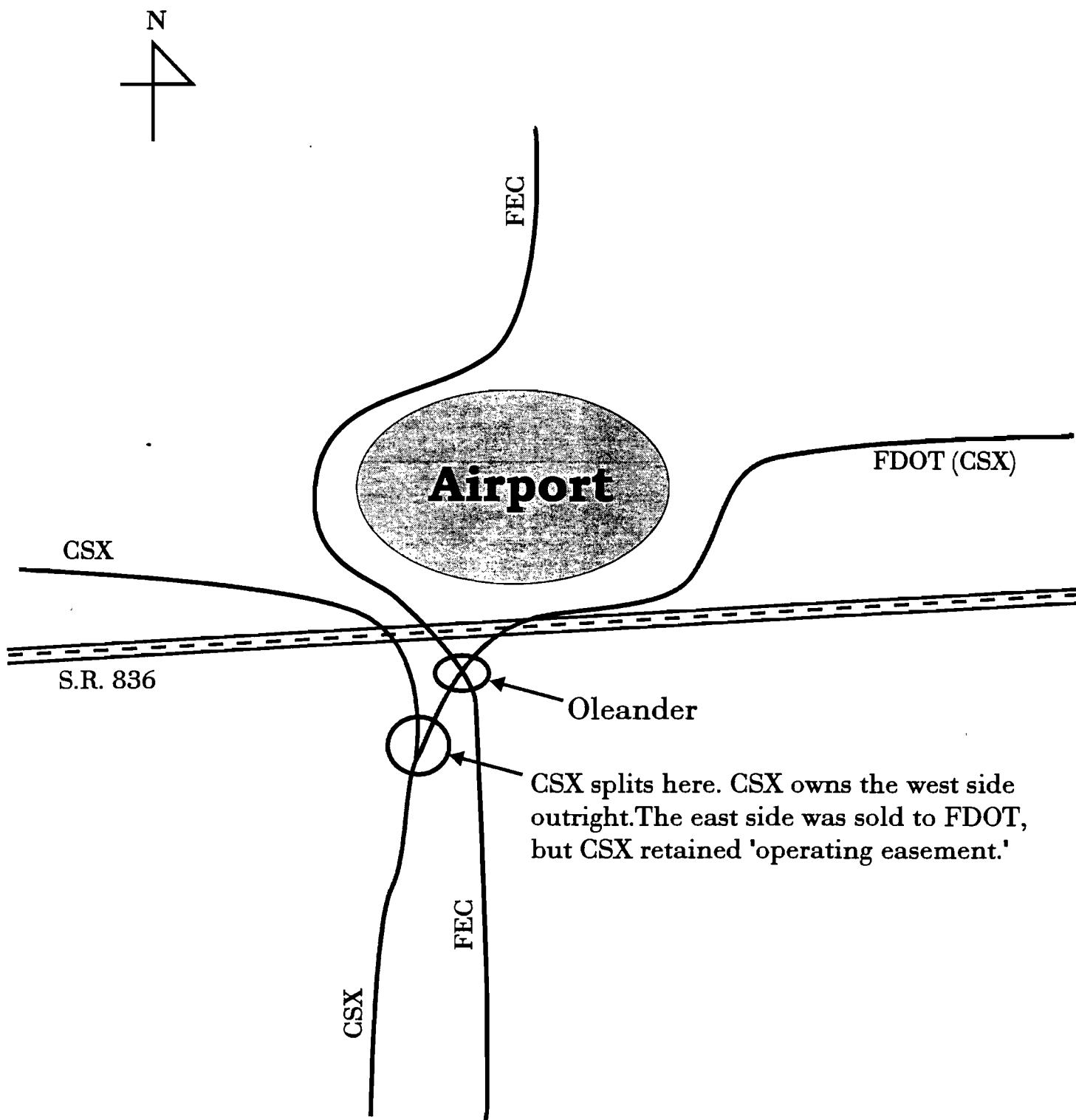


Figure 2
Track Ownership

feasible technology and its cost." It was not within the purview of the system-wide LRTP to study the feasibility of different technologies within all of the corridors.

After the adoption of the LRTP, there was some discussion about determining whether the SR 826 corridor, currently a part of the unfunded list, could move to "funded" status if a less expensive technology was employed, and if existing tracks were used. This was not the first time that this passenger service had been discussed. Analyses of the subject corridors were included in the Railroad Rights-of-Way Assessment that was prepared in August 1993 for the Metro-Dade Metropolitan Planning Organization (MPO).

Of the nine corridors studied in the Railroad Rights-of-Way Assessment, five are recommended to be "...deserving of further study." Both of the alignments that are being examined as part of the current effort are included in this list. There is nothing in the Railroad Right-of-Way Assessment's study of ridership and other factors that precludes rail transit service in either corridor.

Travel demand modeling was performed as a part of the Railroad Rights-of-Way Assessment. The model used was that developed for the Dade County Transit Corridors Transitional Analysis. The "Transitional Analysis" was a series of technical memoranda developed for the Metro-Dade MPO in February 1993. The purpose of the Transitional Analysis was to study those six potential transit corridors developed in the previous update (to the Year 2010) of the LRTP.

The two corridors being investigated for the subject study are *not* included in the Transitional Analysis, except for the east/west portion of Alternative A, just south of the airport. However, the Transitional Analysis does contain a description of the "South Dade Transit Linkage" which was "... a proposal to extend Tri-Rail from the Miami International Airport to the Metrorail Dadeland North Station via existing FEC and former CSX railroad right of way. The South Dixie Busway, whose northern terminus is at the Dadeland South Metrorail Station, is extended northward to the Dadeland North Station. These extensions combine to form a transit hub at Dadeland North combining Metrorail, bus, and Tri-Rail services. The transit linkages provided by this program serve additional markets to those served by the Transitional Study South Corridor alternatives and will complement rather than compete with or preclude each other."

The corridor described for the South Dade Transit Linkage is Alternative A (Figure 3). However, the former proposal was for a heavy rail (Tri-Rail) technology, while the current study is considering trolley/DMU. So, projections regarding ridership are not interchangeable. Still, the outcome of the South Dade Transit Linkage should be considered as it relates to the subject study.

One reason the South Dade Transit Linkage was not realized, was that many of the citizens of the City of South Miami had a concern with the service traversing their neighborhoods. Part of this concern involved the proximity of residences to the tracks, as is shown in the photograph included in **Section 2.2.5** of this report. The lesson that can be learned from this previous study is that rail service that is of a heavy rail technology is intolerable to many area residents. This fact is considered in the "Technology Assessment" portion of this report.

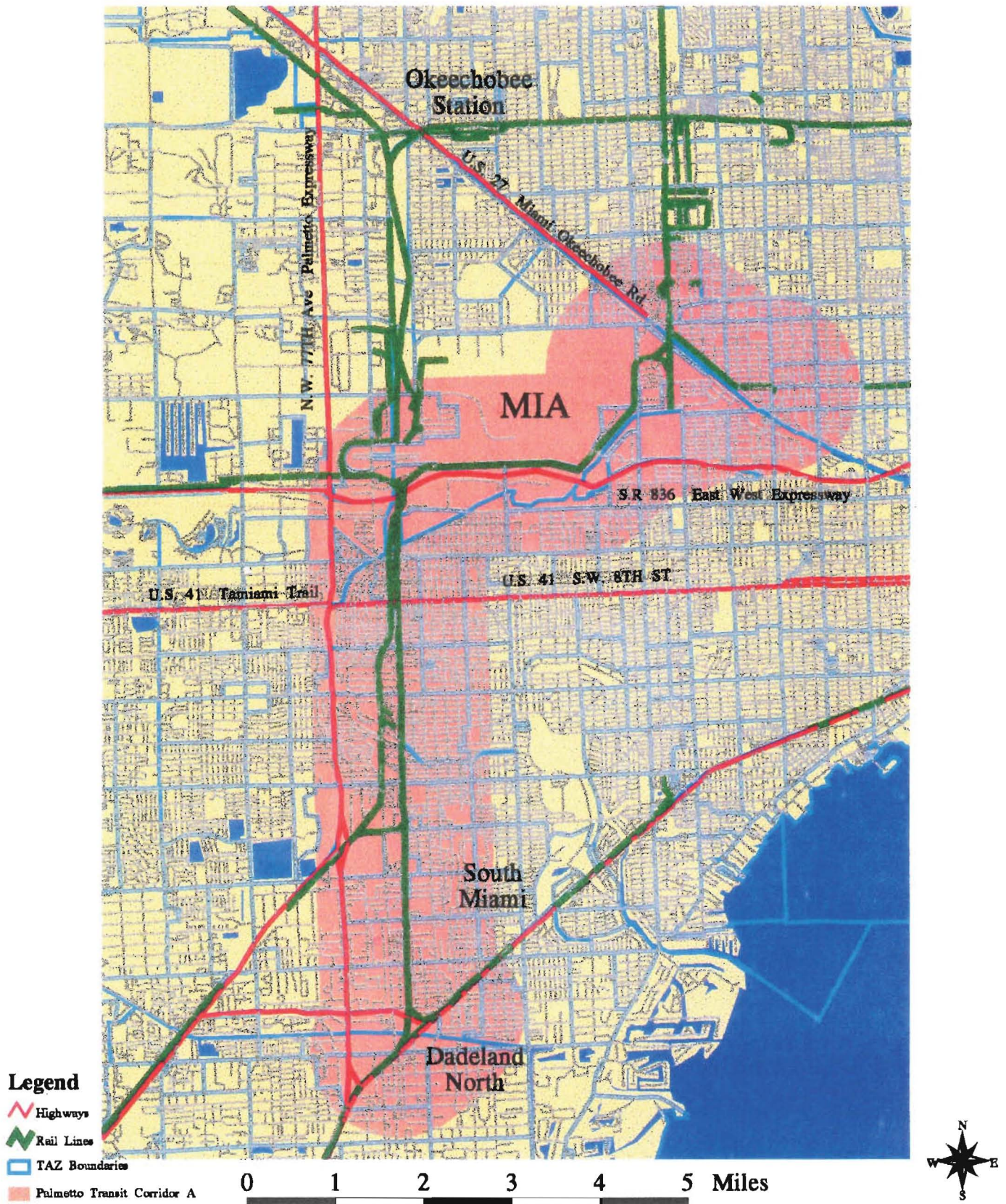
2.2 Study Area Description - As described above, the two corridors being studied for this report are:

- the corridor starting from Dadeland North and running north and then east toward the site of the proposed MIC (labeled Alternative "A" for this report), and
- the corridor beginning at Dadeland North and running north to the Okeechobee Station (labeled Alternative "B" for this report).

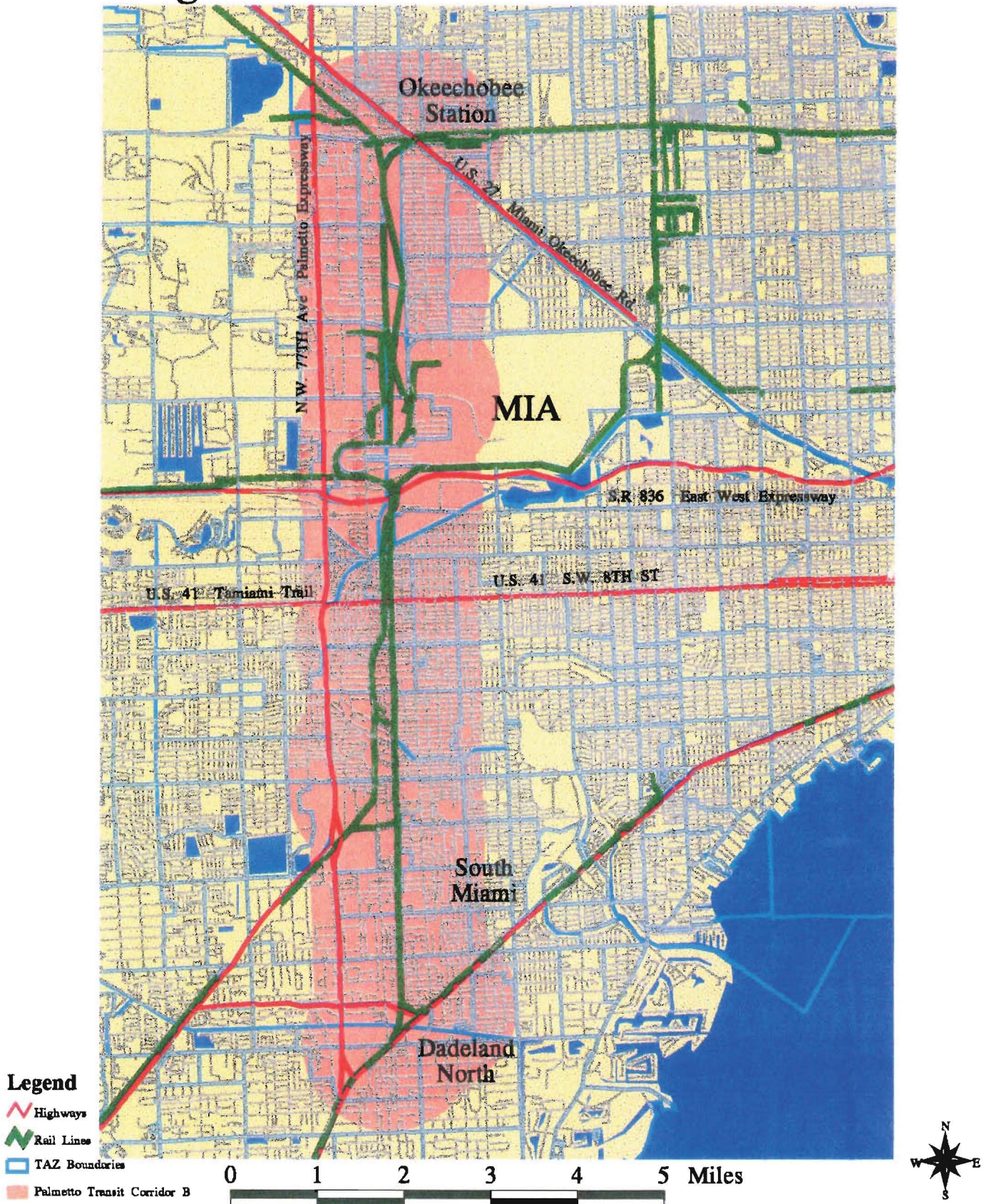
These corridors have a common alignment from the Dadeland North station north to the point under SR 836 of the Oleander interlocking. At that point, Alternative B - after a westward jog around an airport runway - continues north. Alternative A turns eastward. The alignments are shown in **Figures 3 and 4** of this report.

Land uses vary dramatically both from corridor to corridor, and within the individual corridors. Thus, to adequately describe the land uses, the corridors have been divided into six parts, each of which is described below with a photograph typifying the area.

Palmetto Corridor Transit Feasibility Study - Alignment 'A' - MIC Terminus



Palmetto Corridor Transit Feasibility Study - Alignment 'B' - Okeechobee Terminus



A map of Miami, Florida, illustrating the proposed transit line (green line) and existing infrastructure (red lines). The map shows the city grid, major roads, and the proposed transit route. Key features include:

- Proposed Transit Line (Green):** A line running from the north (near the airport) through the city center, passing through the downtown area, and extending south towards the airport.
- Existing Infrastructure (Red):** Major roads and highways, including I-95 (S.W. 37th Ave) and I-111 (S.W. 11th Ave).
- Geographical Labels:** "Dade County", "Miami", "South Miami", and "Dade County North".
- Scale:** A scale bar at the bottom indicates distances in miles (0 to 4 miles).
- Other Labels:** "S.W. 37th Ave", "S.W. 11th Ave", "S.W. 57th St", "S.W. 58th St", "S.W. 59th St", "S.W. 60th St", "S.W. 61st St", "S.W. 62nd St", "S.W. 63rd St", "S.W. 64th St", "S.W. 65th St", "S.W. 66th St", "S.W. 67th St", "S.W. 68th St", "S.W. 69th St", "S.W. 70th St", "S.W. 71st St", "S.W. 72nd St", "S.W. 73rd St", "S.W. 74th St", "S.W. 75th St", "S.W. 76th St", "S.W. 77th St", "S.W. 78th St", "S.W. 79th St", "S.W. 80th St", "S.W. 81st St", "S.W. 82nd St", "S.W. 83rd St", "S.W. 84th St", "S.W. 85th St", "S.W. 86th St", "S.W. 87th St", "S.W. 88th St", "S.W. 89th St", "S.W. 90th St", "S.W. 91st St", "S.W. 92nd St", "S.W. 93rd St", "S.W. 94th St", "S.W. 95th St", "S.W. 96th St", "S.W. 97th St", "S.W. 98th St", "S.W. 99th St", "S.W. 100th St".

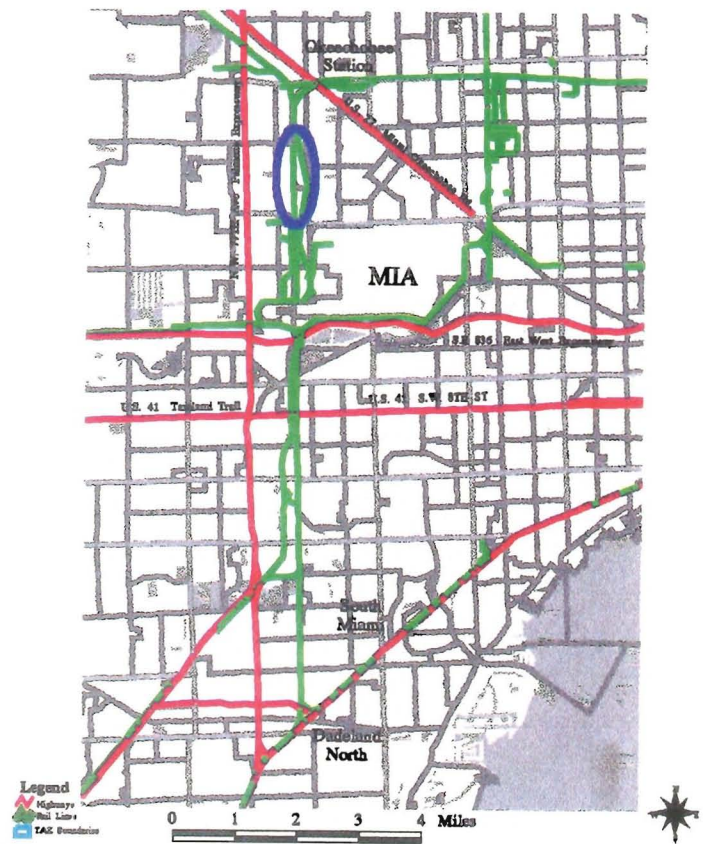
This is an existing Metrorail station that could also be adapted for use by the subject rail service. Such shared use would facilitate transfers between the Palmetto Corridor trolley/DMU service and the Metrorail system.



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2.2.2 FEC Line: Okeechobee Station to MIA

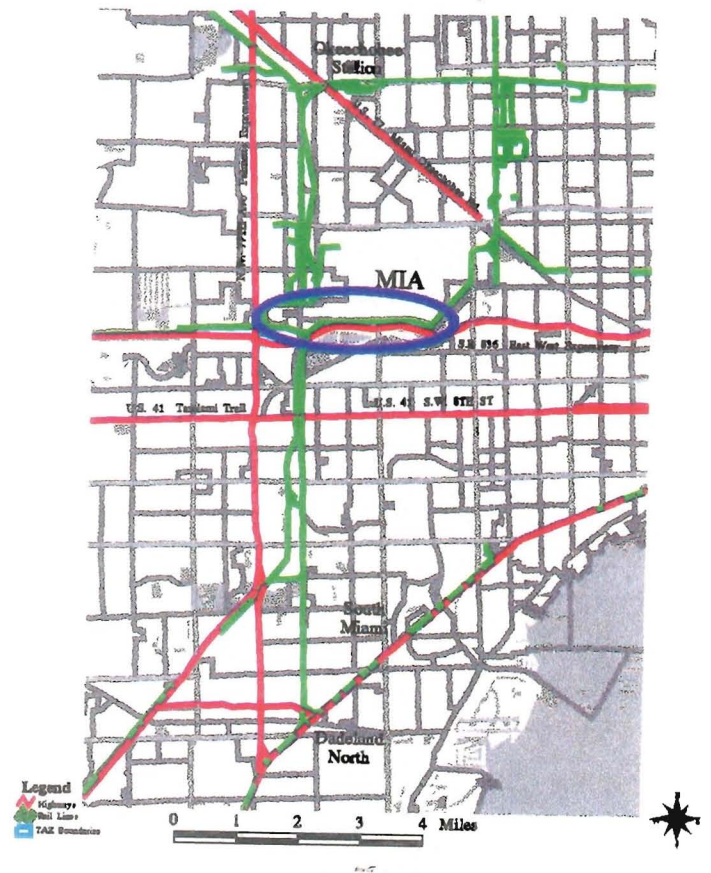
This area is typified by Industrial and/or Manufacturing zoning classifications. The Hialeah rail yards are located adjacent to this stretch of track. The picture below is representative of the area, and was taken looking under NW 36th Street just northwest of the Miami International Airport (MIA).



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2.2.3 Airport Perimeter

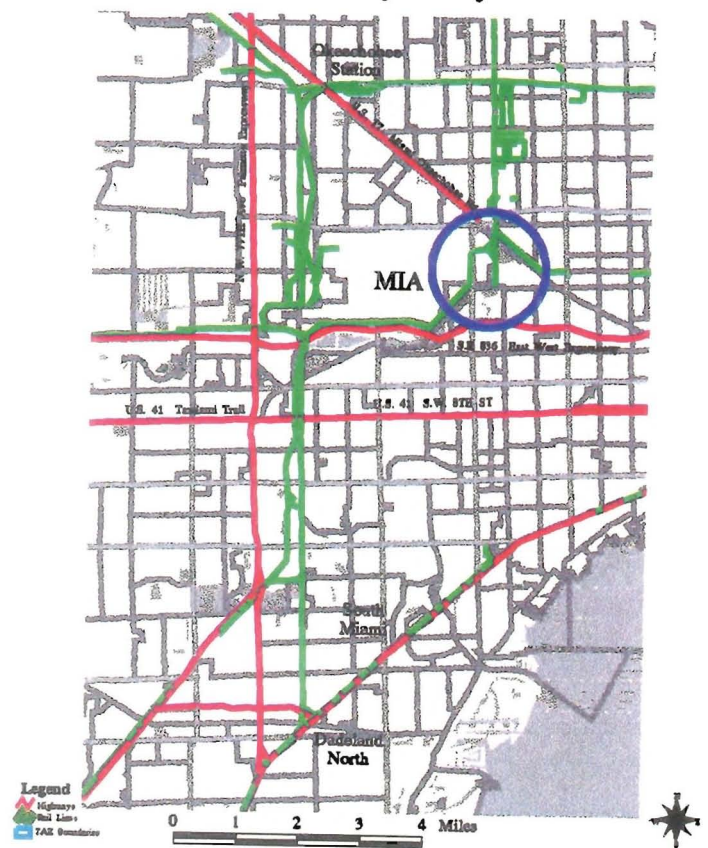
This expanse of existing track surrounds the perimeter of the Miami International Airport (MIA). Some of the track was recently moved for the expansion of a runway. But, connectivity of the rail system was retained.



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2.2.4 East of MIA

The proposed Miami Intermodal Center will be constructed east of MIA, but at a date later than that anticipated for the subject rail service. This is a district with many warehousing and transportation-related land uses, including the convergence of several transportation facilities. The photograph below shows the point where Le Jeune Road, SR 112, and the CSX railroad tracks meet. Note that there is no crossing gate. This is because the needed length of the guide is such that it would penetrate airport air space. This is discussed further in the "Technology" section of this report.



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2.2.5 FEC Line: Southern Leg

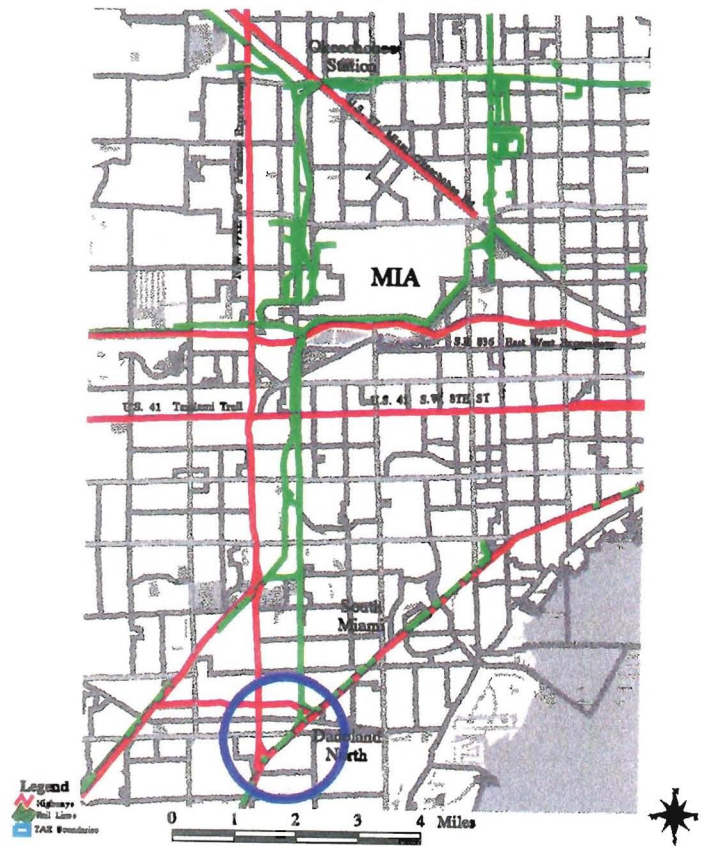
This area is typified by residential and residential support (schools, parks, etc.) land uses. Many of the homes are located in very close proximity to the tracks, as can be seen in the photograph, below. South Miami Elementary School and South Miami High School also directly abut the tracks.



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2.2.6 Dadeland North Area

The proposed southern terminus of the trolley/DMU service would be the Dadeland North Metrorail station, pictured below. Shared use of this station would facilitate transference between the two systems. The Dadeland Mall is currently being constructed just across the street from the station, and would be an attractive use for City of South Miami residents using the proposed service.



2.3 Safety Concerns - As the above descriptions demonstrate, the proposed service will pass in close proximity to homes and schools. Homeowners and school officials should definitely be included at a very early stage in public involvement efforts that will accompany subsequent phases of this project. Involved parties can work together at that time to mitigate any safety concerns.

2.4 Future of the Corridor - The proposed service is a near-term solution to congestion in the Palmetto Corridor. It would not preclude Metrorail service in the Palmetto Corridor in the future. Nor would it compete with the East/West Metrorail Corridor. Portions of proposed corridor *do* parallel the East/West corridor. But, since nothing is being constructed for this proposed service - existing tracks will be used - nothing will be lost if service is modified when East/West service commences, so that the trolley/DMU feeds the Metrorail system, rather than competing with it.

Meanwhile, portions of the proposed trolley/DMU service will operate in the East/West corridor. This will actually benefit the East/West Metrorail line by building a market for it prior to its implementation.

3. Technology Assessment

The type of rail technology that will be employed in this corridor, if service is deemed feasible, is a very critical consideration. For the service to be successful, the technology will have to meet several different criteria. These criteria are discussed in this section of the report.

3.1 Aesthetics/Neighborhood Considerations - This is one of the most important concerns in selecting a technology. Neighborhood considerations have previously halted plans to use these tracks for rail transit. The FEC tracks that the proposed service will use as its southern leg lie in very close proximity to homes in the City of South Miami and adjacent areas. Thus, the technology must be chosen with sensitivity to residents in the area. The technology must be of an appropriate scale. Noise and visual impacts must be considered.

3.2 Interface with Freight - At the same time, the technology *may* have to be of a scale that allows for its use in a mixed-freight environment. This will be the case if agreements are not made with the railroads for periods of "sole occupancy". In other words, one criterion used in selecting a technology is that it should be of a relatively small "neighborhood scale," but that, if necessary, it should be substantial enough to meet the federal "draw and buff" regulations for passenger service operating in a mixed freight environment. In lieu of sole occupancy agreements, the scale of the proposed technology must strike a balance between these competing requirements.

3.3 Propulsion - Another criterion used in selecting a technology is power source. The vehicle(s) will be either electric or diesel. The possible use of Diesel Multiple Units (DMUs) is being explored. There are costs and benefits to either power source. These are being evaluated in conjunction with the other factors that will be considered in the selection of the appropriate technology for the corridor.

If an electrified technology is chosen, negative features of the overhead wire would include (1) visual pollution, and (2) a per mile cost for the wire, itself, and for sub-stations of \$1 to \$1.5 million.

3.5 Acceleration/Speed - This criterion is somewhat less important than those discussed above. Acceleration and speed, along with the number of vehicles in use, will determine the *frequency* of service - whereas Neighborhood Considerations, Interface with Freight, and Propulsion (the presence of the Overhead Wire) determine whether service can be provided at all with a given technology. Either the electric vehicles or the light DMU has better acceleration than the larger DMUs, which are better in a commuter-type environment with less frequent stops.

3.6 Capital Costs and Operating and Maintenance Costs - Capital costs and operating and maintenance costs are examined in the next section of this report. If a larger, FRA-compliant DMU is utilized they would be somewhat more expensive than either the electric or light DMU vehicles. Some type of simple station platform would have to be constructed, regardless of technology. But, the platform would likely have to be somewhat more elaborate/more expensive if a larger, standard DMU were to be used.

Table 1 is a matrix that compares three possible technologies relative to the various attributes. In the table, the DMU technology refers to the standard-sized DMUs, such as the Bombardier DMU, the Nipon-Sharyo DMU, Adtranz's Flexliner, or the Siemens 628. The light DMU is a relatively new technology, and refers to a vehicle such as the Siemens RegioSprinter or Adtranz's Regio Shuttle.

This is a very simple matrix. The "scores" are not weighted, but the criteria are shown generally in their descending order of importance, with such factors as acceleration/speed and maintenance costs being much less expensive than, for example, neighborhood considerations, in selecting a technology.

Table 1
Technology Comparison Matrix

Attribute	Electrification	DMU	Light DMU
Aesthetics/Neighborhood Considerations	Overhead wire (N)	Size, station/stop modification (N)	Small, quiet, no cnstrctn to disrupt nghbrhd (P)
interface with freight/ FRA-compliant	Yes (P)	Yes (P)	No (N)
Airport Glide Path	According to engineers at FDOT that are working on the East/West project, electrification near the airport would be prohibited because of glide path height restrictions. (N)	No wire (0)	No wire (0)
Propulsion/Operating Costs	Electricity (P)	Diesel (0)	Diesel (0) - gets about 4 mile/gallon
acceleration (speed) - Increased speed = increased ridership	(P)	(N)	(P)
capital cost	Requires \$1 - 1.5 million/mile for wire + cars (N)	Requires station/stop modification + cars (N)	Only cars and a few benches and signs to purchase (P)
maintenance cost	Cars + wire (N)	Cars (0)	Cars (0)

(P) = The technology is Positive in terms of this attribute. (0) = The technology is neither positive nor negative in terms of the attribute. (N) = The technology is Negative relative to the attribute.

3.7 Summary of Technology Assessment - The **electric vehicles** and standard-sized DMUs are negative in terms of four and three of the criteria in the table, respectively. Use of electric vehicles would entail both construction and an unsightly wire in close proximity to residences. The capital and maintenance costs would be relatively high, compared to the other technologies. Glide path restrictions would preclude it altogether near the airport.

Standard-sized DMUs are bigger than their light counterparts. Thus, in the matrix they did not "score" as high as the light models in terms of the very important criterion - Neighborhood Considerations. They also scored somewhat lower in terms acceleration and capital costs (cars, plus the somewhat more elaborate platforms).

The **light DMU** is only negative in terms of one criterion - FRA compliance and/or the ability to operate in a mixed-freight environment. But, this is an important criterion that could potentially keep it from being able to operate within either corridor. Sole occupancy agreements must be executed for the light DMUs to run. This is discussed further in Section Three of this report.

For these reasons, the recommended technology is the light DMU, if sole occupancy agreements can be negotiated. If the agreements cannot be negotiated, the standard DMU is the second choice. Electrification is not an option because of glide path considerations.

A demonstration project has recently been completed in Calgary, Alberta, utilizing such a light DMU. Similar demonstration projects are scheduled in Tampa in February/March 1997, and in Orlando in late spring 1997.

Overall, the Calgary transit agency is reported as being "very impressed" with the light DMU, which was very well-received by the public, and "seemed no noisier than a bus." The light DMU did not meet Canadian "draw and buff" regulations, nor would it meet them in the United States. Therefore, in Calgary, a sole occupancy agreement had been executed whereby the vehicle had sole use of the Canadian Pacific (CP) tracks during certain periods of time. In other words, freight trains were not eliminated, their hours were merely restricted.

Highlights of the CP/Calgary Transit sole occupancy agreement were as follows:

- ▶ Liability was a very important issue, and lay completely with the transit authority, regardless of who would have been at fault in the event of an incident.
- ▶ The transit authority paid CP a flat monthly fee.
- ▶ The vehicle was operated by a CP employee - though he wore a transit authority uniform.
- ▶ The vehicle had exclusive use (sole occupancy) for two three-hour (am and pm peaks) periods per day.

4. Alignment and Station Location Analysis

This section of the feasibility study addresses the alignment of the DMU service. One of the study's parameters was that the service should be in the Palmetto Expressway (SR 826) Corridor, so as to address the unmet capacity needs of that corridor. The Dadeland North station was a logical southern terminus for the proposed service. The FEC tracks end in the vicinity of the station.

The study parameters, however, included two potential northern termini for the service - the service could either continue northward on FEC tracks to the Okeechobee Tri-Rail station, or could travel south and then east of the airport (MIA) and terminate in the vicinity of the future Miami Intermodal Center (MIC). These corridors were labeled Alignments A and B, respectively, and are illustrated in **Figures 3 and 4**. To determine which of these northern termini would be the most advantageous, input from track owners, ridership projections, and other unique characteristics of the area were considered.

4.1 Input from Track Owners - There are three separate entities that own track within the two proposed alignment. Track owners include the Florida East Coast (FEC) Railroad, CSX Railroad, and the FDOT. Track ownership is illustrated in Figure 2.

4.1.1 FEC - According to FEC, both the specific tracks that comprise the southern half of both alignments and FEC, itself, are for sale by the parent company. However, either purchase or negotiation for sole occupancy agreements could occur for the tracks south of the Oleander junction, under either the present or future ownership. These tracks are utilized very minimally.

On the other hand, those FEC tracks that comprise the northern half of Alignment B are very heavily traveled. These tracks access the Hialeah Rail Yards, and over twenty trains a day traverse them. It would be extremely difficult to schedule any type of rail transit service over these tracks, and virtually impossible to develop periods of sole occupancy such as are needed to operate the light DMUs.

4.1.2 CSX/FDOT - CSX Railroad sold the tracks that go eastward from Oleander to West Palm Beach - including the east/west portion of Alignment A - to FDOT in 1988. However, CSX retained an operating easement and maintenance responsibilities. Because of the operating easement, it would appear that both parties - CSX and FDOT - would have to participate in any negotiations for a sole occupancy agreement.

CSX trains traverse these tracks. The trains average two round trips per day. There are sometimes three round trips a day on the tracks, with a maximum of four in unusual circumstances. The trains do not operate on a set schedule, but because there are so few of them, some periods of sole occupancy would appear to be negotiable.

FDOT commissioned a study of these tracks in June 1996 called the FEC/CSX Operational Study. The study recommends eliminating a portion of those tracks that comprise the north/eastern portion

of Alignment A. The proposal would eliminate the problematic LeJeune Road crossing, as discussed later in this report; would reduce the construction costs of the SR 112/SR 836 Interconnector; and would allow for airport expansion.

The proposal to eliminate the tracks, and the subject rail transit proposal are not mutually exclusive. The rail transit proposal has always been interim in nature. Elimination of the tracks, if it is approved, could become one phase of the process. When Metrorail service is implemented in the East/West corridor, DMU service in the east/west portion of Alignment A would be discontinued, leaving behind the north/south Palmetto corridor portion to feed the Metrorail service. At that time, the subject service would no longer use the FDOT/CSX tracks, and they could be eliminated.

4.2 Station/Stop Location - Station/stop locations were assumed so that travel demand modeling could be performed for Section Four of this report. These assumed locations are shown in **Figures 5 and 6**. Stops were located at major roadway intersections. These locations will be reviewed and further refined during the potential design stage of this project.

Station locations that are common to both Alignment A and B are:

- ▶ *Dadeland North,*
- ▶ *S.W. 72nd Street,*
- ▶ *Miller Drive,*
- ▶ *Bird Road,*
- ▶ *S.W. 22nd Street,*
- ▶ *Flagler Street, and*
- ▶ *N.W. 12th Street.*

Alignment A then continues westward, with two more stops at:

- ▶ *S.W. 57th Avenue and*
- ▶ *Hialeah/Airport Tri-Rail Station.*

Alignment B continues north with stops at:

- ▶ *N.W. 21st Street,*
- ▶ *N.W. 41st Street,*
- ▶ *N.W. 58th Street, and*
- ▶ *Okeechobee Tri-Rail Station.*

The stops shown in italics are existing rail stations, so parking and amenities can be considered to be in place. Stop location and the siting of parking and amenities will be refined in a subsequent phase of this project.

4.3 Impact upon Highway Crossings - There are many at-grade highway crossings in both potential rail transit corridors. An analysis of the impacts of these corridors upon highway crossings was done as a part of the Railroad Rights-of-Way Assessment. The findings were as follows:

- ▶ Number of crossings. Corridor A = 20, Corridor B = 21.
- ▶ AADT and crossings. Corridor H = High, Corridor I = High.
- ▶ Overall, the Railroad Rights-of-Way Assessment rated corridor A as unfavorable for highway crossings, and corridor B as neutral. This difference may be attributable to the fact that Corridor A crosses LeJuene Road.

A photograph of the CSX/FDOT rail crossing at LeJuene Road near SR 112 can be seen in **Section 2.2.4** of this report. There are crossing gates for the SR 112 crossing, but none for LeJuene Road. The trains stop there and blow their whistles until the highway traffic stops, then they proceed.

There is no crossing gate because, since the tracks cross the roadway at an angle, the gate would have to be 40 feet long to cross the road. A 40-foot long gate would pierce the airport glide path in this location by at least 3 feet.

If frequent rail transit service is to traverse this crossing, some type of regulation would be advisable. Suggestions include: a flag person, a folding gate, or two shorter gates. These options might be explored in a subsequent phase of this project.

4.4 Continuation of Trips to CBD - As discussed above, the northern terminus of Alignment A was, for the purposes of this study, established near the site of the proposed MIC. If, however, the proposed service was to commence in the near term, use of this terminus would have to be re-examined.

There is some merit associated with service terminating at the existing Airport/Hialeah Tri-Rail station. But, providing a quick means of traveling downtown from this terminus would also increase ridership. This could be accomplished through (1) continuation of rail service on the 23rd Street tracks, or (2) through some type of bus service.

4.4.1 23rd Street Rail Service - Continuation of the proposed rail service downtown via the 23rd Street tracks was explored. Such service was found not to be consistent with interim, relatively inexpensive nature of this project. The track is not contiguous to the CBD, and would require the construction of a bridge over the Miami River. For this reason, continuation of the service via the 23rd Street tracks was eliminated as an option for this service.

4.4.2 Bus Service - Currently, Metro-Dade Transit Authority (MDTA) buses serve the area around the airport. A route called the Tri-Rail Shuttle connects the Tri-Rail Station with the main part of the airport, where Tri-Rail patrons can then transfer to routes 7, 37, 42, and J. Of these, route 7 provides a fairly direct path to the CBD with 40 minute headways.

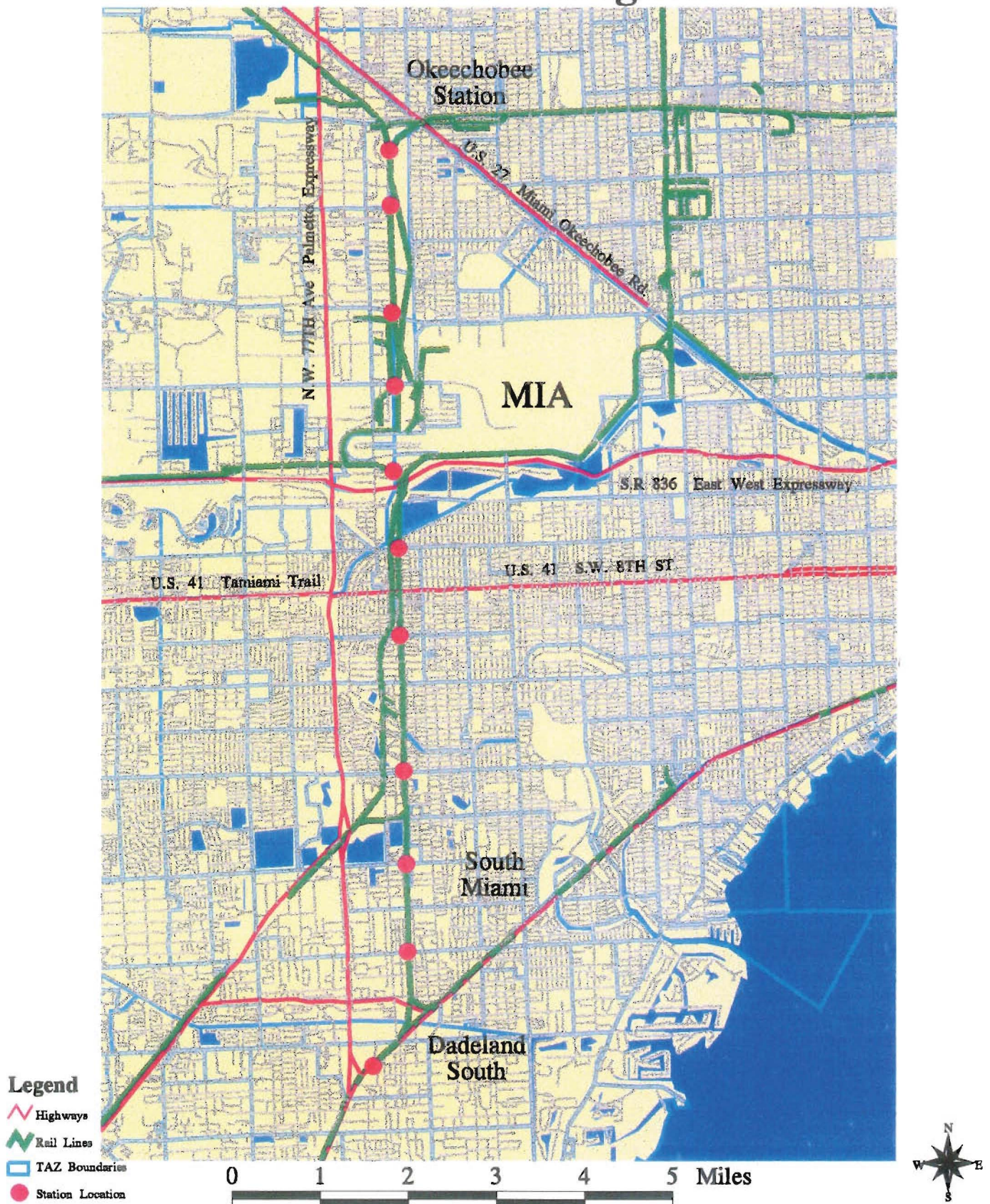
Patrons of the proposed DMU service would also have access to this service, and could, thus, travel to the CBD. One improvement that might be made, and that could be studied in a subsequent phase of this analysis, would be the linking of the Tri-Rail Shuttle route and route 7, for at least a portion of the routes' runs to provide a single, express route to the CBD with no transfers. Transfers are a dis-incentive to the use of transit.

Palmetto Corridor Transit Feasibility Study

- Station Locations - Alignment 'A' -



Palmetto Corridor Transit Feasibility Study - Station Locations - Alignment 'B' -



5. Ridership Analysis

The purposes of this study are to determine (1) whether service is advisable in this corridor, and (2) the optimal northern terminus of trolley/DMU service, if service is determined to be feasible. The FSUTMS model used in the development of the Year 2015 LRTP is being used to test scenarios. Specifically, the Existing plus Committed (E+C) network (Year 2000) is being used to evaluate service as (1) this proposal is for a short-term solution (2) use of the Year 2015 network would place the eastern leg of the proposed corridor in competition with the East-West Metrorail corridor.

Assumptions include the following:

- ▶ Headways were modeled at 30 minutes.
- ▶ E+C network was used.
- ▶ Approximate 30 mph speeds were used (accounting for acceleration, deceleration, and dwell time spent at stops).
- ▶ Stops were as located in **Figures 5 and 6**.

Preliminary analyses were performed on trip produced and attracted to the corridor. A Year 2000 LRTP model trip table was used and trips produced/attracted to/from those traffic analysis zone (TAZ) within 1/2 mile of the alignments were summarized.

Table 2 depicts the trip interchange among and within the two proposed alignments. "South" refers to the 1/2 mile area around the FEC tracks that parallel the Palmetto Expressway; "East" refers to the east/west segment of Alignment A; "North" refers to the northern half of the Alignment B corridor; and "Other" refers to all areas outside of the two alignments.

In using Table 3 to evaluate Alignment A versus Alignment B, it can be noted that a total of about 180,000 trips have at least one end in the "East" area, and about 181,000 have at least one trip end within the north area. Thus, based solely upon the trip tables, the two alignments are equally attractive.

Estimates of actual ridership, however, show that Alignment A has a greater number of boardings. **Figures 7 and 8** depict projected boardings at stations for the Year 2000 for Alignments A and B, respectively. As the figures show, greater ridership can be expected if the proposed rail service follows Alignment A rather than Alignment B. Estimated daily ridership for Alignment A is 5,600 passengers/day, and for Alignment B is 4,300 passengers/day.

In addition to the information gleaned from the model, the greater popularity of Alignment A is somewhat intuitive. The land use surrounding the northern leg of Alignment B is shown and described in **Section 2.2.2** of this report. There are vast parking lots, switching yards, and other uses that are incompatible with pedestrian travel adjacent to the tracks in this location.

For these reasons, Alignment A is recommended as the more feasible alignment for the proposed rail transit service.

Table 2 Trip Interchange

		SOUTH	NORTH	EAST	OTHER	TOTAL
SOUTH	HBW	4,156	4,670	3,241	34,236	46,303
	HBSH	14,536	1,506	370	7,437	23,849
	HBSR	3,516	1,989	3,601	15,866	24,972
	HBO	5,816	3,016	2,776	25,937	37,545
	NHB	11,379	5,905	3,844	51,882	73,010
	TT	3,589	1,600	910	16,992	23,091
	IE/EI	0	0	0	2,756	2,756
	EE	0	0	0	0	0
	TOTAL	42,992	18,686	14,742	155,106	231,526

		SOUTH	NORTH	EAST	OTHER	TOTAL
NORTH	HBW	175	1,188	427	3,845	5,635
	HBSH	431	1,280	101	1,958	3,770
	HBSR	131	1,074	694	2,442	4,341
	HBO	117	1,581	461	2,865	5,024
	NHB	5,883	27,411	8,558	77,973	119,825
	TT	1,623	7,987	2,080	23,174	34,864
	IE/EI	0	0	0	7,645	7,645
	EE	0	0	0	0	0
	TOTAL	8,360	40,521	12,321	119,902	181,104

		SOUTH	NORTH	EAST	OTHER	TOTAL
EAST	HBW	219	649	1,132	6,740	8,740
	HBSH	1,178	716	749	4,284	6,927
	HBSR	151	345	3,122	4,732	8,350
	HBO	143	368	2,288	6,275	9,074
	NHB	3,682	8,599	21,213	76,438	109,932
	TT	893	2,095	5,017	21,815	29,820
	IE/EI	0	0	0	7,261	7,261
	EE	0	0	0	0	0
	TOTAL	6,266	12,772	33,521	127,545	180,104

		SOUTH	NORTH	EAST	OTHER	TOTAL
OTHERS	HBW	55,940	115,133	97,446	1,507,303	1,775,822
	HBSH	109,503	28,690	9,928	758,628	906,749
	HBSR	26,388	36,794	91,099	808,320	962,601
	HBO	32,979	49,739	65,635	1,353,956	1,502,309
	NHB	52,044	78,023	76,484	1,608,549	1,815,100
	TT	16,967	23,226	21,865	623,080	685,138
	IE/EI	2,807	7,542	7,239	570,043	587,631
	EE	0	0	0	1,606	1,606
	TOTAL	296,628	339,147	369,696	7,231,485	8,236,956

		SOUTH	NORTH	EAST	OTHER	TOTAL
TOTAL	HBW	60,490	121,640	102,246	1,552,124	1,836,500
	HBSH	125,648	32,192	11,148	772,307	941,295
	HBSR	30,186	40,202	98,516	831,360	1,000,264
	HBO	39,055	54,704	71,160	1,389,033	1,553,952
	NHB	72,988	119,938	110,099	1,814,842	2,117,867
	TT	23,072	34,908	29,872	685,061	772,913
	IE/EI	2,807	7,542	7,239	587,705	605,293
	EE	0	0	0	1,606	1,606
	TOTAL	354,246	411,126	430,280	7,634,038	8,829,690

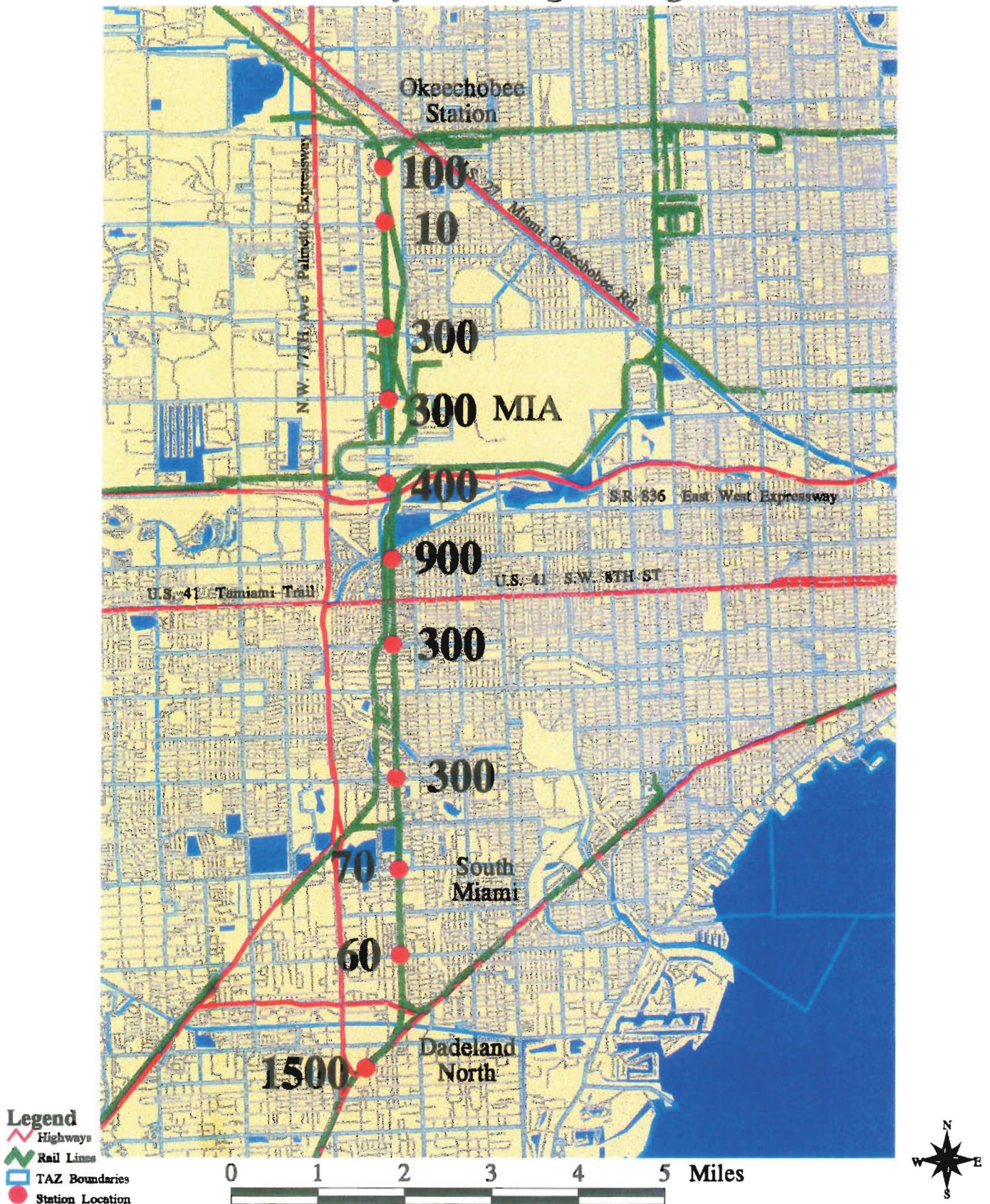
Palmetto Corridor Transit Feasibility Study

- Year 2000 Daily Boardings - Alignment 'A' -



Palmetto Corridor Transit Feasibility Study

- Year 2000 Daily Boardings - Alignment 'B' -



6. Capital and Operating & Maintenance Cost Analysis

Cost information has been developed for the recommended alignment and the recommended technology. Per Sections 3 and 4 of this report, the recommended technology is the "light" DMU, and the recommended alignment is Alignment A, which spans the corridor between Dadeland North and the area east of MIA.

6.1 Proposed Concept - The proposed concept is to have a light DMU traveling on the existing tracks that comprise Alignment A (as shown in **Figure 3**). The Alignment A corridor is about 10 miles long. As was described in the travel demand modeling methodology portion of Section 5 of this report, 30 minute headways were assumed, and a 30 mile per hour speed was assumed, to account for time spent stopped at stations.

The light DMU assumed in the context of this report has seating for 74 persons. To determine the seating - thereby determining the number of vehicles - needed in the corridor, peak hour estimates of ridership are needed. The travel demand forecasts described in Section 5 were developed on a daily basis. However, the busiest segment was that just south of the airport, with stops on either side of U.S. 41. This link had 4,100 trips per day. Applying a presumed peak-to-daily ratio of 15%, peak hour ridership can be presumed to be about 615 persons.

Of these 615 persons, 60% (or about 370 people) can be presumed to be going in the peak direction. Again, 30 minute headways are being assumed, so the 370 persons in the peak hour equates to 185 persons every 30 minutes.

These 185 persons use vehicles with 74 seats, but with standee room for 100. Two such vehicles trained together in either direction with 30 minute headways, would provide 148 seats per direction. Again, 185 seats are needed in the peak hour/peak direction for the busiest link, but 37 standees - about 18 per car - can be assumed during these peak conditions on this short link.

6.2 Capital Costs - Per the above analysis, four light DMUs can be assumed to be needed to serve the corridor. One "spare" should also be available. The price of these type vehicles modified to meet Florida requirements is \$1.5 to \$2.0 million. Therefore, the capital cost of cars for the system would be about \$7.5 to 9.5 million.

6.2.1 Other Capital Costs - Other capital costs would be associated with the development of transit service in this corridor. There are currently freight trains operating on all of the subject tracks. However FRA standards for track/crossings that freight trains traverse are lower than those for track used for passenger service. In addition, the railroads have their own, often higher standards. Therefore, it can be assumed that improvements to the tracks/crossings will be needed.

Estimates of \$1 - \$3 million/mile have been made for bringing track/crossings/bi-pass track to the standard needed for a light DMU. To be conservative, a figure of \$3 million/mile will be used for estimation purposes for this report. If this figure is applied to the approximately 10 miles of track that comprise Alignment A, then the costs of upgrading the track and crossings can be estimated to be about \$30 million.

Capital costs would also be incurred for such items as signs and benches, and perhaps shelters and parking easements. The total cost of these amenities can be estimated to be about \$1 million. However, capital funds are *not* being assumed for the construction of a storage/maintenance facility. It is assumed that an agreement can be reached to use the nearby Tri-Rail maintenance facilities. Thus, the total capital costs of the recommended service are estimated to be: \$7.5 (vehicles) + \$30 (track/crossings) + \$1 (amenities) = \$38.5 million.

6.2.2 Costs of Other Technologies - By way of comparison, the other two technologies that are considered in this report include electrified vehicles and standard-sized DMUs. The average unit cost of a married pair DMU is about \$4.0 million. However, each married pair DMU has about 150 seats. Therefore, only half the number of units would be necessary as compared to the light DMU. Electric vehicles have an average cost similar to the standard DMU.

Thus, the cost of providing cars for rail service on this corridor would not vary substantially among technologies. For electric vehicles and standard DMUs, it can be assumed to be about 2 married pair @ \$4.0 million/or \$8 million, plus 1 spare @ \$12.0 million, for a total of \$7.5 million - essentially the same as the light DMU on a per seat basis. Similar track/crossing upgrades would also be needed for all of the technologies to bring track/crossings up to passenger standards.

However, electric vehicles have capital costs that are not incurred with the use of the light DMU. Low platforms have to be constructed to utilize the low boarding DMU. Costs of platforms vary greatly depending upon their design and upon whether right-of-way is purchased. These platforms would be similar in cost to the light DMU. The capital costs of electrification, including wire and substations, equate to \$1 to \$1.5 million/mile - or about \$12.5 million for the 10 mile corridor.

6.3 Operating and Maintenance Costs - Developing operating and maintenance (O&M) costs for the recommended alignment and technology involves considerable estimation. The recommended technology, the light DMU, is a new technology, so historical O&M data are not available. The information below represents estimates, given the best available data:

6.3.1 Fuel - The model assumes that service operates 2 cars in either direction (every 30 minutes) for 12 hours a day. Thus, it can be presumed that each set of two cars makes one complete round-trip every hour. So, each of the four cars is making 12 round-trips per day. This equates to 48 car-trips.

A round-trip is 20 miles long, and there are 48 car-trips. When multiplied, the product equals 960 vehicle miles of travel per day. Two hundred and fifty-six (256) days of service per year are being assumed to account for weekends and holidays. Thus, 254,400 vehicle miles of travel/year can be presumed.

The light DMU gets about 4 miles/gallon (diesel). A diesel fuel cost of \$0.75/gallon was assumed in the Economics of Diesel Multiple Unit Operations report, referenced in Section Five, above. So, \$.75/4 (cost divided by four miles to the gallon) would equal about \$0.19/mile for fuel. Thus, fuel can be expected to cost (254,400 miles * \$0.19 = \$48,336). Also, the referenced report added a

Capital costs would also be incurred for such items as signs and benches, and perhaps shelters and parking easements. The total cost of these amenities can be estimated to be about \$1 million. However, capital funds are *not* being assumed for the construction of a storage/maintenance facility. It is assumed that an agreement can be reached to use the nearby Tri-Rail maintenance facilities. Thus, the total capital costs of the recommended service are estimated to be: \$7.5 (vehicles) + \$30 (track/crossings) + \$1 (amenities) = \$38.5 million.

6.2.2 Costs of Other Technologies - By way of comparison, the other two technologies that are considered in this report include electrified vehicles and standard-sized DMUs. The average unit cost of a DMU is about \$2.5 million. However, each DMU has about 150 seats - about double the capacity of the light DMU. Therefore, only half the number of units would be necessary as compared to the light DMU. Electric vehicles have an average cost similar to the standard DMU.

Thus, the cost of providing cars for rail service on this corridor would not vary substantially among technologies. For electric vehicles and standard DMUs, it can be assumed to be about 2 vehicles @ \$2.5 million/vehicle or \$5 million, plus 1 spare @ \$2.5 million, for a total of \$7.5 million - the same cost as for the light DMU. Similar track/crossing upgrades would also be needed for all of the technologies to bring track/crossings up to passenger standards.

However, standard DMUs and electric vehicles have capital costs that are not incurred with the use of the light DMU. Platforms have to be constructed to utilize the standard, high-floored DMU. Costs of platforms vary greatly depending upon their design and upon whether right-of-way is purchased. The capital costs of electrification, including wire and substations, equate to \$1 to \$1.5 million/mile - or about \$12.5 million for the 10 mile corridor.

6.3 Operating and Maintenance Costs - Developing operating and maintenance (O&M) costs for the recommended alignment and technology involves considerable estimation. The recommended technology, the light DMU, is a new technology, so historical O&M data are not available. The information below represents estimates, given the best available data:

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A round-trip is 20 miles long, and there are 48 car-trips. When multiplied, the product equals 960 vehicle miles of travel per day. Two hundred and fifty-six (256) days of service per year are being assumed to account for weekends and holidays. Thus, 254,400 vehicle miles of travel/year can be presumed.

The light DMU gets about 4 miles/gallon (diesel). A diesel fuel cost of \$0.75/gallon was assumed in the Economics of Diesel Multiple Unit Operations report, referenced in Section Five, above. So, \$.75/4 (cost divided by four miles to the gallon) would equal about \$0.19/mile for fuel. Thus, fuel can be expected to cost (254,400 miles * \$0.19 = \$48,336). Also, the referenced report added a

A figure of 254,400 vehicle miles of travel/year was calculated in the "Fuel" Section, above, for the system. Thus, maintenance costs can be calculated to be: 254,400 miles * \$0.52/mile = \$132,288/year.

7. Implementation Timeframe

This section contains a conceptual timeframe for implementing the recommended alignment - Alignment A - the airport, and the recommended technology - the "light" DMU. This technology does not necessitate the construction of platforms. Thus, the schedule does not include construction, but does include the following critical items, given the use of only state and/or local funds for the development of this project. These items are shown chronologically.

- (1) Agreements with FEC and FDOT must begin to be negotiated and executed,
- (2) planning and financing studies should be done *concurrently* with the start of negotiations with the railroads. The planning study would fine-tune stop and parking locations and would make recommendations as to the administration of the operation and maintenance of the service. A "Negative Declaration" for environmental impacts should be drawn up. The financial study would fine-tune costs (insurance, operations, etc.) and would recommend revenue sources,
- (3) an engineering study should be undertaken as soon as concurrence is obtained from track owners to assess need for track/crossing upgrades,
- (4) an operator should be advertised for and selected,
- (5) the funding (per the aforementioned financial study) should be obtained, and track/crossing upgrades begun as soon as funding is in place, and
- (6) the vehicles should be ordered, manufactured, and delivered.

Other details would need to be handled, such as distributing benches/shelters, the possible development of easement agreements with property owners for stops/parking lots, etc., but the aforementioned tasks are the most time-consuming and would, therefore, set the schedule. Of these, the vehicle procurement will probably be the lengthiest task.

Manufacturers were contacted regarding the manufacturing and delivery of four hypothetical light DMUs. The representative stated that, "Equipment could be ready within eighteen months of an order being placed."

The schedule for obtaining funding for the system is harder to predict. But, the following would have to occur: (1) the Palmetto Corridor premium transit project would have to move from the "unfunded" portion of the Long Range Transportation to the Cost Feasible Plan via an amendment, (2) the project would have to be included in an update of the Transportation Improvements Program (TIP), and (3) the grant(s) would have to be applied for and received.

The track and crossing upgrades, given an aggressive schedule, could be accomplished within two and a half years. This schedule could be met unless unforeseen problems with the track or crossing

are uncovered during the more in-depth analysis of the existing conditions of the track and crossings that the aforementioned engineering study will provide.

Given all of the tasks that would have to be accomplished, and the timeframes discussed, above, the light DMU system in the Palmetto Corridor could probably be operational within two and a half years of resolutions to "go ahead" with the project. Any major problems in developing the needed agreements with the railroads could compromise this timeframe.