Memorandum

MIAMI-DADE COUNTY

Date: APR 09 2010

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May 12, 2010
Agenda Item No. 7C

To: Honorable Barbara J. Jordan
County Commissioner

From: George M. Burgess
County Manager

Subject: Miami-Dade Transit Report: Modal Options Preliminary Analysis Summary

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This report responds to your request for a study to review the cost of implementing different transit services for the Phases 2 (North Corridor) and 3 (East-West Corridor) of the Orange Line.

A preliminary modal analysis was performed by Miami Dade Transit (MDT) to study the revenue, service, and ridership information on various transit options – Heavy Rail Transit (HRT), Light Rail Transit (LRT), Bus Rapid Transit (BRT), and Bus Rapid Transit-Lite (BRT-Lite) – that could be implemented in the North and East-West Corridors. The analysis focuses on the total cost (capital, state of good repair, operations & maintenance) and cost effectiveness (measured as cost per boarding). Qualitative factors such as economic development, environmental impacts, land use and mobility, albeit important, are not included in this analysis.

METHODOLOGY

The financial model developed to determine the impact of each new transit service option represents a comprehensive 30-year projection of revenues and expenses for MDT. The financial model takes into account the capital investment needed to construct, operate and maintain each line as well as an Infrastructure Renewal Plan (IRP) to keep MDT's transit system safe and secure for the riding public.

Ridership estimates for the analysis were developed using a travel demand model for the year 2030 which combines Miami-Dade and Broward Counties. This model was calibrated with actual surveys conducted by MDT. Using population and employment projections from the Miami-Dade County Planning and Zoning Department, ridership was estimated for each of the options.

The following key assumptions are built into this analysis:

- Federal Funding: No Federal Transit Administration (FTA) New Starts funding is assumed for capital construction.
- State Funding: Florida Department of Transportation (FDOT) is assumed to provide approximately $100 million for the Orange Line-Phase 1, MIC-Earlington Heights Connector (MIC-EH) and a 25% contribution for each of the new modes to the project cost for the North and East-West corridors.
- State Block Grants and Operating Assistance: The plan assumes 2% annual growth in state funding.
- Local Funding Sources:
    - County Maintenance-of-Effort (MOE): Funding grows at 3.5% annually. In 2014 an additional 0.2 mills are provided, growing 3% the first year and 5% thereafter.
    - Charter County Transit System Sales Surtax (Surtax): Revenues are assumed at 1.5% in 2010, 3% in 2011, 4% in 2012, and 5% thereafter.
    - Local Option Gas Tax (LOGT): An additional 2 cents required in 2014, increasing 1.5% annually thereafter.

- Service Growth: Bus revenue miles will not exceed the level of 28.5 million revenue miles.
- Municipal Contribution: 20% of the Surtax revenues currently come "off-the-top" and are allocated to the municipalities of Miami-Dade County.
- Public Works Department: Continued funding for presently programmed road improvements.
- Fares: Fares increase every three years according to the Consumer Price Index (CPI).

TRANSIT OPTIONS

Four new transit service options were analyzed to be placed into service after the MIC-EH Connector opens in 2012: 1) Heavy Rail Transit (HRT), 2) Light Rail Transit (LRT), 3) Bus Rapid Transit (BRT), and 4) Bus Rapid Transit-Lite (BRT-Lite). Each mode is assumed to run along the same general alignment. For the North Corridor, the alignment runs along NW 27th Avenue from Dr. Martin Luther King, Jr. Station to NW 215th Street. For the East-West Corridor the alignment runs along SW 8th Street/Tamiami Trail from 137th Avenue to the Palmetto Expressway then along SR 836 to the Miami Intermodal Center.

- **Option 1 – BRT-Lite** - BRT "Lite" is an express bus service which operates in mixed traffic lanes and includes many standard Bus Rapid Transit features, such as traffic signal priority, low-floor buses for fast boarding, off-bus fare collection, and limited stops. BRT-Lite technology requires limited right-of-way acquisition and less expensive bus stations when compared to a standard BRT. This option is assumed to be operational by 2012 along both the North Corridor and the East West Corridor.

- **Option 2 – BRT** - BRT is a design concept which uses buses to emulate a light rail transit system. BRT has all of the features of BRT-Lite but runs in an exclusive right-of-way. Some system components include exclusive transit lanes, traffic signal priority, level passenger boarding, park and ride lots, advanced hybrid/electric stylized vehicles and off-bus fare collection. Most BRT concepts offer high capacity bus operation along an exclusive bus-only roadway with online stations. This option is assumed to be operational by 2016 on the North Corridor and 2019 on the East-West Corridor.

- **Option 3 – LRT** - LRT can navigate typical roadway intersections and travel along streets, highways, or exclusive rights-of-way. This option is an at grade operation with tracks flush with the street surface running along a dedicated right of way. Rail cars typically receive power from an overhead wire. LRT has more ridership capacity than BRT with faster speeds. This option is assumed to be operational by 2021 on the North Corridor and 2024 on the East-West Corridor.

- **Option 4 – HRT** - HRT is the same Metrorail technology the County presently operates. Trains run along an exclusive elevated guideway where vehicles receive power from a third rail. HRT has the greatest ridership capacity and speed of any mode studied. This option is assumed to be operational by 2017 on the North Corridor and 2024 on the East-West Corridor.

Operating years were based on the time needed to prepare necessary studies and plans, obtain necessary approvals, and construction.

ANALYSIS SUMMARY

The modal analysis reviewed the cost, revenue, service, and ridership information on each new transit service options. The most pertinent results are summarized below.

Cost

The cost (Capital + Infrastructure Renewal + Operations & Maintenance) was calculated for each new transit option after the MIC-EH is in place, currently scheduled for 2012.

Annualized cost was used in the analysis to account for time differences in implementing the various options. This cost is the equivalent yearly amount required to build, operate and maintain each new service. A benefit of using annualized costs is that the results of this analysis remain the same regardless of the implementation schedule for the capital expenditures for the North Corridor and East-West Corridor extensions.

Based on the findings, the new transit service options from least costly to most costly are shown in the following table. However, it is important to note that the table only includes costs for adding the North and East-West Corridors. They do not include costs (Capital, Infrastructure Renewal, Operations & Maintenance) for the existing systems or the MIC-EH Connector.

Table 1. ESTIMATED ANNUALIZED COSTS

Modal Options	Service Option	Annualized Capital Cost ($ Millions)	Annualized IRP[1] Cost ($ Millions)	Annualized O&M Cost ($ Millions)	Annualized Capital + IRP + O&M Cost ($ Millions)
1	BRT Lite	$18	$1	$19	$38
2	BRT	$69	$5	$17	$91
3	LRT	$136	$14	$72	$222
4	HRT	$193	$14	$112	$319

1 – Infrastructure Renewal Plan

Cost per Boarding

The estimated cost per boarding for each transit option was calculated by dividing the total cost by the number of boardings. This is a measure of the cost effectiveness for each new transit line. The boardings are assumed in the model year 2030 to provide a common frame of reference. The cost per boarding only includes the incremental cost per boarding for adding the North Corridor and East-West Corridor. They do not include cost or ridership for the existing system or the MIC-Earlington Heights Connector.

The LRT and HRT options are forecasted to carry a substantially higher number of riders as these modes are ultimate "premium" transit modes with faster travel times and attract a higher number of patrons than the BRT-Lite and BRT options. The HRT is estimated to carry the highest number of riders since it is grade separated, has the lowest travel time and is the only option offering a seamless connection (no transfer) along the East-West line to Dadeland South. Similarly, an HRT option for the North Corridor also offers a continuous ride (no transfer) to Downtown Miami from the Dade-Broward County line. The forecast models are most responsive to lower travel times.

Based on the analysis, the most cost-effective new service transit options (i.e. lowest incremental cost per boarding in the Year 2030), from lowest to highest are:

Table 2

Service Option	Estimated Cost Per Boarding[2]
Option 1 BRT-Lite	$ 7.3
Option 2 BRT	$10.5
Option 4 HRT	$12.7
Option 3 LRT	$13.4

2 – Excluding MIC-EH Extension

Even though LRT and HRT have a much higher number of boardings, the premium rail options are seen to have even higher relative capital and operations costs. Accordingly, the premium rail options have a much higher cost-per-boarding, and thus are less cost-effective, than the premium bus options. The LRT option in particular has capital and operations costs on par with HRT but with noticeably fewer boardings than HRT. By comparison, the base system (existing system + MIC-EH) estimated cost per boarding is $10.80 in the year 2030 based on 120 million annual systemwide boardings.

This result indicates that new premium bus service (BRT-Lite or BRT) can be provided along the North and East-West Corridors by MDT at a cost-per-boarding that is more cost-effective and lower in cost than new premium rail service (LRT or HRT). Therefore, the estimated boardings for each modal alternative in the Year 2030 are:

Table 3

Estimated Annual Boardings YR 2030 (Millions)			
Modal Options	**Description**	**YR 2030 Systemwide Boardings (Millions)[3]**	**YR 2030 Incremental Boardings (Millions)[4]**
	Existing System + MIC-EH	120	N/A
1	BRT-Lite	124	5.2
2	BRT	130	8.7
3	LRT	140	16.6
4	HRT	151	25.2

3 – Includes existing system + MIC-EH + rail extensions + Metrobus + Metromover.

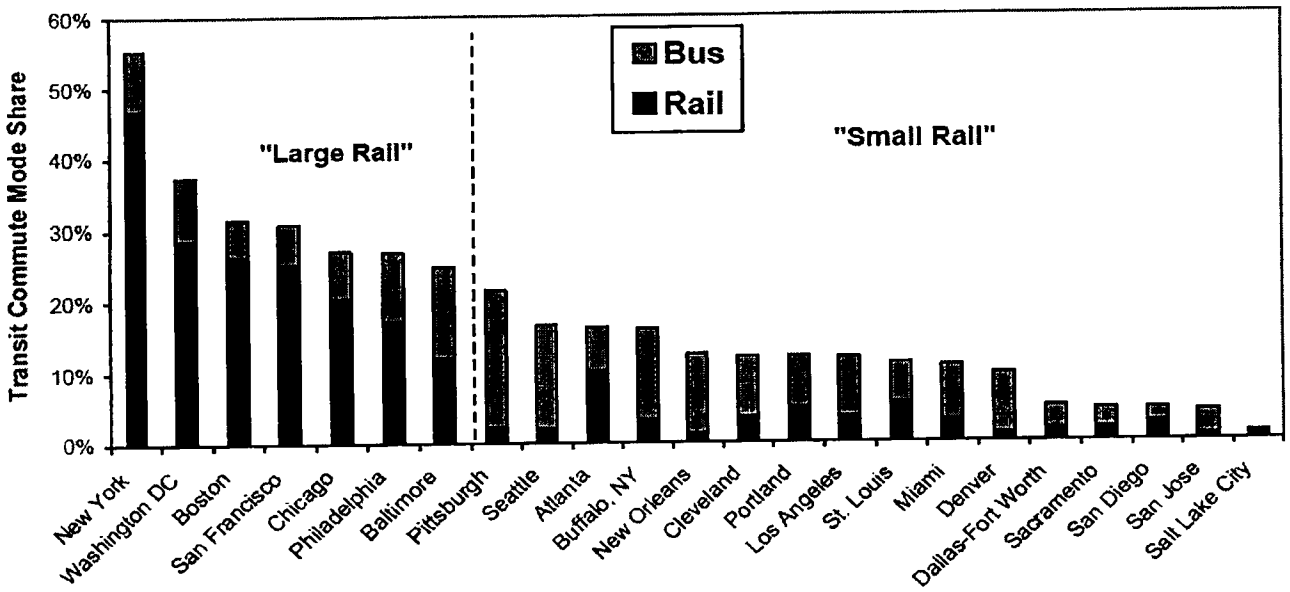
4 – Extensions only (excluding MIC-EH Extension).

The evaluation of cost-effectiveness is directly related to the levels of ridership. To provide perspective on these results, about two dozen U.S. cities have some sort of rail transit system, but most are small and so cannot be expected to significantly affect regional transportation performance, although they may have significant impacts on a particular corridor or district. To compare their relative performance, U.S. cities and their metropolitan regions can be divided into three categories:

- Large Rail – Rail transit is a major component of the transportation system.
- Small Rail – Rail transit is a minor component of the transportation system.
- Bus Only – City has no rail transit system.

Seven cities are classified as "Large Rail," meaning that more than 20% of commutes are by transit, and more than half of transit passenger-miles are by rail, as Figure 1 below illustrates. Miami-Dade County can be seen to fall within the lower range of the "Small Rail" cities. This may reflect a fundamental transit characteristic of the area driven by factors including: urban area density, office space and employment concentration in the central business district (CBD), parking limits in the CBD, and passenger car ownership rates and operating costs. The high capital and O&M costs of the premium rail alternatives are especially difficult to recoup due to these ridership limitations.

Figure 1 **Transit Commute Mode Share** (FTA 2001)



This figure shows the portion of commutes by rail and bus transit. Only a few cities have rail systems large enough to significantly impact regional transportation system performance.

Needs Beyond Existing and Assumed Revenues

As has been stated previously, the baseline assumptions include an increase in revenue that equates to 0.2 mills and 2 cents of LOGT in 2014, which are needed to fund both the current level of service and the future operations and maintenance of the MIC-EH Connector. The 30-year estimated revenue needs beyond these baseline assumptions for each new transit service option was reviewed. As you are aware, the existing system includes the current service levels for Metrorail, Metrobus, Metromover and Special Transportation Services (STS). MDT continues to implement service efficiencies that will help to balance its pro forma over the next 30 years; however, as in prior analyses, MDT is projected to have insufficient funds to implement new transit service options including the MIC-EH without the infusion of new revenue, in addition to maintaining its current service and fixed infrastructure. The difference in needs beyond existing and assumed revenues increases for each new transit option built based on its cost to build, operate and maintain. The results show that the BRT options would be less costly to build, operate and maintain than the rail options.

The estimated 30-year needs beyond existing and assumed revenues for each option are as follows:

Table 4

Options[5]	Estimated Funding Gap
Existing System + MIC-EH Connector	---
Existing System + MIC-EH Connector + Option 1 (BRT-Lite)	$0.8 Billion
Existing System + MIC-EH Connector + Option 2 (BRT)	$1.7 Billion
Existing System + MIC-EH Connector + Option 3 (LRT)	$5.5 Billion
Existing System + MIC-EH Connector + Option 4 (HRT)	$7.2 Billion

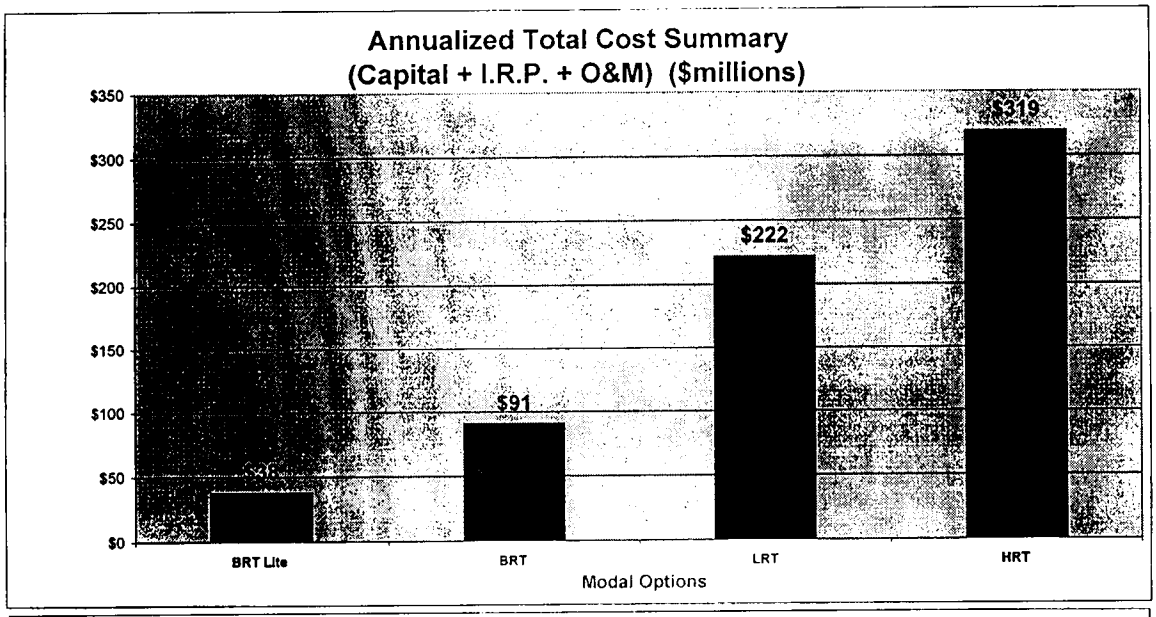
5 - Additional 0.2 mills and 2 cents CI-LOGT are assumed in these scenarios

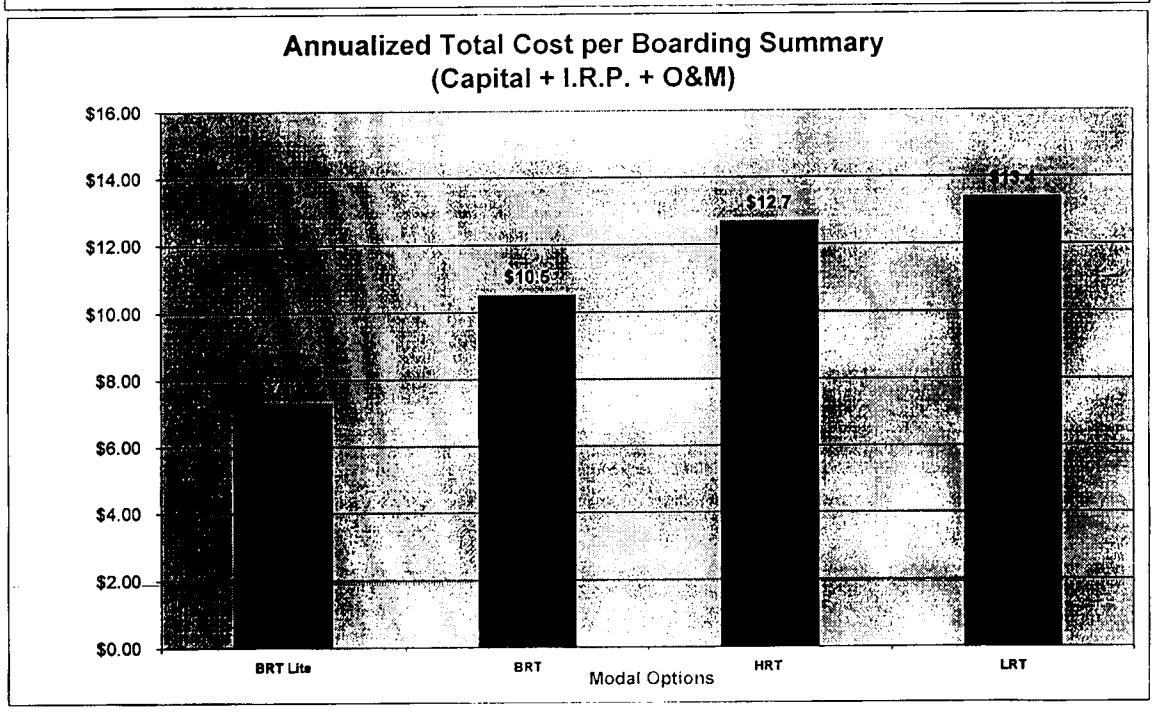
The results for each of the three analyses are shown graphically in the attached table. There appear to be cost-effective options to provide new premium transit service along the North and East-West Corridors; however, any new service, including operations and maintenance of the MIC/EH Connector, will require additional funding to balance the MDT budget.

c: Honorable Carlos Alvarez, Mayor
Ysela Llort, Assistant County Manager
Jennifer Glazer-Moon, Special Assistant/Office of Strategic Business Management Director
Harpal Kapoor, Miami-Dade Transit Director
Jose Mesa, Executive Director, Metropolitan Planning Organization
Charles Scurr, Executive Director, Office of the Citizens' Independent Transportation Trust

Miami-Dade Transit Modal Options Tables

Extensions Only (North Corridor and East-West Corridor)





FUNDING GAP, COST AND RIDERSHIP

Modal Options	Description	30-Year Estimated Funding Gap ($Billions)	YR 2030 Annual Boardings (Millions)	Annualized Capital + I.R.P. + O&M Cost ($Millions)	Annualized Capital + I.R.P. + O&M Cost per YR 2030 Boarding
1	BRT Lite	$0.8	5.2	$38	$7.3
2	BRT	$1.7	8.7	$91	$10.5
4	HRT	$7.2	25.2	$319	$12.7
3	LRT	$5.5	16.6	$222	$13.4

Cost and ridership information is incremental and does not include data for the existing system or the MIC-Earlington Heights Connector.