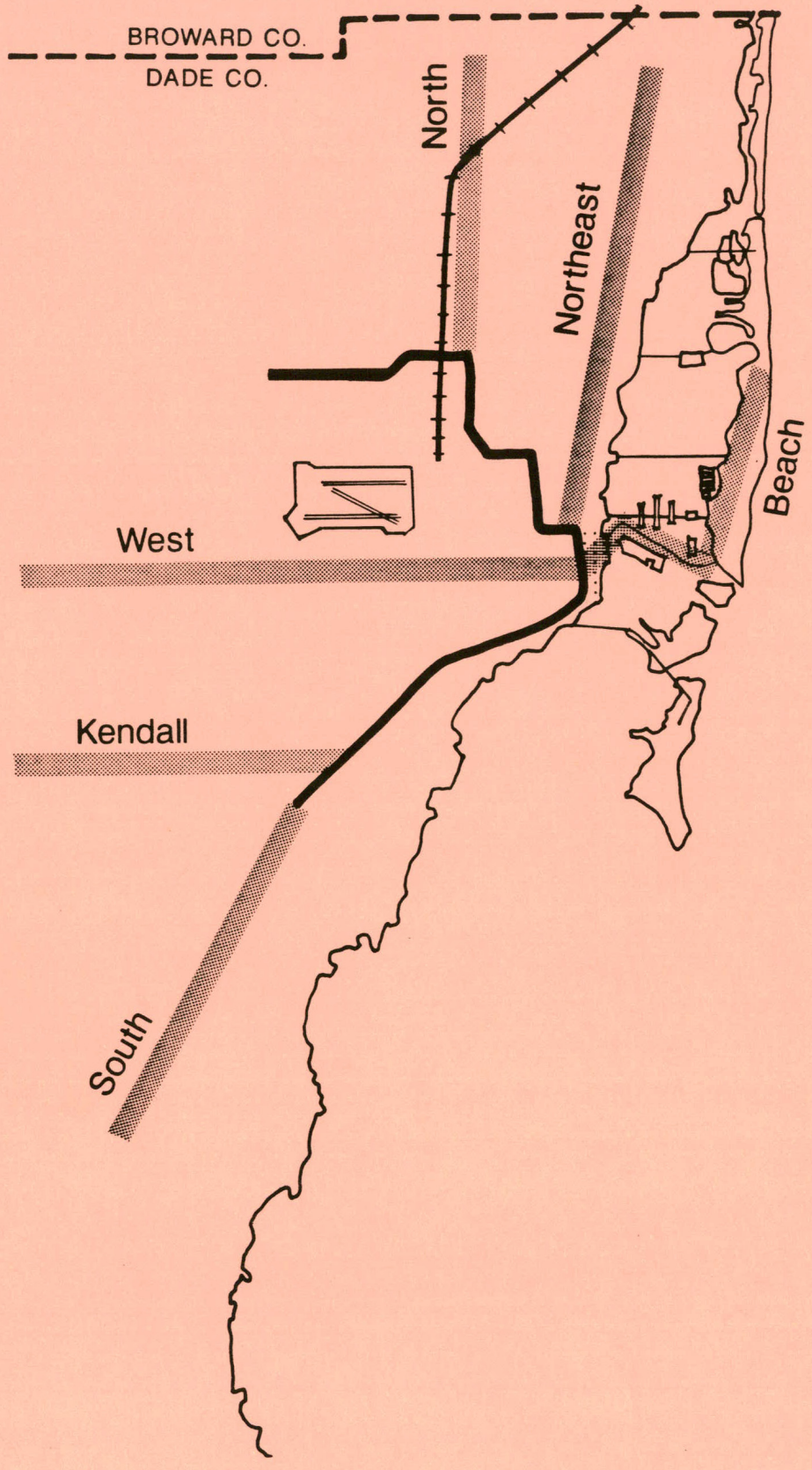

METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County Transit Corridors Transitional Analysis

Technical Memorandum Task 5:

Operating and Maintenance Cost Estimating Process and Results

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DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS

TECHNICAL MEMORANDUM

OPERATING AND MAINTENANCE COST ESTIMATING PROCESS AND RESULTS

INTRODUCTION

This technical report documents the development of operating and maintenance (O&M) cost models and the O&M cost estimating results for the bus and rail transit modes considered as part of the Dade County Transit Corridors Transitional Analysis. Included in this report are a discussion of the sources and method for O&M cost model development and a presentation of the cost estimating results. The O&M cost models for the Transitional Analysis are based on adapting the long range financial forecasting model set used by MDTA to the productivity factor O&M cost model structure recommended by the Federal Transit Administration (FTA) for alternatives analysis studies.

The report presents the development of the bus and rail cost models, the estimation of the changes in bus and rail services for each of the transit improvement alternatives and the estimated O&M costs changes for each of the alternatives.

O&M Cost Model Development

The long range financial forecasting model, used as a basis for the O&M cost models for the Transitional Analysis are maintained and updated annually by the MDTA, including a validation of the model performance. The MDTA model set includes an O&M cost estimating model for all modes operated by MDTA. The discussion below focuses on the heavy rail and bus modes, two modes of interest in the Transitional Analysis.

MDTA's O&M cost model was originally developed and calibrated from three years of Section 15 data, FY 1984, 1985, and 1986. The model has subsequently been updated on annual basis.

The study's models, derived from the MDTA model, use a methodology consistent with FTA guidance for capital project evaluation. FTA's general modelling approach for transit models is to develop productivity-based unit costs which are applied to various measures of transit service provision or operating and maintenance requirements such as platform hours, total vehicle miles, single track miles, or peak vehicles, using recent cost and operating data. These unit costs are then applied to estimates of changes in output measures associated with each transit alternative to obtain estimated changes in operations and maintenance costs. Although MDTA's break out of costs is not precisely equivalent to the FTA standard accounts format, the model provides reasonable estimates of annual operations and maintenance costs.

Two basic models were developed: bus and rail transit. Two rail transit models were developed: one for Metrorail, which was also used for the "hybrid" rail alternatives, and one for light rail transit which was a variation of the Metrorail model.

Bus Operating and Maintenance Cost Model Development and Estimates

For the bus operating system, the model estimates operating and maintenance costs as a function of five variables, using a unit cost of operation for each of these variables. Table 1 shows the unit costs that apply to these variables. The model was developed in FY1990 dollars and escalated to 1992.

TABLE 1
DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
BUS AVERAGE UNIT COST SUMMARY
(1990 Dollars)

	INPUT VARIABLE				
COST CATEGORY	Platform Hours	Vehicle Hours	Vehicle Miles	Passenger Boardings	Garages
Operator Salaries and Fringe	$25.2549				
Other Salaries and Fringe		$3.9827			
Vehicle Maintenance			$0.6976		
Non-Vehicle Maintenance					$720,629
General Adminstration			$0.2801		
Fuel and Lubricants			$0.1636		
Tires and Tubes			$0.0551		
Other Materials and Supplies			$0.1783		
Outside Contractual Services					$1,500,000
Miscellaneous Contractual Services			$0.0393		
Insurance Expense				$0.0563	
Purchased Transport		$4.2000			
Miscellaneous Expense			$0.0238		$90,000
UNIT COST PER VARIABLE	$25.2549	$8.1827	$1.4378	$0.0563	$2,310,629
Escalated 15% to 1992 dollars	$29.0431	$9.4101	$1.6535	$0.0647	$2,657,223

The unit costs along the bottom row of the table constitute the O&M cost model. The unit costs for the bus mode in Table 1 are based on the resource build up equations and productivity factors presented in Appendix A. Table 2 shows the estimates of bus operating statistics for each alternative which was estimated by Dade County's regional travel demand forecasting model used in preparation of the ridership forecasts. These estimated changes in bus operations in the year 2010 are relative to the future baseline condition and are based on the alternatives definition and the year 2010 service plans for each alternatives used as input to the travel demand forecasts. Each unit cost is applied to the changes in the respective service variable to obtain the estimated changes in bus O&M cost. The results are presented in Table 3. The cost associated with transit passenger activities was calculated separately in Table 4.

Rail Operating and Maintenance Cost Model

For the Metrorail operating system, the model estimates operating and maintenance costs as a function of nine variables, using a unit cost of operation for each of these variables. Table 5 shows the unit costs that apply to these variables. The model was developed in FY1990 dollars and escalated to 1992. The unit costs along the bottom row of the table constitute the O&M cost model. The unit costs for the rail mode in Table 5 are based on the resource build up equations and productivity factors presented in Appendix A. The "hybrid" rail modes was treated the same as Metrorail because it would share operations with the Metrorail. A separate cost model was developed for the "stand alone" LRT options using a combination of the Metrorail model as a base and adjusting facility maintenance parameters with information from recently implemented LRT systems.

The estimates of rail transit operating statistics for each alternative was estimated using a train operations spreadsheet program especially developed for this study (Appendix B.) The estimated changes in rail operations in the year 2010 are relative to the future baseline condition and are based on the alternatives definition and the year 2010 service plans for each alternatives used as input to the travel demand forecasts. Each unit cost is applied to the changes in the respective service variable to obtain the estimated changes in rail O&M cost. The results are presented in Appendix B. The cost associated with transit passenger activities was calculated separately in Table 4.

The following train operations assumptions were made for the purposes of the study:

Recovery/Layover Time	10% of the one way Travel Time
Peak Period	8 hours
Non-peak Period	10 hours
Spare Ratio	20%
Days per Year	298
Dead Head Miles	5% of Revenue Miles

These assumptions are consistent with current and expected MDTA operations.

Train car consists and headways were adjusted to reflect passenger loadings forecasted in the ridership estimates. Peak vehicle requirements were estimated based on the number of projected peak period boardings, the service and operating characteristics of each route and the capacity of the vehicles which serve each route. A spare ratio of 20% is then applied to the peak vehicle to estimated the total vehicles required for each alternative. The vehicle requirements are relative the future baseline condition and reflect existing MDTA fleet sizes. Table 6 provides a summary of the vehicle requirements which was used in the capital cost estimates.

TABLE 2

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS

BUS SYSTEM OPERATING AND MAINTENANCE STATISTICS

ALTERNATIVES	ANNUAL CHARACTERISTICS			RELATIVE TO TSM		
	Bus Miles	Bus Hours	Peak Vehicles	Bus Miles	Bus Hours	Peak Vehicles
TSM	29,571,000	2,349,000	713	N/A	N/A	N/A
S1-Homestead Busway	30,165,000	2,360,000	720	594000	11000	7
S2-Fla City Hybrid	28,346,000	2,307,000	697	-1225000	-42000	-16
S3-Fla City Metrorail	28,346,000	2,307,000	697	-1225000	-42000	-16
K1-Killian Busway	29,621,000	2,349,000	713	50000	0	0
K2-Kendall LRT	29,428,000	2,346,000	700	-143000	-3000	-13
K3-Kendal Metrorail	29,439,000	2,346,000	700	-132000	-3000	-13
N1-NW 27 Busway	30,314,000	2,378,000	715	743000	29000	2
N2-NW 27 Direct	29,396,000	2,343,000	704	-175000	-6000	-9
N3-NW 27 via Glades	29,050,000	2,335,000	694	-521000	-14000	-19
NE1-Busway	31,232,000	2,359,000	708	1661000	10000	-5
NE2-LRT	28,498,000	2,278,000	690	-1073000	-71000	-23
NE3-Hybrid LRT	28,498,000	2,278,000	690	-1073000	-71000	-23
NE4-Metrorail	28,519,000	2,238,000	690	-1052000	-111000	-23
W1-836 via MIA	28,781,000	2,328,000	693	-790000	-21000	-20
W2-836 Direct	28,793,000	2,329,000	694	-778000	-20000	-19
W3-836/Flagler	28,523,000	2,307,000	689	-1048000	-42000	-24
W4-Flagler LRT	28,318,000	2,294,000	684	-1253000	-55000	-29
B1-Beach	27,743,000	2,220,000	674	-1828000	-129000	-39
WB1-MBCC-FIU via MIA	27,223,000	2,202,000	654	-2348000	-147000	-59
WB2-via McArthur	27,235,000	2,203,000	655	-2336000	-146000	-58
WB3-via Tunnel	27,254,000	2,203,000	655	-2317000	-146000	-58

TABLE 3
DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
BUS OPERATING AND MAINTENANCE COST CALCULATIONS

ALTERNATIVES	ANNUAL CHARACTERISTICS			ANNUAL COST					TOTAL	Change from TSM
	Bus Miles	Bus Hours	Peak Vehicles	Bus Miles $1.65	Platform Hours $29.04	Bus Hours $9.41	Peak Vehicles $8,529.55	Maintenance Facilities $2,657,223.35		
TSM	29,571,000	2,349,000	713	48,898,162	68,222,324	22,104,337	6,081,569	5,314,447	150,620,839	N/A
S1-Homestead Busway	30,165,000	2,360,000	720	49,880,392	68,541,799	22,207,848	6,141,276	5,314,447	152,085,761	1,464,922
S2-Fla City Hybrid	28,346,000	2,307,000	697	46,872,520	67,002,512	21,709,112	5,945,096	5,314,447	146,843,688	-3,777,151
S3-Fla City Metrorail	28,346,000	2,307,000	697	46,872,520	67,002,512	21,709,112	5,945,096	5,314,447	146,843,688	-3,777,151
K1-Killian Busway	29,621,000	2,349,000	713	48,980,841	68,222,324	22,104,337	6,081,569	5,314,447	150,703,518	82,679
K2-Kendall LRT	29,428,000	2,346,000	700	48,661,699	68,135,195	22,076,106	5,970,685	5,314,447	150,158,132	-462,707
K3-Kendal Metrorail	29,439,000	2,346,000	700	48,679,889	68,135,195	22,076,106	5,970,685	5,314,447	150,176,322	-444,517
N1-NW 27 Busway	30,314,000	2,378,000	715	50,126,776	69,064,575	22,377,230	6,098,628	5,314,447	152,981,655	2,360,817
N2-NW 27 Direct	29,396,000	2,343,000	704	48,608,785	68,048,065	22,047,876	6,004,803	5,314,447	150,023,976	-596,863
N3-NW 27 via Glades	29,050,000	2,335,000	694	48,036,644	67,815,720	21,972,595	5,919,508	5,314,447	149,058,914	-1,561,925
NE1-Busway	31,232,000	2,359,000	708	51,644,767	68,512,755	22,198,438	6,038,921	5,314,447	153,709,328	3,088,489
NE2-LRT	28,498,000	2,278,000	690	47,123,865	66,160,262	21,436,219	5,885,389	5,314,447	145,920,182	-4,700,656
NE3-Hybrid LRT	28,498,000	2,278,000	690	47,123,865	66,160,262	21,436,219	5,885,389	5,314,447	145,920,182	-4,700,656
NE4-Metrorail	28,519,000	2,238,000	690	47,158,591	64,998,536	21,059,815	5,885,389	5,314,447	144,416,778	-6,204,061
W1-836 via MIA	28,781,000	2,328,000	693	47,591,830	67,612,418	21,906,724	5,910,978	5,314,447	148,336,397	-2,284,441
W2-836 Direct	28,793,000	2,329,000	694	47,611,673	67,641,461	21,916,135	5,919,508	5,314,447	148,403,223	-2,217,615
W3-836/Flagler	28,523,000	2,307,000	689	47,165,205	67,002,512	21,709,112	5,876,860	5,314,447	147,068,136	-3,552,702
W4-Flagler LRT	28,318,000	2,294,000	684	46,826,220	66,624,952	21,586,781	5,834,212	5,314,447	146,186,611	-4,434,227
B1-Beach	27,743,000	2,220,000	674	45,875,409	64,475,760	20,890,433	5,748,917	5,314,447	142,304,965	-8,315,874
WB1-MBCC-FIU via MIA	27,223,000	2,202,000	654	45,015,544	63,952,983	20,721,051	5,578,326	5,314,447	140,582,351	-10,038,487
WB2-via McArthur	27,235,000	2,203,000	655	45,035,387	63,982,026	20,730,461	5,586,855	5,314,447	140,649,177	-9,971,662
WB3-via Tunnel	27,254,000	2,203,000	655	45,066,806	63,982,026	20,730,461	5,586,855	5,314,447	140,680,595	-9,940,243

TABLE 4
DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
ANNUAL OPERATING AND MAINTENANCE COSTS

NET CHANGE RELATIVE TO TSM*

Alternatives		Bus Component	Light Rail Transit Component	Metrorail Component	Costs Associated with Passenger Activities	Total
TSM/Base		N/A		N/A	N/A	N/A
S1	Busway Extension to Florida City	1,465,000		0	28,000	1,493,000
S2	"Hybrid" Metrorail	-3,777,000		16,890,000	129,000	13,242,000
S3	Metrorail	-3,777,000		15,226,000	143,000	11,592,000
K1	Busway	83,000		0	2,000	85,000
K2	"Hybrid" Metrorail	-463,000		11,986,000	107,000	11,630,000
K3	Metrorail	-445,000		8,986,000	97,000	8,638,000
N1	Reversible Bus Lane	2,361,000		0	94,000	2,455,000
N2	Direct Metrorail	-597,000		8,289,000	256,000	7,948,000
N3	Metrorail via Golden Glades	-1,562,000		9,486,000	230,000	8,154,000
NE1	Busway	3,088,000		0	320,000	3,408,000
NE2	Standard LRT	-4,701,000	8,800,000	0	246,000	4,345,000
NE3	"Hybrid" Metrorail	-4,701,000		14,177,000	242,000	9,718,000
NE4	Metrorail	-6,204,000		12,992,000	237,000	7,025,000
W1	Direct Metrorail	-2,284,000		17,986,000	299,000	16,001,000
W2	"Hybrid" Metrorail via SR 836	-2,218,000		20,971,000	372,000	19,125,000
W3	"Hybrid" Metrorail via SR 836/8th St.	-3,553,000		22,394,000	353,000	19,194,000
W4	Standard LRT via Flagler	-4,434,000	21,046,000	0	279,000	16,891,000
B1	Standard LRT	-8,316,000	18,011,000	0	390,000	10,085,000
WB1	"Hybrid" LRT via Metrorail/Causeway	-10,038,000		42,629,000	696,000	33,287,000
WB2	"Hybrid" LRT via Metrorail/Causeway	-9,972,000		33,753,000	764,000	24,545,000
WB3	"Hybrid" LRT via SR 836/Government Cut	-9,940,000		30,900,000	704,000	21,664,000
WB1	"Hybrid" LRT via Metrorail/Causeway**	-10,038,000		49,012,000	975,000	39,949,000
WB2	"Hybrid" LRT via Metrorail/Causeway**	-10,000,000		38,551,000	1,043,000	29,594,000
WB3	"Hybrid" LRT via SR 836/Government Cut**	-9,900,000		35,647,000	984,000	26,731,000

*In 1992 $

**Includes Airport and Seaport service

TABLE 5
DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
HEAVY RAIL AVERAGE UNIT COST SUMMARY
(1990 Dollars)

	INPUT VARIABLE								
COST CATEGORY	Platform Hours	Vehicle Hours	Peak Vehicles	Rail Vehicles	Vehicle Miles	Passenger Boardings	Stations*	Yards*	Rail Trk. Miles*
Operator Salaries and Fringe	27.0948								
Other Salaries and Fringe		13.84							
Vehicle Maintenance				$49,265					
Non-Vehicle Maintenance									
General Adminstration					$1.4446				$31,606
Other Materials and Supplies					$0.4846				
Outside Contractual Services							$168,000	$168,000	
Miscellaneous Contractual Services					$0.1554				
Insurance Expense						0.0868			
Miscellaneous Expense					$0.0291		$10,080	$10,080	
UTILITIES:									
Metering Cost			$776						
Demand Cost			$8,605				$39,877	$265,848	
Consumption Cost			$5,053	$38,248			$42,732	$328,710	
UNIT COST PER VARIABLE	$27.0948	$13.8400	$14,434	$87,513	$2.1137	$0.0868	$260,689	$772,638	$31,606
Escalated 15% to 1992 dollars	$31.1590	$15.9160	$16,599	$100,640	$2.4308	$0.0998	$299,792	$888,534	$36,347

*LRT unit costs for these parameters are:
Stations = $22,500
Vehicle Maintenance Facilities = $222,134
Rail Track Miles = $22,500

TABLE 6
DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL STUDY
OPERATING AND MAINTENANCE COSTS
VEHICLE REQUIREMENTS

Alternative	TOTAL					NEW VEHICLES PURCHASED					
	Bus Vehicle	Standard LRV (1)	Hybrid LRV (2)	Standard HRV (3)	Hybrid HRV (4)	Bus Vehicle	Standard LRV (1)	Hybrid LRV (2)	Standard HRV (3)	Hybrid HRV (4A)	Hybrid HRV (4B)
TSM	713			132		N/A	N/A	N/A	N/A	N/A	N/A
S1	720			132		7	0	0	0	0	0
S2	697			67	86	0	0	0	0	69	17
S3	697			67	82	0	0	0	0	59	13
K1	713			132		0	0	0	0	0	0
K2	700			67	94	0	0	0	0	69	25
K3	700			146		0	0	0	10	0	0
N1	715			132		2	0	0	0	0	0
N2	704			139		0	0	0	3	0	0
N3	694			139		0	0	0	3	0	0
NE1	708			132		0	0	0	0	0	0
NE2	690	17		132		0	17	0	0	0	0
NE3	690			67	86	0	0	0	0	69	17
NE4	690			153		0	0	0	17	0	0
W1	693			168		0	0	0	32	0	0
W2	694			168		0	0	0	32	0	0
W3	689			172		0	0	0	36	0	0
W4	684	50		132		0	50	0	0	0	0
B1	674	48		132		0	48	0	0	0	0
WB1*	654		149	67		0	0	149	0	0	0
WB2*	655	55		132		0	55	0	0	0	0
WB3*	655	50		132		0	50	0	0	0	0

* Does not include vehicles for premium service between Airport and Seaport.
Premium service vehicles for WB1=14, WB2=10, and WB3=10.

(1) Standard light rail vehicle (not third rail capability).

(2) Hybrid light rail vehicle (standard LRV with additional third rail pickup).

(3) Standard (existing) heavy rail vehicle; same as existing 136 car fleet (new purchase if number exceeds 136).

(4A) Hybrid heavy rail vehicle (existing Metrorail car with pantograph added); from existing 136 car fleet.

(4B) Hybrid heavy rail vehicle with pantograph added.

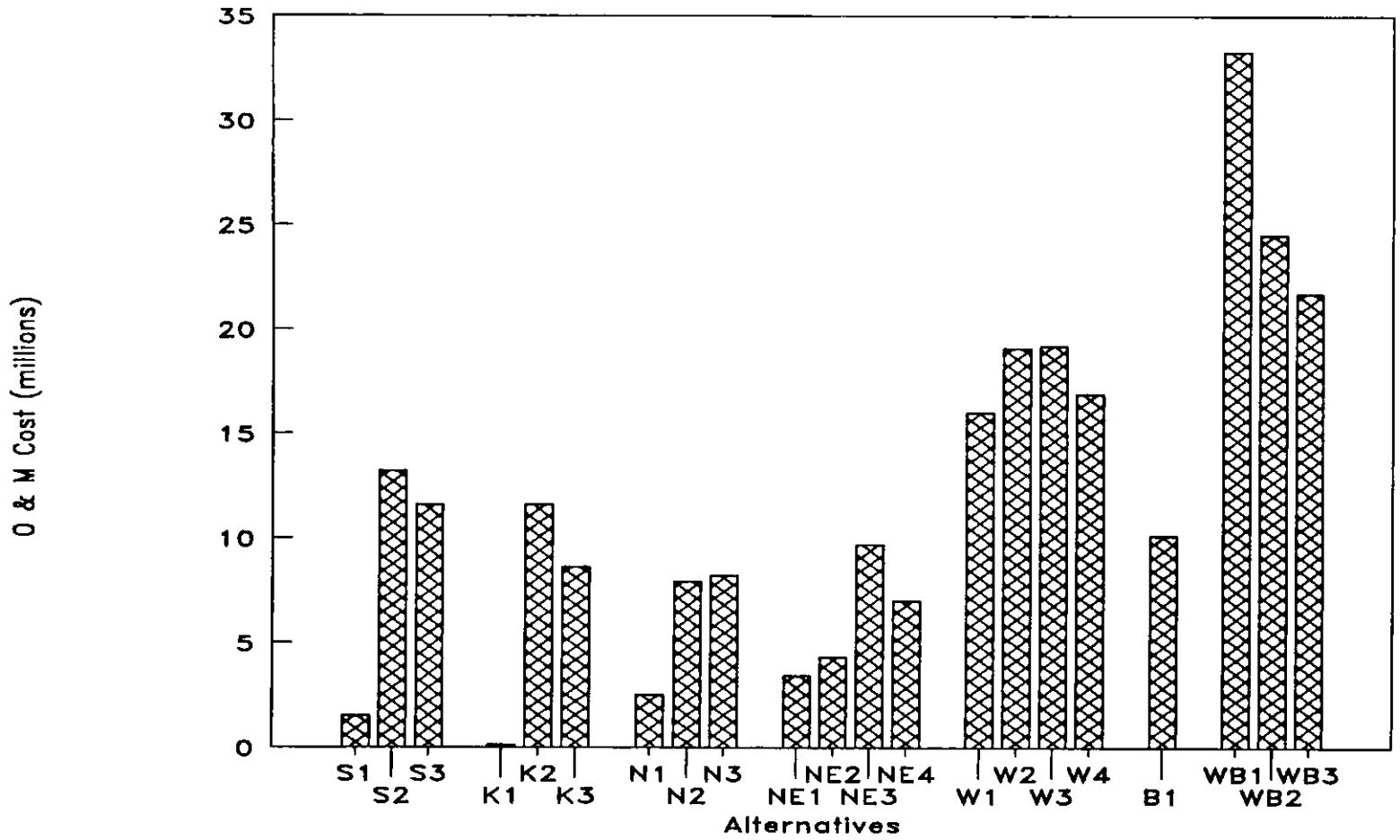
Net Change in Annual Operating and Maintenance Costs

The net changes in bus, light rail transit, Metrorail, and passengers O&M costs are summarized in Table 4 and combined to show the net change in cost for each alternative relative to the TSM/future baseline condition in Table 4 and Figure 1.

In general, the longer corridor, the higher the O&M cost. The West-Beach Options as a group are the most costly to operate because they involve the longest route lengths and represent, for the most part, a separate line from the existing Metrorail system. For similar reasons, the West Corridor alternatives are the second costliest group. The rail alternatives for the South, North, Northeast, Beach, and Kendall Corridors have a similar order of magnitude costs. The busway options have small cost increases given that they represent TSM bus service plans operating over new guideways.

Many of the alternatives, particularly the rail options, free up bus vehicles which can be used for service in other areas of Dade County.

FIGURE 1
DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
INCREMENTAL ANNUAL O&M COST



APPENDIX A

RESOURCE BUILD-UP EQUATIONS
BUS MODEL

LABOR EXPENSES

Operator Salaries = [(total platform hours) x (labor hours / platform hour) x (hourly wage rate) x (fringe multiplier)] + [(overtime hours) x (labor hours / overtime hour) x (hourly overtime surcharge) x (fringe multiplier)]
= [(total platform hours) x (1.21 labor hours / platform hour) x ($12.28 / hour wage rate) x (1.538 fringe)] + [(overtime hours=0.2511 x platform hours) x (1 labor hour / overtime hour) x ($6.22 / hour overtime surcharge) x (1.538 fringe)]
= total platform hours x ($22.8528 +$2.4201 overtime surcharge)
= total platform hours x $25.2549

Other Salaries = (total vehicle hours) / (vehicle hours / employee) x (hours / employee) x (hourly wage) x (fringe multiplier) x (1 - contractor service percent)
= (total vehicle hours) / (12,075 vehicle hours / employee) x (2080 hours / employee) x ($20.37 / hour wage) x (1.2898 fringe) x (1 - 0.12 contractor service percent)
= (total vehicle hours) x $3.98265

Vehicle Maintenance = (total vehicle miles) / (vehicle miles / employee) x (hours / employee) x (hourly wage rate) x (fringe multiplier) x (1 - contractor service percent)
= (total vehicle miles) / (64,000 vehicle miles / employee) x (2080 hours / employee) x ($15.86 / hour wage) x (1.538 fringe) x (1 - 0.12 contractor service percent)
= (total vehicle miles) x $0.69763

Non-Vehicle Maint. = (number of garages) x (employees / garage) x (hours / employee) x (hourly wage rate) x (fringe multiplier)
= (number of garages) x (15.2 employees / garage) x (2080 hours / employee) x ($14.82 / hour wage) x (1.538 fringe)
= (number of garages) x $720,629

Gen. Administration = (total vehicle miles) x (cost / vehicle mile) x (fringe multiplier)
= (total vehicle miles) x $0.2172 / vehicle mile x 1.2898 fringe
= (total vehicle miles) x $0.28014

NON-LABOR EXPENSE

Fuel and Lubricants = (total vehicle miles) / (miles / gallon) x (fuel cost / gallon) x (total fuel cost / total diesel cost)
= (total vehicle miles) / (3.58 miles / gallon) x ($0.52 / gallon) x (1.1263 total fuel cost / total diesel cost)
= (total vehicle miles) x $0.1636

Tires and Tubes = (total vehicle miles) x (cost / vehicle mile) x (total tire and tube cost / bus tire and tube cost) x (1 - service contract percent)
= (total vehicle miles) x ($0.0167 / vehicle mile) x (1.014 total tire and tube cost / bus tire and tube cost) x (1 - 0.12 service contract percent)
= (total vehicle miles x $0.05506

Other materials and supplies = (total vehicle miles) x (cost / vehicle miles) x (1 - service contract percent)
= (total vehicle miles) x ($0.2026 / vehicle miles) x (1 - 0.12 service contract percent)
= (total vehicle miles) x $0.1783

Outside contractual services = (number of garages) x (cost / garage)
= (number of garages) x $1,500,000

Miscellaneous contract services = (total miscellaneous contract services amount) x (percent allocated to bus)
= $2,000,000 x (42 percent allocated to bus) [1]
= $840,000 [2]

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[1] Modal allocation of these costs are based on 1990 distribution of general administration costs. Alternatively, this could be allocated based on MDTA's reporting procedures regarding joint expenses. This could be accomplished by obtaining their Section 15 report and seeing how the joint expenses are allocated.

[2] In the unit cost summary table the cost of miscellaneous contract services is allocated to vehicle miles.

Insurance expense = (passenger boardings) x (cost / passenger) + (fixed insurance cost) x (percent allocated to bus)
= (passenger boardings) x ($0.0484 / passenger) + ($1,000,000) x (42 percent allocated to bus)
= (passenger boardings) x ($0.0484 / passenger) + $840,000 [3]
= (passenger boardings) x ($0.0484 / passenger) + ($0.00789 / passenger)
= passenger boardings x $0.0563

Purchased transport. = (total vehicle hours) x (service contract percent) x (cost / hour)
= (total vehicle hours) x (0.12 service contract percent) x ($35 / hour)
= (total vehicle hours) x $4.20

Misc. expense = 6 percent x [(cost of fuel and lube) + (cost of tires and tubes) + (cost of other materials and supplies) + (cost of outside contractual services)]
= 0.06 x [($0.1636 + $0.05506 + $0.1783) x vehicle miles + ($1,500,000) x number of garages
= 0.06 x ($0.39696 x vehicle miles + $1,500,000 x number of garages)
= $0.02382 x vehicle miles + $90,000 x number of garages

HEAVY RAIL MODEL

LABOR EXPENSES

Operator Salaries = [(total platform hours) x (labor hours / platform hour) x (hourly wage rate) x (fringe multiplier)] + [(overtime hours) x (labor hours / overtime hour) x (hourly overtime surcharge) x (fringe multiplier)]
= [(total platform hours) x (1.27 labor hours / platform hour) x ($12.42 / hour wage rate) x (1.538 fringe)] + [(overtime hours = 0.2885 x platform hours) x (1 labor hour / overtime hour) x ($6.39 / hour overtime surcharge) x (1.538 fringe)]
= total platform hours x ($24.2595 + $2.8353 overtime surcharge)
= total platform hours x ($27.0948)

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[3] This translates to $0.00789 per passenger using 1988 data.

Other Salaries = (total vehicle hours) / (vehicle hours / employee) x (hours / employee) x (hourly wage) x (fringe multiplier)
= (total vehicle hours) / (3,637 vehicle hours / employee) x (2080 hours / employee) x ($18.76 / hour wage) x (1.2898 fringe)
= (total vehicle hours) x $13.84

Vehicle Maintenance = (total active rail vehicles) / (rail vehicles / employee) x (hours / employee) x (hourly wage rate) x (fringe multiplier)
= (total active rail vehicles) / (1 vehicle / employee) x (2080 hours / employee) x ($15.40 / hour wage) x (1.538 fringe)
= (total active rail vehicles) x $49,265

Non-Vehicle Maint. = (rail track miles) x (cost / track mile) x (fringe multiplier)
= (rail track miles) x ($20,550 / track mile) x 1.538 fringe
= (rail track miles) x $31,605.90

Gen. Administration = (total vehicle miles) x (cost / vehicle mile) x (fringe multiplier)
= (total vehicle miles) x $1.12 / vehicle mile x 1.2898 fringe
= (total vehicle miles) x $1.4446

NON-LABOR EXPENSE

Other materials and supplies = (total vehicle miles) x (cost / vehicle miles)
= (total vehicle miles) x $0.4846

Outside contractual services = (number of stations and yards) x (cost / station and yard)
= (number of stations and yards) x $168,000

Miscellaneous contract services = (total miscellaneous contract services amount) x (percent allocated to rail)
= $2,000,000 x (40 percent allocated to rail)
= $800,000 [4]

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[4] In the unit cost summary table the cost of miscellaneous contract services is allocated to vehicle miles.

Insurance expense = (passenger boardings) x (cost / passenger) + (fixed insurance cost) x (percent allocated to rail)
= (passenger boardings) x ($0.0484 / passenger) + ($1,000,000) x (40 percent allocated to rail)
= (passenger boardings) x ($0.0484 / passenger) + ($400,000)

Misc. expense = 6 percent x [(cost of other materials and supplies) + (cost of outside contractual services)]
= 0.06 x [($0.4846) x vehicle miles + ($168,000) x number of stations and yards]
= $0.0291 x vehicle miles + $10,080 x number of stations and yards

UTILITIES

Metering cost = annual cost of metering x sales tax
= $54,180 / year x (1.06 sales tax)
= $57,431

Demand cost:
Stations = (stations) x (kilowatt hour / rail station demand) x (months / year) x demand rate x sales tax
= stations x (300 KWH / rail station) x (12 months / year) x $10.45 / KWH x (1.06 sales tax)
= stations x $39,877

Demand cost:
Yards = (yards) x (kilowatt hour / rail station demand) x (months / year) x demand rate x sales tax
= yards x (2000 KWH / rail yard) x (12 months / year) x $10.45 / KWH x (1.06 sales tax)
= yards x $265,848

Demand cost:
peak operations = (peak vehicles) x (miles / hour) x (additional charge for highest period of service, i.e. peaking factor) x kilowatt hour / rail car mile) x (months / year) x demand rate x sales tax
= (peak vehicles) x (24.2 miles / hour) x (0.5 peaking factor) x 5.35 kilowatt hour / rail car mile) x (12 months / year) x $10.45 / KWH x (1.06 sales tax)
= peak vehicles x $8,605

Consumption cost:

Stations = (stations) x (kilowatt hour / rail station consumption) x (rail stations hours / year) x consumption rate x sales tax

= stations x (156 KWH / rail station) x (7300 hours / year) x $0.0354 / KWH x (1.06 sales tax)

= stations x $42,732

Consumption cost:

Yards = (yards) x (kilowatt hour / rail station consumption) x (hours / year) x consumption rate x sales tax

= yards x (1000 KWH / rail yard) x (8760 hours / year) x $0.0354 / KWH x (1.06 sales tax)

= yards x $328,710

Consumption cost:

peak operations = (peak vehicles) x (miles / hour) x (hours of peak period operations per week) x kilowatt hour / rail peak vehicle) x (weeks / year) x consumption rate x sales tax

= (peak vehicles) x (24.2 miles / hour) x (20 peak hours / week) x 5.35 kilowatt hour / rail peak vehicle) x (52 weeks / year) x $0.0354 / KWH x (1.06 sales tax)

= peak vehicles x $5,053

Consumption cost:

non peak ops = (total active rail vehicles) x (miles / hour) x (hours of non peak operations per week) x kilowatt hour / rail non peak vehicle) x (weeks / year) x consumption rate x sales tax

= (total active rail vehicles) x (24.2 miles / hour) x (120 peak hours / week) x 6.75 kilowatt hour / rail peak vehicle) x (52 weeks / year) x $0.0354 / KWH x (1.06 sales tax)

= total active rail vehicles x $38,248

APPENDIX B

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS
HEAVY RAIL TIMES AND DISTANCE FROM 2010 TSM NETWORK

Stations	Link Time* (minutes)	Link Distance (miles)	Cummulative Time (minutes)	Cummulative Distance (miles)
Dadeland South	0	0	0	0
Dadeland North	1.5	0.72	1.5	0.72
South Miami	2.3	1.31	3.8	2.03
University	2	1	5.8	3.03
Douglas Road	2.8	1.85	8.6	4.88
Coconut Grove	2.1	1.12	10.7	6
Vizcaya	2.8	1.82	13.5	7.82
Brickell	2.6	1.47	16.1	9.29
Government Center	2	0.84	18.1	10.13
Overtown	1.2	0.34	19.3	10.47
Culmer	2.1	0.9	21.4	11.37
Civic Center	1.9	0.68	23.3	12.05
Santa Clara	1.4	0.42	24.7	12.47
Allapattah	1.8	0.89	26.5	13.36
Earlington Heights	2.3	1.1	28.8	14.46
Brownville	2.7	1.23	31.5	15.69
Martin Luther King	1.7	0.7	33.2	16.39
Northside	2.5	0.79	35.7	17.18
Tri-Rail	1.2	0.67	36.9	17.85
Hialah	2.2	1.32	39.1	19.17
Okeechobee	2.8	1.4	41.9	20.57
Palmetto	2.7	1.25	44.6	21.82

*Includes dwell time at stations.

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Existing Dadeland South/ Okeechobee	108,610	2514	251	46.00	2	5531	92	Peak	8	7.5	128	20.6	6.00	15798
								Non-peak	10	15	80		4.00	6582
											208			22380
TSM/Base Dadeland South/ Earlington Heights	76,349	1728	173	32.00	2	3802	63	Peak	8	7.5	128	14.5	6.00	11105
								Non-peak	10	15	80		2.00	2314
											208			13419
TSM/Base Dadeland South/ Palmetto Expwy	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS: Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Existing													
Dadeland South/	789.9	268	16588	102.8	13	78	94	21	954,319	2,925,311	11,994,479	1,495,311	888,534
Okeechobee	329.1	168	6912	64.2	7	28	34		596,450	1,218,880	4,997,699		
			23499	167					1,550,769	4,144,190	16,992,178	1,495,311	888,534
TSM/Base													
Dadeland South/	555.3	184	11661	70.7	9	54	65	0	655,952	2,010,715	8,431,704	1,051,152	0
Earlington Heights	115.7	115	2429	44.2	5	10	12		409,970	418,899	1,756,605		
			14090	115					1,065,922	2,429,614	10,188,309	1,051,152	0
TSM/Base													
Dadeland South/	558.6	285	11730	109.4	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68.4	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	ANNUAL COSTS									
	Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs	Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
	$22,500	$100,640	$16,599							
	$299,792	$100,640	$16,599							
Existing						Existing				
Dadeland South/ Okeechobee	6,295,639	9,419,899	1,294,730	35,268,222	298					
				6,813,028						
	6,295,639	9,419,899	1,294,730	42,081,251		42,081,251	N/A	1,791	2,045,751	539,503
TSM/Base						TSM				
Dadeland South/ Earlington Heights	0	6,521,469	896,351	19,567,344	298					
				2,585,474						
	0	6,521,469	896,351	22,152,818						
TSM/Base										
Dadeland South/ Palmetto Expwy	6,595,432	6,763,005	929,550	28,336,630	298					
				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		54,423,744	N/A	1,846	2,494,205	494,761

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative S2														
South Corridor	177,949	3614	361	66.00	2	7951	133	Peak	8	7.5	128	33.7	4.00	17256
"Hybrid LRT"								Non-peak	10	15	80		2.00	5392
											208			22648
S2-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	6.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663
Alternative S3														
South Corridor	177,949	3299	330	60.00	2	7258	121	Peak	8	7.5	128	33.7	4.00	17256
Metrorail								Non-peak	10	15	80		2.00	5392
											208			22648
S3-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	6.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative S2													
South Corridor	862.8	385	18118	147.8	18	72	86	12	1,371,881	2,803,520	13,101,392	2,449,960	0
"Hybrid LRT"	269.6	241	5662	92.4	9	18	22		857,426	876,100	4,094,185		
			23780	240					2,229,307	3,679,620	17,195,577	2,449,960	0
S2-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534
Alternative S3													
South Corridor	862.8	352	18118	134.9	17	68	82	10	1,252,307	2,559,162	13,101,392	2,449,960	0
Metrorail	269.6	220	5662	84.3	9	18	22		782,692	799,738	4,094,185		
			23780	219					2,034,999	3,358,900	17,195,577	2,449,960	0
S3- Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
	Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
	$22,500	$100,640	$16,599							
	$299,792	$100,640	$16,599							
Alternative S2						S2				
South Corridor	3,597,508	8,695,292	1,195,135	33,214,689	298					
"Hybrid LRT"				5,827,711						
	3,597,508	8,695,292	1,195,135	39,042,400						
S2-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		71,313,326	16,889,582	1,820	1,736,705	557,135
Alternative S3						S3				
South Corridor	2,997,924	8,212,220	1,128,739	31,701,703	298					
Metrorail				5,676,615						
	2,997,924	8,212,220	1,128,739	37,378,318						
S3-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		69,649,245	15,225,500	1,778	1,696,180	561,687

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative K2														
Kendall Corridor	110,247	2519	252	46.00	2	5542	92	Peak	8	7.5	128	20.9	6.00	16036
Metrorail								Non-peak	10	15	80		2.00	3341
											208			19377
K2-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663
Alternative K3														
Kendall Corridor	109,131	2226	223	41.00	2	4897	82	Peak	8	7.5	128	20.7	6.00	15874
Metrorail								Non-peak	10	15	80		2.00	3307
											208			19181
K3-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative K2													
Kendall Corridor	801.8	269	16838	103.0	13	78	94	7	956,217	2,931,129	12,175,352	1,517,860	0
Metrorail	167.0	168	3508	64.4	7	14	17		597,636	610,652	2,536,532		
			20346	167					1,553,853	3,541,781	14,711,883	1,517,860	0
K2-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534
Alternative K3													
Kendall Corridor	793.7	237	16667	91.0	11	66	79	6	844,994	2,590,192	12,052,060	1,502,490	0
Metrorail	165.4	148	3472	56.9	6	12	14		528,121	539,623	2,510,846		
			20140	148					1,373,115	3,129,815	14,562,906	1,502,490	0
K3-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,010,715	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	418,899	2,650,700		
			15396	178					1,650,699	2,429,614	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
$22,500	$100,640	$16,599							
$299,792	$100,640	$16,599							
Alternative K2									
Kendall Corridor					K2				
Metrorail	2,098,546	9,419,899	1,294,730	30,393,734	298				
				3,744,819					
	2,098,546	9,419,899	1,294,730	34,138,553					
K2-Existing									
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298				
Palmetto Expwy				3,934,296					
	6,595,432	6,763,005	929,550	32,270,926		66,409,479	11,985,735	1,858	2,293,127	495,593
Alternative K3					K3				
Kendall Corridor	1,798,754	7,970,684	1,095,541	27,854,715	298				
Metrorail				3,578,590					
	1,798,754	7,970,684	1,095,541	31,433,305					
K3-Existing									
Dadeland South/	6,595,432	6,763,005	929,550	28,271,468	298				
Palmetto Expwy				3,704,483					
	6,595,432	6,763,005	929,550	31,975,951		63,409,256	8,985,512	1,784	2,109,513	519,748

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative N2														
North Corridor	138,739	2926	293	54.00	2	6437	107	Peak	8	7.5	128	26.3	4.00	13453
Direct Metrorail								Non-peak	10	15	80		2.00	4204
											208			17658
N2-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											,208			14663
Alternative N3														
North Corridor	147,939	3037	304	56.00	2	6681	111	Peak	8	7.5	128	28.0	4.00	14346
Golden Glades								Non-peak	10	15	80		2.00	4483
Metrorail											208			18829
N3-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS: Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative N2													
North Corridor	672.7	312	14126	119.6	15	60	72	7	1,110,715	2,269,812	10,214,579	1,910,126	0
Direct Metrorail	210.2	195	4414	74.8	8	16	19		694,197	709,316	3,192,056		
			18541	194					1,804,912	2,979,128	13,406,634	1,910,126	0
N2-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534
Alternative N3													
North Corridor	717.3	324	15063	124.2	15	60	72	7	1,152,851	2,355,919	10,891,923	2,036,789	0
Golden Glades	224.2	202	4707	77.6	8	16	19		720,532	736,225	3,403,726		
Metrorail			19770	202					1,873,383	3,092,143	14,295,649	2,036,789	0
N3-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	ANNUAL COSTS									
	Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs	Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
	$22,500	$100,640	$16,599							
	$299,792	$100,640	$16,599							
Alternative N2						N2				
North Corridor	2,098,546	7,246,076	995,946	25,845,800	298					
Direct Metrorail				4,595,569						
	2,098,546	7,246,076	995,946	30,441,369						
N2-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		62,712,295	8,288,551	1,848	1,977,904	540,623
Alternative N3						N3				
North Corridor	2,098,546	7,246,076	995,946	26,778,051	298					
Golden Glades				4,860,483						
Metrorail	2,098,546	7,246,076	995,946	31,638,534						
N3-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		63,909,460	9,485,716	1,817	1,910,662	550,944

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative NE2														
NE Corridor	66,800	1376	138	25.00	2	3027	50	Peak	8	7.5	128	12.7	2.00	3239
Regular LRT								Non-peak	10	15	80		2.00	2024
											208			5263
NE2-Existing														
Dadeland South/	76,349	1728	173	32.00	2	3802	63	Peak	8	7.5	128	14.5	6.00	11105
Earlington Heights								Non-peak	10	15	80		2.00	2314
											208			13419
NE2-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663
Alternative NE3														
NE Corridor	121,882	2422	242	44.00	2	5328	89	Peak	8	7.5	128	23.1	6.00	17728
Hybrid LRT								Non-peak	10	15	80		2.00	3693
											208			21422
NE3-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative NE2													
NE Corridor	161.9	147	3401	56.3	7	14	17	13	522,332	533,708	2,459,056	673,061	222,134
Regular LRT	101.2	92	2125	35.2	4	8	10		326,458	333,568	1,536,910		
			5526	91					848,790	867,276	3,995,965	673,061	222,134
NE2-Existing													
Dadeland South/	555.3	184	11661	71	9	54	65	0	655,952	2,010,715	8,431,704	1,051,152	0
Earlington Heights	115.7	115	2429	44	5	10	12		409,970	418,899	1,756,605		
			14090	115					1,065,922	2,429,614	10,188,309	1,051,152	0
NE2-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534
Alternative NE3													
NE Corridor	886.4	258	18615	99.0	12	72	86	12	919,396	2,818,259	13,460,238	1,678,043	0
Hybrid LRT	184.7	161	3878	61.9	6	12	14		574,622	587,137	2,804,216		
			22493	161					1,494,018	3,405,396	16,264,454	1,678,043	0
NE3-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
$22,500	$100,640	$16,599							
$299,792	$100,640	$16,599							

Alternative NE2						NE2-LRT		NE2-LRT		
NE Corridor	292,500	1,690,751	232,387	6,625,929	298					
Regular LRT				2,196,935						
	292,500	1,690,751	232,387	8,822,864		8,822,864		1,597	697,376	630,205
NE2-Existing						NE2-HRT		NE2-HRT		
Dadeland South/	0	6,521,469	896,351	19,567,344	298					
Earlington Heights				2,585,474						
	0	6,521,469	896,351	22,152,818						
NE2-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		54,423,744	8,822,864	1,846	2,494,205	494,761

Alternative NE3						NE3				
NE Corridor	3,597,508	8,695,292	1,195,135	32,363,870	298					
Hybrid LRT				3,965,976						
	3,597,508	8,695,292	1,195,135	36,329,846						
NE3-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		68,600,772	14,177,028	1,811	1,992,256	535,944

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative NE4														
NE Corridor	121,882	2281	228	42.00	2	5018	84	Peak	8	7.5	128	23.1	6.00	17728
Metrorail								Non-peak	10	15	80		2.00	3693
											208			21422
NE4-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663
Alternative W1														
West Corridor	138,449	2877	288	53.00	2	6329	105	Peak	8	7.5	128	26.2	6.00	20138
Metrorail								Non-peak	10	15	80		2.00	4195
											208			24333
W1-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative NE4													
NE Corridor	886.4	243	18615	93.3	12	72	86	9	865,872	2,654,190	13,460,238	1,678,043	0
Metrorail	184.7	152	3878	58.3	6	12	14		541,170	552,956	2,804,216		
			22493	152					1,407,042	3,207,146	16,264,454	1,678,043	0
NE4-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534
Alternative W1													
West Corridor	1006.9	307	21145	117.6	14	84	101	8	1,092,115	3,347,701	15,289,841	1,906,133	0
Metrorail	209.8	192	4405	73.5	7	14	17		682,572	697,438	3,185,384		
			25550	191					1,774,687	4,045,138	18,475,225	1,906,133	888,534
W1-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
	Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
	$22,500	$100,640	$16,599							
	$299,792	$100,640	$16,599							
Alternative NE4						NE4				
NE Corridor	2,698,131	8,695,292	1,195,135	31,246,901	298					
Metrorail				3,898,342						
	2,698,131	8,695,292	1,195,135	35,145,243						
NE4-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		67,416,169	12,992,425	1,779	1,957,854	526,689
Alternative W1						W1				
West Corridor	2,398,339	10,144,507	1,394,324	35,572,960	298					
Metrorail				4,565,393						
	2,398,339	10,144,507	1,394,324	40,138,353						
W1-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		72,409,279	17,985,535	1,768	2,156,229	517,209

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative W2														
West Corridor	69,835	1397	140	26.00	2	3073	51	Peak	8	7.5	128	13.2	4.00	6772
Metrorail								Non-peak	10	15	80		2.00	2116
FIU/Brickell											208			8888
W2-extension														
FIU/Airport	51,300	835	84	15.00	2	1837	31	Peak	8	15	64	9.7	4.00	2487
								Non-peak	10	15	80		2.00	1555
											144			4042
W2-Extension														
Airport/	84,386	2237	224	41.00	2	4921	82	Peak	8	7.5	128	16.0	4.00	8183
Dadeland South								Non-peak	10	15	80		2.00	2557
											208			10740
W2-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative W2													
West Corridor	338.6	149	7110	57.1	7	28	34	11	530,304	1,083,707	5,141,561	961,472	0
Metrorail	105.8	93	2222	35.7	4	8	10		331,440	338,658	1,606,738		
FIU/Brickell			9332	93					861,744	1,422,366	6,748,299	961,472	0
W2-extension													
FIU/Airport	124.4	45	2612	17.1	3	12	14	1	158,484	323,871	1,888,466	706,286	0
	77.7	56	1632	21.3	3	6	7		198,105	202,419	1,180,292		
			4244	38					356,589	526,290	3,068,758	706,286	0
W2-Extension													
Airport/	409.1	239	8592	91.5	11	44	53	0	849,170	1,735,328	6,212,900	1,161,812	0
Dadeland South	127.9	149	2685	57.2	6	12	14		530,731	542,290	1,941,531		
			11277	149					1,379,900	2,277,618	8,154,431	1,161,812	0
W2-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
$22,500	$100,640	$16,599							
$299,792	$100,640	$16,599							
Alternative W2					W2				
West Corridor	3,297,716	3,381,502	464,775	14,861,037	298				
Metrorail				2,276,836					
FIU/Brickell	3,297,716	3,381,502	464,775	17,137,874					
W2-extension									
FIU/Airport	299,792	1,207,679	199,189	4,783,768	298				
		603,840		2,184,655					
	299,792	1,811,519	199,189	6,968,424					
W2-Extension									
Airport/	0	5,313,789	730,360	16,003,359	298				
Dadeland South				3,014,552					
	0	5,313,789	730,360	19,017,911					
W2-Existing									
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298				
Palmetto Expwy				3,934,296					
	6,595,432	6,763,005	929,550	32,270,926		75,395,135	20,971,390	1,873	2,144,746	538,537

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative W3														
West Corridor	74,135	1529	153	28.00	2	3364	56	Peak	8	7.5	128	14.0	4.00	7189
Hybrid LRT								Non-peak	10	15	80		2.00	2247
FIU/Brickell											208			9435
W3-Extension														
FIU/Airport	48,800	957	96	18.00	2	2105	35	Peak	8	15	64	9.2	4.00	2366
								Non-peak	10	15	80		2.00	1479
											144			3845
W3-Extension														
Airport/	84,386	2237	224	41.00	2	4921	82	Peak	8	7.5	128	16.0	4.00	8183
Dadeland South								Non-peak	10	15	80		2.00	2557
											208			10740
W3-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative W3													
West Corridor	359.4	163	7548	62.5	8	32	38	13	580,411	1,186,105	5,458,147	1,020,673	0
Hybrid LRT	112.3	102	2359	39.1	4	8	10		362,757	370,658	1,705,671		
FIU/Brickell			9907	102					943,168	1,556,762	7,163,817	1,020,673	0
W3-Extension													
FIU/Airport	118.3	51	2484	19.6	3	12	14	1	181,640	371,191	1,796,436	671,867	0
	73.9	64	1553	24.5	3	6	7		227,049	231,994	1,122,772		
			4037	44					408,689	603,185	2,919,208	671,867	0
W3-Extension													
Airport/	409.1	239	8592	91.5	11	44	53	0	849,170	1,735,328	6,212,900	1,161,812	0
Dadeland South	127.9	149	2685	57.2	6	12	14		530,731	542,290	1,941,531		
			11277	149					1,379,900	2,277,618	8,154,431	1,161,812	0
W3-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
$22,500	$100,640	$16,599							
$299,792	$100,640	$16,599							
Alternative W3					W3				
West Corridor	3,897,301	3,864,574	531,171	16,538,382	298				
Hybrid LRT				2,439,086					
FIU/Brickell	3,897,301	3,864,574	531,171	18,977,467					
W3-Extension									
FIU/Airport	299,792	1,449,215	199,189	4,969,330	298				
				1,581,816					
	299,792	1,449,215	199,189	6,551,146					
W3-Extension									
Airport/	0	5,313,789	730,360	16,003,359	298				
Dadeland South				3,014,552					
	0	5,313,789	730,360	19,017,911					
W3-Existing									
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298				
Palmetto Expwy				3,934,296					
	6,595,432	6,763,005	929,550	32,270,926		76,817,451	22,393,707	1,891	2,135,728	533,455

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative W4														
West Corridor	63,900	2135	214	39.00	2	4697	78	Peak	8	7.5	128	12.1	2.00	3098
Regular LRT								Non-peak	10	15	80		2.00	1936
FIU/Govt. Center											208			5035
W4-Extension														
FIU/Airport	50,300	1469	147	27.00	2	3232	54	Peak	8	15	64	9.5	2.00	1219
								Non-peak	10	15	80		2.00	1524
											144			2744
W4-Extension														
Airport/	31,200	1188	119	22.00	2	2614	44	Peak	8	7.5	128	5.9	2.00	1513
Government								Non-peak	10	15	80		2.00	945
Center											208			2458
W4-Existing														
Dadeland South/	76,349	1728	173	32.00	2	3802	63	Peak	8	7.5	128	14.5	6.00	11105
Earlington Heights								Non-peak	10	15	80		2.00	2314
											208			13419
W4-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative W4													
West Corridor	154.9	228	3253	87.3	11	22	26	18	810,450	828,101	2,352,300	643,841	222,134
Regular LRT	96.8	142	2033	54.6	6	12	14		506,531	517,563	1,470,188		
FIU/Govt. Center			5286	142					1,316,981	1,345,664	3,822,488	643,841	222,134
W4-Extension													
FIU/Airport	61.0	78	1280	30.0	4	8	10	2	278,818	284,890	925,827	506,811	0
	76.2	98	1600	37.5	4	8	10		348,522	356,113	1,157,284		
			2881	68					627,340	641,003	2,083,111	506,811	0
W4-Extension													
Airport/	75.6	127	1588	48.6	6	12	14	0	450,967	460,789	1,148,541	314,364	0
Government	47.3	79	993	30.4	3	6	7		281,854	287,993	717,838		
Center			2581	79					732,822	748,782	1,866,379	314,364	0
W4-Existing													
Dadeland South/	555.3	184	11661	71	9	54	65	0	655,952	2,010,715	8,431,704	1,051,152	0
Earlington Heights	115.7	115	2429	44	5	10	12		409,970	418,899	1,756,605		
			14090	115					1,065,922	2,429,614	10,188,309	1,051,152	0
W4-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
$22,500	$100,640	$16,599							
$299,792	$100,640	$16,599							

Alternative W4						W4-LRT		W4-LRT		W4-LRT
West Corridor	405,000	2,656,895	365,180	8,283,901	298					
Regular LRT				2,494,282						
FIU/Govt. Center	405,000	2,656,895	365,180	10,778,183						
W4-Extension										
FIU/Airport	45,000	966,144	132,793	3,140,282	298					
				1,861,918						
	45,000	966,144	132,793	5,002,200						
W4-Extension										
Airport/	0	1,449,215	199,189	4,023,065	298					
Government				1,287,686						
Center	0	1,449,215	199,189	5,310,751		21,091,134		1,962	1,531,791	502,170
W4-Existing						W4-HRT		W4-HRT		W4-HRT
Dadeland South/	0	6,521,469	896,351	19,567,344	298					
Earlington Heights				2,585,474						
	0	6,521,469	896,351	22,152,818						
W4-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		54,423,744	21,091,134	1,846	2,494,205	494,761

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative B1														
Beach Corridor	54,200	2001	200	37.00	2	4402	73	Peak	8	3.75	256	10.3	2.00	5256
MacA. LRT								Non-peak	10	7.5	160		2.00	3285
											416			8541
B1-Existing														
Dadeland South/	76,349	1728	173	32.00	2	3802	63	Peak	8	7.5	128	14.5	6.00	11105
Earlington Heights								Non-peak	10	15	80		2.00	2314
											208			13419
B1-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative B1													
Beach Corridor	262.8	427	5519	163.6	20	40	48	24	1,519,167	1,552,253	3,990,444	546,106	0
MacA LRT	164.2	267	3449	102.3	10	20	24		949,479	970,158	2,494,027		
			8968	266					2,468,646	2,522,412	6,484,471	546,106	0
B1-Existing													
Dadeland South/	555.3	184	11661	71	9	54	65	0	655,952	2,010,715	8,431,704	1,051,152	0
Earlington Heights	115.7	115	2429	44	5	10	12		409,970	418,899	1,756,605		
			14090	115					1,065,922	2,429,614	10,188,309	1,051,152	0
B1-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
$22,500	$100,640	$16,599							
$299,792	$100,640	$16,599							
Alternative B1					B1-LRT		B1-LRT		B1-LRT
Beach Corridor	540,000	4,830,718	663,964	13,642,652	298				
MacA. LRT				4,413,665					
	540,000	4,830,718	663,964	18,056,316		18,056,316		2,013	1,758,992	451,408
B1-Existing						B1-HRT		B1-HRT		B1-HRT
Dadeland South/	0	6,521,469	896,351	19,567,344	298					
Earlington Heights				2,585,474						
	0	6,521,469	896,351	22,152,818						
B1-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926		54,423,744	18,056,316	1,846	2,494,205	494,761

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative WB1														
West/Beach Corrido	141,349	2847	285	52.00	2	6263	104	Peak	8	7.5	128	26.8	6.00	20560
Hybrid LRT								Non-peak	10	15	80		2.00	4283
FIU/Dadeland S.											208			24843
WB1														
FIU/Miami Beach	109,815	2685	269	49.00	2	5907	98	Peak	8	7.5	128	20.8	2.00	5324
Convention Center								Non-peak	10	15	80		2.00	3328
											208			8652
WB1														
Downtown Miami/	35,500	1157	116	21.00	2	2545	42	Peak	8	7.5	128	6.7	2.00	1721
Miami Beach								Non-peak	10	15	80		2.00	1076
Convention Center											208			2797
WB1-Premium														
Airport/	42,215	1065	107	20.00	2	2343	39	Peak	8	7.5	128	8.0	2.00	2047
Seaport								Non-peak	10	15	80		2.00	1279
											208			3326
WB1-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative WB1													
West/Beach Corrido	1028.0	304	21588	116.4	14	84	101	7	1,080,727	3,312,792	15,610,086	1,946,057	0
Hybrid LRT	214.2	190	4497	72.8	7	14	17		675,454	690,165	3,252,101		
FIU/Dadeland S.			26085	189					1,756,181	4,002,957	18,862,187	1,946,057	0
WB1													
FIU/Miami Beach	266.2	286	5591	109.8	14	28	34	12	1,019,231	1,041,429	4,042,533	1,511,907	0
Convention Center	166.4	179	3494	68.6	7	14	17		637,019	650,893	2,526,583		
			9085	178					1,656,251	1,692,323	6,569,116	1,511,907	0
WB1													
Downtown Miami/	86.1	123	1807	47.3	6	12	14	0	439,199	448,765	1,306,833	488,756	0
Miami Beach	53.8	77	1130	29.6	3	6	7		274,500	280,478	816,771		
Convention Center			2937	77					713,699	729,243	2,123,604	488,756	0
WB1-Premium													
Airport/	102.3	114	2149	43.5	6	12	14	1	404,276	413,081	1,554,027	581,206	0
Seaport	64.0	71	1343	27.2	3	6	7		252,673	258,176	971,267		
			3492	71					656,949	671,256	2,525,295	581,206	0
WB1-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
$22,500	$100,640	$16,599							
$299,792	$100,640	$16,599							

Alternative WB1						WB1				
West/Beach Corrid	2,098,546	10,144,507	1,394,324	35,587,040	298					
Hybrid LRT				4,617,720						
FIU/Dadeland S.	2,098,546	10,144,507	1,394,324	40,204,760						
WB1										
FIU/Miami Beach	3,597,508	3,381,502	464,775	15,058,886	298					
Convention Center				3,814,496						
	3,597,508	3,381,502	464,775	18,873,382						
WB1										
Downtown Miami/	0	1,449,215	199,189	4,331,958	298					
Miami Beach				1,371,749						
Convention Center	0	1,449,215	199,189	5,703,707						
WB1-Premium										
Airport/	299,792	1,449,215	199,189	4,900,787	298					
Seaport				1,482,115						
	299,792	1,449,215	199,189	6,382,903						
WB1-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926	*	97,052,774	42,629,030	1,814	2,455,266	539,182
			*With Airport/Seaport premium service =			103,435,677				

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative WB2 Hybrid LRT FIU/Miami Beach Convention Center	100,800	2281	228	42.00	2	5018	84	Peak	8	7.5	128	19.1	2.00	4887
								Non-peak	10	15	80		2.00	3055
											208			7942
WB2 FIU/Airport	51,300	845	85	15.00	2	1859	31	Peak	8	15	64	9.7	2.00	1244
								Non-peak	10	15	80		2.00	1555
											144			2798
WB2 Airport/Miami Beach Convention Center	59,500	1634	163	30.00	2	3595	60	Peak	8	7.5	128	11.3	2.00	2885
								Non-peak	10	15	80		2.00	1803
											208			4688
WB2-Premium Airport/ Seaport	33,400	755	76	14.00	2	1661	28	Peak	8	7.5	128	6.3	2.00	1619
								Non-peak	10	15	80		2.00	1012
											208			2632
WB2-Existing Dadeland South/ Earlington Heights	76,349	1728	173	32.00	2	3802	63	Peak	8	7.5	128	14.5	6.00	11105
								Non-peak	10	15	80		2.00	2314
											208			13419
WB2-Existing Dadeland South/ Palmetto Expwy	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative WB2													
Hybrid LRT	244.4	243	5132	93.3	12	24	29	23	865,872	884,730	3,710,671	1,387,791	0
FIU/Miami Beach	152.7	152	3207	58.3	6	12	14		541,170	552,956	2,319,169		
Convention Center			8339	152					1,407,042	1,437,686	6,029,840	1,387,791	0
WB2													
FIU/Airport	62.2	45	1306	17.3	3	6	7	1	160,382	163,875	944,233	706,286	0
	77.7	56	1632	21.6	3	6	7		200,477	204,844	1,180,292		
			2938	39					360,859	368,718	2,124,525	706,286	0
WB2													
Airport/Miami	144.2	174	3029	66.8	8	16	19	0	620,270	633,779	2,190,327	819,182	0
Beach Convention	90.2	109	1893	41.8	4	8	10		387,668	396,112	1,368,954		
Center			4922	109					1,007,938	1,029,890	3,559,281	819,182	0
WB2-Premium													
Airport/	81.0	81	1700	30.9	4	8	10	1	286,599	292,841	1,229,528	459,843	0
Seaport	50.6	50	1063	19.3	2	4	5		179,125	183,026	768,455		
			2763	50					465,724	475,867	1,997,983	459,843	0
WB2-Existing													
Dadeland South/	555.3	184	11661	71	9	54	65	0	655,952	2,010,715	8,431,704	1,051,152	0
Earlington Heights	115.7	115	2429	44	5	10	12		409,970	418,899	1,756,605		
			14090	115					1,065,922	2,429,614	10,188,309	1,051,152	0
WB2-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	ANNUAL COSTS									
	Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs	Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
	$22,500	$100,640	$16,599							
	$299,792	$100,640	$16,599							
Alternative WB2						WB2				
Hybrid LRT	6,895,224	2,898,431	398,378	17,041,097	298					
FIU/Miami Beach				3,413,296						
Convention Center	6,895,224	2,898,431	398,378	20,454,392						
WB2										
FIU/Airport	299,792	724,608	99,595	3,098,771	298					
				1,585,612						
	299,792	724,608	99,595	4,684,383						
WB2										
Airport/Miami	0	1,932,287	265,586	6,461,429	298					
Beach Convention				2,152,734						
Center	0	1,932,287	265,586	8,614,164						
WB2-Premium										
Airport/	299,792	966,144	132,793	3,667,541	298					
Seaport				1,130,605						
	299,792	966,144	132,793	4,798,146						
WB2-Existing										
Dadeland South/	0	6,521,469	896,351	19,567,344	298					
Earlington Heights				2,585,474						
	0	6,521,469	896,351	22,152,818						
WB2-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926	*	88,176,683	33,752,939	1,930	2,106,569	565,235
	*With Airport/Seaport premium service =					92,974,829				

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Travel Distance (feet)	One way Travel Time (sec)	10% Recovery/ Layover Time (sec)	One Way Time (min)	Direc-tions	Cycle Time (sec)	Cycle Time (min)	Time Period (hours)	Time Period (hours)	Headway (min)	Number One Way Trips	One Way Trip Length (miles)	Cars Per Train	Revenue Miles
Alternative WB3														
Hybrid LRT	101,200	2070	207	38.00	2	4554	76	Peak	8	7.5	128	19.2	2.00	4907
FIU/Miami Beach								Non-peak	10	15	80		2.00	3067
Convention Center											208			7973
WB3														
FIU/Airport	51,300	845	85	15.00	2	1859	31	Peak	8	15	64	9.7	2.00	1244
								Non-peak	10	15	80		2.00	1555
											144			2798
WB3														
Airport/Miami	59,900	1393	139	26.00	2	3065	51	Peak	8	7.5	128	11.3	2.00	2904
Beach Convention								Non-peak	10	15	80		2.00	1815
Center											208			4719
WB3-Premium														
Airport/	33,400	714	71	13.00	2	1571	26	Peak	8	7.5	128	6.3	2.00	1619
Seaport								Non-peak	10	15	80		2.00	1012
											208			2632
WB3-Existing														
Dadeland South/	76,349	1728	173	32.00	2	3802	63	Peak	8	7.5	128	14.5	6.00	11105
Earlington Heights								Non-peak	10	15	80		2.00	2314
											208			13419
WB3-Existing														
Dadeland South/	115,210	2676	268	49.00	2	5887	98	Peak	8	7.5	128	21.8	4.00	11172
Palmetto Expwy								Non-peak	10	15	80		2.00	3491
											208			14663

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	Dead Head Miles	Dead Head Time (min)	Total Vehicle Miles	Platform Hours	Peak Trains Req.	Peak Vehicles Req.	Total Vehicles Req.	Stations	ANNUAL COSTS				
									Train Platform Hours	Total Vehicle Hours	Total Vehicle Miles	Dir. Track Miles	Vehicle Maint. Facilities
								LRT Unit Cost	$31.15	$15.92	$2.43	$26,600	$222,134
								HRT Unit Cost	$31.15	$15.92	$2.43	$36,347	$888,534
Alternative WB3													
Hybrid LRT	245.3	221	5152	84.6	11	22	26	18	785,776	802,890	3,725,396	1,393,298	0
FIU/Miami Beach	153.3	138	3220	52.9	6	12	14		491,110	501,806	2,328,372		
Convention Center			8372	138					1,276,886	1,304,696	6,053,768	1,393,298	0
WB3													
FIU/Airport	62.2	45	1306	17.3	3	6	7	0	160,382	163,875	944,233	706,286	0
	77.7	56	1632	21.6	3	6	7		200,477	204,844	1,180,292		
			2938	39					360,859	368,718	2,124,525	706,286	0
WB3													
Airport/Miami	145.2	149	3049	57.0	7	14	17	0	528,785	540,302	2,205,051	824,689	0
Beach Convention	90.8	93	1906	35.6	4	8	10		330,491	337,689	1,378,157		
Center			4955	93					859,276	877,991	3,583,209	824,689	0
WB3-Premium													
Airport/	81.0	76	1700	29.2	4	8	10	1	271,036	276,939	1,229,528	459,843	0
Seaport	50.6	48	1063	18.2	2	4	5		169,397	173,087	768,455		
			2763	47					440,433	450,025	1,997,983	459,843	0
WB3-Existing													
Dadeland South/	555.3	184	11661	71	9	54	65	0	655,952	2,010,715	8,431,704	1,051,152	0
Earlington Heights	115.7	115	2429	44	5	10	12		409,970	418,899	1,756,605		
			14090	115					1,065,922	2,429,614	10,188,309	1,051,152	0
WB3-Existing													
Dadeland South/	558.6	285	11730	109	14	56	67	22	1,015,815	2,075,877	8,482,240	1,586,179	888,534
Palmetto Expwy	174.6	178	3666	68	7	14	17		634,884	648,712	2,650,700		
			15396	178					1,650,699	2,724,588	11,132,940	1,586,179	888,534

DADE COUNTY TRANSIT CORRIDORS TRANSITIONAL ANALYSIS: RAIL O&M COST CALCULATIONS

	ANNUAL COSTS				Days in Year	TOTAL	Change from TSM	Cost per Vehicle Miles	Cost per Route Miles	Cost per Peak Vehicle
	Stations	Total Rail Vehicles	Peak Vehicles Req.	Total Yearly Costs						
	$22,500	$100,640	$16,599							
	$299,792	$100,640	$16,599							
Alternative WB3						WB3				
Hybrid LRT	5,396,262	2,656,895	365,180	15,125,696	298					
FIU/Miami Beach				3,321,288						
Convention Center	5,396,262	2,656,895	365,180	18,446,985						
WB3										
FIU/Airport	0	724,608	99,595	2,798,978	298					
				1,585,612						
	0	724,608	99,595	4,384,591						
WB3										
Airport/Miami	0	1,690,751	232,387	6,021,967	298					
Beach Convention				2,046,337						
Center	0	1,690,751	232,387	8,068,304						
WB3-Premium										
Airport/	299,792	966,144	132,793	3,636,074	298					
Seaport				1,110,939						
	299,792	966,144	132,793	4,747,013						
WB3-Existing										
Dadeland South/	0	6,521,469	896,351	19,567,344	298					
Earlington Heights				2,585,474						
	0	6,521,469	896,351	22,152,818						
WB3-Existing										
Dadeland South/	6,595,432	6,763,005	929,550	28,336,630	298					
Palmetto Expwy				3,934,296						
	6,595,432	6,763,005	929,550	32,270,926	*	85,323,623	30,899,879	1,865	2,034,726	533,273
	*With Airport/Seaport premium service =					90,070,637				