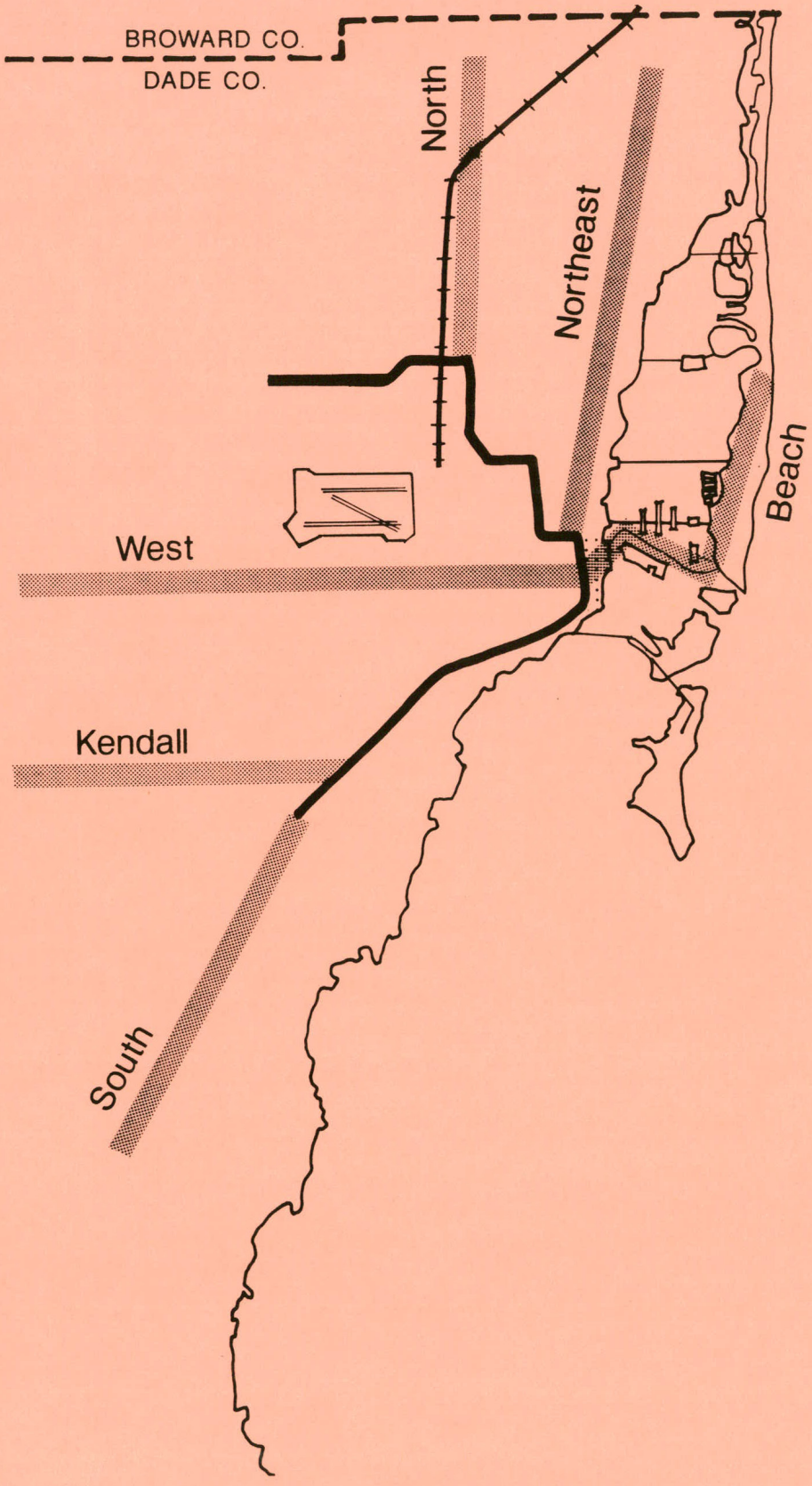

METRO-DADE

Dade County
Metropolitan Planning
Organization

Dade County Transit Corridors Transitional Analysis

Technical Memorandum Task 5:

Transit
Forecasting Methodology
and Results

Prepared by:

Parsons Brinckerhoff
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Dade County Transit Corridors Transitional Analysis

Transit Forecasting Methodology and Results

Prepared by:

KPMG Peat Marwick

Prepared for:

Parsons Brinckerhoff Quade & Douglas, Inc.

Under Contract to:

Dade County Metropolitan Planning Organization

February, 1993

Table of Contents

List of Exhibits

List of Exhibits (Continued)

PATRONAGE FORECASTING OVERVIEW

The patronage forecasting methodology employed for the Dade County Transit Transitional Analysis built upon the regional travel demand models used in the Miami area, supplemented by a refined modal choice model and supporting procedures. The existing models are based on the Florida Standard Urban Transportation Model Structure (FSUTMS) which has been developed and maintained by the Florida Department of Transportation (FDOT) for use in metropolitan areas throughout the state. The Miami model system previously employed the most complex of the four available transit planning options within the FSUTMS structure and was the only metropolitan area within Florida using this model structure. Some deficiencies were noted in this model, which are described below, and thus a revised modal choice model was implemented. The revised model serves not only as a basis for reliable transit demand forecasts for the transitional study, but also provides a firm analytical underpinning for future more detailed Alternatives Analysis efforts and eventual support to preliminary engineering activities.

Area System

Travel demand forecasting in the Miami area is performed for the developed portions of metropolitan Dade County, extending from the Atlantic Ocean westward to the edge of the Everglades. The adjacent urbanized areas of Broward County to the north are not included within the modeling area, following standard practices in Florida. Interaction with Broward County is maintained through 18 external stations located along the county line. The Miami area is broken up into a relatively fine zone system consisting of some 1089 internal zones plus the Broward County external stations and three additional external stations along the western and southern boundaries of the urbanized area, or a total of 1110 zones in all.

The overall modeling area includes both the mainland area and Miami Beach and other adjacent keys and barrier island communities. The large number of zones reflects quite small zone sizes in the Miami CBD and other highly developed communities. The zone system is also quite regular and generally rectangular in form, following the highly developed grid street system in place in most of the urbanized area.

Data Base

Land use forecasts and allocations to small areas are maintained by the Metropolitan Planning Organization (MPO) which functions as an integral part of the overall Metropolitan Dade County government structure. Land use projections were assembled for 1986 as part of a major model update and projections for 2010 have been made and used as the basis for a number of recent planning studies and served as the basis for the transitional analysis. During the study, the 1986 base line inputs were updated to 1990 and used for the final model development activities. A summary of key socio-economic variables for the study area (Dade County) is shown in Exhibit OV-1.

Exhibit OV–1

Dade County Transit Corridors Transitional Study
Socio–Economic Data Summary

	1990	2010	Change	Percent Change
Population	1,929,800	2,335,100	405,300	21%
Households	769,900	991,200	221,300	29%
Employment	967,700	1,256,400	288,700	30%
Average Household Size	2.51	2.36		
Employment/Population	0.50	0.54		

Travel demand forecasting for the Miami area follows FSUTMS conventions and uses a fairly conventional purpose split as follows:

- home based work trips
- home based shopping trips
- home base social-recreational trips
- home based other trips
- non-home based trips
- truck/taxi trips
- internal/external and through trips

The home based categories include trips produced at "transient" dwelling units, effectively considering hotel/motel rooms as "home" for this important group of travelers in south Florida.

Trip end estimates for each of these seven trip purposes are prepared using conventional trip generation rates. The trip rates for the four primary home-based categories are computed using a cross-classification approach based on autos/dwelling unit and persons/dwelling unit, as summarized in Exhibit OV-2. This trip generation model structure is common to FSUTMS but the trip rates are developed and customized for each urbanized area; the rates shown are those developed for Miami during the 1986 model update.

Trip attractions are computed using default rates specified within FSUTMS as summarized in Exhibit OV-3. Trip attractions are scaled to productions within FSUTMS, so customized attraction rates are not developed. In addition to the "standard" trip end estimates, some modifications are made for special generators which include several shopping centers and the Miami International Airport.

Each of the seven trip purposes are distributed using a conventional gravity model based on average 24-hour highway speeds. The gravity model does not contain any K-factors or other explicit treatment designed to adjust for distribution anomalies. As shown in Exhibit OV-4, the friction factors for each trip purpose show expected patterns, with work trips and non-home based trips having relatively long "tails" and shopping trips, particularly, showing a tighter trip length distribution.

Exhibit OV–2

Dade County Transit Corridors Transitional Study

Trip Production Rates

Home Based Work Trips

		Autos/DU		
		0	1	2+
Pers/	1	0.45	1.01	1.35
DU	2	1.01	1.60	2.45
	3	1.53	2.36	3.30
	4	1.93	2.72	3.44
	5	2.45	3.22	4.25

Single Family

		Autos/DU		
		0	1	2+
Pers/	1	0.40	1.21	1.48
DU	2	0.70	1.55	2.75
	3	1.40	2.36	3.20
	4	1.67	2.61	3.71
	5	1.89	2.88	4.18

Multi Family

		Autos/DU		
		0	1	2+
Pers/	1	0.25	0.25	0.25
DU	2	0.20	0.20	0.20
	3	0.15	0.15	0.15
	4	0.10	0.10	0.10
	5	0.10	0.10	0.10

Transient Units

Home Based Shopping Trips

		Autos/DU		
		0	1	2+
Pers/	1	0.30	0.80	0.90
DU	2	0.35	1.05	1.25
	3	0.40	1.20	1.45
	4	0.45	1.30	1.60
	5	0.45	1.30	1.70

Single Family

		Autos/DU		
		0	1	2+
Pers/	1	0.30	0.50	0.65
DU	2	0.35	1.25	1.40
	3	0.40	1.50	1.65
	4	0.45	1.65	1.85
	5	0.45	1.70	1.95

Multi Family

		Autos/DU		
		0	1	2+
Pers/	1	0.30	0.30	0.30
DU	2	1.30	1.30	1.30
	3	2.00	2.00	2.00
	4	2.50	2.50	2.50
	5	2.90	2.90	2.90

Transient Units

Home Based Social/Recreational Trips

		Autos/DU		
		0	1	2+
Pers/	1	0.20	0.65	0.85
DU	2	0.25	0.85	1.05
	3	0.30	1.10	1.30
	4	0.40	1.35	1.65
	5	0.45	1.70	2.10

Single Family

		Autos/DU		
		0	1	2+
Pers/	1	0.30	0.65	0.75
DU	2	0.35	1.05	1.20
	3	0.40	1.45	1.65
	4	0.45	1.90	2.20
	5	0.55	2.65	3.05

Multi Family

		Autos/DU		
		0	1	2+
Pers/	1	0.60	0.60	0.60
DU	2	1.65	1.65	1.65
	3	2.70	2.70	2.70
	4	3.90	3.90	3.90
	5	5.90	5.90	5.90

Transient Units

Home Based Other Trips

		Autos/DU		
		0	1	2+
Pers/	1	0.20	0.60	0.70
DU	2	0.30	1.10	1.20
	3	0.55	1.85	2.20
	4	1.00	2.75	3.55
	5	1.60	3.95	5.35

Single Family

		Autos/DU		
		0	1	2+
Pers/	1	0.25	0.80	0.95
DU	2	0.45	1.20	1.50
	3	0.70	1.60	2.30
	4	1.10	2.10	3.40
	5	1.70	3.00	4.65

Multi Family

		Autos/DU		
		0	1	2+
Pers/	1	0.50	0.50	0.50
DU	2	1.20	1.20	1.20
	3	2.10	2.10	2.10
	4	3.30	3.30	3.30
	5	4.40	4.40	4.40

Transient Units

Exhibit OV–3

Dade County Transit Corridors Transitional Study

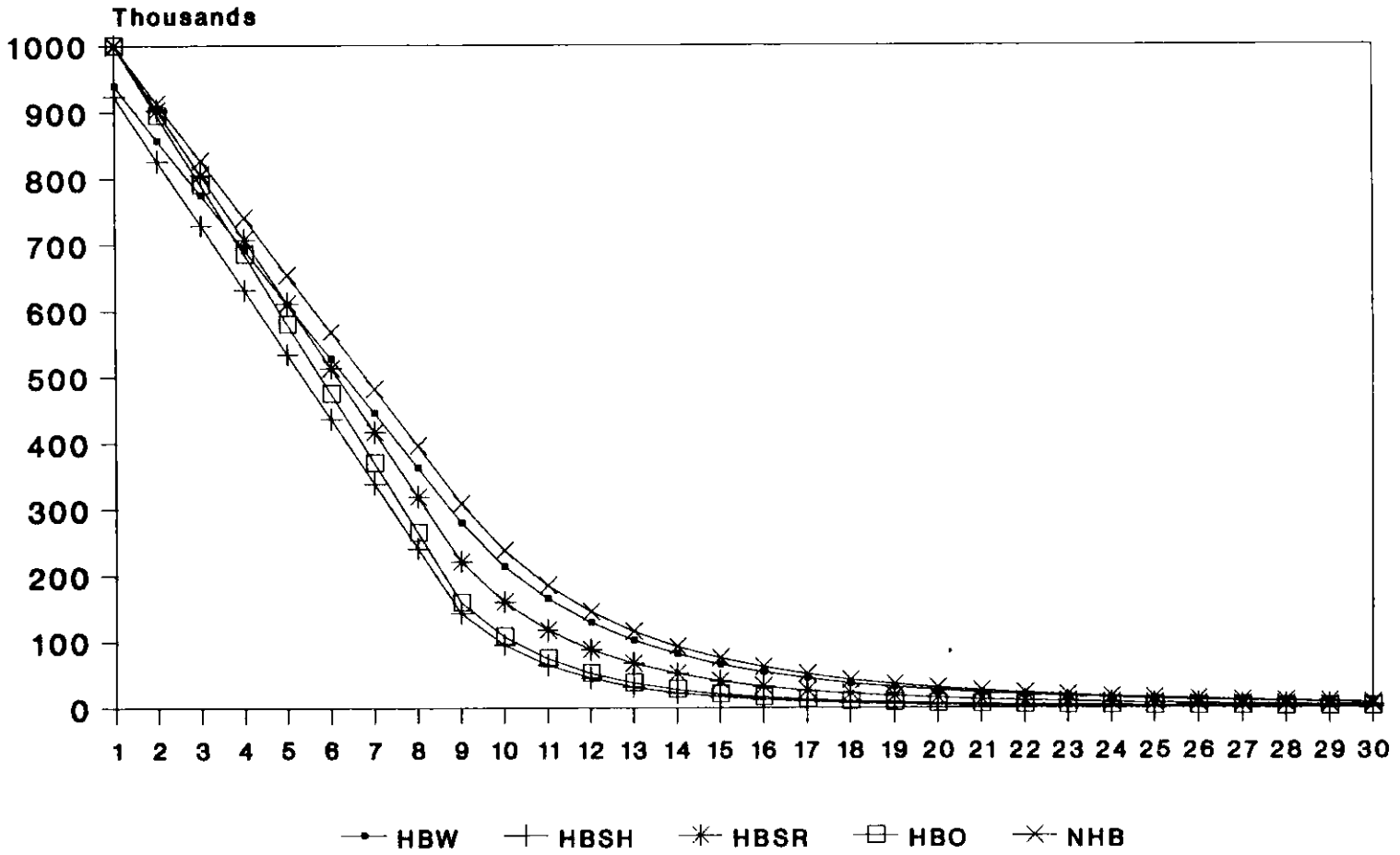
Trip Attraction Rates

Home Based Work Trips	=	1.80 x (Total Employees)
Home Base Shopping Trips	=	6.10 x (Commercial Employees)
Home Based Soc./Rec. Trips	=	0.50 x (Dwelling Units)
	+	1.50 x (Service Employees)
Home Based Other Trips	=	0.20 x (Dwelling Units)
	+	1.80 x (Service Employees)
	+	1.30 x (School Enrollment)
Non–Home Based Trips	=	0.30 x (Dwelling Units)
	+	2.90 x (Commercial Employees)
	+	1.40 x (Service Employees)

Exhibit OV-4

Transit Corridors Transitional Study

Miami Friction Factors



Note: Factors truncated for display

Among the leading candidates for adaptation to Miami was a fairly sophisticated model recently implemented for the Twin Cities area (Minneapolis/St. Paul). The model was adapted and refined from previous work in other cities and used to support extensive transit planning efforts in the Twin Cities area.

The largest shortcoming in the Minneapolis model was that the full model system had been developed only for home based work trips. Other transit trip purposes are estimated using much simpler factoring mechanisms. However, the *structure* of the Minneapolis model is such that it could be extended to other purposes, initially using coefficients "borrowed" from other cities, and refined as additional data become available.

The use of a "nested" structure is one of the main attractions of the Minneapolis model. A nested structure explicitly recognizes that the choice of main-mode, access mode, and transit service or "path" present distinct choices to travelers rather than an equal competition between what is essentially a mixture of modes and submodes as is done within the Miami model. The nesting structure assumes that the elasticity or sensitivity to travel characteristics will be higher at the lower levels of the nest. Thus, a choice between premium and local transit, for example, at a lower level of the nest, would be quite sensitive to the "competition" between these submodes, but the impact of a change in one submode would be diminished at higher level decisions (on main mode choice between transit and automobile, for example.)

The nesting structure contained in the Minneapolis model is shown at the top of Exhibit OV-5. As shown, the primary choice is simply a binary one between auto and transit. Nests exist beneath both of these modes, explicitly recognizing the somewhat sequential nature of decision-making. A third nest exists on the highway side, essentially an auto occupancy trade-off between the various shared ride categories.

A similar nested structure has been used in Honolulu, except that an additional nest is provided below the walk access choice between local and premium service. This is a useful distinction and one that is made within the existing Miami model and, indeed, exists even in the less sophisticated modal choice routines within FSUTMS. Therefore, a modified nesting structure was adopted for the revised Miami model, as shown at the bottom of Exhibit OV-5, with an additional nest between premium and local transit service.

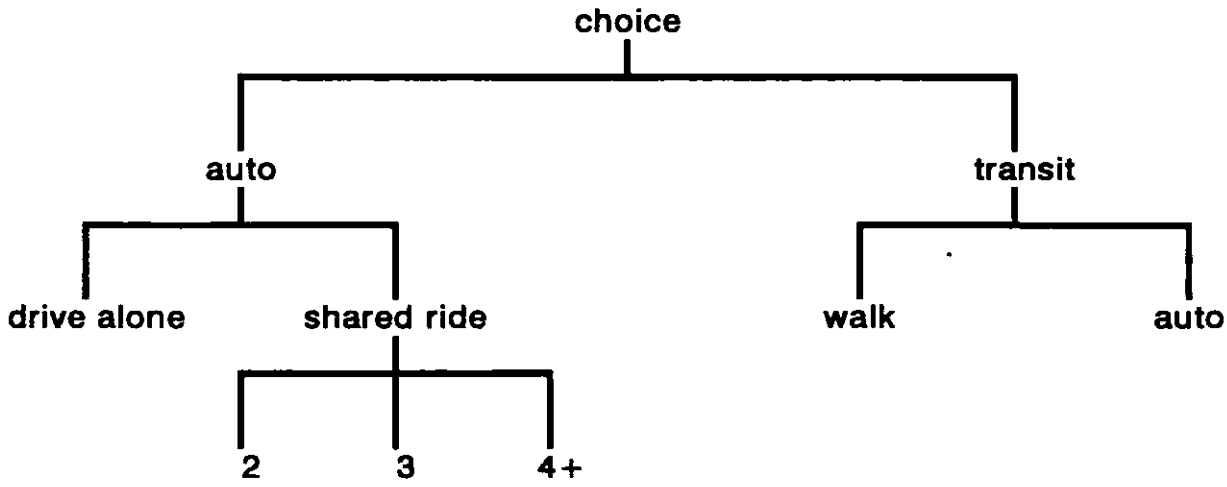
In theory, a similar nest could be constructed below the auto access mode choice. However, in practice such choices are much more likely to be "all or nothing" and little would be gained from the added complexity. In implementation, therefore, it was assumed that auto access is available to both local and premium services on a "best path" basis. This assumption differs from that used in the previous Miami model which restricted auto access to the premium path. The more general approach is considered more appropriate as it eliminates any "cliffs" which may occur in distinguishing between "express" and "local" bus services which may serve an outlying park-and-ride lot. An additional nest was added, however, below the auto access mode choice to divide trips between park-ride and kiss-ride/drop-off modes. This approach allows for more direct estimation of parking demands at major transit stations.

Exhibit OV–5

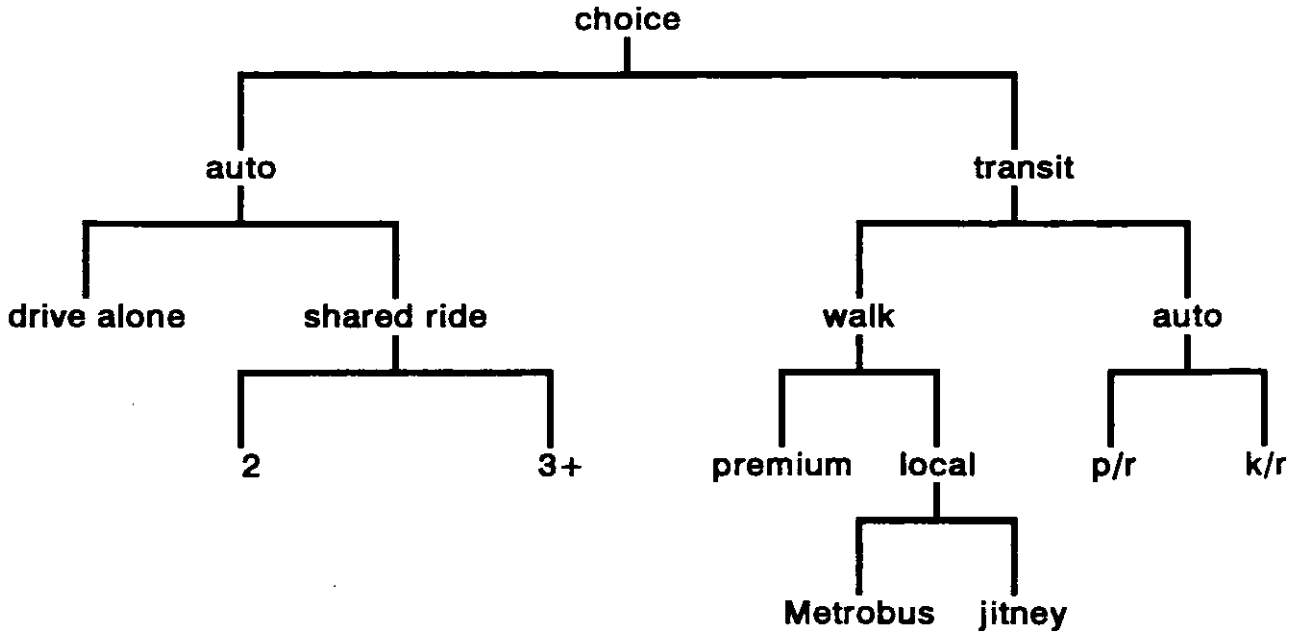
Dade County Transit Corridors Transitional Study

Nesting Strategies

Minneapolis Model



Revised Miami Model



Also, it was appropriate to reduce the nest under the shared ride mode from three to two categories. The definition of shared ride as 2-person versus 3 or more persons is consistent with the access options in FSUTMS and the previous Miami model and should be adequate to address any future HOV planning issues or other related needs in a low density Sun Belt city such as Miami.

The approach to developing a revised regional model was to merge the logical structure of the Minneapolis model with the FSUTMS interface of the Miami model. This was a relatively straightforward exercise as the Minneapolis model had been implemented using the TRANPLAN travel forecasting package, which is the same package as underlies FSUTMS. Additional features were added including the treatment of non-work purposes (noted below) and switches to allow certain portions of the model to be bypassed for specific applications.

The revised model was adjusted to replicate the 1986 data base used in developing the previous Miami model. However, during the development process, additional information was obtained which indicated that ridership patterns had changed somewhat as the Metrorail system had matured and that more recent data would be more appropriate as a basis for model development. Thus, a 1990 data base including highway and transit networks, zonal socio-economic data, and transit ridership information was assembled.

Also during this period, increasing jitney activity in the Miami area led to a desire to formally incorporate jitney service and ridership estimation as an additional sub-mode in the modal choice model. Although only limited jitney service and ridership data could be collected, a revised model structure was prepared and an additional nest below the local transit modal choice was added to the model, as shown previously in Exhibit OV-5.

Model Parameters

Relatively little data were available in the Miami area to re-calibrate the model, and no data to permit a true disaggregate calibration. The model was therefore implemented using the common practice of "borrowing" coefficients from other cities, adjusting the modal bias constants to replicate available Miami data, and examining the validation results to identify any additional adjustments to coefficients or other parameters which were appropriate.

The variable coefficients for home based work trips (HBW) used in the model were similar to those used in the Minneapolis model. The coefficients for other home-based trips (HBO) and non-home based trips (NHB) were based upon models developed in other cities, adjusted to be consistent with the structure of the HBW model. These coefficients are shown in the upper part of Exhibit OV-6.

The mode specific coefficients were adjusted to replicate the available Miami ridership data. Since little disaggregate data were available, many of the relationships, such as among auto ownership categories, were preserved from the Minneapolis model and all values were adjusted a similar amount.

Exhibit OV-6

Dade County Transit Corridors Transitional Study

Regional Mode Choice Models

Variable Coefficients	Modes								Values		
	Transit					Auto					
	p	l	d	k	j	1	2	3	HBW	HBO	NHB
In Vehicle/Run Time	x	x	x	x	x	x	x	x	−0.0200	−0.0150	−0.0180
Walk Time	x	x	x	x	x				−0.0450	−0.0350	−0.0450
Highway Out of Vehicle Time						x	x	x	−0.0450	−0.0350	−0.0450
First Wait (<7 min)	x	x	x	x	x				−0.0450	−0.0350	−0.0450
First Wait (<7 min)	x	x	x	x	x				−0.0230	−0.0350	−0.0450
Transfer Time	x	x	x	x	x				−0.0450	−0.0350	−0.0450
Number of Transfers	x	x	x	x	x				−0.0450	−0.0350	−0.0450
Auto−Access Time			x	x					−0.0200	−0.0150	−0.0180
Transit Fare	x	x	x	x	x				−0.0032	−0.0048	−0.0048
Parking Cost						x	x	x	−0.0032	−0.0048	−0.0048
Auto Operating Costs						x	x	x	−0.0025	−0.0048	−0.0048
Mode Specific Coefficients											
Zero Cars − Walk to Local	x								1.8308	1.7612	−0.9693
Zero Cars − Walk to Premium		x							1.9678	2.3132	−0.7344
Zero Cars − Walk to Jitney					x				1.9022	1.6443	−1.2133
Zero Cars − Park/Ride			x						0.1181	−0.0580	−1.3225
Zero Cars − Kiss/Ride				x					−0.0494	−0.2849	−1.8122
Zero Cars − Auto−2							x		0.1700	1.1300	0.6300
Zero Cars − Auto−3+								x	−0.0300	1.0900	0.4400
One Car − Walk to Local	x								−0.6692	−0.7388	−0.9693
One Car − Walk to Premium		x							−0.5322	−0.1868	−0.7344
One Car − Walk to Jitney					x				−0.5878	−0.8557	−1.2133
One Car − Park/Ride			x						−1.1719	−1.0580	−1.3225
One Car − Kiss/Ride				x					−1.3094	−1.2849	−1.8122
One Car − Auto−2							x		−0.4900	0.9800	0.6300
One Car − Auto−3+								x	−0.7400	0.8900	0.4400
Two+ Cars − Walk to Local	x								−1.9920	−1.7488	−0.9693
Two+ Cars − Walk to Premium		x							−1.8622	−1.1968	−0.7344
Two+ Cars − Walk to Jitney					x				−1.9178	−1.8657	−1.2133
Two+ Cars − Park/Ride			x						−1.9719	−1.8580	−1.3225
Two+ Cars − Kiss/Ride				x					−2.1394	−2.0849	−1.8122
Two+ Cars − Auto−2							x		−1.2500	0.6800	0.6300
Two+ Cars − Auto−3+								x	−1.5000	0.3800	0.4400
Downtown − Walk to Transit	x	x			x				1.1000	1.1000	1.0000
Downtown − Drive to Transit			x	x					1.2000	1.2000	1.1000
Downtown − Auto−2							x		0.5000	0.0000	0.0000
Downtown − Auto−3+								x	0.5000	0.0000	0.0000

Exhibit OV-6 (Continued)

Dade County Transit Corridors Transitional Study

Regional Mode Choice Models

Nesting Coefficients	Modes								Values		
	Transit					Auto					
	p	l	d	k	j	1	2	3	HBW	HBO	NHB
Transit	x	x	x	x	x				0.3000	0.3000	0.3000
Transit Walk	x	x			x				0.5000	0.5000	0.5000
Jitney		x			x				0.5000	0.5000	0.5000
Auto Access			x	x					0.5000	0.5000	0.5000
Highway						x	x	x	0.8000	0.8000	0.8000
Shared Ride							x	x	0.2000	0.2000	0.2000

Note: Based on Minneapolis models; distance in miles; time in minutes; cost in 1988 cents

Previous studies have shown that modal choice for transit and ridesharing modes is higher in the central business district (CBD) than for other areas because of the availability of supporting services that can easily be accessed by walking, thus minimizing the need for an automobile during the day. Following common practice, a downtown (CBD) "dummy" variable was added to the model. Again, due to a lack of disaggregate data, the CBD variable was adjusted based primarily on Metrorail station boarding data.

The coefficients are shown as they would appear in a conventional, multinomial logit model without nesting. The nesting coefficients are shown in the lower part of the Exhibit. The nesting coefficient of 0.30 for transit access mode choice (walk versus drive) is typical of those found in other nested model structures. The nesting coefficients for the highway submodes appear to be logical given the nature of the trade-offs implied at these nests. For the Miami model structure, which includes an additional premium-local nest, a nesting coefficient of 0.50 was assumed. A similar nesting coefficient of 0.50 was applied to the jitney/Metrobus split at the lowest level of the nesting structure.

The Minneapolis work model was developed using auto ownership as a socio-economic stratifer. Most work models use either auto ownership or income for this purpose. In the previous Miami model, a provision was made for income stratification, but since data were not available, this feature was not implemented in practice, as all income-related coefficients were set equal to the same values. In the revised model, the auto ownership approach was taken as the most appropriate because this variable is contained in the standard FSUTMS structure, used in trip generation, and is projected by the MPO. In the NHB model, socio-economic stratification is irrelevant so the actual model structure is somewhat simpler; for presentation purposes, the auto ownership stratifiers are maintained in Exhibit OV-6 but with identical coefficients.

Finally, the Minneapolis model introduced another level of sophistication in access coding. This subject is noted more completely below. The Minneapolis work model also reflected the non-linear nature of lengthy wait times for transit. This useful distinction was maintained in the Miami model.

Highway Network

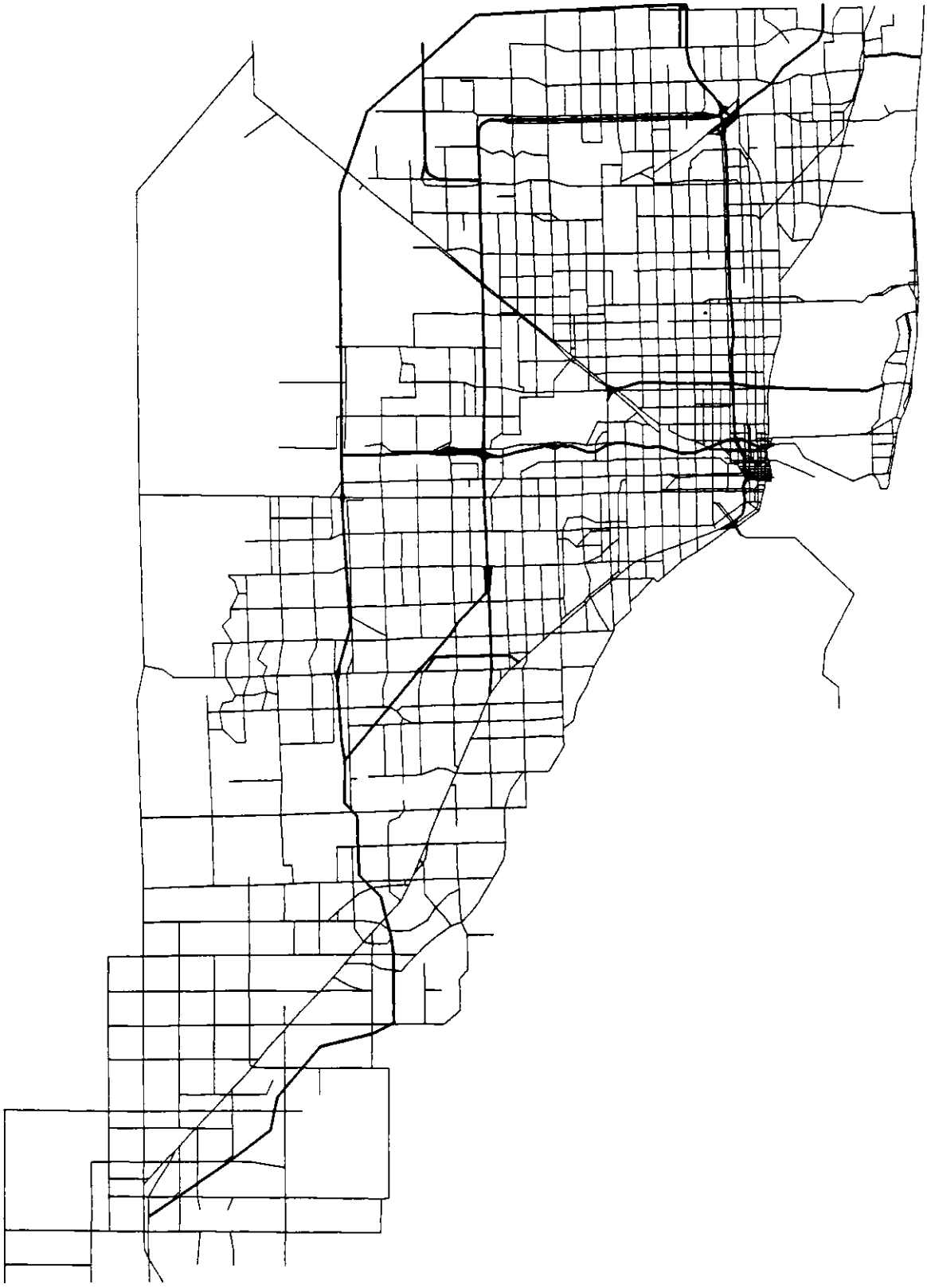
The Miami highway network has been coded as a standard FSUTMS network for the Dade County modeling area. The network reflects all freeways, primary arterials, and most secondary arterials and major collector streets in the area. The highway "grain" is consistent with the grain of the area system, being much more dense in the urban core and less dense in the outer suburban areas. The downtown portion of the network includes virtually all streets which are coded appropriately as either one-way or two-way. Highway impedances are taken from standard FSUTMS inputs and are typical of highway networks developed for most major urban areas. A plot of the 1990 highway network, with freeways shown in bolder line weight, is included in Exhibit OV-7.

Off-peak highway impedances were extracted from this network to use in the HBO and NHB models. Peak speeds were created by using the FSUTMS equilibrium assignment technique and used to obtain peak impedances for the HBW model.

Exhibit OV–7

Dade County Transit Corridors Transitional Study

1990 Highway Network



Parking costs and highway terminal times are provided in the zonal data maintained as part of the regional model structure and were adopted for use in the transitional analysis. The model structure is such, however, that revised parking costs, for example, could be used to examine sensitivity to public policies. Auto operating costs were established to be consistent with the original estimation of the Minneapolis model and were assumed to remain constant into the future, as improving fuel economy is generally assumed to offset any cost increases beyond normal inflation. However, parameters were made available in the model to adjust such assumptions for policy tests in the future.

Transit Network Inputs

The current transit network serving the Miami area is quite complex and includes numerous local and express Metrobus routes, the existing Metrorail line, and the downtown Metromover service. Many parts of Miami are also served by jitneys which present special analytical challenges to the study, as noted above. Transit coverage is shown for the 1990 Metrobus network in Exhibit OV-8. The extent of the Metrorail and Metromover systems are shown in Exhibit OV-9.

Transit network processing follows a very conventional approach. Transit routes serving the area are coded on an individual basis using an integrated network approach which develops the transit running times from the highway links traversed by the various bus routes and special links for other transit modes such as Metrorail and Metromover developed directly from the performance characteristics of the individual services. Again following common modeling practice, work trip estimation is made using peak transit services and non-work using off-peak services. The distinction between route and headway parameters for peak and off-peak services is straightforward and is based directly on the operating policy. Some routes change headway between peak and off-peak conditions while others operate only in a single period.

As noted above off-peak services are coded directly from the 24-hour highway network used for the gravity model and other model components. Peak services are coded using the constrained highway speeds developed from an equilibrium assignment of highway volumes. Provisions have been made in the model implementation package so that an iteration between modal choice results and highway speeds can be performed at the discretion of the analyst. In past model applications, MetroDade staff have found it desirable to override the speeds on certain links in order to better replicate actual bus operating speeds. These overrides have been preserved in the development and application of the revised model and provide the analyst with a convenient tool for further "fine-tuning" the modeling effort.

Transit access coding is one of the more "artful" parts of transit modeling. The state-of-the-practice has moved toward the identification of "walk" and "non-walk" areas for each TAZ, often with different percentages for trip productions and attractions. In application, the mode choice is effectively computed for a reduced choice set, with only the auto access path being available for the non-walk portion of the production zone and only the walk-access area being available for any transit trips at the attraction end of the trip.

Exhibit OV–8

Dade County Transit Corridors Transitional Study

1990 Metrobus Coverage

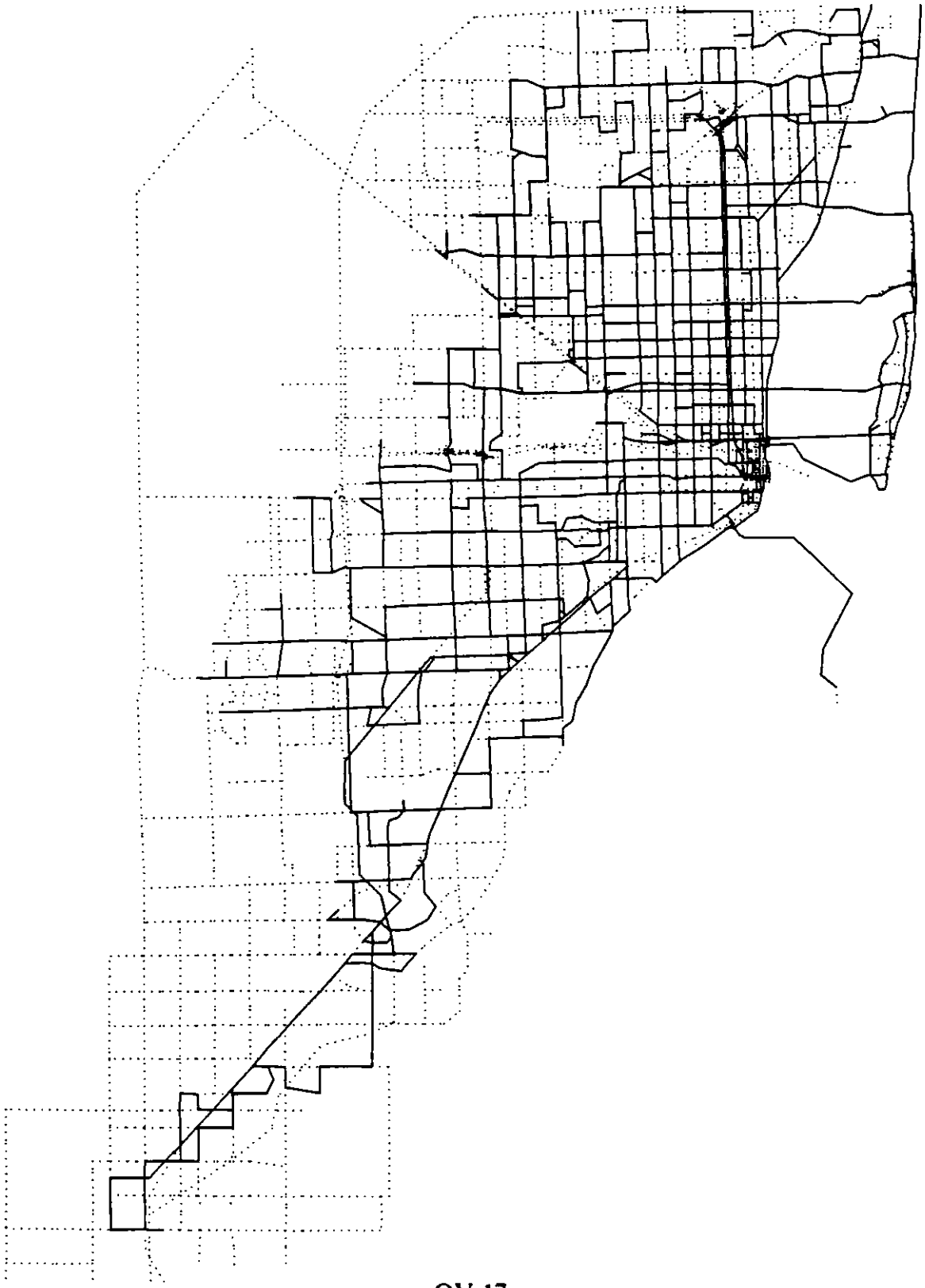
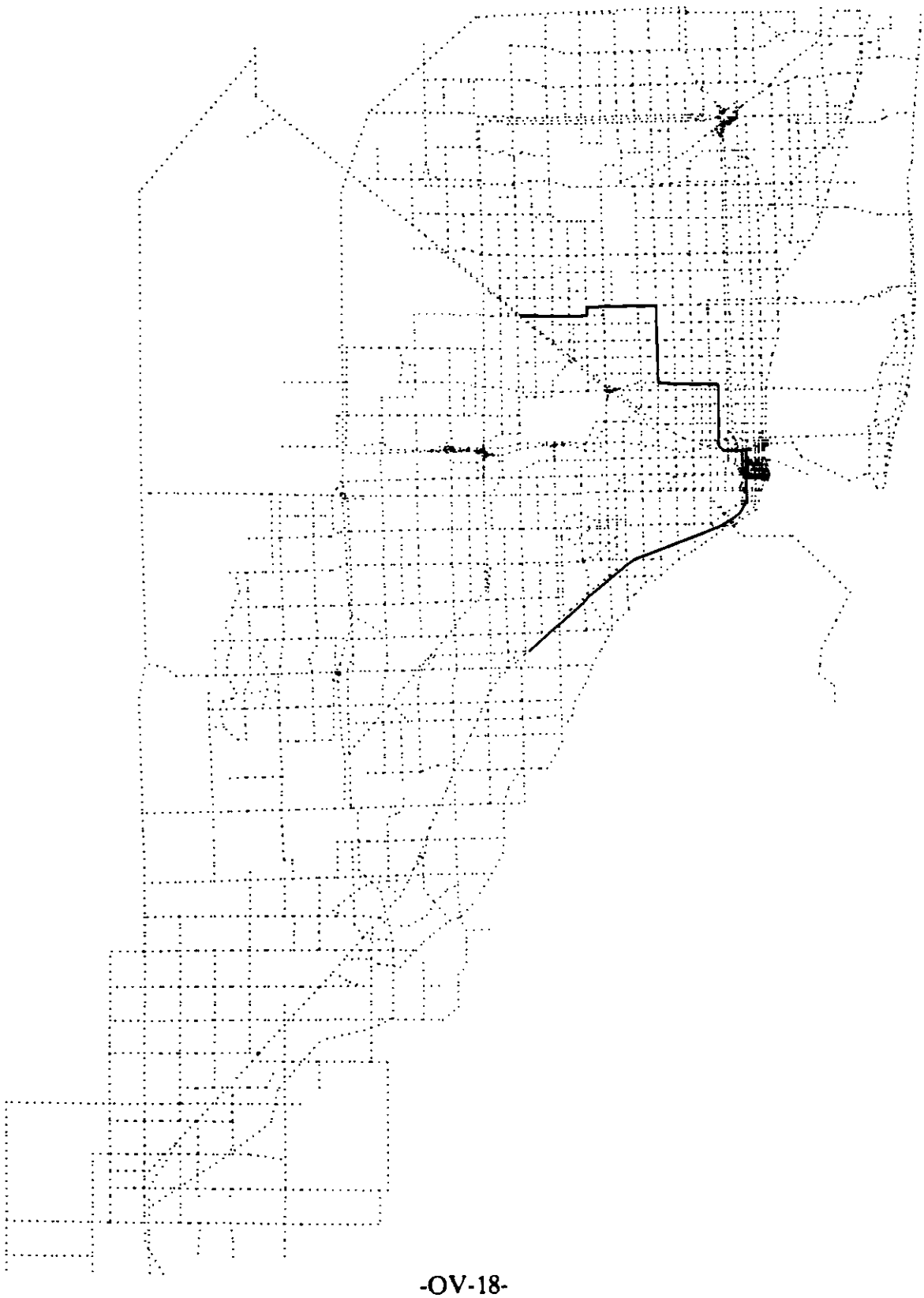


Exhibit OV–9

Dade County Transit Corridors Transitional Study

1990 Metrorail and Metromover Systems



In most models, the walk area is typically defined as that portion of the zone within a "normal" walking distance of transit, often defined as 0.30 to 0.40 miles. Although this approach is a vast improvement over the all-or-nothing approach used in the current FSUTMS models, it still does not take into account the fact that some transit users are willing to walk rather long distances. A few recent models, including Minneapolis, have addressed this problem by creating a two-tiered concept for walk areas. The first tier applies to "short" walks of less than one-third of a mile while the second applies to "long" walks between one-third and one mile of transit service.

The Minneapolis approach was adopted for the revised Miami model. This approach is particularly useful for the transitional analysis and future Alternatives Analysis efforts for corridors which extend from heavily developed central areas with a dense zone system to outer suburban areas with much larger zones and less uniform access characteristics. A special-purpose program was prepared which computes the walk access links for the transit network, based upon the available highway network connectors, the topology of the transit network, and percent "short walk" and "long walk" estimated for each zone.

Auto access to transit is another key issue and the subject of substantial model development in other cities. The state-of-the-art dictates that auto connectors to transit park-and-ride lots be coded with travel times and distances that are consistent with the regional highway network. Although there is no direct auto access coding feature in FSUTMS (or TRANPLAN itself, for that matter), the problem was addressed in the previous Miami model by the use of a special-purpose program which extracted highway impedances from zonal production centroids to attraction zones which have been "equivalenced" to park-and-ride lots. In effect, this means that the auto access time is the time from the production zone to the attraction zone in which the station is located. This is a very straightforward approach and provides acceptable results.

A special-purpose program was written for auto access coding, building upon the previous Miami modeling approach. The approach used for the revised model develops auto connectors to any park-and-ride facility providing differential service that is within an acceptable distance. The distance limitation is frequently imposed by FTA and has been set at five miles for most facilities and ten miles for major end-of-line facilities which have been shown to draw from a larger geographic area.

One final network element used in the model is sidewalk links supplementing the zonal access connectors. A sidewalk network previously prepared by MetroDade was reviewed and refined, covering the Miami CBD and several other activity centers. In addition, another special-purpose program was developed which dynamically adds any additional sidewalk links in the vicinity of major transit stations.

Other transit inputs are provided in conventional manners. Fares are computed using the existing FSUTMS/TRANPLAN software to reflect the relatively simple MetroDade fare structure. Parking costs and station access times are provided through a special station data file which is also used to identify park-and-ride facilities and other stations used in any given alternative.

Jitneys

Currently, transit service provision in the Miami area is complicated by policy issues concerning the future role of jitneys as a major transit option. Historically, jitneys have served selected neighborhoods or corridors in the Miami area more effectively than they could be served by conventional fixed-route, large-vehicle Metrobus services. A rapid and uncontrolled expansion in jitney service has created some problems for transit integration and recent legal challenges to jitney regulation has further clouded the issue. Nevertheless, jitney service is recognized as a viable transit mode, at least in portions of the Miami area, and the revised model was structured to treat these services explicitly.

A jitney network was inferred based on limited field observation of jitneys operating throughout several major corridors in the area. Jitneys were coded in an analogous manner to Metrobus services, although the speed relationships between jitney and highway times were adjusted to reflect jitney operating characteristics. For modeling purposes, it was assumed that transfers between jitneys and MetroDade service were minimal and could be ignored in the development of the model. Thus, the jitney/Metrobus tradeoff is made at the lowest nest of the model structure and the impact of jitneys on other MetroDade services is reflected only through composite impedances between local and premium services and then between walk access and auto access submodes.

FSUTMS Interface

The regional model was designed to operate in conjunction with FSUTMS and standard TRANPLAN inputs and outputs. The model currently operates in a stand-alone mode and can be run either using standard TRANPLAN control statements or through a FSUTMS-like menu system. The operating procedures are described more fully in the Technical Memorandum "Transit Forecasting Process and User's Guide." Further integration of the model system could be added subsequently, if desired by MetroDade or FDOT.

The operating procedures are designed to facilitate the use of the model in a transit Alternatives Analysis or similar transit planning activity. The model (and menu system) allows for a "standard" set of inputs such as person trip tables and highway networks as well as alternative-specific inputs including transit impedances, walk percentages, and related items. In addition, the menu system is designed so that the model may be run for work trips only, including a peak assignment normally used to evaluate system performance during network equilibration. The menu system also allows for a non-work only run, to be performed after a successful work trip application, or the running of all parts of the analysis for use in final clean-ups, sub-alternative evaluations, etc. This operational flexibility greatly improves the usefulness of the models for transit planning purposes but does prevent the model from being substituted directly within the existing FSUTMS menu and control module system.

TRAVEL DEMAND FORECASTS

Background

Travel demand forecasts were prepared for each transit alternatives included in the transitional analysis. A total of 22 alternatives were examined, included a total of 18 in six different corridors, three alternatives in combined options, and a transportation systems management (TSM) base line alternative. The estimates were prepared using the Miami travel forecasting models as described in the Patronage Forecasting Overview section and input data developed by MetroDade and the Florida Department of Transportation (FDOT). All forecasts were made for a 2010 time horizon, based on projected land use data and other inputs provided by MetroDade.

Selected input data and various output information was summarized by geographic areas as shown in Exhibit BG-1. These areas were designed to reflect the impact of the various corridor alternatives as noted below. A summary of socio-economic data for these areas is shown in Exhibit BG-2. As expected, major population growth is anticipated in the Doral, West Dade, Redlands, and Howard areas, while major employment growth areas include the Miami CBD, the Doral area, and the MIA/south area.

The highway system improvements assumed to be in place by 2010 included:

- Numerous arterial street improvements, particularly in the rapidly growing western parts of the county.
- Extension of the Dolphin Expressway (SR 836) to NW 137th Avenue.
- Extension of SR 874 to SW 137th Avenue.
- Construction of a new expressway along the northern edge of the airport from the Palmetto to LeJeune, connecting with SR 112 to the east.
- Construction of Gratigny Parkway in the Opa Locka area from the Palmetto to the vicinity of NW 27th Avenue.

The 2010 highway network is shown in Exhibit BG-3.

A 2010 transit network was created to serve as a base line for comparing each of the corridor alternatives. This network was prepared following the guidelines specified by the Federal Transit Administration (FTA) which calls for the creation of a "Transportation Systems Management" (TSM) alternative to serve as basis for calculating various impacts and evaluation measures. The TSM alternative was developed on a regional basis so that a single, common network could be used as a base line for all of the corridor alternatives. The network also included transit improvements in other parts of the region and has been designed to represent a reasonable representation of future transit services in Dade County if no major investments were made in additional fixed-rail facilities.

Exhibit BG–1

Dade County Transit Corridors Transitional Study

Patronage Summary Areas

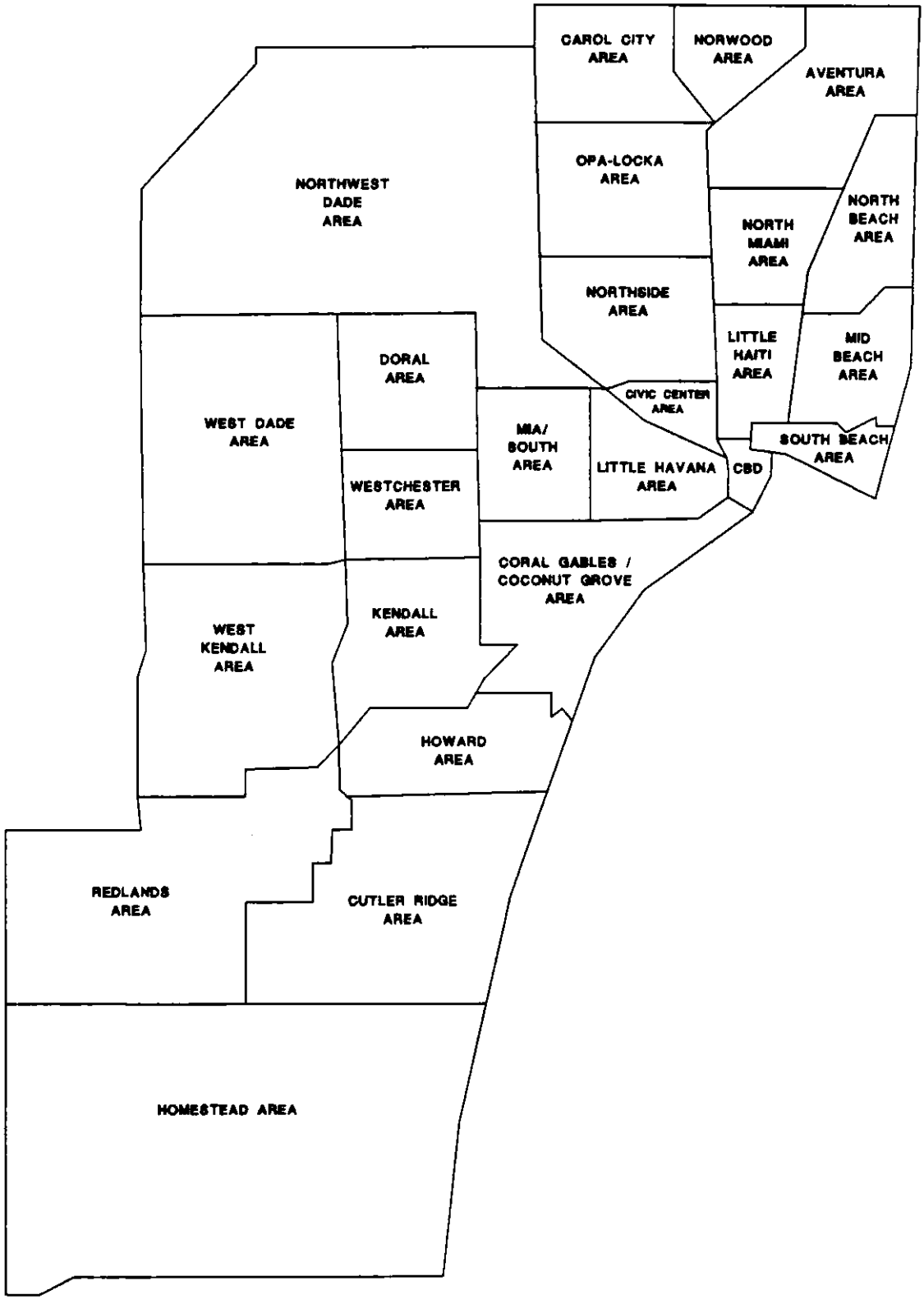


Exhibit BG–2

Dade County Transit Corridors Transitional Study

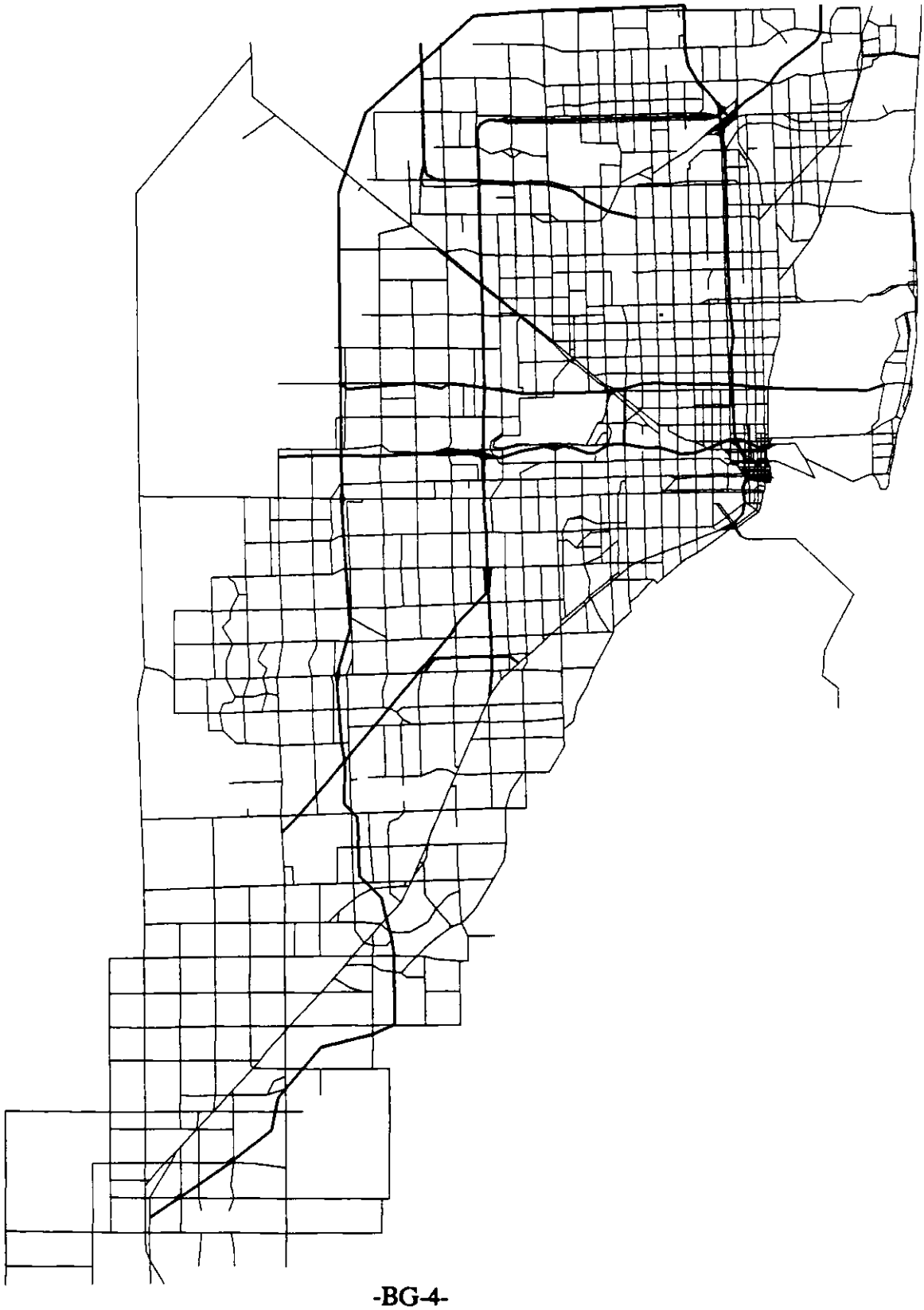
Socio–Economic Data by Area

	1990			2010			Growth		
	Popu–lation	House–holds	Employ–ment	Popu–lation	House–holds	Employ–ment	Popu–lation	House–holds	Employ–ment
Miami CBD Area	8,500	5,700	95,200	12,900	9,800	158,900	52%	72%	67%
North Beach Area	42,500	27,100	12,200	40,200	27,700	11,600	–5%	2%	–5%
Mid Beach Area	28,200	20,800	23,500	31,800	23,000	25,400	13%	11%	8%
South Beach Area	42,300	29,500	19,900	49,900	34,000	21,800	18%	15%	10%
Aventura Area	112,300	59,200	43,700	138,900	71,200	43,400	24%	20%	–1%
North Miami Area	75,400	33,600	24,500	72,600	36,300	29,400	–4%	8%	20%
Little Haiti Area	62,900	25,400	32,100	73,200	29,800	62,500	16%	17%	95%
Norwood Area	41,800	17,700	15,400	46,500	19,200	15,400	11%	8%	0%
Carol City Area	77,400	22,300	10,200	85,100	25,800	17,600	10%	16%	73%
Opa Locka Area	76,900	24,700	48,800	79,000	27,600	37,000	3%	12%	–24%
Northside Area	156,000	53,100	63,900	161,500	56,300	61,800	4%	6%	–3%
Civic Center Area	48,600	17,100	49,500	50,100	19,800	64,500	3%	16%	30%
West Dade Area	47,000	14,600	6,000	85,100	31,900	8,100	81%	118%	35%
Doral Area	6,400	3,800	53,700	48,300	23,200	104,100	655%	511%	94%
Westchester Area	115,000	39,500	26,300	100,900	42,300	27,800	–12%	7%	6%
MIA South Area	71,900	26,400	75,900	73,400	28,500	104,600	2%	8%	38%
Little Havana Area	130,300	51,300	61,800	126,300	52,600	94,000	–3%	3%	52%
West Kendall Area	119,500	45,200	14,100	177,500	75,100	23,000	49%	66%	63%
Kendall Area	96,600	37,800	34,900	95,500	40,600	33,700	–1%	7%	–3%
Homestead Area	48,200	16,400	12,400	53,100	17,600	11,600	10%	7%	–6%
Redlands Area	21,800	7,900	8,900	58,400	24,400	16,700	168%	209%	88%
Cutler Ridge Area	101,500	34,900	25,900	136,700	48,700	32,600	35%	40%	26%
Howard Area	92,100	33,700	26,800	191,400	73,800	40,100	108%	119%	50%
NW Dade Area	181,900	66,700	97,300	215,200	87,800	107,300	18%	32%	10%
Gables/Grove Area	124,700	55,600	84,700	131,400	64,200	103,400	5%	15%	22%
County Total	1,929,800	769,900	967,700	2,335,100	991,200	1,256,400	21%	29%	30%

Exhibit BG–3

Dade County Transit Corridors Transitional Study

2010 Highway Network



The TSM network was based on current Dade County transit services and reflected those improvements, such as the Metromover extensions, which are well underway or which could be considered part of a "committed" system. Among the key features of the network are the following:

- Extension of the Metromover system to the Brickell and Omni areas and re-orientation of bus service to reduce bus demands on congested downtown streets.

- Extension of the north end of the Stage I Metrorail system to a new station just west of the Palmetto expressway.

- Addition of a "short-turn" Metrorail line from Dadeland South to Earlington Heights, providing additional service along the higher-utilized southern part of the Metrorail system and providing a base lie service to tie into several of the corridor alternatives.

- Creation of a Multi-Modal terminal near Miami International Airport, served by an on-airport people mover system, a Tri-Rail extension, and various Metrobus routes.

- Construction of a South Corridor busway along South Dixie from Cutler Ridge to Dadeland South, including the construction of several park-and-ride lots and the addition of express bus service to Dadeland South from the Homestead area and along the corridor.

- Creation of park-and-ride lots and transit centers in the west corridor, with express bus service to the CBD via SR 836.

- Addition of a west corridor MAX service from FIU to downtown Miami along SW 8th Street and Flagler Street, addition of a Beach MAX service from 71st Street to downtown Miami, and addition of a NW 67th Avenue MAX service from the Miami Springs area to the employment centers west of the airport.

- Extension of several local bus routes to serve growing areas in the western part of the county, as well as addition of new crosstown and other local routes connecting suburban growth areas.

The expanded Metrobus coverage for the 2010 network is shown in Exhibit BG-4. The alignments of the various fixed guideway alternatives building upon the existing and committed Metrorail and Metromover systems are shown in Exhibit BG-5.

Because of the uncertainties associated with future jitney service, the current level of service was assumed to continue to exist for the future system and thus the 1990 jitney network was incorporated in the 2010 TSM base line.

Exhibit BG–4

Dade County Transit Corridors Transitional Study

2010 Metrobus Coverage

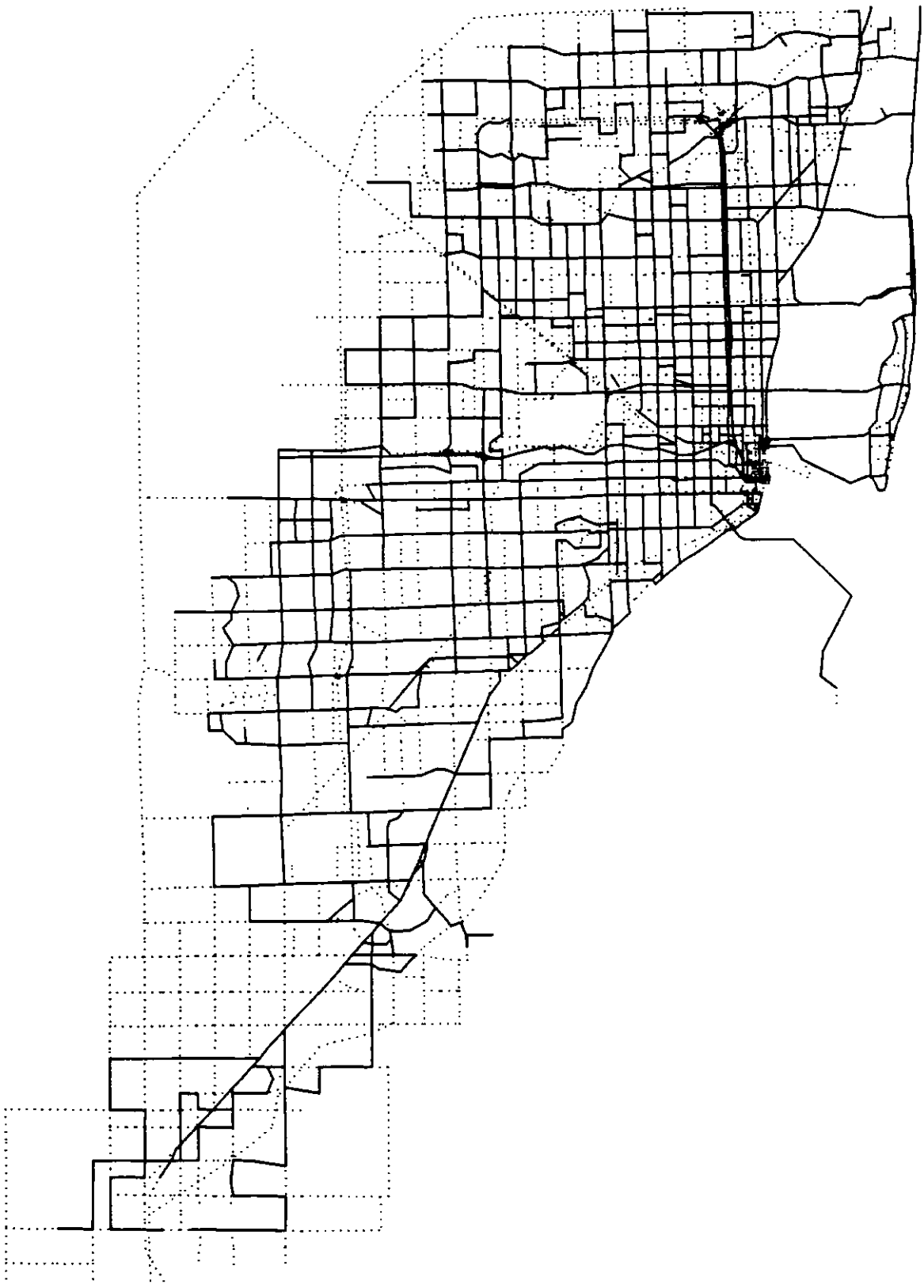
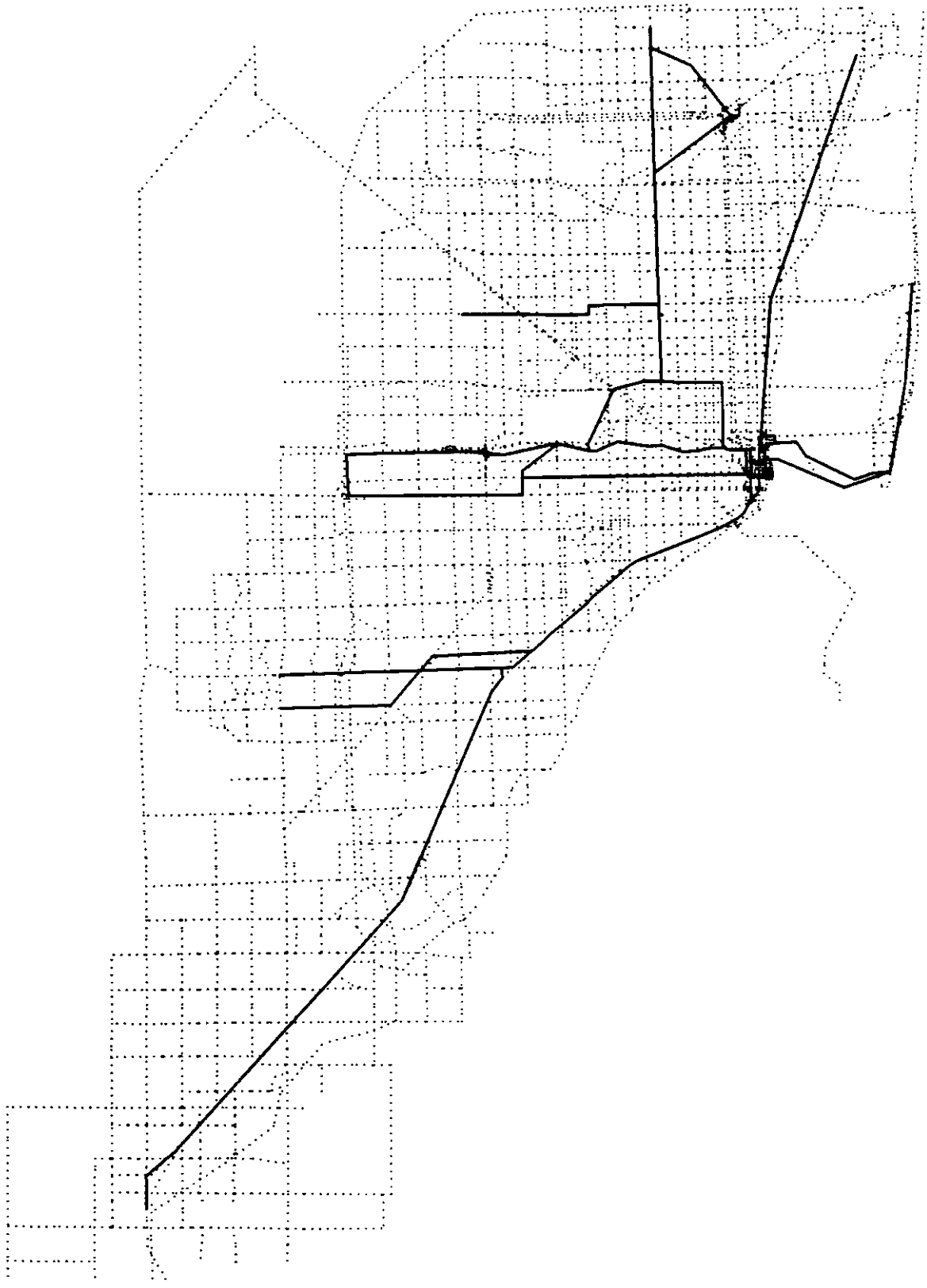


Exhibit BG–5

Dade County Transit Corridors Transitional Study

2010 Fixed Guideway Alignments



Ridership Forecasts - South Corridor

The South corridor extends southwest from the Dadeland area to Homestead and Florida City, following the FEC railroad and US Route 1. In the TSM alternative, a busway was assumed to be constructed along the alignment as far south as Cutler Ridge. A total of three additional alternatives were examined, including extending the busway to Florida City and replacing the busway with hybrid rail or Metrorail service. The three "build" alternatives are identified as "S1", "S2", and "S3" in the summary materials which follow.

Input Assumptions

Input assumptions for the three South corridor alternatives are summarized in Exhibit S-1. As noted above, the busway alternative extended the TSM assumptions south to Homestead. An additional Homestead express run was added to Dadeland South, the Homestead limited service was operated via the busway making all station stops and two Florida City/Homestead local routes were extended to Dadeland South via the busway. Off-peak service was assumed to be somewhat less comprehensive in both the TSM and S1 alternatives, with some express routes eliminated and others converted to circulators.

Rail service in the busway alternative was the same as in the TSM alternative. In the two rail alternatives,, the short-turn Metrorail line was extended south from Dadeland South to Florida City. Express bus routes were deleted or converted into feeder services.

Ridership

Ridership results are summarized in Exhibit S-2. The information in the top section of the exhibit shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking Metrobus to Cutler Ridge, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the lower part of the exhibit reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include all stations along the South corridor alignment south of Dadeland, including the busway stations in the TSM alternative. The TSM and busway alternatives also include passengers on express buses prior to their entry onto the busway.

The ridership on the busway alternative is only slightly higher than for TSM as the major benefit of the busway occurs along the more congested portions of Route 1 north of Cutler Ridge. The two rail alternatives attract somewhat greater numbers of passengers due to higher speeds, more uniform service as all intermediate stations, and avoidance of a need to transfer at Dadeland South. The Metrorail alternative attracts slightly more work trips because of higher speeds, but actually attracts slightly fewer non-work trips because of fewer stations and thus less local access for shorter trips.

Exhibit S–1

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
South Corridor

		TSM	S1 Homest'd Busway	S2 Fla City Hybrid	S3 Fla City Metrorail
Rail Service					
Line 1	From To Via	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext
Line 2	From To Via	Dadeland S Earl. Hts. Stage 1	Dadeland S Earl. Hts. Stage 1	Fla. City Earl. Hts. Stage 1	Fla. City Earl. Hts. Stage 1
Bus Service					
Premium Peak	Homestead Ltd.	Dadeland	(delete)	(delete)	(delete)
	Cutler Ridge Expr.	Dadeland	Dadeland	(delete)	(delete)
	Cutler Ridge Ltd.	Dadeland	Dadeland	(delete)	(delete)
	Hammocks Expr.	Dadeland	Dadeland	Local	Local
	Country Walk/184	Dadeland	Dadeland	cb Perrine	cb Perrine
	Country Walk/157	Dadeland	Dadeland	cb Coral Rf	cb Coral Rf
	Howard Expr.	Dadeland	Dadeland	cb @ 136	cb @ 136
	Saga Bay Expr.	Dadeland	Dadeland	cb Perrine	cb Perrine
	Homestead Expr.	N/A	Dadeland	(delete)	(delete)
Premium Off–Peak	Homestead Ltd.	Dadeland	Dadeland	(delete)	(delete)
	Cutler Ridge Ltd.	Dadeland	Dadeland	(delete)	(delete)
	Howard Expr.	Dadeland	Dadeland	cb @ 136	cb @ 136

Exhibit S–1 (Continued)

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
South Corridor (Continued)

		TSM	S1 Homest'd Busway	S2 Fla City Hybrid	S3 Fla City Metrorail
Bus Service (Continued)					
Locals Peak	Fla. City/Palm	Ctlr Rdge	Dadeland	Moody	Moody
	Homestead/Palm	Ctlr Rdge	Dadeland	Coco Palm	Coco Palm
	Crosstowns	(nominal)	(nominal)	(nominal)	(nominal)
Locals Off–Peak	Saga Bay/Cntry Wlk	via Perrine	via Perrine	via Perrine	via Perrine
	Fla. City Circ.	(nominal)	minor adj.	minor adj.	minor adj.
	Homestead Circ.	(nominal)	minor adj.	minor adj.	minor adj.
	Crosstowns	(nominal)	(nominal)	(nominal)	(nominal)

Exhibit S-2

Dade County Transit Corridors Transitional Study

Travel Demand Summary

Average Weekday Travel – 2010

South Corridor

	TSM	S1 Homest'd Busway	S2 Fla City Hybrid	S3 Fla City Metrorail
MODE SPLIT RESULTS				
LINKED TRANSIT TRIPS				
Work	152,400	153,200	155,000	155,700
Home-based Non-work	110,600	110,800	112,200	112,100
Non-home Based	69,100	69,100	69,300	69,200
Total	332,100	333,100	336,500	337,000
ASSIGNMENT RESULTS				
REGIONAL RAIL BOARDINGS				
Total Un-Linked	94,500	95,300	105,800	106,200
Transfers	0	0	(1,200)	(1,200)
Total Linked	94,500	95,300	104,600	105,000
CORRIDOR BOARDINGS				
Boardings on New Alignments (1)	23,600	28,400	30,900	31,400
Peak Hour, Peak Direction Loads:				
South of Brickell	6,100	6,200	6,500	6,600
North of Overtown	2,000	2,000	2,000	2,000
South of Dadeland	3,400	3,600	3,900	4,100
% Outbound	6%	5%	3%	3%

(1) Includes South Busway stations to Cutler Ridge in TSM alternative

A few front-to-back rail transfers are recorded for passengers traveling to or from areas along the Stage I Metrorail line beyond Earlington Heights. Outbound ridership is fairly modest and drops even further south of Cutler Ridge.

Travel summaries for market areas within the South corridor are summarized in Exhibit S-3. The primary impacts for the rail alternatives include the long-distance trips from the Homestead area to the CBD and through trips from the south corridor to other parts of the region, reflecting the elimination of a transfer at Dadeland South.

A station boarding summary is included in Exhibit S-4. Boardings in the busway alternative are greatest at Campbell and Caribbean (Cutler Ridge) where express service is provided to Dadeland South. Boardings are somewhat more uniform for the rail alternatives, since the service level is the same at all rail stations along this single line.

Travel Impacts

Cost effectiveness measures computed in accordance with FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown as the top of Exhibit S-5. The incremental ridership is shown both for total transit trips (including jitneys) and MetroDade-only ridership (excluding jitneys). Since jitney activity is insignificant in the South corridor, these ridership differences are identical. As noted above, the incremental ridership is rather modest for the busway extension and is about 1.3 to 1,4 million trips for the rail alternatives.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed relative to existing passengers (really, passengers projected for the TSM alternative) and thus reflect the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT reduction is only slightly less for the busway alternative, in part because the busway alternative best serves the longest distance trips by providing non-stop service, while the rail alternatives compete more favorably in the shorter trip markets.

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami. The times show a mixture of results, reflecting the fact that some areas benefit more from the express service options in the busway alternative while others benefit more from the rail service plan. As expected, the greatest savings are generally from the outermost areas.

Exhibit S–3

Dade County Transit Corridors Transitional Study

Travel Market Summary

South Corridor

Market	Person Trips	Transit Trips				Delta Transit Trips		
		TSM	S1 Homest'd Busway	S2 Fla City Hybrid	S3 Fla City Metrorail	S1 Homest'd Busway	S2 Fla City Hybrid	S3 Fla City Metrorail
Work Trips								
Homestead–CBD	19,000	5,000	5,300	6,000	6,400	300	1,000	1,400
Redlands–CBD	6,000	1,400	1,300	1,200	1,300	(100)	(200)	(100)
Cutler Ridge–CBD	12,600	3,500	3,600	3,900	4,000	100	400	500
Howard–CBD	5,200	1,200	1,200	1,200	1,200	0	0	0
South–Intra	132,200	4,300	4,400	4,400	4,300	100	100	0
South–Other	197,900	7,800	8,300	9,100	9,600	500	1,300	1,800
Other–South	25,200	900	900	1,000	1,000	0	100	100
All Other	1,562,000	128,100	128,100	128,100	128,100	0	0	0
Total	1,960,200	152,400	153,200	155,000	155,700	800	2,600	3,300
Total Trips								
Homestead–CBD	25,200	5,500	5,800	6,600	7,000	300	1,100	1,500
Redlands–CBD	11,000	1,800	1,600	1,600	1,600	(200)	(200)	(200)
Cutler Ridge–CBD	28,000	4,900	5,000	5,600	5,700	100	700	800
Howard–CBD	11,600	1,700	1,800	1,900	1,900	100	200	200
South–Intra	711,600	10,000	10,300	10,300	9,800	300	300	(200)
South–Other	493,200	10,100	10,700	12,400	13,000	600	2,300	2,900
Other–South	110,000	1,800	1,800	2,100	2,100	0	300	300
All Other	6,619,500	296,200	296,200	296,100	296,100	0	(100)	(100)
Total	8,010,300	332,100	333,100	336,500	337,100	1,000	4,400	5,000

Exhibit S–4

Dade County Transit Corridors Transitional Study

Station Boarding Summary

Average Weekday Travel – 2010

South Corridor

Station	TSM	S1 Homestead Busway	S2 Fla City Hybrid	S3 Fla City Metrorail
FEC @ Florida City	NA	NA	1,070	1,220
FEC @ Campbell	NA	2,900	2,260	2,400
FEC @ Biscayne	NA	810	1,530	1,600
FEC @ Moody	NA	1,520	2,270	2,660
FEC @ Coconut Plam	NA	390	820	NA
FEC @ Goulds	NA	260	460	710
FEC @ Caribbean	NA	4,430	3,260	3,490
FEC @ Cutler Ridge	4,940	NA	NA	NA
FEC @ Marlin	460	520	660	NA
FEC @ Perrine	1,240	1,480	2,880	2,920
FEC @ Coral Reef	560	590	1,480	1,480
FEC @ Howard	200	220	720	770
FEC @ SW 124th	150	150	NA	NA
FEC @ SW 112th	100	150	430	410
TOTAL	7,650	13,420	17,840	17,660

Note: Boardings for TSM and Alternative S–1 do not include passengers already onboard express buses when they enter the busway

Exhibit S–5

Dade County Transit Corridors Transitional Study

Travel Impact Summary

Average Weekday Travel – 2010

South Corridor

			TSM	S1 Homest'd Busway	S2 Fla City Hybrid	S3 Fla City Metrorail
ANNUAL TRANSIT TRIPS (Millions)						
Total (including jitneys)			101.194	101.348	102.358	102.491
MetroDade Only			84.457	84.611	85.621	85.755
Incremental Total			NA	0.285	1.295	1.429
Incremental MetroDade Only			NA	0.285	1.295	1.429
ANNUAL FARE REVENUE (Millions)						
Incremental MetroDade Only			NA	$0.575	($0.490)	($0.299)
TRAVEL TIME SAVINGS (as per FTA formula)						
Daily Hours			NA	700	800	1,600
Annual Savings (Millions $)			NA	$0.758	$0.835	$1.680
AUTO VMT SAVINGS (Daily Vehicle Miles) (1,000's)			NA	45.3	105.0	136.9
SELECTED TRAVEL TIMES (Total Minutes)						
FROM:	TO:					
Country Walk (845)	CBD	A	63.8	61.0	69.7	68.5
Franjo (961)	CBD	W	62.1	61.1	64.8	60.8
Homestead (1024)	CBD	W	110.1	108.1	90.2	83.2
Princeton (1059)	CBD	A	59.2	65.4	60.2	55.3
Florida City (1086)	CBD	A	86.6	67.1	66.7	61.4

Ridership Forecasts - Kendall Corridor

The Kendall corridor extends westward from the Dadeland area to the rapidly growing southwestern suburbs. Alignments were considered along SR 878, Kendall Drive, and Killian Drive, extending westward to the vicinity of SW 137th Avenue. A total of three "build" alternatives were examined in the corridor, identified as "K1", "K2", and "K3" in the summary materials which follow.

Input Assumptions

Input assumptions for the three Kendall corridor alternatives are summarized in Exhibit K-1. As shown, the busway alternative ran along Killian Drive from the vicinity of SW 137th Avenue to SR 874, then along SR 874 and SR 878 to the Dadeland North station. The Killian KAT and one of the Kendall KAT's were routed onto the busway, plus an additional park-and-ride route running express from the parking lots along the route. The hybrid rail alternative ran along Kendall Drive from SW 137th Avenue and was through-routed with the short-turn Metrorail line at Dadeland South, providing direct service to downtown Miami, the Civic Center, and other destinations along Stage I Metrorail. The remaining alternative featured fully grade-separated Metrorail service from SW 137th Avenue along Kendall Drive, SR 874 and SR 878, merging with the Stage I Metrorail alignment north of the Dadeland North station. Thus, the first common station on the Metrorail line was South Miami. Like the hybrid alternative, through service was provided to downtown Miami and beyond.

Bus service changes were very minor for the two rail alternatives. The Kendall and Killian KAT's were converted into feeders serving appropriate rail stations. Local bus service along Kendall was reduced with the introduction of competing rail service. Some additional minor variations were made to other local and crosstown routes to serve appropriate rail stations.

Ridership

Ridership results are summarized in Exhibit K-2. The information in the top section of the exhibit shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking Metrobus to Dadeland South, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the lower part of the exhibit reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include those stations along the Kendall corridor alignments west of Dadeland. For the busway alternative, boardings also include passengers on express buses prior to their entry onto the busway.

Exhibit K–1

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
Kendall Corridor

		TSM	K1 Killian Busway	K2 Kendall Hybrid	K3 Kendall Metrorail
Rail Service					
Line 1	From To Via	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext
Line 2	From To Via	Dadeland S Earl. Hts. Stage 1	Dadeland S Earl. Hts. Stage 1	Kendall/137 Earl. Hts. Dadeland N	Kendall/137 Earl. Hts. S Miami
Bus Service					
KAT's	Sunset	Dadeland	Dadeland	Dadeland	Dadeland
	Kendall	Dadeland	bway fr. 874	(delete)	(delete)
	Kendale	Dadeland	via busway	cb @ 137th	cb @ 137th
	Killian	Dadeland	via busway	cb @ 107th	cb @ 107th
	P/R Express		via busway		
Locals	Kendall	Dadeland	Dadeland	Dadeland	Dadeland
	Kendall cutback	Dadeland	Dadeland	(delete)	(delete)
	Crosstowns	(nominal)	(nominal)	minor deviations	minor deviations

Exhibit K–2

Dade County Transit Corridors Transitional Study

Travel Demand Summary

Average Weekday Travel – 2010

Kendall Corridor

	TSM	K1 Killian Busway	K2 Kendall Hybrid	K3 Kendall Metrorail
MODE SPLIT RESULTS				
LINKED TRANSIT TRIPS				
Work	152,400	152,500	153,100	153,700
Home–based Non–work	110,600	110,500	112,900	112,400
Non–home Based	69,100	69,100	69,400	69,200
Total	332,100	332,100	335,400	335,300
ASSIGNMENT RESULTS				
REGIONAL RAIL BOARDINGS				
Total Un–Linked	94,500	95,100	101,200	100,700
Transfers	0	0	(700)	(1,100)
Total Linked	94,500	95,100	100,500	99,600
CORRIDOR BOARDINGS				
Boardings on New Alignments	NA	2,800	19,100	19,800
Peak Hour, Peak Direction Loads:				
South of Brickell	6,100	6,200	6,400	6,500
North of Overtown	2,000	2,000	2,000	2,000
Killian/Kendall West of Dadeland	NA	600	2,100	2,500
% Outbound	NA	NA	2%	1%

The results show virtually no ridership changes for the busway alternative. In a more detailed examination of the results, it was found that boardings along the Killian busway were largely offset by losses in ridership due to reduction in service along the more heavily developed Kendall Drive. Only relatively few auto access trips were made to the busway stations, with most of these trips continuing to Dadeland or other Metrorail stations to avoid the need to transfer from the express buses.

Both rail alternatives were found to serve additional riders, with the Metrorail alternative attracting more work trip commuters because of faster travel times while the hybrid alternative attracted more non-work trips because of its service to additional stations particularly along Kendall east of SR 874. The overall results for the rail alternatives reflect some drops in ridership at the Dadeland stations due to the diversion of Metrorail service to the Kendall corridor and the resulting longer waiting times for the remaining Dadeland trains. Also, as expected, outbound ridership is very low, reflecting the primary function of this corridor as a commuter facility feeding Metrorail and activities in the Dadeland area.

Travel summaries for market areas within the Kendall corridor are summarized in Exhibit K-3. The primary impacts for the rail alternatives were from the outer West Kendall area. Rail ridership also increased for internal trips and for trips from the corridor to all destinations, particularly for non-work travel (the difference between total trips and work trips shown in the exhibit).

A station boarding summary is included in Exhibit K-4. The end-of-line rail station boardings dominate, although boardings at SW 107th Avenue are substantial as well. Boardings at other rail stations and at all the busway stations were much more modest.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top of Exhibit K-5. The incremental ridership is shown both for total transit trips (including jitneys) and MetroDade-only ridership (excluding jitneys). These values are virtually identical in the Kendall corridor since jitney activity is not nearly as significant as in other areas. As noted above, the incremental ridership for the busway alternative is very small while the incremental annual ridership is approximately one million for the rail alternatives.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed relative to existing passengers (really, passengers projected for the TSM alternative) and thus reflect the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

Exhibit K–3

Dade County Transit Corridors Transitional Study

Travel Market Summary

Kendall Corridor

Market	Person Trips	Transit Trips				Delta Transit Trips		
		TSM	K1 Killian Busway	K2 Kendall Hybrid	K3 Kendall Metrorail	K1 Killian Busway	K2 Kendall Hybrid	K3 Kendall Metrorail
Work Trips								
West Kendall–CBD	16,700	4,200	4,200	4,900	5,100	0	700	900
Kendall–CBD	8,300	1,900	1,900	2,000	2,000	0	100	100
Kendall–Intra	51,700	2,200	2,200	2,200	2,100	0	0	(100)
Kendall–Other	108,500	4,200	4,200	4,500	4,600	0	300	400
Other–Kendall	17,100	600	600	600	600	0	0	0
All Other	1,757,900	139,400	139,600	139,000	139,300	200	(400)	(100)
Total	1,960,200	152,400	152,500	153,100	153,700	100	700	1,300
Total Trips								
West Kendall–CBD	31,900	5,600	5,600	6,900	7,100	0	1,300	1,500
Kendall–CBD	18,200	3,000	3,000	3,100	3,200	0	100	200
Kendall–Intra	305,400	4,700	4,600	5,800	5,300	(100)	1,100	600
Kendall–Other	307,300	6,100	6,100	7,000	7,100	0	900	1,000
Other–Kendall	100,000	1,400	1,400	1,500	1,500	0	100	100
All Other	7,247,400	311,300	311,500	311,100	311,200	200	(200)	(100)
Total	8,010,300	332,100	332,200	335,400	335,200	100	3,300	3,100

Exhibit K–4

Dade County Transit Corridors Transitional Study

Station Boarding Summary

Average Weekday Travel – 2010

Kendall Corridor

Station	K1 Killian Busway	K2 Kendall Hybrid	K3 Kendall Metrorail
Off–Line @ SW 137th	410	NA	NA
Killian @ SW 137th	70	NA	NA
Killian @ SW 127th	200	NA	NA
Killian @ SW 117th	20	NA	NA
MDCC South Campus	250	NA	NA
Kendall @ SW 137th	NA	4,750	5,670
Kendall @ SW 127th	NA	1,370	NA
Kendall @ SW 123rd	NA	NA	1,140
Kendall @ SW 117th	NA	620	NA
Kendall @ SW 107th	NA	1,980	2,790
Kendall @ SW 99th	NA	NA	550
Kendall @ SW 97th	NA	1,080	NA
Kendall @ SW 87th	NA	240	NA
Kendall @ SW 78th	NA	690	NA
Snapper Creek @ SW 87th	NA	NA	350
TOTAL	950	10,730	10,500

Note: Boardings for Alternative K–1 do not include passengers already onboard express buses when they enter the busway

Exhibit K–5

Dade County Transit Corridors Transitional Study

Travel Impact Summary

Average Weekday Travel – 2010

Kendall Corridor

			TSM	K1 Killian Busway	K2 Kendall Hybrid	K3 Kendall Metrorail
ANNUAL TRANSIT TRIPS (Millions)						
Total (including jitneys)			101.194	101.086	102.137	102.039
MetroDade Only			84.457	84.350	85.400	85.302
Incremental Total			NA	0.024	1.074	0.976
Incremental MetroDade Only			NA	0.024	1.074	0.975
ANNUAL FARE REVENUE (Millions of 90$)						
Incremental MetroDade Only			NA	$0.423	$0.372	$0.185
TRAVEL TIME SAVINGS (as per FTA formula)						
Daily Hours			NA	100	800	1,200
Annual Savings (Millions $)			NA	$0.070	$0.991	$1.313
AUTO VMT SAVINGS (Daily Vehicle Miles) (1,000's)			NA	–5.4	36.1	33.3
SELECTED TRAVEL TIMES (Total Minutes)						
FROM:	TO:					
Hammocks W (834)	CBD	A	54.4	54.4	49.5	45.9
Westwind Lks (826)	CBD	A	62.7	62.7	51.0	47.4
Westwind Lks (826)	Omni	A	70.9	70.2	63.4	59.8
Calusa (857)	CBD	W	71.0	58.7	63.1	64.2
Baptist Hosp (876)	CBD	W	66.4	66.0	40.3	63.8

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. As expected, the VMT reduction is smaller for the busway alternative and larger for the rail alternatives. The savings in VMT is greater for the Metrorail alternative since it attracts more work trips which are typically longer than non-work trips which are higher for the hybrid alternative, as noted above.

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The auto access travel times are generally the same for the TSM and busway alternatives since, as noted above, most of the park-and-ride passengers use the same stations in both alternatives as parking at the busway stations, boarding an express bus to Dadeland, and transferring to Metrorail is not the fastest travel path. The travel time savings for auto access to the rail alternatives is more significant, with a shorter auto access time and a non-transfer ride to downtown Miami. Another significant travel time reduction is from locations along the inner part of the Kendall corridor in the hybrid alternative where direct boarding of rail service to downtown saves significant time compared with boarding a local bus along Kendall and transferring at Dadeland.

Ridership Forecasts - NW 27th Avenue Corridor

The NW 27th Avenue corridor extends northward from the existing Metrorail line along NW 27th Avenue to the vicinity of Joe Robbie Stadium and Calder racetrack, just south of the Broward County line. Alignments were considered straight north along NW 27th Avenue and along a diversion to Golden Glades and back via SR 9 and Florida's Turnpike. A total of three "build" alternatives were examined in the corridor, identified as "N1", "N2", and "N3" in the summary materials which follow.

Input Assumptions

Input assumptions for the three NW 27th Avenue corridor alternatives are summarized in Exhibit N-1. As shown, the busway alternative ran directly north along NW 27th Avenue to a terminal near Joe Robbie Stadium. Express buses were assumed to operate from the terminal station and from an intermediate location at NW 135th Street to a transfer location with Metrorail at the Northside station. The NW 27th Avenue MAX service was rerouted via the busway to provide limited-stop service. Local bus service along NW 27th Avenue was reduced and some local buses were modified to serve busway stations.

Bus service changes were relatively minor for the two rail alternatives. Local service along NW 27th Avenue was reduced as in the busway alternative with circulating service at the north end of the corridor changed to a rail feeder. Changes were made to the NW 32nd Avenue service to be consistent with the busway operating plan. The NW 27th MAX service was eliminated as its function was replaced by rail. Some additional minor variations were made to other local and crosstown routes to serve appropriate rail stations.

Ridership

Ridership results are summarized in Exhibit N-2. The information in the top section of the exhibit shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking Metrobus to the Opa Locka station, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the lower part of the exhibit reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include those stations along the NW 27th Avenue corridor alignments north of the junction with Metrorail. Boardings at Golden Glades are included only in alternative N3 when a new facility is added. For the busway alternative, boardings also include passengers on express buses prior to their entry onto the busway.

Exhibit N–1

Dade County Transit Corridors Transitional Study

Service Planning Assumptions

NW27th Avenue Corridor

		TSM	N1 Busway	N2 Metrorail Direct	N3 Metrorail via Glades
Rail Service					
Line 1	From To Via	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext
Line 2	From To Via	Dadeland S Earl. Hts. Stage 1	Dadeland S Earl. Hts. Stage 1	Dadeland S Calder NW27th Ave	Dadeland S Calder Gldn Glades
Bus Service					
Premium	NW27th MAX 95X–CBD 95X–MIA/CC	NW 27th Via I–95 Via I–95	Busway Via I–95 Busway	(delete) Via I–95 Via I–95	(delete) (delete) Via I–95
Locals	NW 27th Ave NW 32nd Ave Parallel Streets Crosstowns	(nominal) (nominal) (nominal) (nominal)	JRS X 135 X divert 103,135,166 minor deviations	Loop Calder Break MLK Break 135 divert 103,135,166 minor deviations	cb @ 135 Break MLK Break 135 divert 103,135 minor deviations

Exhibit N-2

Dade County Transit Corridors Transitional Study

Travel Demand Summary

Average Weekday Travel – 2010

NW27th Avenue Corridor

	TSM	N1 Busway	N2 Metrorail Direct	N3 Metrorail via Glades
MODE SPLIT RESULTS				
LINKED TRANSIT TRIPS				
Work	152,400	153,000	155,100	154,700
Home-based Non-work	110,600	111,500	112,900	112,600
Non-home Based	69,100	69,500	70,000	69,800
Total	332,100	334,000	338,000	337,100
ASSIGNMENT RESULTS				
REGIONAL RAIL BOARDINGS				
Total Un-Linked	94,500	96,000	109,200	110,400
Transfers	0	0	(1,000)	(1,100)
Total Linked	94,500	96,000	108,200	109,300
CORRIDOR BOARDINGS				
Boardings on New Alignments	NA	7,100	17,700	18,700
Peak Hour, Peak Direction Loads:				
South of Brickell	6,100	6,100	6,100	6,100
North of Overtown	2,000	2,100	2,800	3,000
NW 27th at 79th St	NA	500	1,500	1,800
% Outbound	NA	16%	12%	10%

Ridership increases are fairly modest for the busway alternative since a transfer to Metrorail is still required for a trip to the Civic Center, downtown, or beyond. Since 95X service from Golden Glades was assumed to remain, many park-and-ride paths continued to be faster via this facility since a transfer is not required. Ridership is higher for the rail alternatives since the need to transfer is eliminated. The ridership for the direct alternative is slightly higher than for the longer route via Golden Glades, since the service to the JRS and Calder areas is longer for this alternative and offsets any benefits to replacing 95X bus service with Metrorail at Golden Glades.

Travel summaries for market areas within the North corridor are summarized in Exhibit N-3. Ridership increases, particularly for the rail alternatives, are spread rather uniformly across nearly all of the travel markets.

A station boarding summary is included in Exhibit N-4. Boardings are spread fairly uniformly across most of the stations in the corridor. The highest boardings for both rail alternatives are at 183rd Street which attracts significant volumes of auto access trips.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top of Exhibit N-5. The incremental ridership is shown both for total transit trips (including jitneys) and MetroDade-only ridership (excluding jitneys). These values are slightly higher for the MetroDade-only comparison as there is some competition with jitneys in this corridor. The annual ridership shown in this exhibit also reflects an estimate of ridership attracted from Broward County which is not directly addressed in the travel demand modeling system. The incremental ridership is about 600 thousand trips per year for the busway alternative and between 1.5 and 2 million for the rail alternatives.

Travel time savings is another element of a typical FTA cost-effectiveness calculation. The travel time savings are computing relative to existing passengers (really, passengers projected for the TSM alternative) and thus is a reflection of the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The direct alternative (N2) shows a greatest VMT reduction, probably because it attracts more of the longest trips from the northern part of the County.

Exhibit N–3

Dade County Transit Corridors Transitional Study

Travel Market Summary

NW 27th Avenue Corridor

Market	Person Trips	Transit Trips				Delta Transit Trips		
		TSM	N1 Busway	N2 Metrorail Direct	N3 Metrorail v/ Glades	N1 Busway	N2 Metrorail Direct	N3 Metrorail v/ Glades
Work Trips								
Norwood–CBD	4,000	800	800	800	900	0	0	100
Carol City–CBD	5,300	900	1,000	1,300	1,200	100	400	300
Opa Locka Area–CBD	5,900	1,100	1,100	1,400	1,300	0	300	200
NW27th–Intra	53,200	2,200	2,100	2,300	2,200	(100)	100	0
NW27th–Other	76,900	3,600	3,800	4,200	4,200	200	600	600
Other–NW27th	36,600	1,400	1,500	1,600	1,600	100	200	200
Northside Area	135,300	12,000	12,000	12,200	12,200	0	200	200
Civic Center Area	83,000	9,700	9,800	9,800	9,800	100	100	100
Other	1,560,100	120,700	120,900	121,500	121,300	200	800	600
Total	1,960,200	152,400	153,000	155,100	154,700	600	2,700	2,300
Total Trips								
Norwood–CBD	8,800	1,100	1,100	1,300	1,400	0	200	300
Carol City–CBD	11,000	1,300	1,500	2,100	1,900	200	800	600
Opa Locka Area–CBD	13,800	1,900	1,900	2,300	2,300	0	400	400
NW27th–Intra	265,500	5,600	5,900	6,000	5,700	300	400	100
NW27th–Other	248,200	6,500	7,000	7,600	7,500	500	1,100	1,000
Other–NW27th	158,900	3,600	3,800	4,000	4,000	200	400	400
Northside Area	485,400	24,400	24,500	25,000	25,000	100	600	600
Civic Center Area	348,800	23,500	23,600	23,700	23,700	100	200	200
Other	6,470,000	264,100	264,800	265,900	265,700	700	1,800	1,600
Total	8,010,300	332,100	334,000	338,000	337,100	1,900	5,900	5,000

Exhibit N–4

Dade County Transit Corridors Transitional Study

Station Boarding Summary

Average Weekday Travel – 2010

NW27th Avenue Corridor

Station	N1 Busway	N2 Metrorail Direct	N3 Metrorail via Glades
NW 27th @ NW 215th	NA	1,360	1,340
NW 27th @ JRS	970	780	NA
NW 27th @ NW 183rd	720	2,870	NA
NW 27th @ NW 166th	510	1,270	NA
NW 27th @ NW 151st	80	NA	NA
NW 27th @ NW 135th	430	1,510	2,030
NW 27th @ NW 119th	180	NA	NA
NW 27th @ MDCC North	550	1,060	1,090
NW 27th @ NW 103rd	220	1,510	1,580
Turnpike @ JRS	NA	NA	800
Turnpike @ NW 183rd	NA	NA	2,970
Golden Glades	NA	NA	990
TOTAL	3,660	10,360	10,800

Note: Boardings for Alternative N–1 do not include passengers already onboard express buses when they enter the busway

Exhibit N–5

Dade County Transit Corridors Transitional Study

Travel Impact Summary

Average Weekday Travel – 2010

NW27th Avenue Corridor

			TSM	N1 Busway	N2 Metrorail Direct	N3 Metrorail via Glades
ANNUAL TRANSIT TRIPS (Millions)						
Total (including jitneys)			101.194	101.662	102.851	102.598
MetroDade Only			84.457	84.942	86.239	85.977
Incremental Total			NA	0.604	1.816	1.558
Incremental MetroDade Only			NA	0.621	1.941	1.674
ANNUAL FARE REVENUE (Millions)						
Incremental MetroDade Only			NA	$0.933	$1.713	$1.302
TRAVEL TIME SAVINGS (as per FTA formula)						
Daily Hours			NA	400	1,200	1,000
Annual Savings (Millions $)			NA	$0.509	$1.429	$1.133
AUTO VMT SAVINGS (Daily Vehicle Miles) (1,000's)			NA	–1.5	43.8	32.5
SELECTED TRAVEL TIMES (Total Minutes)						
FROM:	TO:					
Norwood (102)	CBD	A	46.2	46.3	46.3	46.1
Carol City (114)	CBD	W	54.4	61.2	61.2	51.1
Miami Gardens (126)	CBD	A	60.5	60.5	45.0	53.7
Bunche Park (220)	CBD	A	45.5	45.6	48.7	40.7
Opa Locka (214)	CBD	W	69.0	56.1	53.5	53.5
MDCC–N (210)	CBD	W	46.2	45.2	33.7	33.7

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The park-and-ride travel times are similar because many of the paths continue to build via Golden Glades, as noted above. As expected, some of the greatest savings are for travelers along the rail corridor, such as in the Community College area, who can board a train direct to downtown in the rail alternatives.

Ridership Forecasts - Northeast Corridor

The Northeast corridor extends northeast from downtown along the Florida East Coast (FEC) railroad right-of-way, generally parallel to Biscayne Boulevard, to the vicinity of Aventura Mall, just south of the Broward County line. A total of four "build" projects were examined, all of which followed the same general alignment between similar end points and are identified as "NE1", "NE2", "NE3", and "NE4" in the summary materials which follow.

Input Assumptions

Input assumptions for the four Northeast corridor alternatives are summarized in Exhibit NE-1. The busway alternative was assumed to have on-line stations and also provide for express service from several intermediate points. The Biscayne MAX service was rerouted to the busway to provide a limited stop service between all busway stations. Existing local routes were revised to include a circulation portion in a nearby neighborhood, a stop at a busway station, a non-stop run to the northern part of downtown, then all stops through the downtown area. All portions of the existing routes on local streets received similar or better coverage, but through routes were effectively broken at the busway stations.

Rail operation in the three rail alternatives was similar within the corridor, but differed in its linkage to the regional system. In alternative NE2, a light rail system was assumed which terminated within downtown near the Arena and Government Center stations. In alternatives NE3 and NE4, rail service was through-routed onto the existing Stage I Metrorail system, linking with the short-turn Metrorail service to Dadeland South. Thus, is these alternatives, some service was removed from the Stage I system between downtown and Earlington Heights, as compared with the TSM, busway, and NE2 alternatives. Also, within the corridor, operating speeds and station spacing differed among the rail alternatives, which also contributed to the ridership results noted below.

Bus service was extensively modified in the corridor to serve the rail stations, reduce the amount of parallel and competing service, and maintain consistency with the service plan developed for the busway alternative. Thus, long routes were broken into two or three parts, with at least one end at a rail station. These bus service changes were virtually identical for all of the rail alternatives. Changes to crosstown routes were very minor in all alternatives, generally only affecting the location of end-of-line turnaround points.

Ridership

Ridership results are summarized in Exhibit NE-2. The information in the top section of the exhibit shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking a crosstown Metrobus to the 163rd Street Station, transferring to Metrorail to Government Center, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

Exhibit NE–1

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
Northeast Corridor

		TSM	NE1 Northeast Busway	NE2 Northeast Light Rail	NE3 Northeast Hybrid	NE4 Northeast Metrorail
Rail Service						
Line 1	From To Via	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext
Line 2	From To Via	Dadeland S Earl. Hts. Stage 1	Dadeland S Earl. Hts. Stage 1	Dadeland S Earl. Hts. Stage 1	Dadeland S Aventura CBD	Dadeland S Aventura CBD
Line 3	From To Via			Aventura CBD FEC		
Bus Service						
Premium	MAX	Biscayne	Busway	(delete)	(delete)	(delete)
	95X/Aventura	(nominal)	(delete)	(delete)	(delete)	(delete)
Locals	Biscayne	(nominal)	Aventura X 163 X 79 X local fr. 95	(nominal)	(nominal)	(nominal)
	Biscayne cutback	(nominal)	Busway	(delete)	(delete)	(delete)
	NE 6th	(nominal)	163 X 125X 96 X 79 X local fr. 79	cb @ 163 cb @ 96 cb @ 79 local fr. 79	cb @ 163 cb @ 96 cb @ 79 local fr. 79	cb @ 163 cb @ 96 cb @ 79 local fr. 79
	NE 2nd	(nominal)	125 X MLK X	cb @ 125 cb @ MLK	cb @ 125 cb @ MLK	cb @ 125 cb @ MLK
	MLK–Omni	(nominal)	MLK X	cb @ MLK	cb @ MLK	cb @ 54
	Crosstowns	(nominal)	minor deviations	minor deviations	minor deviations	minor deviations

Exhibit NE-2

Dade County Transit Corridors Transitional Study

Travel Demand Summary

Average Weekday Travel – 2010

Northeast Corridor

	TSM	NE1 Northeast Busway	NE2 Northeast Light Rail	NE3 Northeast Hybrid	NE4 Northeast Metrorail
MODE SPLIT RESULTS					
LINKED TRANSIT TRIPS					
Work	152,400	155,400	156,500	157,100	157,400
Home-based Non-work	110,600	114,200	112,400	112,000	111,900
Non-home Based	69,100	69,700	69,600	69,100	69,100
Total	332,100	339,300	338,500	338,200	338,400
ASSIGNMENT RESULTS					
REGIONAL RAIL BOARDINGS					
Total Un-Linked	94,500	101,200	130,600	120,100	119,800
Transfers	0	0	(12,000)	(2,100)	(2,100)
Total Linked	94,500	101,200	118,600	118,000	117,700
CORRIDOR BOARDINGS					
Boardings on New Alignments	NA	26,100	28,000	33,900	34,200
Peak Hour, Peak Direction Loads:					
South of Brickell	6,100	6,200	6,200	6,200	6,200
North of Overtown	2,000	1,900	2,000	1,700	1,600
NE Corridor at Overtown	NA	1,700	2,000	2,600	2,700
% Outbound	NA	17%	16%	14%	12%

The data in the lower part of the exhibit reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include those stations along the Northeast corridor alignments north of downtown. For the busway alternative, boardings also include passengers on express buses prior to their entry onto the busway.

The ridership results are very similar for all alternatives, including the busway. The busway alternative serves somewhat fewer work trips but attracts more non-work trips than any of the rail alternatives due to its mix of local and express services which were assumed to operate throughout the day. The results for the through-routed rail alternatives (NE3 and NE4) are net of any losses from service reductions in the Civic Center area. The impact can be partially seen in the corridor boardings on new alignments, where these two alternatives attract more total boardings than the light rail alternative (NE2). However, a more detailed analysis shows that some of this ridership is diversion from the Stage I line rather than new riders. The impact on the Stage I line can also be seen in the reduction in the peak load on the line north of Overtown.

Travel summaries for market areas within the Northeast corridor are summarized in Exhibit NE-3. Ridership increments are spread among virtually all of the markets, with the close-in Little Haiti area benefiting the least from the alternatives. The Civic Center area shows a small decline in the through-routed rail alternatives (NE3 and NE4), reflecting the reduction in rail service north of the CBD as the cutback train is diverted onto the northeast corridor alignment.

A station boarding summary is included in Exhibit NE-4. Ridership is spread across most of the stations fairly evenly, particularly for the rail alternatives. Ridership is much more variable for the busway stations since service levels vary at the different busway entrance points.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top of Exhibit NE-5.
The incremental ridership is shown both for total transit trips (including jitneys) and MetroDade-only ridership (excluding jitneys). These values are quite different as extensive jitney activity occurs in this corridor. The annual ridership shown in the exhibit reflects an estimate of ridership attracted from Broward County which is not directly addressed in the travel demand modeling system. On an annual basis, the incremental ridership is highest for the busway alternative which reflects its superior performance in non-work travel markets and thus might be expected to perform well on weekends and other times with less work ridership than average weekdays.

Exhibit NE-3

Dade County Transit Corridors Transitional Study

Travel Market Summary

Northeast Corridor

Market	Person Trips	Transit Trips					Delta Transit Trips			
		TSM	NE1 Northeast Busway	NE2 Northeast Light Rail	NE3 Northeast Hybrid	NE4 Northeast Metrorail	NE1 Northeast Busway	NE2 Northeast Light Rail	NE3 Northeast Hybrid	NE4 Northeast Metrorail
Work Trips										
Aventura Area–CBD	11,900	2,400	3,200	3,300	3,500	3,500	800	900	1,100	1,100
N. Miami Area–CBD	9,300	1,800	2,200	2,300	2,400	2,500	400	500	600	700
Little Haiti Area–CBD	15,200	4,100	4,100	4,200	4,200	4,300	0	100	100	200
Northeast–Intra	96,800	8,500	8,800	8,800	8,800	8,800	300	300	300	300
Northeast–Other	90,200	5,800	6,400	6,700	6,700	6,700	600	900	900	900
Other–Northeast	87,900	7,500	7,800	8,000	8,000	7,900	300	500	500	400
Civic Center Area	78,900	9,300	9,300	9,400	9,100	9,100	0	100	(200)	(200)
Other	1,569,900	112,800	113,700	114,000	114,400	114,500	900	1,200	1,600	1,700
Total	1,960,200	152,400	155,400	156,500	157,100	157,400	3,000	4,100	4,700	5,000
Total Trips										
Aventura Area–CBD	26,600	4,100	5,400	5,400	5,900	5,800	1,300	1,300	1,800	1,700
N. Miami Area–CBD	22,800	3,400	4,100	4,100	4,400	4,400	700	700	1,000	1,000
Little Haiti Area–CBD	64,100	11,500	11,600	11,600	11,800	11,900	100	100	300	400
Northeast–Intra	540,800	22,400	24,000	22,800	22,800	22,700	1,600	400	400	300
Northeast–Other	314,000	11,900	13,000	13,100	13,100	13,100	1,100	1,200	1,200	1,200
Other–Northeast	380,100	19,300	20,200	20,100	20,200	20,000	900	800	900	700
Civic Center Area	352,300	24,100	24,100	24,200	22,600	22,600	0	100	(1,500)	(1,500)
Other	6,309,600	235,500	236,800	237,200	237,500	237,800	1,300	1,700	2,000	2,300
Total	8,010,300	332,100	339,300	338,500	338,200	338,400	7,200	6,400	6,100	6,300

Exhibit NE–4

Dade County Transit Corridors Transitional Study

Station Boarding Summary

Average Weekday Travel – 2010

Northeast Corridor

Station	E1 Northeast Busway	E2 Northeast Light Rail	E3 Northeast Hybrid	E4 Northeast Metrorail
Aventura	1,570	2,570	3,030	3,720
FEC @ NE 185th	580	1,350	1,390	NA
FEC @ NE 163rd	2,760	3,260	3,660	3,810
FEC @ NE 151st	200	NA	NA	NA
FEC @ NE 135th	290	750	830	1,050
FEC @ NE 125th	1,130	2,630	3,050	2,890
FEC @ NE 96th	30	NA	NA	NA
FEC @ NE 79th	1,810	3,310	4,260	3,950
FEC @ NE 61st	670	1,060	860	NA
FEC @ NE 54th	150	820	1,050	2,110
FEC @ NE 36th	240	1,780	1,760	2,350
FEC @ NE 20th	1,610	460	660	540
FEC @ NE 15th	750	340	420	NA
TOTAL	7,470	18,330	20,970	20,420

Note: Boardings for Alternative NE–1 do not include passengers already onboard express buses when they enter the busway

Exhibit NE–5

Dade County Transit Corridors Transitional Study

Travel Impact Summary

Average Weekday Travel – 2010

Northeast Corridor

			TSM	NE1 Northeast Busway	NE2 Northeast Light Rail	NE3 Northeast Hybrid	NE4 Northeast Metrorail
ANNUAL TRANSIT TRIPS (Millions)							
Total (including jitneys)			101.194	103.285	102.912	102.749	102.781
MetroDade Only			84.457	87.536	86.794	86.750	86.702
Incremental Total			NA	2.257	1.890	1.739	1.769
Incremental MetroDade Only			NA	3.245	2.508	2.476	2.427
ANNUAL FARE REVENUE (Millions)							
Incremental MetroDade Only			NA	$4.957	$1.758	$1.447	$1.365
TRAVEL TIME SAVINGS (as per FTA formula)							
Daily Hours			NA	2,200	2,400	2,600	3,000
Annual Savings (Millions $)			NA	$2.504	$2.718	$2.798	$3.245
AUTO VMT SAVINGS (Daily Vehicle Miles) (1,000's)			NA	50.9	60.8	65.5	62.7
SELECTED TRAVEL TIMES (Total Minutes)							
FROM:	TO:						
Highland Oaks (88)	CBD	A	84.5	49.3	49.6	43.7	41.5
Sunny Isles (49)	CBD	A	73.2	39.3	42.2	37.6	36.1
N Miami Beach (261)	CBD	W	77.8	39.6	41.4	39.5	38.5
North Miami (270)	CBD	A	47.4	47.4	39.0	34.7	33.2
Miami Shores (306)	CBD	W	50.9	34.7	37.5	35.6	34.6
Little Haiti (456)	CBD	W	35.3	27.6	24.6	21.7	21.7

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed relative to existing passengers (really, passengers projected for the TSM alternative) and thus reflect the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT reductions are somewhat greater for the two through-routed rail alternatives (NE3 and NE4), while the results for the busway and light rail alternatives are very similar to one another.

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. Auto access time savings are substantial virtually everywhere as available parking opportunities in this corridor are very limited in the TSM alternative. Walk access times are also improved over TSM reflecting the higher speeds that are achievable on the fixed guideway facilities as compared to local bus or MAX times on congested Biscayne Boulevard. Times for the rail alternatives are generally shorter than for the busway, with the highest speed Metrorail alternative (NE4) having the shortest times.

Ridership Forecasts - West Corridor

The West corridor extends westward from downtown Miami area to the rapidly growing western suburbs and includes major activity centers surrounding Miami International Airport. Alignments were considered along SR 836, SW 8th Street, Flagler, and the existing north leg of Metrorail. All corridor alternatives were assumed to terminate in the vicinity of the western campus of Florida International University (FIU) near SW 8th Street (Tamiami Trail) and the Homestead Extension of Florida's Turnpike (HEFT). A total of four alternatives were examined, noted as "W1", "W2", "W3", and "W4" in the summary materials which follow.

Input Assumptions

Input assumptions for the four West corridor alternatives are summarized in Exhibit W-1. All four alternatives featured rail as the primary mode. In the first alternative, the short-turn Metrorail line is assumed to diverge from the Stage I alignment west of Earlington Heights, continue on a new alignment through the proposed Multi-Modal terminal near the airport, and then run along SR 836 and the HEFT to FIU. The second alternative diverts from Stage I Metrorail just west of the Culmer station and follows SR 836 and the HEFT to FIU, with a branch to Multi-Modal near LeJeune Road. The third alternative is very similar, deviating at the west end to approach FIU via surface streets. The fourth alternative is assumed to be light rail at grade all the way into downtown via SW 8th Street and Flagler, with a branch to Multi-Modal along NW 37th Avenue. In all but the first alternative, separate operating routes are created to serve the FIU/downtown, FIU/Multi-Modal, and Multi-Modal/downtown markets. Also, it should be noted that alternatives W2 and W3 result in lower levels of service to the Civic Center and nearby areas as the short-turn trains are diverted onto the West corridor.

Bus service plans are very similar for all alternatives, differing only in response to variations in rail alignment. All of the west corridor express bus services via SR 836 in the TSM alternative are either deleted or converted into feeders to convenient rail stations. The Flagler MAX service is curtailed in alternatives W3 and W4 where it would duplicate rail service along the same streets. The west end of the East/West MAX from the airport through downtown to the Beach is deleted in all alternatives.

Local bus service changes are primarily to the NW 7th Street and Flagler routes which are diverted to serve rail stations and broken better match transit supply and demand and to minimize direct competition with rail service. Several other local routes are modified slightly, including consolidation of the ends of several routes at the FIU rail terminal station which would then function as a major bus-rail transit center. Other changes were made to provide additional distribution service from rail stations in the western part of the corridor to serve employment areas west of the airport.

Exhibit W–1

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
West Corridor

		TSM	W1 West Direct	W2 West via 836	W3 West Composite	W4 West via Flagler
Rail Service						
Line 1	From To Via	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext
Line 2	From To Via	Dadeland S Earl. Hts. Stage 1	Dadeland S FIU MultiModal	FIU Brickell SR 836	FIU Brickell SW 8/836	Dadeland S Earl. Hts. Stage 1
Line 3	From To Via			FIU MultiModal SR 836	FIU MultiModal SW 8	FIU CBD SW8/Flagler
Line 4	From To Via			Dadeland S MultiModal SR 836	Dadeland S MultiModal SR 836	FIU MultiModal SW 8
Line 5	From To Via					MultiModal CBD Flagler

Exhibit W–1 (Continued)

Dade County Transit Corridors Transitional Study

Service Planning Assumptions

West Corridor (Continued)

		TSM	W1 West Direct	W2 West via 836	W3 West Composite	W4 West via Flagler
Bus Service						
Premium	West Dade expr	via 836	link @ FIU	link @ FIU	link @ FIU	link @ FIU
	Sweetwater expr	via 836	cb @ 107	cb @ 107	extend 107	extend 107
	Doral express	via 836	(delete)	(delete)	(delete)	(delete)
	Kendall Lakes expr	via 836	(delete)	(delete)	(delete)	(delete)
	Flagler MAX	FIU–CBD	FIU–CBD	FIU–CBD	FEC–CBD	(delete)
	E/W MAX	MIA–MBCC	Beach only	Beach only	Beach only	Beach only
	NW 67/72 MAX	NW 12th St	ext Palmetto	ext Palmetto	ext FEC	ext FEC
Locals	NW 7th St	Hook–CBD	Hook–CBD	divert 17	divert 17	Hook–CBD
		Mall–CBD	cb @ Red Red–CBD	cb @ Red Red–CBD	cb @ MMT FEC–CBD	cb @FEC FEC–CBD
	Flagler	FIU–CBD	FIU–MMT MMT–CBD	FIU–MMT MMT–CBD	FIU–MMT MMT–CBD	FIU–MMT MMT–CBD
		Mid–CBD	87–MMT MMT–CBD	87–MMT MMT–CBD	Mid–MMT MMT–CBD	Mid–MMT MMT–CBD
	Other locals & Crosstowns	(nominal)	minor deviations	minor deviations	minor deviations	minor deviations

Note: MMT = MultiModal terminal @ airport

Exhibit W-2

Dade County Transit Corridors Transitional Study

Travel Demand Summary

Average Weekday Travel – 2010

West Corridor

	TSM	W1 West Direct	W2 West via 836	W3 West Composite	W4 West via Flagler
MODE SPLIT RESULTS					
LINKED TRANSIT TRIPS					
Work	152,400	156,600	157,300	157,000	155,100
Home-based Non-work	110,600	114,000	115,000	114,900	113,500
Non-home Based	69,100	70,900	71,000	70,500	70,400
Total	332,100	341,500	343,300	342,400	339,000
ASSIGNMENT RESULTS					
REGIONAL RAIL BOARDINGS					
Total Un-Linked	94,500	119,200	127,600	126,800	126,800
Transfers	0	(2,400)	(6,700)	(6,300)	(9,200)
Total Linked	94,500	116,800	120,900	120,500	117,600
CORRIDOR BOARDINGS					
Boardings on New Alignments	NA	28,000	38,700	37,900	30,600
Peak Hour, Peak Direction Loads:					
South of Brickell	6,100	6,200	6,200	6,100	6,100
North of Overtown	2,000	3,100	3,200	3,200	2,100
North of West Line Split	NA	1,800	2,000	2,000	NA
West Line	NA	1,400	1,700	1,700	1,400
% Outbound	NA	39%	38%	36%	33%

Exhibit W-4

Dade County Transit Corridors Transitional Study

Station Boarding Summary

Average Weekday Travel – 2010

West Corridor

Station	W1 West Direct	W2 West via 836	W3 West Composite	W4 West via Flagler
FIU	3,400	4,000	3,870	3,040
SR 836 @ NW 107	2,790	3,190	NA	NA
SR 836 @ NW 97	610	700	NA	NA
SR 836 @ NW 87	1,950	2,210	NA	NA
SR 836 @ Palmetto	2,100	2,470	NA	NA
SR 836 @ Red Road	990	1,080	790	NA
SR 836 @ LeJeune	3,770	4,350	4,410	NA
Multi-Modal	2,910	1,540	1,530	3,740
SR 836 @ NW 37th	NA	2,520	2,070	NA
SR 836 @ NW 27th	NA	2,260	2,250	NA
SR 836 @ NW 17th	NA	1,640	1,600	NA
SW 8th @ SW 107th	NA	NA	1,790	1,480
SW 8th @ SW 97th	NA	NA	1,230	840
SW 8th @ SW 87th	NA	NA	1,820	1,520
SW 8th @ Palmetto	NA	NA	380	250
SW 8th @ FEC	NA	NA	960	580
Flagler @ FEC	NA	NA	2,690	2,010
Flagler @ Red Road	NA	NA	NA	630
Flagler @ 49th	NA	NA	NA	330
Flagler @ 42nd	NA	NA	NA	880
Flagler @ 37th	NA	NA	NA	1,360
NW 37th @ NW 7th	NA	NA	NA	440
Flagler @ 32nd	NA	NA	NA	150
Flagler @ 27th	NA	NA	NA	1,690
Flagler @ 22nd	NA	NA	NA	550
Flagler @ 17th	NA	NA	NA	1,270
Flagler @ 12th	NA	NA	NA	740
Flagler @ 8th	NA	NA	NA	540
TOTAL	18,520	25,960	25,390	22,040

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top of Exhibit W-5. The incremental ridership is shown both for total transit trips (including jitneys) and MetroDade-only ridership (excluding jitneys). The results show the impact of some jitney diversion in the Flagler corridor.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed relative to existing passengers (really, passengers projected for the TSM alternative) and thus reflect the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips. The travel time savings are the greatest for the most direct alternatives (W2 and W3), carrying long-distance commuters from western Dade County to central area destinations.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT savings are less for the light rail alternative (W4) reflecting its greater attractiveness to shorter trips and less attractiveness to long distance commuting trips.

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The travel time savings to downtown are highly variable, depending upon the specific locations relative to the alignment for a given alternative. As expected, travel times are shortest from the western part of the corridor for the more direct and higher speed alternatives (W2 and W3). Very substantial time savings occur for trips to the airport where direct service from any location along the line is far superior to the indirect service often requiring two or more local buses in the TSM alternative.

Exhibit W-5

Dade County Transit Corridors Transitional Study

Travel Impact Summary

Average Weekday Travel – 2010

West Corridor

			TSM	W1 West Direct	W2 West via 836	W3 West Composite	W4 West via Flagler
ANNUAL TRANSIT TRIPS (Millions)							
Total (including jitneys)			101.194	103.922	104.482	104.219	103.216
MetroDade Only			84.457	87.318	88.058	87.860	87.123
Incremental Total			NA	2.859	3.420	3.157	2.153
Incremental MetroDade Only			NA	2.992	3.732	3.534	2.797
ANNUAL FARE REVENUE (Millions)							
Incremental MetroDade Only			NA	$2.632	$3.480	$3.223	$2.394
TRAVEL TIME SAVINGS (as per FTA formula)							
Daily Hours			NA	1,900	3,000	2,700	800
Annual Savings (Millions $)			NA	$2.260	$3.435	$3.199	$0.945
AUTO VMT SAVINGS (Daily Vehicle Miles) (1,000's)			NA	46.8	47.0	28.6	10.1
SELECTED TRAVEL TIMES (Total Minutes)							
FROM:	TO:						
Doral West (157)	CBD	A	50.7	53.4	45.4	48.6	54.4
Tamiami Plaza (617)	CBD	A	58.0	50.7	42.7	47.3	58.9
Westchester (642)	CBD	W	74.1	73.6	66.6	44.9	58.9
W Dade GC (635)	CBD	A	52.6	45.5	37.7	38.2	49.2
Blue Lagoon (577)	CBD	W	61.2	47.5	40.5	37.7	51.7
Auditorium area (689)	CBD	W	29.3	29.3	29.3	29.3	27.0
Tamiami Plaza (617)	MIA	A	96.8	43.3	41.7	46.3	70.0
Brickell (719)	MIA	W	58.2	43.3	36.3	36.3	52.5

Ridership Forecasts - Beach Corridor

The Beach corridor extends from the CBD across Biscayne Bay to Miami Beach, then northward along Collins Avenue to the vicinity of 71st Street. Only a single alternative, featuring light rail at grade, was examined for this corridor, identified as "B1" in the summary materials which follow.

Input Assumptions

Input assumptions for the Beach alternative is summarized in Exhibit B-1. A single operating rail line was assumed to run from the vicinity of 71st Street, through Miami Beach, across the MacArthur Causeway, and into downtown Miami. No direct connection was assumed with the existing Metrorail line, although convenient transfers to Metrorail and Metromover would be provided within the downtown area.

Bus service changes were made so as to eliminate most direct duplication of service. The Beach MAX was eliminated and the Beach end of the East/West MAX was terminated. No bus service was provided across the MacArthur causeway, with routes terminating at the 71st Street station or the Miami Beach Convention Center (MBCC). The local Beach portions of some routes were consolidated into a circulator route with the trans-bay service eliminated.

Ridership

Ridership results are summarized in Exhibit B-2. The information in the top section of the exhibit shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking Metrobus from north beach to 71st Street station, transferring to Metrorail to downtown, and then transferring to Metromover to reach the final destination is counted as only a single "linked" trip.

The data in the lower part of the exhibit reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include all stations along the Beach line.

The results show an increase in ridership attributed to the Beach service. Non-work ridership increases more than work ridership which might be expected given the close station spacing on most of the line and its attractiveness for shorter trips. Outbound ridership is quite high with the outbound peak load exceeding one-fourth of the inbound load.

Travel summaries for market areas within the Beach corridor are summarized in Exhibit B-3. Modest increases are shown in most of the work trip markets. Larger increases are observed for non-work trips (the difference between total trips and work trips as shown in the exhibit), particularly travel from the South Beach area and travel within the beach area.

Exhibit B–1

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
Beach Corridor

		TSM	B1 Beach
Rail Service			
Line 1	From To Via	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext
Line 2	From To Via	Dadeland S Earl. Hts. Stage 1	Dadeland S Earl. Hts. Stage 1
Line 3	From To Via		Collins/71 CBD MacArthur
Bus Service			
Premium	Beach MAX E/W MAX	71–CBD MIA–MBCC	(delete) MIA–CBD
Local	191 st St Aventura Bal Harbour Mt. Sinai Lincoln	S Beach Omni Omni Omni Omni NW 22	cb @ 71 cb @ 71 cb @ MBCC circulator (delete) (delete)

Exhibit B-2

Dade County Transit Corridors Transitional Study

Travel Demand Summary

Average Weekday Travel – 2010

Beach Corridor

	TSM	B1 Beach
MODE SPLIT RESULTS		
LINKED TRANSIT TRIPS		
Work	152,400	154,700
Home-based Non-work	110,600	113,900
Non-home Based	69,100	69,700
Total	332,100	338,300
ASSIGNMENT RESULTS		
REGIONAL RAIL BOARDINGS		
Total Un-Linked	94,500	135,800
Transfers	0	(14,100)
Total Linked	94,500	121,700
CORRIDOR BOARDINGS		
Boardings on New Alignments	NA	33,300
Peak Hour, Peak Direction Loads:		
South of Brickell	6,100	6,200
North of Overtown	2,000	2,100
Beach Corridor	NA	1,200
% Outbound	NA	27%

Exhibit B–3

Dade County Transit Corridors Transitional Study

Travel Market Summary

Beach Corridor

Market	Person Trips	Transit Trips		Delta
		TSM	B1 Beach Light Rail	B1 Beach Light Rail
Work Trips				
North Beach–CBD	4,400	1,100	1,200	100
Mid Beach–CBD	4,300	1,300	1,400	100
South Beach–CBD	9,100	3,100	3,400	300
Intra Beach Area	39,500	6,100	6,200	100
Beach Area–Other	33,800	4,300	4,700	400
Other–Beach Area	36,900	2,400	2,800	400
Other	1,832,100	134,000	135,000	1,000
Total	1,960,200	152,400	154,700	2,300
Total Trips				
North Beach–CBD	11,500	2,200	2,400	200
Mid Beach–CBD	16,900	3,400	3,900	500
South Beach–CBD	33,700	7,700	8,700	1,000
Intra Beach Area	207,900	14,100	15,300	1,200
Beach Area–Other	154,500	10,200	11,400	1,200
Other–Beach Area	120,100	5,300	6,100	800
Other	7,465,700	289,200	290,500	1,300
Total	8,010,300	332,100	338,200	6,100

A station boarding summary is included in Exhibit B-4. Boardings are spread throughout the corridor along the Beach, with the greatest number at the Collins/71st terminal and at Washington and 17th. The largest single number of boardings are at Bicentennial park, reflecting the role of the Beach line as an additional east-west downtown distribution system.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top of Exhibit B-5. The incremental ridership is shown both for total transit trips (including jitneys) and MetroDade-only ridership (excluding jitneys). The incremental MetroDade-only ridership is approximately double the incremental total ridership, reflecting the competitiveness of the light rail service with the extensive jitney service in this corridor.

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed relative to existing passengers (really, passengers projected for the TSM alternative) and thus reflect the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips. The savings is very modest for this alternative and reflects, in part, offsets from the reduction in local bus service.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT reduction is relatively large given the change in transit ridership because of the relatively long trans-bay trips that are diverted to transit.

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The travel time savings are relatively similar for all markets and reflect largely the running time improvements for the trans-bay portion of the trip.

Exhibit B–4

Dade County Transit Corridors Transitional Study

Station Boarding Summary

Average Weekday Travel – 2010

Beach Corridor

Station	B1 Beach
Collins @ 71st	2,550
Collins @ 63rd & 59th	360
Collins @ 55th & 51st	1,540
Collins @ 45th @ 41st	1,270
Collins @ 33rd	620
Collins @ 26th	1,060
Collins @ 23rd	520
Collins @ 20th	1,290
Washington @ 17th	2,460
Washington @ 12th	1,170
Washington @ 7th	1,700
Meridian	1,500
Alton	1,780
Palm Island	130
Watson Island	50
Bicentennial Park	6,460
Bayside	580
TOTAL	25,040

Note: Does not include boardings at downtown transfer station

Exhibit B–5

Dade County Transit Corridors Transitional Study

Travel Impact Summary

Average Weekday Travel – 2010

Beach Corridor

			TSM	B1 Beach
ANNUAL TRANSIT TRIPS (Millions)				
Total (including jitneys)			101.194	102.982
MetroDade Only			84.457	88.237
Incremental Total			NA	1.919
Incremental MetroDade Only			NA	3.911
ANNUAL FARE REVENUE (Millions)				
Incremental MetroDade Only			NA	$3.528
TRAVEL TIME SAVINGS (as per FTA formula)				
Daily Hours			NA	300
Annual Savings (Millions $)			NA	$0.153
AUTO VMT SAVINGS (Daily Vehicle Miles) (1,000's)			NA	39.5
SELECTED TRAVEL TIMES (Total Minutes)				
FROM:	TO:			
Bal Harbour (46)	CBD	A	67.6	57.8
Indian Beach (35)	CBD	W	62.5	44.8
Lummus Beach (14)	CBD	W	46.5	28.8
Brickell (719)	MBCC	W	50.9	34.4

Ridership Forecasts - West/Beach Options

The West/Beach options provide through service from the western campus of Florida International University (FIU) to the Miami Beach Convention Center (MBCC) area, with intermediate service to the Multi-Modal terminal near the Miami International Airport and downtown Miami. Three options were examined which varied in their access to Multi-Modal and in the way they crossed Biscayne Bay. These options are noted as "WB1", "WB2", and "WB3" in the summary materials which follow.

Input Assumptions

Input assumptions for the three West/Beach options are shown in Exhibit W/B-1. In the first option (WB1), the short-turn Metrorail line from Dadeland South is diverted from the Stage 1 line west of the Culmer station, proceeds on a separate alignment to the Multi-Modal terminal, then continue west along SR 836 and south along the HEFT to FIU. A third operating line runs from FIU through Multi-Modal and downtown Miami to MBCC. A fourth line provides additional service between downtown Miami and MBCC. Both of last two lines run on an alignment across the MacArthur Causeway from downtown to Miami Beach.

The second and third options are identical except for access to Miami Beach. In these options, the short-turn Stage 1 line remains as in the TSM alternative, running from Dadeland South to Earlington Heights. A third line runs from FIU along the HEFT and SR 836 to the Miami River, then on a new alignment through downtown and across the MacArthur Causeway to Miami Beach. A fourth line runs from FIU to Multi-Modal via a branch near LeJeune Road and a fifth line runs from Multi-Modal south to SR 836 and then through the CBD to MBCC as line 3. The only difference between the second and third options is that the latter runs directly from downtown to the Seaport, then through a tunnel under Government Cut to Miami Beach.

All three options also provide for special Airport-Seaport service which is not available to the general public and is thus not reflected in the travel demand modeling process. In the first and second options, this service is provided by a branch from the downtown line near Biscayne Boulevard out to the Seaport. In the third option, service is provided directly over the main alignment, similar to line 5 but without intermediate local stops.

Bus service changes were virtually identical for all alternatives. The express buses from western Dade County in the TSM alternative were terminated at outer rail stations or eliminated. The Flagler MAX was retained but both the East/West MAX and the Beach MAX were deleted. Parallel bus service on NW 7th Street and Flagler was re-oriented to serve the Multi-Modal terminal and broken at that point to minimize duplicative service and allow for better balancing of transit supply and demand. All local bus service across the MacArthur Causeway from the Beach was eliminated, with most routes cutback at MBCC or converted to local area circulation. A few other minor changes were made to other local and crosstown routes, primarily to serve the FIU terminal station at the west end and to improve circulation from stations along SR 836 to employment areas west of the airport.

Exhibit W/B–1

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
West/Beach Options

		TSM	WB1 West–Bch Direct	WB2 West–Bch via 836	WB3 West–Bch via Tunnel
Rail Service					
Line 1	From To Via	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext	Dadeland S Palmetto Stage I Ext
Line 2	From To Via	Dadeland S Earl. Hts. Stage 1	Dadeland S FIU MultiModal	Dadeland S Earl. Hts. Stage 1	Dadeland S Earl. Hts. Stage 1
Line 3	From To Via		FIU MBCC MultiModal	FIU MBCC MacArthur	FIU MBCC Tunnel
Line 4	From To Via		MBCC CBD MacArthur	FIU MultiModal SR 836	FIU MultiModal SR 836
Line 5	From To Via			MultiModal MBCC MacArthur	MultiModal MBCC Tunnel
Special Service	From To Via		Airport Seaport CBD branch	Airport Seaport CBD branch	Airport Seaport Mainline
Bus Service					
Premium	West Dade expr	via 836	link @ FIU	link @ FIU	link @ FIU
	Sweetwater expr	via 836	cb @ 107	cb @ 107	cb @ 107
	Doral express	via 836	(delete)	(delete)	(delete)
	Kendall Lakes expr	via 836	(delete)	(delete)	(delete)
	Flagler MAX	FIU–CBD	FIU–CBD	FIU–CBD	FIU–CBD
	E/W MAX	MIA–MBCC	(delete)	(delete)	(delete)
	Beach MAX	71–CBD	(delete)	(delete)	(delete)

Exhibit W/B–1 (Continued)

Dade County Transit Corridors Transitional Study
Service Planning Assumptions
West/Beach Options (Continued)

		TSM	WB1 West–Bch Direct	WB2 West–Bch via 836	WB3 West–Bch via Tunnel
Bus Service (Continued)					
Locals	NW 7th St	Hook–CBD	Hook–CBD	divert 17	divert 17
		Mall–CBD	cb @ Red Red–CBD	cb @ Red Red–CBD	cb @ Red Red–CBD
	Flagler	FIU–CBD	FIU–MMT MMT–CBD	FIU–MMT MMT–CBD	FIU–MMT MMT–CBD
		Mid–CBD	87–MMT MMT–CBD	87–MMT MMT–CBD	87–MMT MMT–CBD
	191 st St Aventura	S Beach Omni	cb @ MBCC cb @ MBCC	cb @ MBCC cb @ MBCC	cb @ MBCC cb @ MBCC
	Bal Harbour	Omni	cb @ MBCC	cb @ MBCC	cb @ MBCC
	Mt. Sinai	Omni Omni	circulator (delete)	circulator (delete)	circulator (delete)
	Lincoln	NW 22	(delete)	(delete)	(delete)
	Other locals & Crosstowns	(nominal)	minor deviations	minor deviations	minor deviations

Note: MMT = MultiModal terminal @ airport

Ridership

Ridership results are summarized in Exhibit W/B-2. The information in the top section of the exhibit shows average weekday total transit trips for 2010. These values include all modes of transit in the Dade County area, including Metrobus, Metrorail, Metromover, and jitneys. Ridership data in this form is consistent with that used by FTA in computing project evaluation measures and thus consists of "linked" passenger trips. For example, a commuter taking a Metrobus from north beach area to MBCC, transferring to rail to the NW 87th Avenue station at SR 836, and then transferring to a distributor bus to a final destination behind the airport is counted as only a single "linked" trip.

The data in the lower part of the exhibit reflects boardings on the primary corridor services and at other key locations on the system. The boardings on new alignment include all new stations along the West/Beach alignments including Multi-Modal. Boardings at stations on the existing Stage 1 line between downtown and Earlington Heights in option WB1 are not included in the totals.

Ridership results are quite similar for all alternatives, with option WB2 carrying slightly more passengers. The service patterns to other parts of the region are very different, particularly to south county, as reflected in the much lower transfer values for option WB1. Option WB2 carries slightly more riders than option WB3 even though the latter is faster through the tunnel than the former along the Causeway, because WB2 provides additional distribution directly to the northern part of downtown while a transfer to Metromover is required in WB3. Outbound ridership is significant on both branches, being over 40 percent of the inbound values on the west leg and over 25 percent on the Beach leg.

Travel summaries for West/Beach market areas are summarized in Exhibit W/B-3. The primary impacts are for internal trips and trips to the West/Beach area from other parts of the region, both markets which include travel to the airport and surrounding areas.

A station boarding summary is included in Exhibit W/B-4. Stations with the largest number boardings are at the FIU terminal, at 836 and LeJeune, and at Washington and 17th on the Beach. The largest number of boardings, in options WB1 and WB2 occur at the Bicentennial Park station which reflects additional ridership using the line for east-west distribution within the downtown area.

Travel Impacts

Cost effectiveness measures computed in accordance to FTA guidelines are based on annual increments in projected ridership for each "build" project over the TSM base line. In other words, the measure is the amount of "new" ridership that would be generated by the specific alternative. This incremental ridership is shown at the top of Exhibit W/B-5. The incremental ridership is shown both for total transit trips (including jitneys) and MetroDade-only ridership (excluding jitneys). The results show the significant combined impact of jitney diversion from the Beach and Flagler corridors.

Exhibit W/B–2

Dade County Transit Corridors Transitional Study

Travel Demand Summary

Average Weekday Travel – 2010

West/Beach Options

	TSM	WB1 West–Bch Direct	WB2 West–Bch via 836	WB3 West–Bch via Tunnel
MODE SPLIT RESULTS				
LINKED TRANSIT TRIPS				
Work	152,400	159,300	160,000	159,400
Home–based Non–work	110,600	117,800	118,200	117,700
Non–home Based	69,100	71,800	72,000	71,700
Total	332,100	348,900	350,200	348,800
ASSIGNMENT RESULTS				
REGIONAL RAIL BOARDINGS				
Total Un–Linked	94,500	150,200	171,000	166,500
Transfers	0	(7,700)	(24,500)	(23,000)
Total Linked	94,500	142,500	146,500	143,500
CORRIDOR BOARDINGS				
Boardings on New Alignments	NA	58,200	63,700	58,100
Peak Hour, Peak Direction Loads:				
South of Brickell	6,100	6,200	6,400	6,400
North of Overtown	2,000	3,600	2,200	2,200
North of West Line Split	NA	1,900	NA	NA
West Corridor	NA	1,700	1,700	1,600
% Outbound	NA	39%	41%	42%
Beach Corridor	NA	1,100	1,300	1,300
% Outbound	NA	25%	26%	28%

Exhibit W/B–3

Dade County Transit Corridors Transitional Study

Travel Market Summary

West/Beach Options

Market	Person Trips	Transit Trips				Delta Transit Trips		
		TSM	WB1 W/B Direct	WB2 W/B via 836	WB3 W/B Tunnel	WB1 W/B Direct	WB2 W/B via 836	WB3 W/B Tunnel
Work Trips								
West–CBD	49,200	11,700	11,900	12,100	12,000	200	400	300
Beach–CBD	17,800	5,600	5,900	6,000	6,000	300	400	400
West/Beach–Intra	246,000	17,100	18,800	19,000	18,900	1,700	1,900	1,800
West/Beach–Other	147,900	10,100	11,400	11,400	11,400	1,300	1,300	1,300
Other–West/Beach	373,000	16,000	18,900	19,000	19,000	2,900	3,000	3,000
Other	1,126,300	91,900	92,400	92,500	92,100	500	600	200
Total	1,960,200	152,400	159,300	160,000	159,400	6,900	7,600	7,000
Total Trips								
West–CBD	156,400	24,500	25,300	25,900	25,800	800	1,400	1,300
Beach–CBD	62,100	13,200	14,700	14,800	14,900	1,500	1,600	1,700
West/Beach–Intra	1,210,500	38,200	42,900	43,600	43,300	4,700	5,400	5,100
West/Beach–Other	635,700	21,800	24,800	24,900	24,700	3,000	3,100	2,900
Other–West/Beach	1,207,700	31,400	37,500	37,100	37,000	6,100	5,700	5,600
Other	4,737,900	203,000	203,700	204,000	203,200	700	1,000	200
Total	8,010,300	332,100	348,900	350,200	348,800	16,800	18,100	16,700

Exhibit W/B–4

Dade County Transit Corridors Transitional Study

Station Boarding Summary

Average Weekday Travel – 2010

West/Beach Options

Station	WB1 West–Bch Direct	WB2 West–Bch via 836	WB3 West–Bch via Tunnel
FIU	4,250	3,950	3,830
SR 836 @ NW 107th	3,380	3,160	3,160
SR 836 @ NW 97th	730	670	670
SR 836 @ NW 87th	2,430	2,250	2,160
SR 836 @ Palmetto	1,940	1,840	1,790
SR 836 @ Red Road	1,260	1,090	970
SR 836 @ LeJeune	4,800	4,230	4,160
SR 836 @ NW 37th	NA	2,530	2,410
SR 836 @ NW 27th	NA	2,300	2,220
SR 836 @ NW 17th	NA	1,360	1,330
SR 836 @ NW 12th	NA	430	360
NW 4th @ NW 8th	NA	1,380	1,330
Multi–Modal	4,530	1,430	1,470
Collins @ 20th	1,310	1,390	1,590
Washington @ 17th	4,870	5,400	6,270
Washington @ 12th	1,070	1,120	1,200
Washington @ 7th	1,530	1,560	2,410
Meridian	1,460	1,520	NA
Alton	2,370	2,490	NA
Palm Island	130	140	NA
Watson Island	50	60	NA
Bicentennial Park	6,320	7,620	NA
Bayside	640	1,190	3,240
Arena	1,110	NA	NA
South Beach	NA	NA	1,620
TOTAL	44,180	49,110	42,190

Note: Boardings at downtown transfer station not included

Travel time savings form another element of a typical FTA cost-effectiveness calculation. The travel time savings are computed relative to existing passengers (really, passengers projected for the TSM alternative) and thus reflect the benefits of the alternative to passengers who would use transit anyway, as opposed to the "new" riders noted above. The travel time savings are computed on a regional basis and converted to an annual savings by assigning FTA-specified values of $4.00 per hour for work trips and $2.00 per hour for non-work trips. The travel time savings are the greatest for the WB3 option with trans-bay travelers benefiting from higher operating speeds. The travel times in option WB1 are also offset by the longer travel times from the west corridor via Multi-Modal and the Stage 1 Metrorail alignment.

New transit riders are diverted from auto trips, so some reduction will occur in automobile vehicle miles of travel (VMT), a key measure of environmental impact from highway travel. The VMT savings are slightly higher for the WB2 option than for the other two.

Finally, some selected travel times are shown from various locations within the corridor to major destinations in downtown Miami and elsewhere. The travel time savings are fairly substantial from most locations, showing the benefits of rail over bus operations in mixed traffic. The travel time savings are very dramatic for trips to the airport, where direct service (in most cases) replaces inconvenient local bus access, generally requiring one or more transfers.

Exhibit W/B-5

Dade County Transit Corridors Transitional Study

Travel Impact Summary

Average Weekday Travel – 2010

West/Beach Options

			TSM	WB1 West-Bch Direct	WB2 West-Bch via 836	WB3 West-Bch via Tunnel
ANNUAL TRANSIT TRIPS (Millions)						
Total (including jitneys)			101.194	106.257	106.643	106.210
MetroDade Only			84.457	91.298	91.982	91.383
Incremental Total			NA	5.195	5.580	5.147
Incremental MetroDade Only			NA	6.972	7.655	7.057
ANNUAL FARE REVENUE (Millions)						
Incremental MetroDade Only			NA	$6.380	$7.005	$6.493
TRAVEL TIME SAVINGS (as per FTA formula)						
Daily Hours			NA	2,900	4,000	4,700
Annual Savings (Millions $)			NA	$3.346	$4.655	$5.499
AUTO VMT SAVINGS (Daily Vehicle Miles) (1,000's)			NA	83.9	89.1	86.6
SELECTED TRAVEL TIMES (Total Minutes)						
FROM:	TO:					
Tamiami Plaza (617)	CBD	A	58.0	50.1	45.0	45.0
Tamiami Plaza (617)	Omni	A	66.2	53.1	45.7	49.9
Blue Lagoon (577)	CBD	W	61.2	46.5	42.4	42.4
Indian Beach (35)	CBD	W	62.5	45.1	44.2	38.2
Indian Beach (35)	Omni	W	53.2	39.4	39.4	39.2
Tamiami Plaza (617)	MBCC	A	95.6	64.2	56.8	52.7
Blue Lagoon (577)	MBCC	W	99.6	63.5	56.5	50.5
Indian Beach (35)	MIA	W	92.6	69.1	62.1	56.1
Tamiami Plaza (617)	MIA	A	96.8	41.1	41.7	41.7

Summary

A summary of incremental ridership results for all 21 alternatives is shown in Exhibit SUM-1 and includes total transit trips, work transit trips, and total system-wide rail boardings. These values are shown graphically in Exhibits SUM-2, SUM-3, and SUM-4. As expected, the largest values in all categories occur for the west/beach combined options. The largest total incremental transit ridership occurs with the West corridor alternatives, while the West and northeast Corridors generate similar work trip values. Regional rail boardings are similar for the Northeast, West, and Beach corridors, with the latter including some travel in the downtown area.

Incremental travel impacts for the 21 alternatives are summarized in Exhibit SUM-5. Values shown include travel time savings, VMT savings, fare revenue, incremental total passengers (including jitneys), and incremental MetroDade passengers. All values except VMT savings are expressed in annual terms. Travel time savings, VMT savings, and fare revenues are also shown graphically in Exhibit SUM-6, SUM-7, and SUM-8. The incremental passenger figures are not shown graphically as the results are similar to those produces for the average daily values in the previous exhibits.

As expected, the combined West/Beach options generate the highest incremental impacts in virtually every category. Travel time savings are most significant for the Northeast and West corridors and are fairly modest for other alternatives. VMT savings are more highly variable and reflect in part diversion from auto access trips to more nearby park-and-ride opportunities. Fare revenue results are also highly variable, with increments for the South and Kendall corridors being very modest (or negative) reflecting diversion of riders from higher fare express buses to rail. The difference between total and MetroDade passenger estimates is most pronounced in areas with highest jitney activity, such as the Beach and Northeast corridors, with lesser impacts in the West and North corridors.

Exhibit SUM–1

Dade County Transit Corridors Transitional Study

Incremental Daily Ridership Summary – 2010

	Total Transit Trips	Work Transit Trips	Total Rail Boardings
S1	1,040	810	780
S2	4,420	2,580	10,120
S3	5,020	3,370	10,460
K1	110	150	610
K2	3,300	750	5,930
K3	3,160	1,280	5,030
N1	1,880	590	1,500
N2	5,880	2,720	13,610
N3	5,050	2,330	14,840
NE1	7,220	3,040	6,670
NE2	6,440	4,150	24,100
NE3	6,130	4,750	23,450
NE4	6,290	4,980	23,120
W1	9,370	4,230	22,230
W2	11,190	4,970	26,440
W3	10,340	4,620	25,970
W4	6,950	2,770	23,100
B1	6,140	2,280	27,210
WB1	16,830	6,930	47,960
WB2	18,120	7,620	51,980
WB3	16,710	7,020	48,890

Exhibit SUM-2

Transit Corridors Transitional Study

Incremental Total Daily Transit Trips

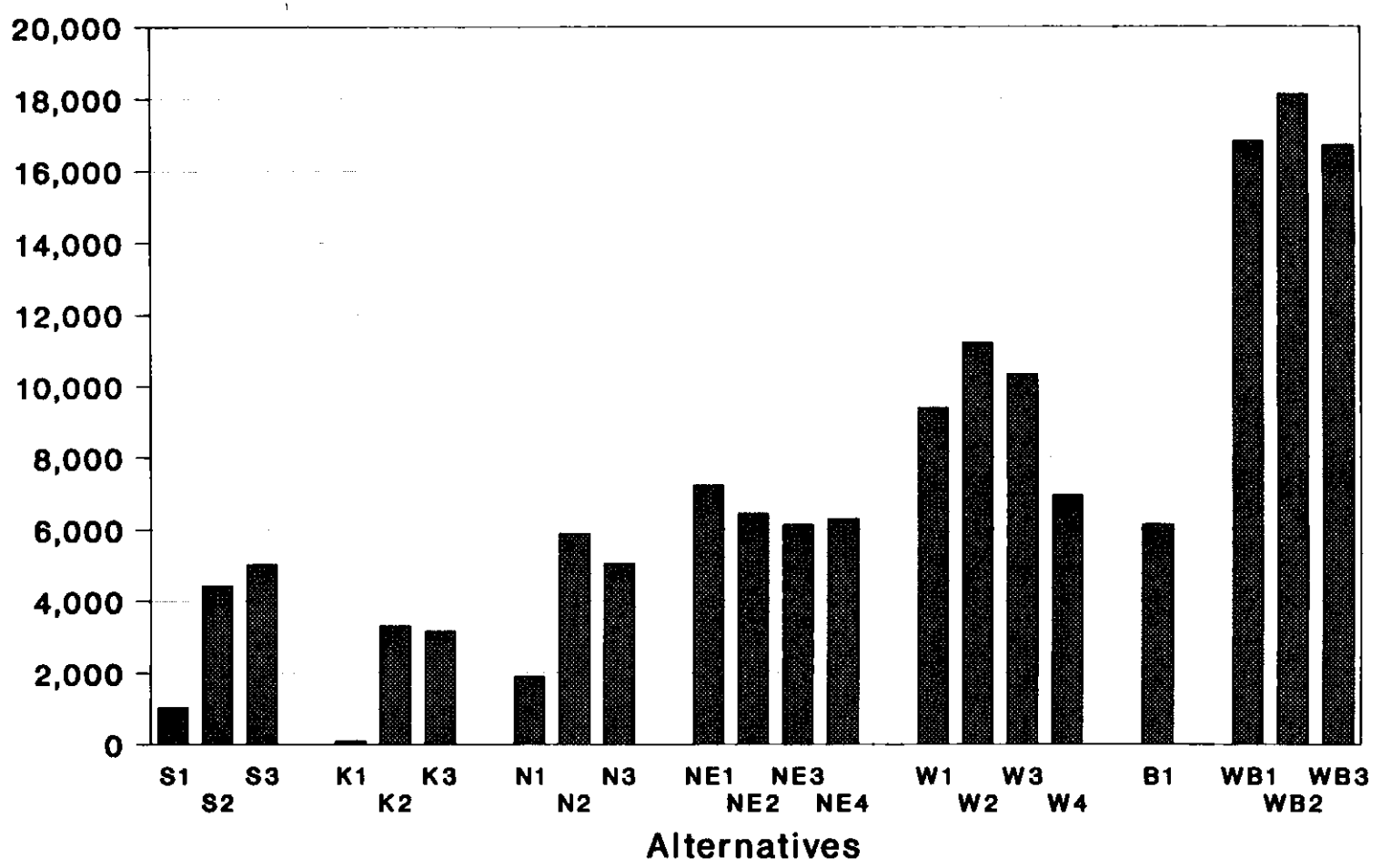


Exhibit SUM-3

Transit Corridors Transitional Study

Incremental Daily Transit Work trips

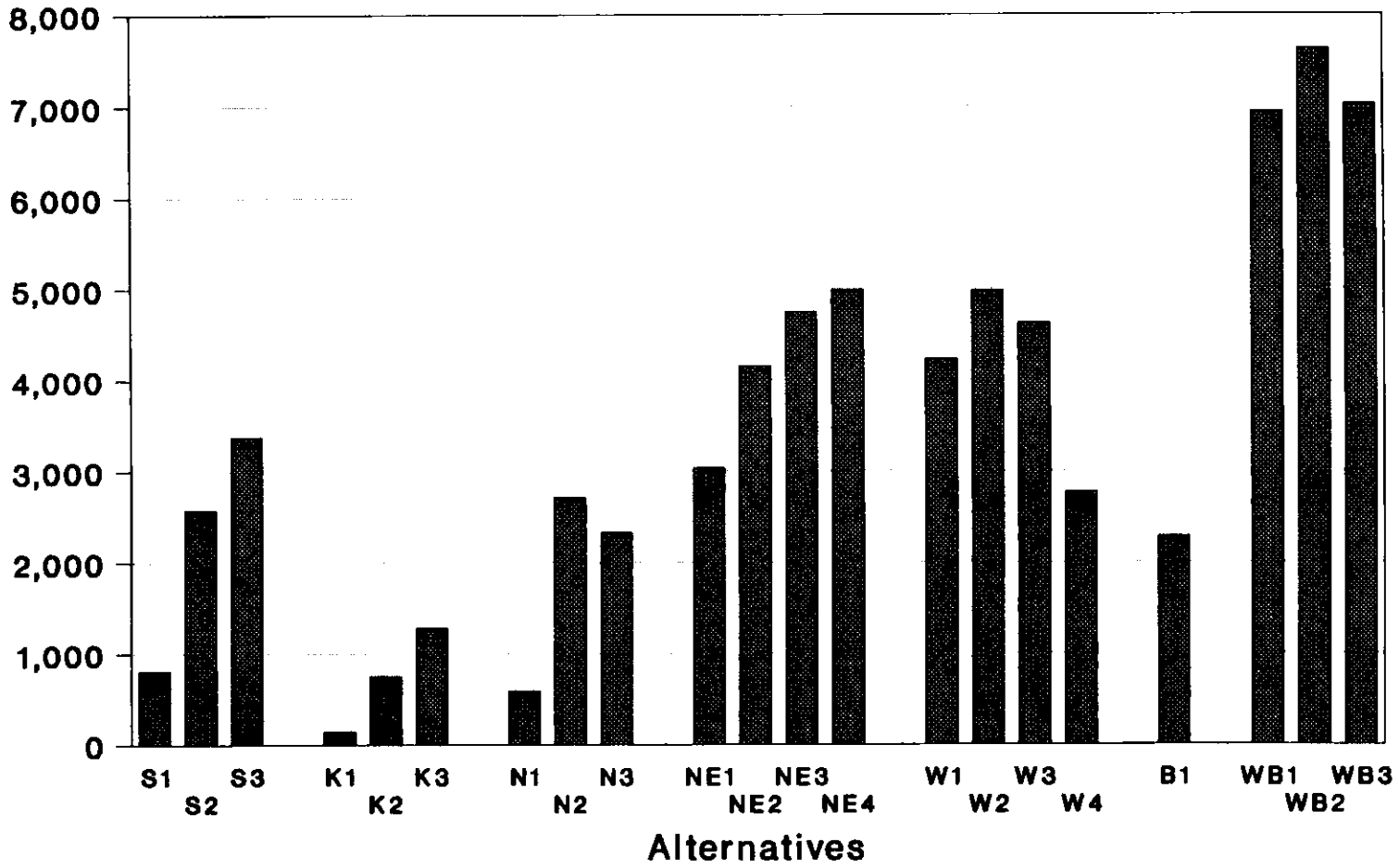


Exhibit SUM-4

Transit Corridors Transitional Study

Incremental Total Daily Rail Boardings

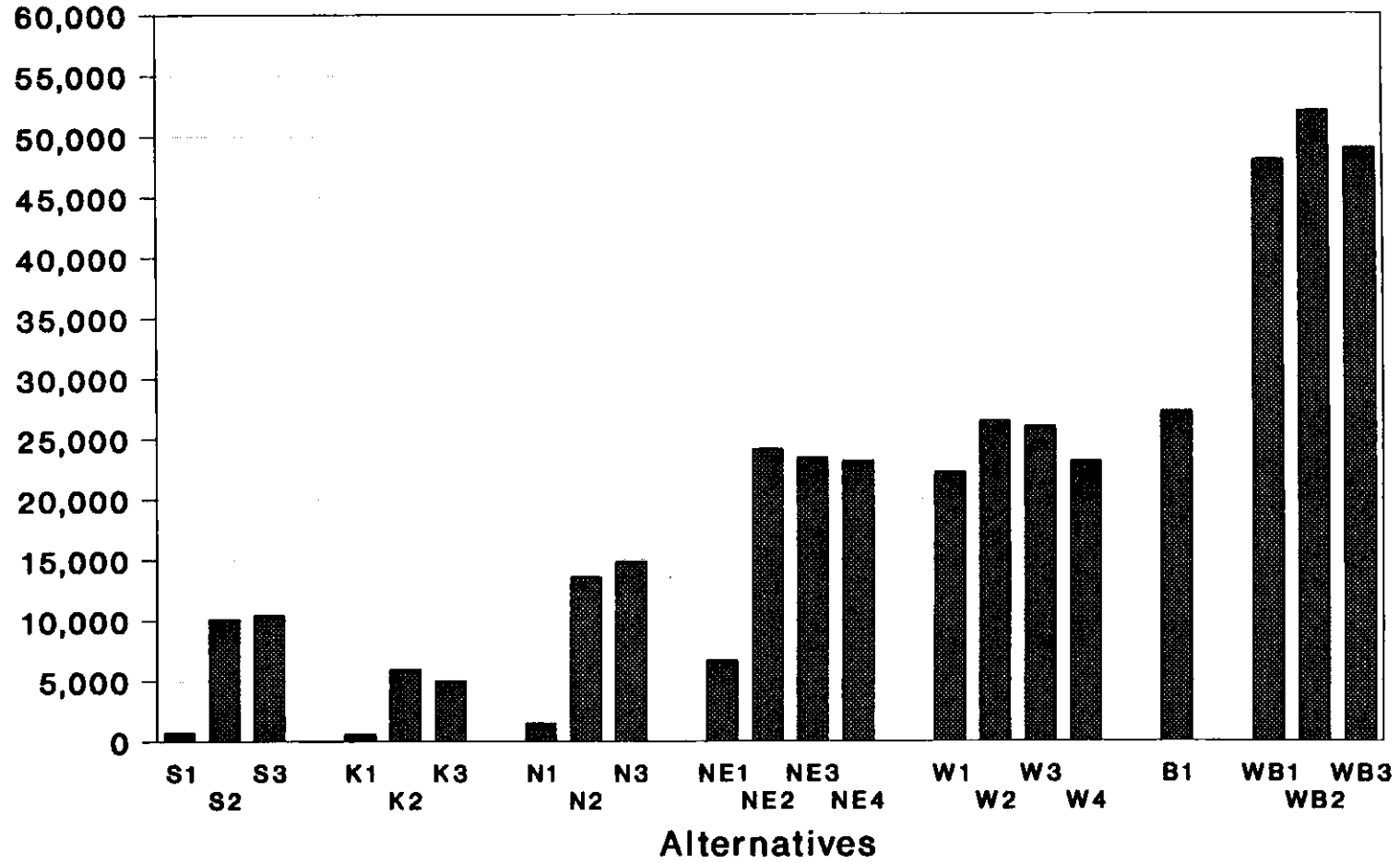


Exhibit SUM–5

Dade County Transit Corridors Transitional Study

Incremental Travel Impacts – 2010

Alternative/ Option	Travel Time Savings (Annual, millions)	VMT Savings (Daily, thousands)	Incremental Fare Revenue (Annual, millions)	Incremental Annual Total Passengers (millions)	Incremental Annual MetroDade Passengers (millions)
S1	$0.758	45.3	$0.575	0.285	0.285
S2	$0.835	105.0	($0.490)	1.295	1.295
S3	$1.680	136.9	($0.299)	1.429	1.429
K1	$0.070	–5.4	$0.423	0.024	0.024
K2	$0.991	36.1	$0.372	1.074	1.074
K3	$1.313	33.3	$0.185	0.976	0.975
N1	$0.509	–1.5	$0.933	0.604	0.621
N2	$1.429	43.8	$1.713	1.816	1.941
N3	$1.133	32.5	$1.302	1.558	1.674
NE1	$2.504	50.9	$4.957	2.257	3.245
NE2	$2.718	60.8	$1.758	1.890	2.508
NE3	$2.798	65.5	$1.447	1.739	2.476
NE4	$3.245	62.7	$1.365	1.769	2.427
W1	$2.260	46.8	$2.632	2.859	2.992
W2	$3.435	47.0	$3.480	3.420	3.732
W3	$3.199	28.6	$3.223	3.157	3.534
W4	$0.945	10.1	$2.394	2.153	2.797
B1	$0.153	39.5	$3.528	1.919	3.911
W/B1	$3.346	83.9	$6.380	5.195	6.972
W/B2	$4.655	89.1	$7.005	5.580	7.655
W/B3	$5.499	86.6	$6.493	5.147	7.057

Exhibit SUM-6

Transit Corridors Transitional Study

Annual Travel Time Savings

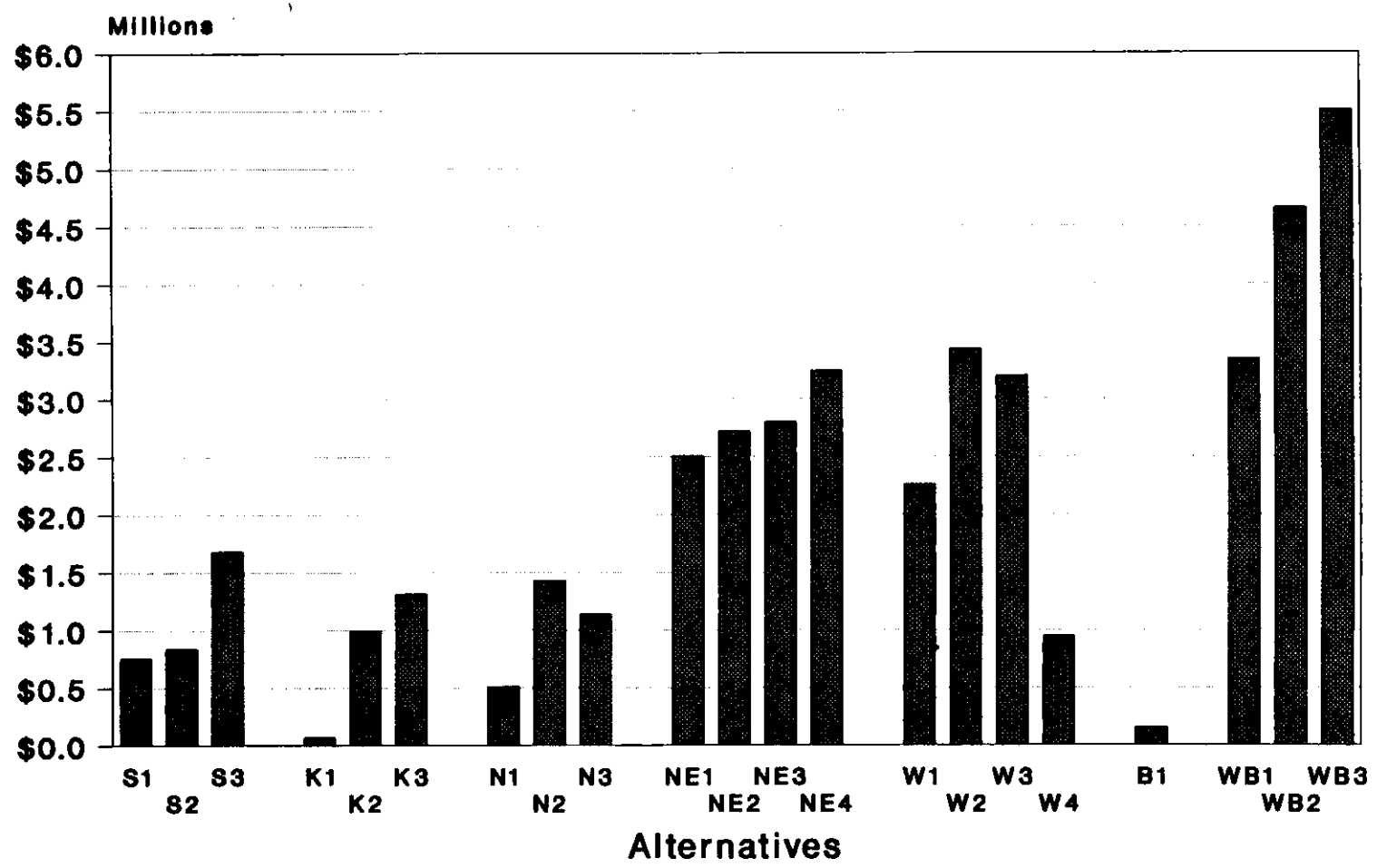


Exhibit SUM-7

Transit Corridors Transitional Study

Average Daily Auto VMT Savings

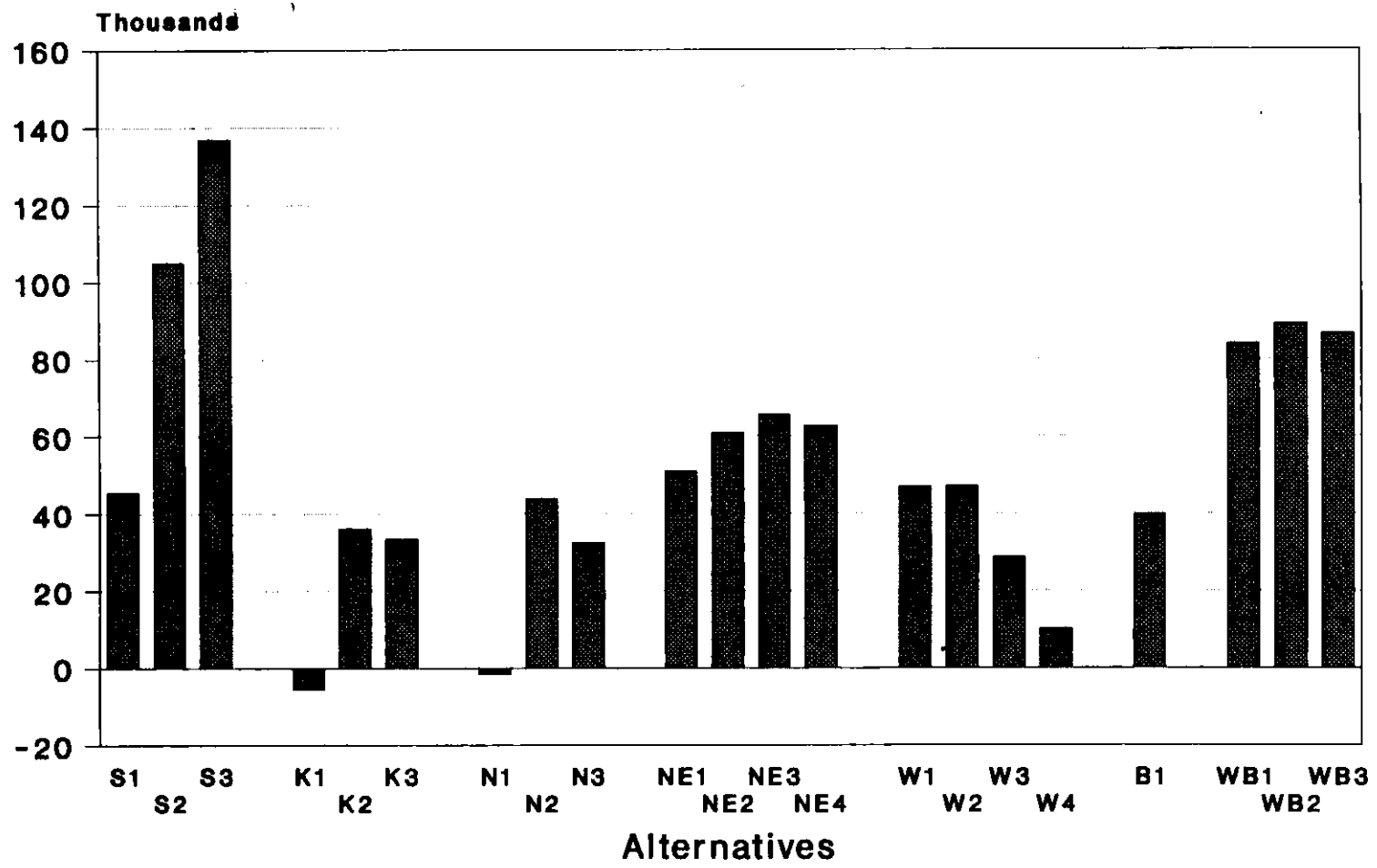


Exhibit SUM-8

Transit Corridors Transitional Study

Incremental Annual Fare Revenue