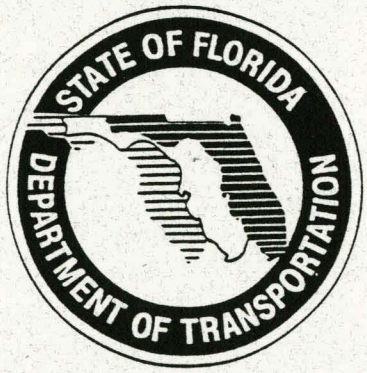
AIR QUALITY REPORT

US 1 EXCLUSIVE BUS LANES

FROM: S.W. 200TH STREET (CARIBBEAN BLVD.)
TO: DADELAND SOUTH METRORAIL STATION

Work Program Item No.: 6113959
State Project No.: 87100-1516
Federal Aid Project No.: MAF-485-2(64)
Dade County



Prepared by:
FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT SIX
MIAMI, FLORIDA

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1. INTRODUCTION

The purpose of this *Air Quality Report* is to describe the potential air quality impacts of the proposed project, consistent with the Florida Department of Transportation's (FDOT's) *Project Development and Environment Manual.* It describes the methodology used to determine where impacts could occur, how data were collected and processed, how receptors were identified, and other assumptions affecting the outcome of the analysis.

1.1 PHYSICAL DESCRIPTION OF THE PROJECT

The Florida Department of Transportation (FDOT) plans to design and construct exclusive bus lanes from south of SW 200th Street / Caribbean Boulevard to the southernmost Metrorail station at Dadeland South, approximately 2000 feet south of SW 88th Street/Kendall Drive (Figure 1-1). The project would use an abandoned 100-foot Florida East Coast (FEC) Railroad right-of-way, that was acquired by FDOT in December 1988. The existing right-of-way is 100 feet, except at the north end where it narrows to about 80 feet. North of SW 102nd Street the right-of-way widens as it approaches the Dadeland South Metrorail Station and tail track area. At the south project end and north of SW 164th Street the rail right-of-way is contiguous with that of US 1. Between these two points the rail right-of-way is as much as 400 feet to the west.

Three typical sections are under consideration (Figure 1-2). West to east the desired typical section, equal to the 100 foot right-of-way would be: 6-foot slope to ditch, 2-foot bike path shoulder, 10-foot bike path, 8-foot ditch, 8-foot gravel shoulder, 12-foot travel lane, 4-foot buffer, 12-foot travel lane, 8-foot gravel shoulder, and 30-foot sloped ditch. Where right-of-way is restrictive, the shoulders could be eliminated, with curb and gutter drainage. Also a 21-foot guideway is being considered. With the guideway, a conventional bus would be fitted with tracking wheels on each side to follow the guideway walls. In each case the typical section would accommodate one lane of flow in each direction, with exclusive use by buses. Vehicle type (and exhaust emission characteristics) would be the same for both typical sections.

At the south end of the project four optional sites are under consideration for development of a park-and-ride lot. Development of such a site would be a separate project by the Metro-Dade Transit Agency and would not be a part of this federal action.

Two sites are to the south of the Cutler Ridge Mall, on the north side of SW 211th Street. A third is on the south side of SW 211th Street, across from the Mall. The fourth site is east of the Homestead Extension of Florida's Turnpike, on the north side of SW 211th Street. Buses would exit the selected park-and-ride lot to SW 211th Street, then proceed north on SW 112th Avenue. SW 112th Avenue would be extended north across US 1,

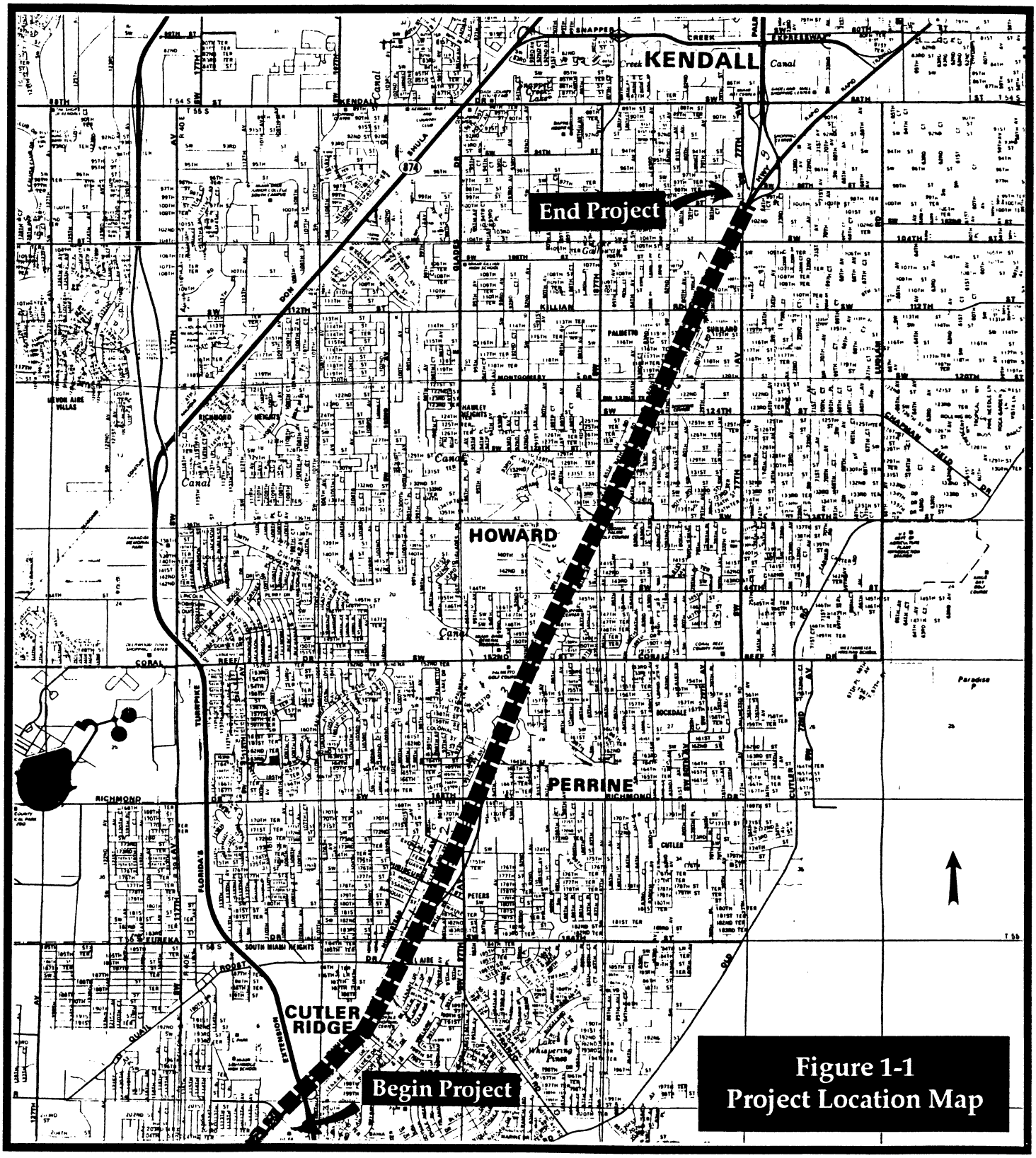


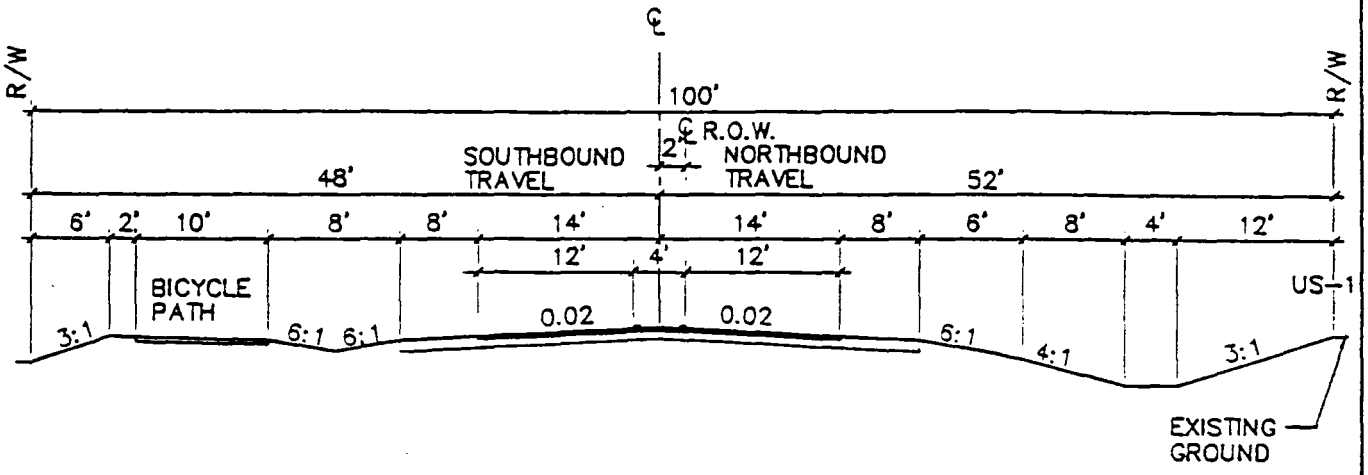
Figure 1-1
Project Location Map

U.S. 1 Exclusive Bus Lanes Corridor

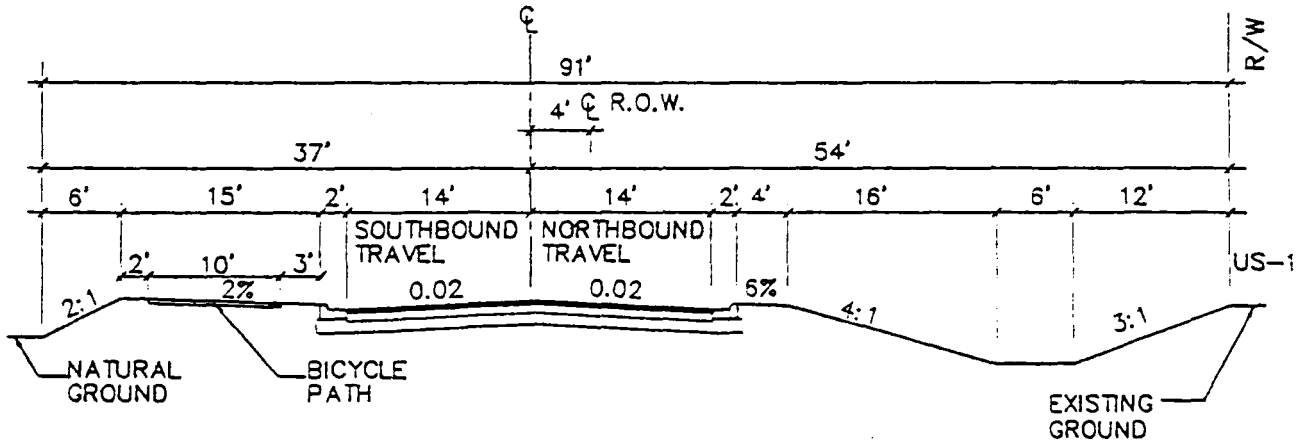
From: Caribbean Boulevard
To: Dadeland South
Metrorail Station

W.P.I. No. 6113959
State Project No. 87100-151 6
F.A.P. No. MAF-485-2(64)

Dade County, Florida



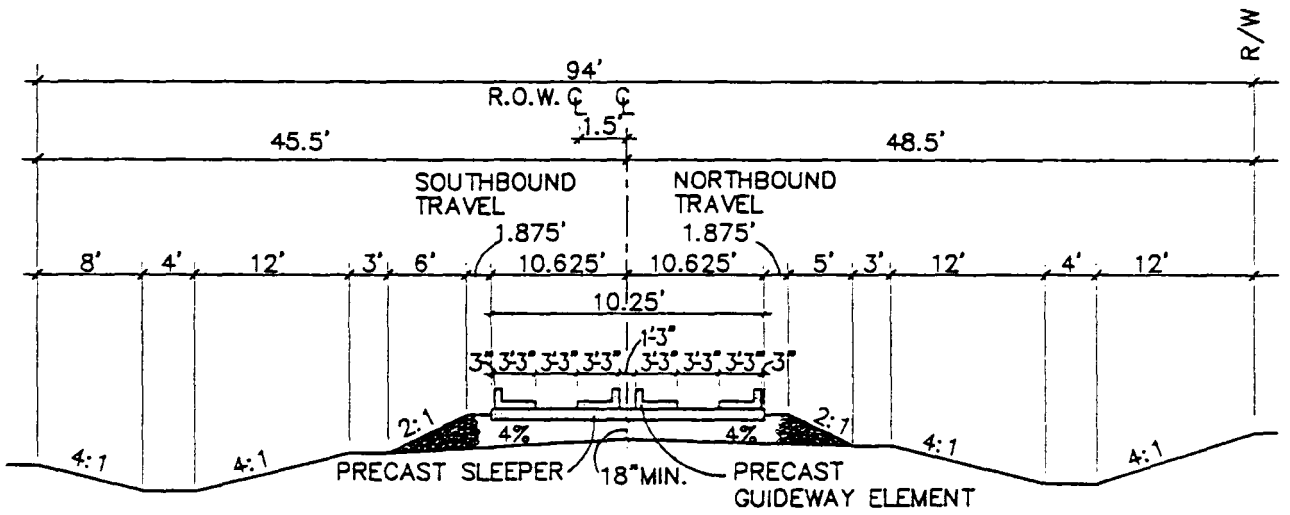
PROPOSED BUSWAY TYPICAL SECTION
(W/BICYCLE PATH)



PROPOSED BUSWAY TYPICAL SECTION
(W/BICYCLE PATH, ROCKDALE TRACT AREA)

ALTERNATIVE 1C

	TYPICAL SECTION	FIGURE 1-2a



PROPOSED GUIDED BUSWAY TYPICAL SECTION

ALTERNATIVE 2A

	TYPICAL SECTION	FIGURE 1-2b

TABLE 1-1

BUS STOP LOCATIONS

Cross Street	Northbound	Southbound
Caribbean Boulevard	North	South
Marlin Road	North	South
SW 186th Street	North	South
SW 184th / Eureka	South	South
Hibiscus	North	South
SW 173rd Street / Banyan	North	North
SW 168th Street / Richmond	North	North
SW 160th Street / Colonial	North	South
SW 152nd Street / Coral Reef	North	North
SW 144th Street	North	South
SW 136th Street	South	South
SW 132nd Street	North	South
SW 128th Street	North	South
SW 124th Street	North	South
SW 112th Street	North	North
SW 104th Street	North	South

allowing bus access to the FEC right-of-way. Transit stops with shelters would be provided along the corridor at major cross streets (Table 1-1). In some cases bus stops on the exclusive lanes for both directions are located north of the cross street, in other cases both are south, and in some cases they are split.

At the north end of the project, two options are under consideration for interface with the Dadeland South Metrorail Station. Option 1 is to circulate buses under the Datran Center, using the existing drop-off at the Metrorail Station. This is considered undesirable, because it requires several tight turns on congested local streets. The second option is to terminate the busway on the south side of the Datran Center in an area that is now owned by the Metro-Dade Transit Agency (MDTA) and leased to another party as parking. Use of this parking area would avoid circulation on local streets and the added congestion that would

result. There are several potential layouts for use of this site. Bus layovers could also be accommodated here. Option 2 is more desirable from an air quality standpoint, because it would result in less congestion.

1.2 OPERATIONAL DESCRIPTION OF PROJECT

Changes to bus route patterns with the project would not have a significant effect on air quality. Existing bus routes 1, 35, 38X, 52, and 65 now use some portion of US 1 between Caribbean and Datran South. These routes would be reoriented to the bus lanes for appropriate sections of their routes to improve travel times (the *Traffic Report* for the project shows new and old routings). Some routes would be longer than they are now. Two new routes, 51X and 152X would be added. Table 1-2 lists major cross streets and the two-

TABLE 1-2

PLANNED TWO-WAY PEAK BUS USE BY ROUTE

Bus Lane Access Point	Bus Route Number							
	1	35	38X	51X	52	65	152X	Total
Cutler Ridge Mall	0	2	8	0	0	0	0	10
Caribbean Blvd. / 200th St.	0	2	8	0	0	0	0	10
Marlin Road	0	2	8	0	0	0	0	10
184th St. / Eureka	0	2	8	0	0	0	0	10
Indigo	0	0	8	0	0	0	0	8
174th St. / Banyan	12	0	8	0	0	0	0	20
168th St. / Richmond Dr.	12	0	8	4	0	0	0	24
152nd St. / Coral Reef	12	0	8	4	0	0	0	24
136th St. / Howard	12	0	8	4	4	0	6	34
112th Street	12	0	8	4	4	2	6	36
104th Street	12	0	8	4	4	2	6	36
S. Dadeland Metrorail	12	0	8	4	4	2	6	36

Note: The last column reflects total peak hour buses on the busway at any given point.

way bus volumes on the exclusive lanes at the time the facility is planned for opening (1995). The greatest volumes would be at the north end of the corridor, approaching the Dadeland South Metrorail Station. Based on proposed headways provided by MDTA for 1995, the number of buses on the facility during the peak hour would range from a maximum of 36 at the north project end (18 in each direction) to 8 near the south project limit. Bus volumes are not expected to increase, because as patronage increases, it is anticipated that articulated buses would be put into operation. These buses have a substantially greater capacity than standard coaches.

From the standpoint of air quality analysis, it is important to understand how traffic would operate on US 1 with the busway in place. Traffic on streets crossing the busway will be controlled by signals or possibly by gates like those at railroad crossings. Buses will either have a green light at the same time that north/south traffic on US 1 gets the green (with the possibility of extending the green time, up to some maximum), or they will preempt cross-street traffic. Planning will ensure that westbound vehicles stopped for buses on the cross streets will not back up onto US 1. Turn lanes would be added on US 1, as determined by traffic analysis, so that storage occurs on US 1, rather than on the westbound cross streets. This will only be necessary at locations where the busway will be immediately adjacent to US 1 and there is no storage space available between the two. Southbound right turns will only be allowed when the busway is clear. Northbound left turns that are now "permissive" will have to be protected and coordinated with the busway. With permissive turning, the driver may proceed at his own risk, when no oncoming traffic is present. In the future these left turns would only be allowed during a dedicated turn phase with a turn arrow.

Cross street approaches to US 1 will be widened at several locations. This will have the effect of reducing the need for cross street green time, allowing more green time to US 1. These basic design considerations have the effect of minimizing air quality impacts, by minimizing delay at intersections.

2. AIR QUALITY IMPACTS

The air quality analysis included two elements, 1) a pollutant burden analysis of 1995 bus emissions with and without the project, and 2) a microscale carbon monoxide (CO) analysis using emission factors from the Environmental Protection Agency's (EPA) MOBILE 4.1 emissions model and the CAL3QHC model developed by the EPA, and based on the CALINE3 model.

2.1 POLLUTANT BURDEN ANALYSIS

A daily pollutant burden was estimated for 1995 using bus operational data presented in the *Traffic Report* for the study. Information included round trip distances and travel times for each route, and peak and off-peak headways. This allowed computation of total daily vehicle miles, including deadhead (miles run from route ends to and from the garage), and overall route speeds. Emission factors were provided by the Dade County Department of Environmental Resources Management (DERM), reflecting MOBILE 4.1 input parameters representing local conditions. The analysis was performed for three different conditions. First, estimates of the burden were made for 1995 assuming that no changes were made in routes. This is the No Action Alternative. Estimates were then made for the proposed route changes and use of the exclusive lanes representing the Proposed Action. Finally, for purposed of comparison the effects of a "No Build Modified Bus Operations" were estimated. This last effort made the same route shifts and additions associated with the proposed action, but put the buses on US 1, rather than on the busway. Under this scenario the route changes would not benefit from the higher speeds on the busway. The analysis found that the Proposed Action would result in an increase in the pollutant burden generated by **buses** each day in the corridor (Table 2-1), compared to taking no action. This would result from the lengthening of Routes 38X and 65 and the addition of two new routes, 51X and 152X. The increased burden would be offset by reduced auto travel in the corridor. When compared to the bus pollutant burden under a scenario where the increased bus travel occurred on US 1, rather than the busway, analysis finds that the Proposed Action with its higher bus travel speeds would have a lower burden. Thus under a scenario of increased service, the busway has clear air quality benefits, even when the mode shift to transit is not considered.

2.2 MICROSCALE CARBON MONOXIDE ANALYSIS

Using information from project engineers and the screening procedures of FDOT, intersections were identified that could be affected by the project.

The project will have several effects. First, buses would shift off of US 1 to the busway. The result is a very minor decrease in vehicles and congestion on US 1. Second, the diversion of some auto users to transit would result in a very minor reduction in traffic.

TABLE 2-1
DAILY BUS POLLUTANT BURDEN - 1995

NO ACTION ALTERNATIVE

Route	Two-Way Dist.	Two-Way Time	Speed	Buses Hour Peak	Buses Hour Off	# of Hours Peak	# of Hours Off	Daily Total Buses	Daily Total Miles	Emission Factors (grams per mile) HC	CO	NOx	Total Bus Burden (lbs. per day) HC	CO	NOx
1	29.0	92.0	18.9	12	4	6	12	120	3480	1.15	1.90	1.54	9	15	12
35	50.6	188.0	16.1	2	2	6	12	36	1822	1.35	2.12	1.65	5	9	7
38X	51.0	118.0	25.9	6	NA	6	12	36	1836	0.84	1.46	1.43	3	6	6
51X	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
52	49.2	208.0	14.2	4	2	6	12	48	2362	1.60	2.30	1.71	8	12	9
57	20.9	64.0	19.6	2	NA	6	12	12	251	1.09	1.83	1.56	1	1	1
65	19.1	78.0	14.7	2	NA	6	12	12	229	2.00	2.23	1.70	1	1	1
152X	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TOTAL	219.8	748	17.6	28	8	36	72	264	9979	NA	NA	NA	28	43	35

NO BUILD MODIFIED BUS OPERATIONS

Route	Two-Way Dist.	Two-Way Time	Speed	Buses Hour Peak	Buses Hour Off	# of Hours Peak	# of Hours Off	Daily Total Buses	Daily Total Miles	Emission Factors (grams per mile) HC	CO	NOx	Total Bus Burden (lbs. per day) HC	CO	NOx
1	29.0	92.0	18.9	12	4	6	12	120	3480	1.15	1.90	1.54	9	15	12
35	50.6	188.0	16.1	2	2	6	12	36	1822	1.35	2.12	1.65	5	9	7
38X	43.1	136.7	18.9	8	NA	6	12	48	2069	1.15	1.90	1.54	5	9	7
51X	30.8	97.7	18.9	4	NA	6	12	24	739	1.15	1.90	1.54	2	3	3
52	49.2	208.0	14.2	4	2	6	12	48	2362	1.60	2.30	1.71	8	12	9
57	20.9	64.0	19.6	2	NA	6	12	12	251	1.09	1.83	1.56	1	1	1
65	22.1	90.2	14.7	2	NA	6	12	12	265	2.00	2.23	1.70	1	1	1
152X	24.6	78.0	18.9	6	NA	6	12	36	886	1.15	1.90	1.54	2	4	3
TOTAL	270.3	954.	17.0	40	8	48	96	336	11873	NA	NA	NA	34	53	42

PROPOSED ACTION

Route	Two-Way Dist.	Two-Way Time	Speed	Buses Hour Peak	Buses Hour Off	# of Hours Peak	# of Hours Off	Daily Total Buses	Daily Total Miles	Emission Factors (grams per mile) HC	CO	NOx	Total Bus Burden (lbs. per day) HC	CO	NOx
1	29.0	78.0	22.3	12	4	6	12	120	3480	1.00	1.70	1.50	8	13	11
35	50.6	152.0	20.0	2	2	6	12	36	1822	1.09	1.83	1.56	4	7	6
38X	43.1	99.8	25.9	8	NA	6	12	48	2069	0.84	1.46	1.43	4	7	7
51X	30.8	84.0	22.0	4	NA	6	12	24	739	1.00	1.70	1.50	2	3	2
52	49.2	186.0	15.9	4	2	6	12	48	2362	1.35	2.12	1.67	7	11	9
57	20.9	64.0	19.6	2	NA	6	12	12	251	1.09	1.83	1.56	1	1	1
65	22.1	90.2	14.7	2	NA	6	12	12	265	2.00	2.23	1.70	1	1	1
152X	24.6	70.0	21.1	6	NA	6	12	36	886	1.05	1.67	1.53	2	3	3
TOTAL	270.3	824.	19.7	40	8	48	96	336	11873	NA	NA	NA	28	46	40

Third, the presence of the busway could cause congestion and poorer air quality, if planning does not anticipate traffic conflicts and prevent these through proper design.
The significance of the first two items is negligible in the context of the traffic volumes on US 1. Daily buses will number fewer than 400, compared to background traffic volumes ranging from 44,000 to 88,000 today. Of potential significance are the delays and congestion that could occur on US 1, if traffic stopped on the cross streets to allow buses on the busway to pass, interfered with traffic flow on US 1. Analysis focused on areas where this could occur. The screening analysis found the need to examine the following intersections with US 1: SW 104th, 112th, 124th, 128th, 132nd, 136th, 152nd, and 160th Streets, and Caribbean Boulevard.

Except for two parks, reasonable receptors at all intersections are commercial. For commercial locations the nearest building corner was taken to be the sensitive receptor. There are sidewalks along US 1, however, the corridor is overwhelmingly auto, rather than pedestrian, oriented. There is no residential use and little reason for anyone to dwell in the sidewalk areas. Only individuals working at gas stations would be outside in close proximity to US 1 for prolonged periods. For this reason building corners were taken to be the most reasonable receptors. Other locations such as building doorways could have been used, but in all cases, the near building corner would represent a worst case.

Receptors in the parks were assumed to be near, but not immediately adjacent to US 1. Suniland Park is on the southeast corner of SW 128th Street . Here activity is assumed 20 feet into the park, adjacent to a ballfield. Perrine Wayside Park is on the southeast corner of SW 160th/164th streets. Activity is assumed 25 feet into this park, where there is a building. The size and openness of the park suggest that most peoples' activity would be a good distance away from the road.

CO concentrations were calculated at the above sites for both build and no-build conditions for the estimated year of completion (1995) and for twenty years thereafter (2015). The difference in build and no-build conditions is the geometry and signal timing of the intersections. Intersection geometry will change where southbound right-turn lanes are added and the approaches of side streets. Signal changes will be made to optimize traffic movement. Generally speaking the total cycle lengths were extended to 150 seconds.

Eight-hour CO concentrations were derived from the one-hour concentrations by the following formula:

$$CO\ (8hr) = (CO\ (1hr) - bkgd\ CO) \times MPF \times TF + bkgd$$

Where,

MPF = Meteorological Persistence Factor (0.6),
TF = Traffic Factor (average hourly volume over 8 hours, divided by peak hour volume (0.91)), and
bkgd = ambient CO background level

The Traffic Factor was derived from actual traffic counts made for this project. The results of the analysis of the eight intersections are shown in Table 2-2, which also lists the National Ambient Air Quality Standards (NAAQS) for CO. Values in the table include the ambient background level of 2 parts per million.

TABLE 2-2

CO CONCENTRATIONS AT CRITICAL INTERSECTIONS

	One-Hour CO (ppm)			Eight-Hour CO (ppm)		
	NAAQS	Build	No-Build	NAAQS	Build	No-Build
1995						
SW 104th St.	35.0	4.9	4.9	9.0	3.6	3.6
SW 112th St.	35.0	4.0	4.2	9.0	3.1	3.2
SW 124th St.	35.0	4.2	3.9	9.0	3.2	3.0
SW 128th St.	35.0	4.6	4.5	9.0	3.4	3.4
SW 132nd St.	35.0	4.3	5.8	9.0	3.3	4.1
SW 136th St.	35.0	3.9	5.4	9.0	3.0	3.9
SW 152nd St.	35.0	4.6	6.1	9.0	3.4	4.2
SW 160th St.	35.0	4.6	4.6	9.0	3.4	3.4
2015						
SW 104th St.	35.0	3.4	3.4	9.0	2.8	2.8
SW 112th St.	35.0	3.4	3.8	9.0	2.8	3.0
SW 124th St.	35.0	3.2	3.2	9.0	2.7	2.7
SW 128th St.	35.0	3.6	3.8	9.0	2.9	3.0
SW 132nd St.	35.0	4.3	4.0	9.0	3.3	3.1
SW 136th St.	35.0	4.8	4.6	9.0	3.5	3.4
SW 152nd St.	35.0	4.6	4.8	9.0	3.4	3.5
SW 160th St.	35.0	4.0	4.0	9.0	3.1	3.1

As shown in the table, CO concentrations will be well within standards at worst case reasonable receptors under both build and no-build conditions, both in the year of opening and twenty years thereafter. In the year of opening, one hour values would be lower with the project at four locations, the same at two locations, and higher at two locations. Eight hour values would be lower with the project at four locations, the same at three locations, and higher at one location. Twenty years later one hour and eight hour values would be lower at three locations, the same at three locations, and higher in two locations. Therefore, this project will not have a significant impact on air quality.

Construction activities will cause minor short-term air quality impacts in the form of dust from earthwork and unpaved roads. These impacts will be minimized by adherence to all State and local regulations and to the 1991 edition of FDOT's *Standard Specifications for Road and Bridge Construction*.

3. PLAN CONSISTENCY

Transit development will benefit air quality. Miami is a nonattainment area for ozone under the 1990 Clean Air Act Amendments, falling in the "moderate" category. Regarding project conformity with the SIP and the local Transportation Improvement Program the following applies:

> This project is in an air quality nonattainment area which has transportation control measures in the State Implementation Plan (SIP), which was approved by the Environmental Protection Agency on May 14, 1981. The FHWA has determined that both the transportation plan and the transportation improvement program conform to the SIP. The Federal Highway Administration has determined that this project is included in the transportation improvement program for Metro-Dade County area. Therefore, pursuant to 23 CFR 770.9(c)(2), this project conforms to the SIP.

An inter-office memorandum from the District Multi-Modal Planning section dated January 7, 1992 substantiates this information.