DALE MABRY HIGHWAY (S.R. 597/600)

From
EUCLID AVENUE IN TAMPA, FLORIDA to
S.R. 45/US 41 IN PASCO COUNTY,FLORIDA

ENGINEERING ALTERNATIVES REPORT

FLORIDA DEPT. OF TRANSPORTATION
DISTRICT ONE-TAMPA BAY URBAN OFFICE

PREPARED BY DSA GROUP, INC.
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14040-1503

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I. INTRODUCTION TO
DALE MABRY HIGHWAY
ENGINEERING ALTERNATIVES REPORT

This report presents the various alternatives considered for Dale Mabry Highway (SR 597/600) between Euclid Avenue in Tampa, Hillsborough County, and U.S. 41 in Pasco County, a distance of approximately 20 miles (Figure I-1). The methodology used in analyzing the proposed alternatives is discussed along with the justification for the elimination of non-viable alternatives from further study. The purpose of this report is to serve as a supplement to the environmental report, to fully document the major alternatives considered, but not addressed at the public hearing for the project.

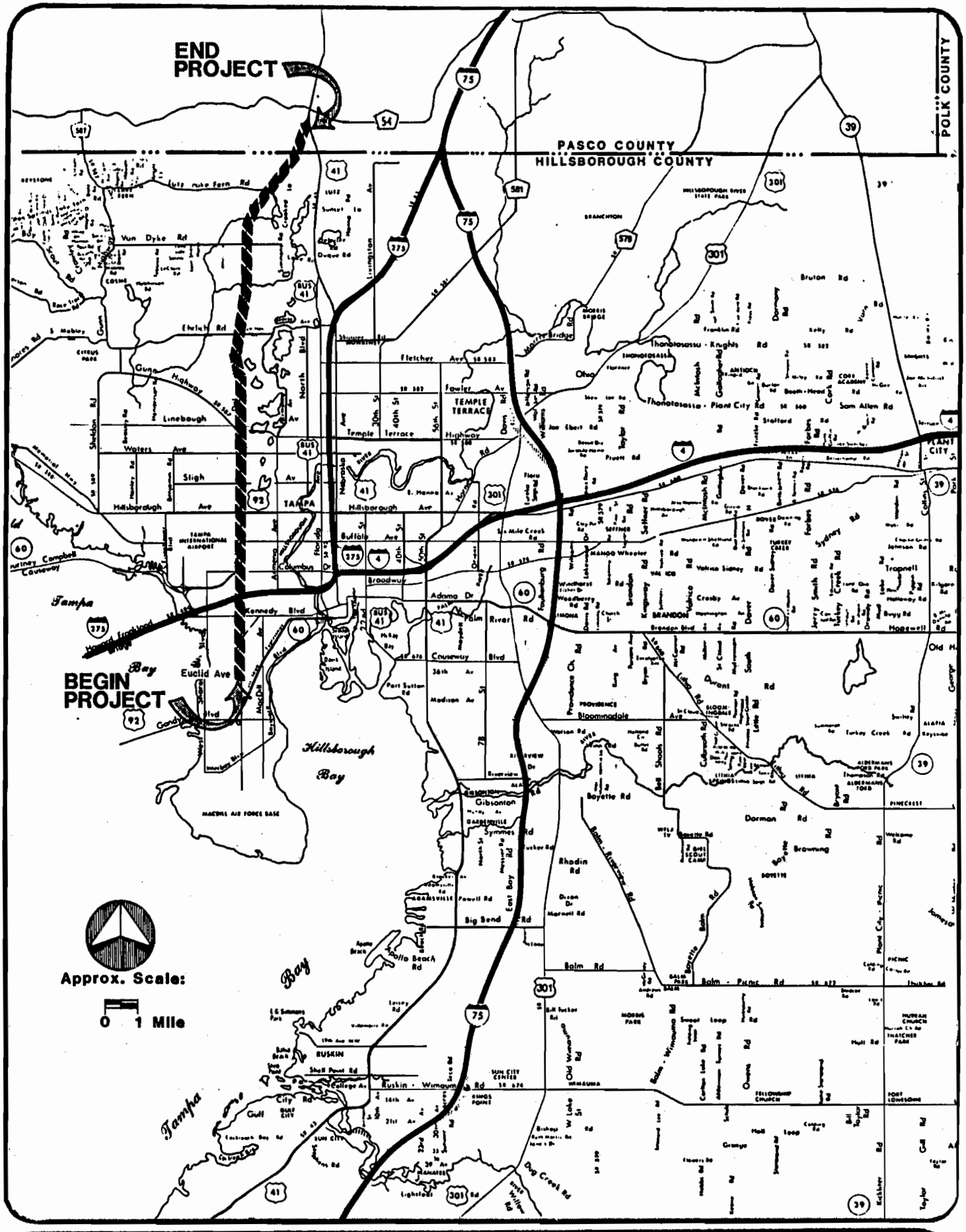

FIGURE I- LOCATION MAP

DALE MABRY HIGHWAY

II. EXISTING CONDITIONS

Existing Street and Highway System

Dale Mabry Highway is classified as an urban principal arterial south of Hillsborough Avenue, an urban minor arterial between Hillsborough and Van Dyke Road, and a rural minor arterial between Van Dyke and U.S. 41 in Pasco County. It runs from MacDill Air Force Base in Tampa to U.S. 41 in Pasco County, a distance of approximately 23 miles. In addition to providing trip continuity between Pinellas County (via Gandy Boulevard) and Pasco County to the north, Dale Mabry serves as the primary arterial route for many of the communities and subdivisions in the northwest part of Hillsborough County, including Carrollwood and Carrollwood Village, Northdale, Country Place, North Lakes, Brentwood, and others. Of the north-south highways traversing the City of Tampa, it provides the longest continuous route for motorists, and it carries the highest volume of traffic for a general access facility. It provides linkage with other State Roads, including Busch Blvd./Gunn Highway, Hillsborough Avenue, Buffalo Avenue, Columbus Drive, I-275, Kennedy Blvd., Henderson Blvd, and Gandy Blvd. The only similar parallel facilities, in terms of trip lengths, are U.S. 41 (Florida Avenue) located 2.8 miles to the east, and portions of I-275 and Nebraska Avenues, slightly further east.

Cross Section, Right-of-Way, and Programmed Improvements

Existing and to-be-constructed* typical sections for Dale Mabry Highway are shown in Figure II-1. Existing typical right-of-way widths are given in Table II-1. Improvements already programmed for construction are shown in Figure II-2. Figure II-3 shows the existing and programmed-for-construction number of through lanes for both Dale Mabry Highway and Himes Avenue.

The southern end of Dale Mabry, between Euclid and Kennedy, is generally four-lane undivided, with a 40-foot pavement between gutter sections. Right-of-way (R/W) varies between 60' and 80' generally. Several of the major intersections have left-turn storage lanes on Dale Mabry, and additional widening is currently planned at Azeele and at Kennedy.

The segment of Dale Mabry between Kennedy and Cypress is six-lane divided urban in a R/W of 120'. The I-275 interchange area of Dale Mabry (between Cypress and Spruce) is currently scheduled for minor widening and signalization of the ramps.

The segment of Dale Mabry between Spruce Street and Hillsborough Avenue is six-lane divided rural in a 200' R/W. Currently, Dale

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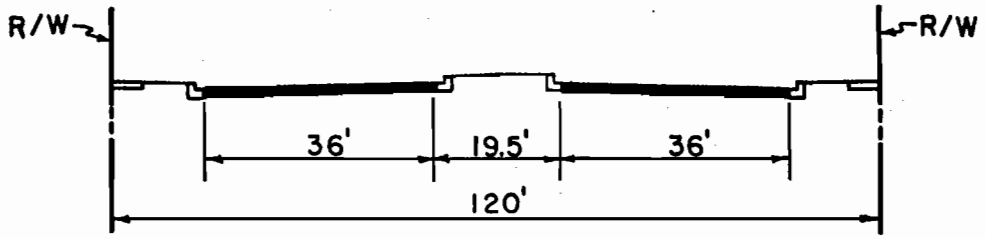
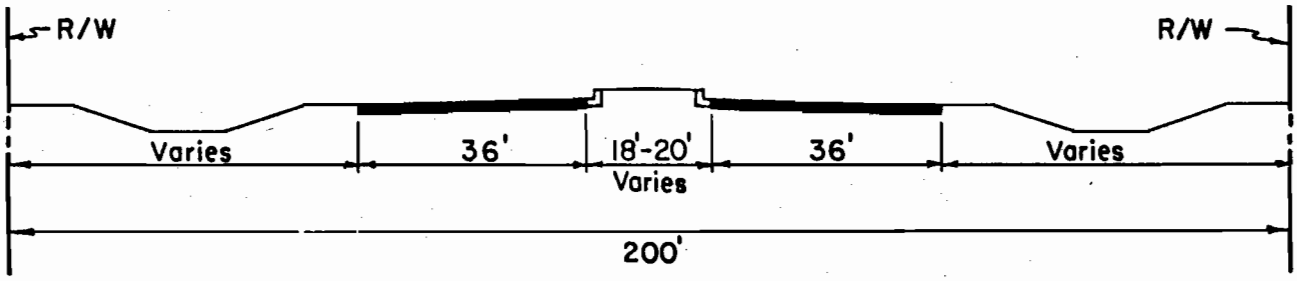
*Currently programmed for construction sometime before FY 88/89.

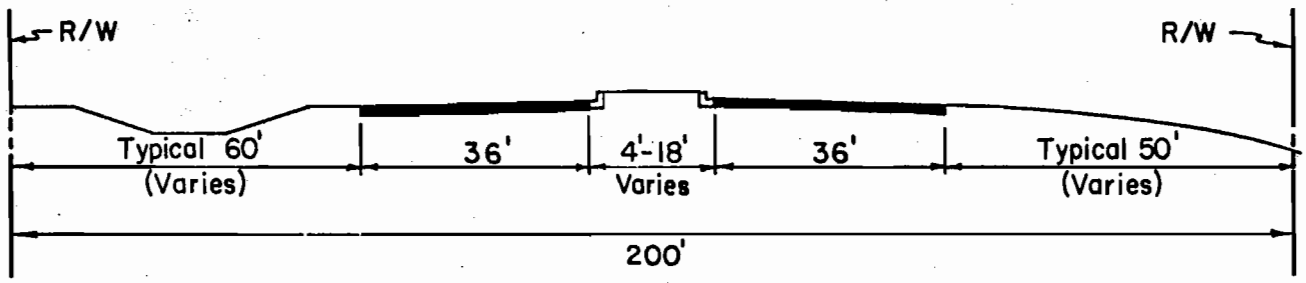
KENNEDY TO CYPRESS (6 Lane Divided Urban)



CYPRESS TO BUFFALO (6 Lane Divided Rural)



BUFFALO TO HILLSBOROUGH (6 Lane Divided Rural)

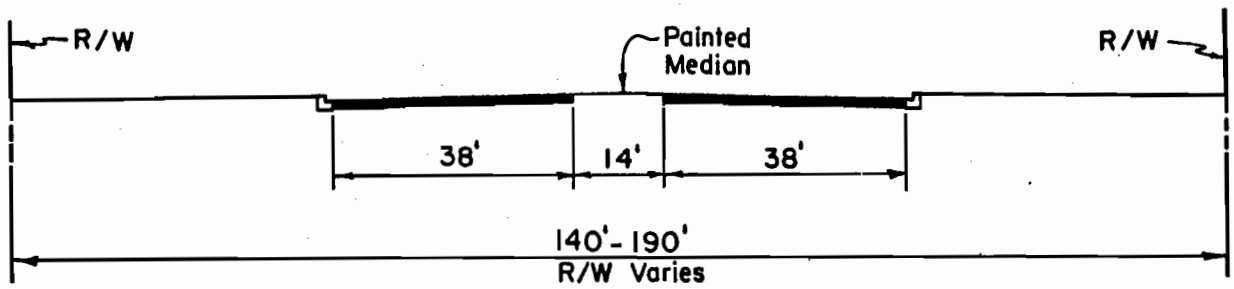


* **Programmed for construction within 5 year work program**

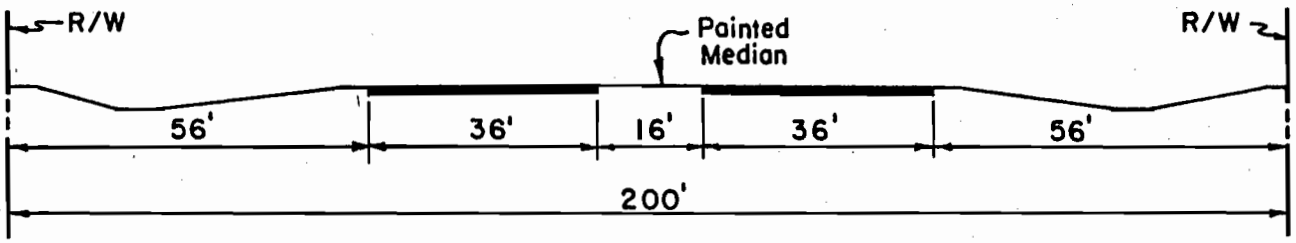
FIGURE II **EXISTING AND PROGRAMMED TYPICAL SECTIONS**

DALE MABRY HIGHWAY

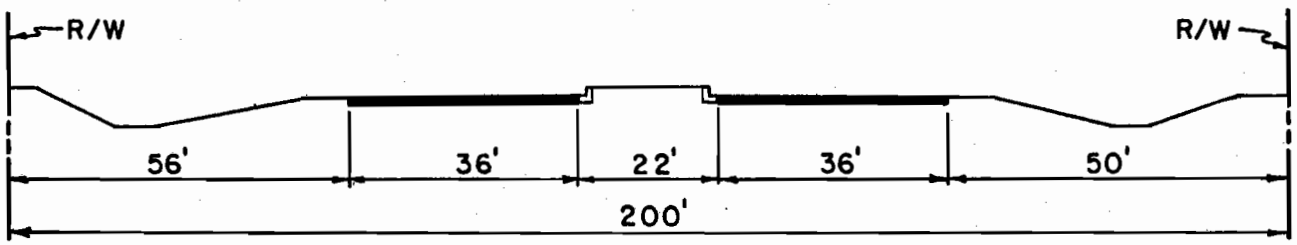
HILLSBOROUGH TO WATERS*(6 Lane Divided Urban)



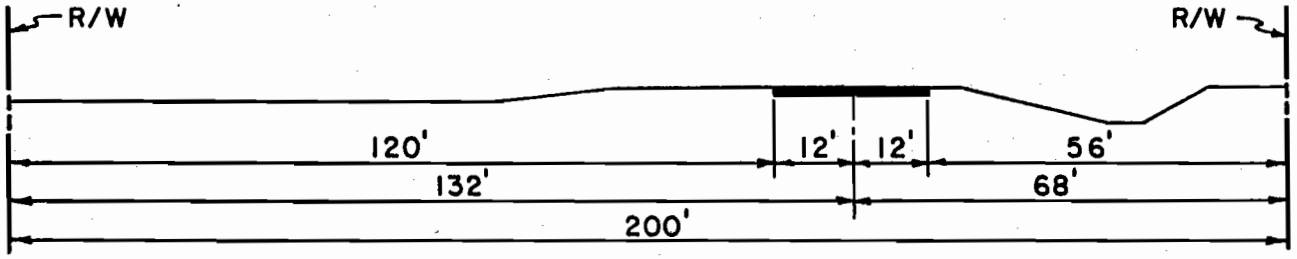
WATERS TO STALL*(6 Lane Divided Rural)



STALL TO VAN DYKE*(6 Lane Divided Rural)



VAN DYKE TO US 41 (2 Lane Rural)



***Programmed for construction within 5 year work program**

FIGURE II- CONTINUED

TABLE II-1 - EXISTING TYPICAL RIGHT-OF-WAY WIDTHS

Segment of Dale Mabry Hwy.	Length (Miles)	Existing Minimum R/W (ft)
U.S. 41 to County Line	0.95	200
County Line to Van Dyke	3.61	200
Van Dyke to Ehrlich	3.00	200
Ehrlich to Gunn/Busch	3.36	200
Gunn/Busch to Waters	0.76	200
Waters to Lambright	1.26	140-165
Lambright to Hillsborough	0.79	140
Hillsborough to Buffalo	0.98	200
Buffalo to Columbus Drive	1.02	200
Columbus Drive to Spruce	0.50	200
Spruce to I-275	0.31	200
I-275 to Cypress	0.19	200
Cypress to Kennedy	0.51	120
Kennedy to Palmira[1]	1.56	80
Palmira to Bay-to-Bay	0.19	60
Bay-to-Bay to San Luis[2]	0.29	60
San Luis to Euclid	0.47	80
Total	19.8	

[1]Palmira is located 0.19 miles north of Bay-to-Bay.

[2]San Luis is located 0.47 miles north of Euclid.

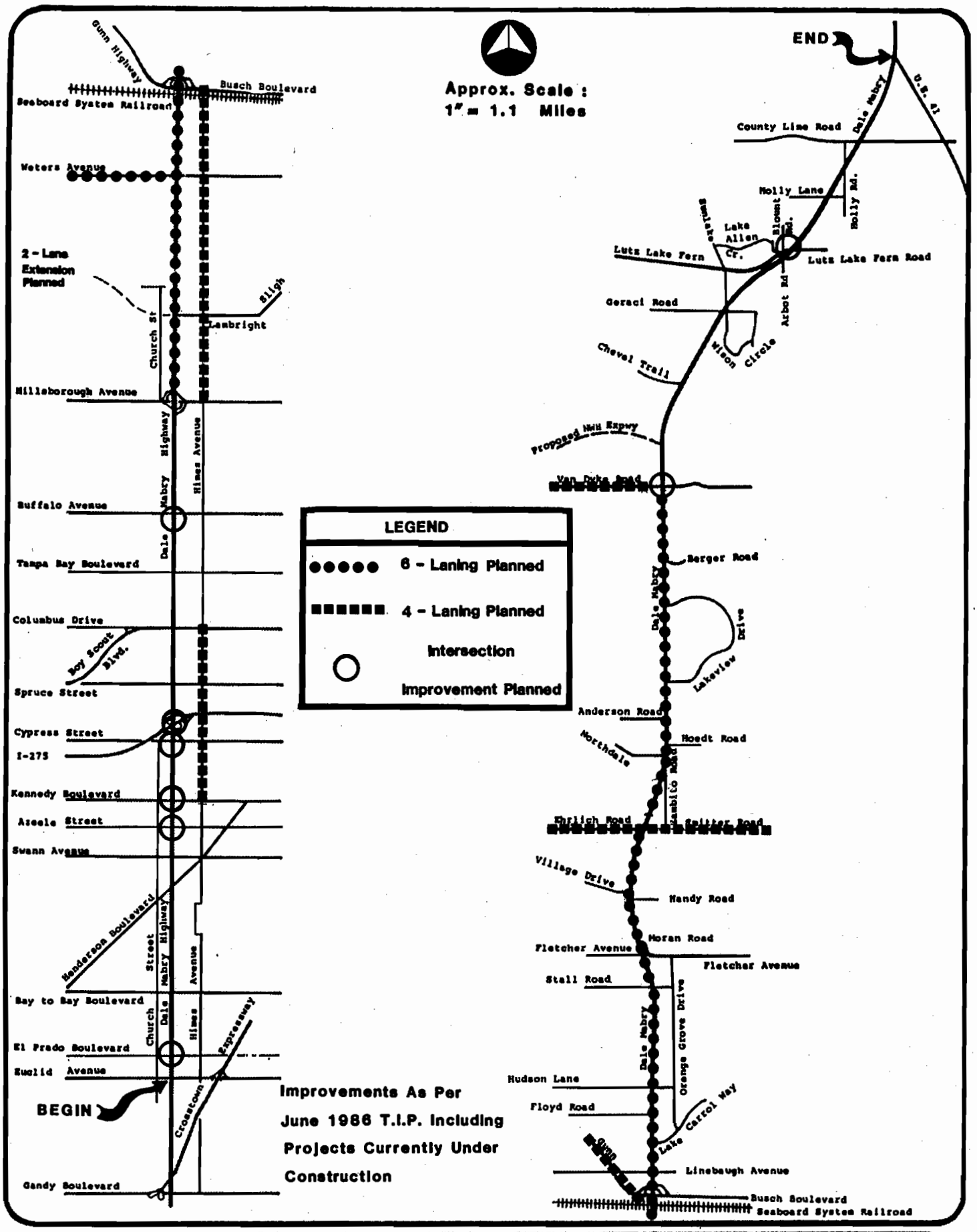


FIGURE II · PROGRAMMED STREET AND INTERSECTION IMPROVEMENTS

DALE MABRY HIGHWAY

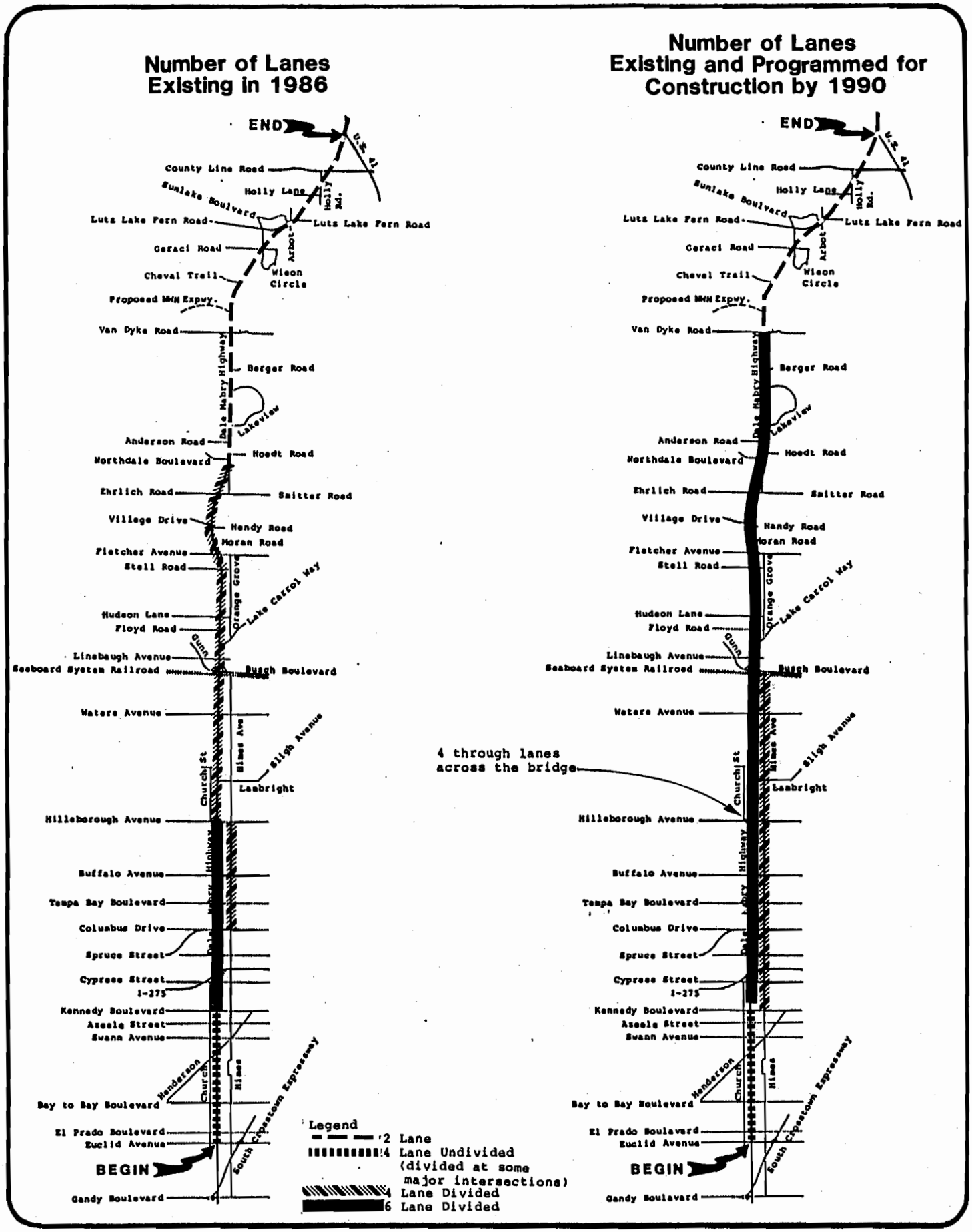


FIGURE II EXISTING AND PROGRAMMED NUMBER OF LANES

DALE MABRY HIGHWAY

Mabry is four-lane divided rural between Hillsborough Avenue and 600' ± north of Northdale Boulevard, where the roadway transitions to two-lane rural. The segment between Hillsborough and Waters Avenue is scheduled to be widened to six-lane urban within the existing 140'-165' R/W. The segment between Waters Avenue and Van Dyke Road is scheduled to be widened to six-lane rural, with varying median widths, within the existing 200' R/W.

As shown in Figure II-2, improvements are also planned to Himes Avenue, an important parallel facility. The City of Tampa plans to four lane the segment between Kennedy Boulevard and Columbus Drive, and Hillsborough County plans on four-laning the segment between Hillsborough Avenue and Busch Boulevard.

Traffic Volumes

Existing system traffic volumes are given in Figure II-4. In 1983, the highest recorded volume on Dale Mabry was approximately 64,000 vehicles per day (VPD) north of Columbus Drive, adjacent to Tampa International Airport.

In addition to midblock volumes, entering ADT's (average daily traffic) for major intersections are given in Table II-2, for both Dale Mabry Highway and Himes Avenue. The highest-volume intersection without an existing interchange is Dale Mabry at Columbus Drive, with 86,000 ± VPD.

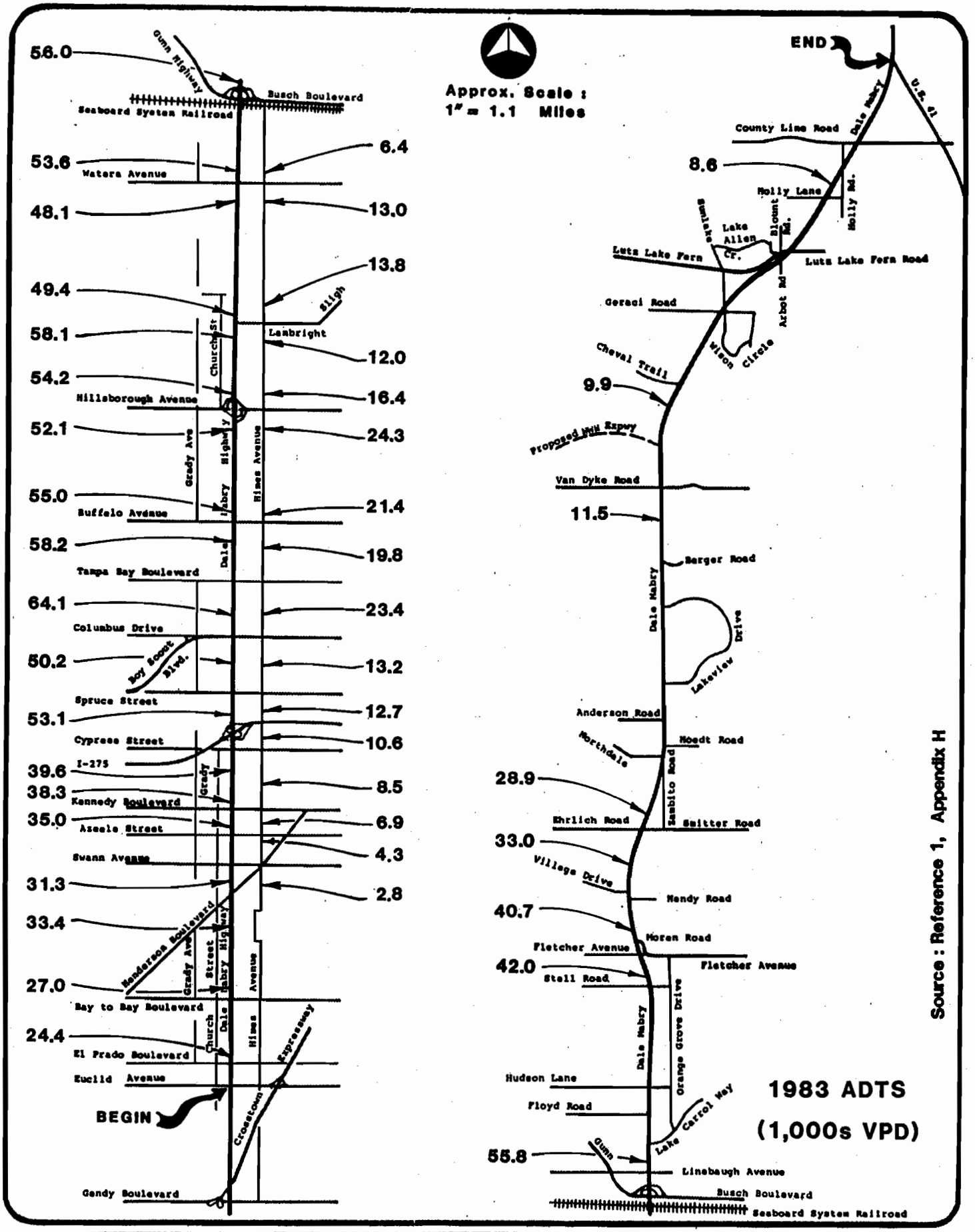


FIGURE II-4 · EXISTING SYSTEM AVERAGE DAILY TRAFFIC (ADT)

DALE MABRY HIGHWAY

TABLE II-2 - EXISTING SYSTEM ADT'S FOR MAJOR INTERSECTIONS

Intersecting Street	1983 Entering ADT (Vehicles per Day) Dale Mabry Hwy.	Himes Ave.
Lutz-Lake Fern Rd.	10,140	-
Van Dyke Rd.	14,400	-
Ehrlich Rd.	46,400	-
Fletcher Ave.	45,800	-
Linebaugh Ave.	59,300	-
Busch / Gunn	73,200	(N/Applic.)
Waters Ave.	73,900	32,600
Lambright Ave.	62,100	30,700
Hillsborough Ave.	95,200	56,000
Buffalo Ave.	76,300	46,000
Tampa Bay Blvd.	75,000	32,200
Columbus Dr.	86,300	40,900
Spruce St.	62,600	21,100
I-275	154,900	(N/Applic.)
Cypress St.	48,400	18,800
Kennedy Blvd.	61,600	30,400
Azeele St.	40,700	12,100
Swann Ave.	37,400	23,600
Henderson Blvd.	48,000	-
Bay-to-Bay Blvd.	36,700	-
El Prado Blvd.	31,500	-
Euclid Ave.	33,000	-

Source: Reference 1

Levels of Service

Existing levels of service for Dale Mabry Highway are expressed in terms of intersection levels of service, since the capacity of an arterial "is generally limited by the capacity of signalized intersections, with segment characteristics rarely playing a major role in the determination of capacity" (Reference 2, p. 2-5).

Intersection levels of service (LOS) calculated for 1983 volumes and geometry are given in Figure II-5. These are based on the critical movement analysis methodology of TRB Circular #212 (Reference 3). Except where improvements have been made, most of the intersections are operating at a worse LOS in 1986, with the major intersections along Dale Mabry operating under forced flow conditions (LOS "F") during the peak hours.

Accidents

Accident statistics were obtained for 1983 through 1985, inclusive, for Dale Mabry Highway between Euclid Avenue and U.S. 41. A summary of the data is included below in Table II-3:

TABLE II-3 - ACCIDENT STATISTICS FOR 1983 - 1985

	1983	1984	1985
Reported No. of Accidents	1659	1023	1005
Reported No. of Injuries	834	895	878
Reported No. of Fatalities	11	12	12
Economic Loss ($ millions)	12.5	11.9	11.7

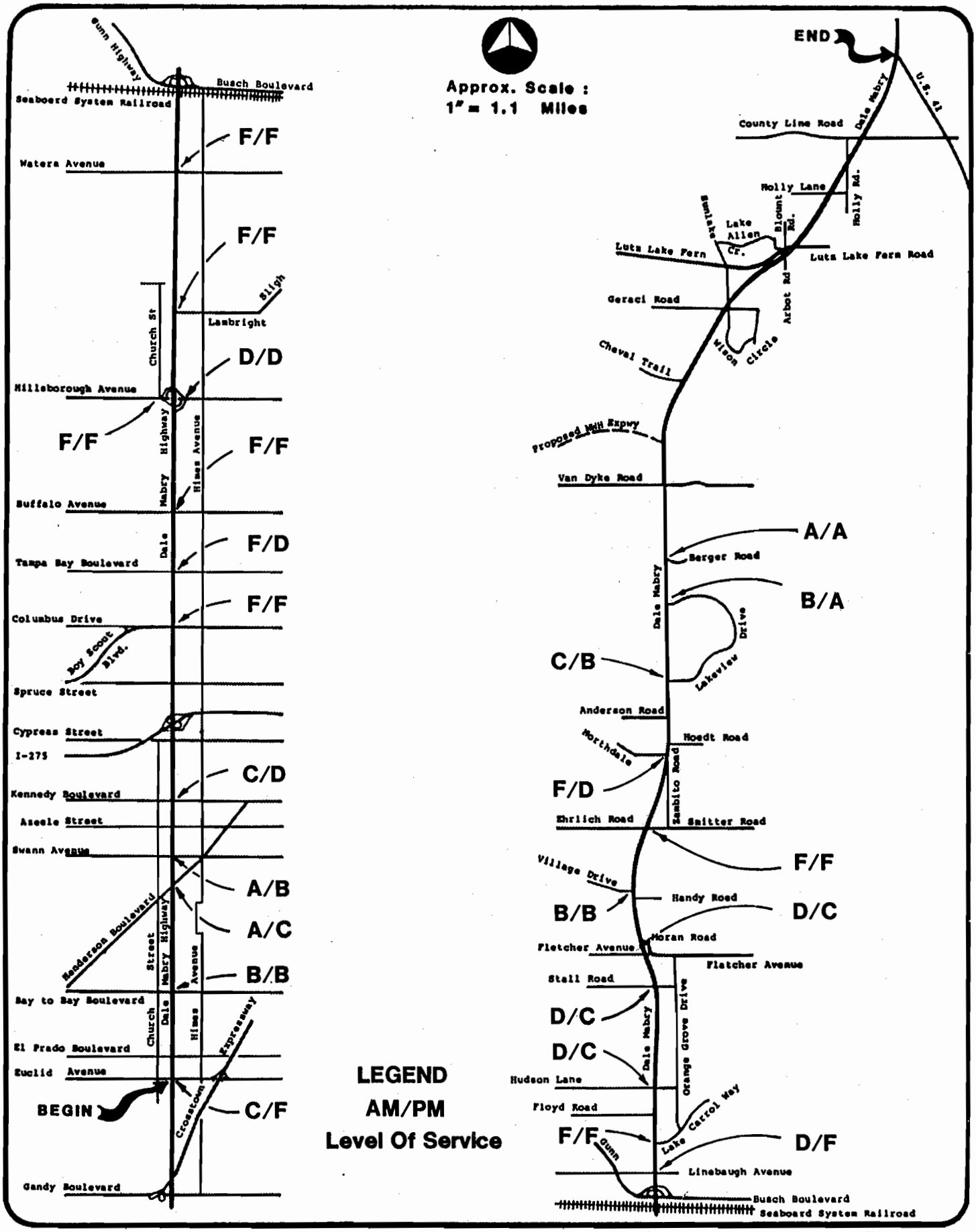


FIGURE II-5 EXISTING (1983) INTERSECTION LEVELS OF SERVICE

DALE MABRY HIGHWAY

The drop in reported accidents in 1984 is apparently due to the implementation in Florida of the short accident form, beginning in January of 1984. All accidents with no injuries and only minor property damage are coded on the short form, which does not go into FDOT's accident records data base in Tallahassee.

The highest accident segments in 1983 are included in Table II-4, below:

TABLE II-4 - HIGHEST ACCIDENT SECTIONS IN 1983

Segment	Approximate Length (mi.)	Number of Reported Accidents
N. of Euclid to Watrous[1]	1.5	150
Gold Triangle St.[2] to N. of Columbus	0.5	109
N. of Hillsborough to S. of Waters	1.6	173
S. of Waters to N. of Waters	0.4	104
N. of Busch to Colby Road[3]	1.2	174

Accident rates for various segments of Dale Mabry Highway are included in Table II-5 along with statewide average accident rates for similar type roadways. For 1983, the statewide averages were exceeded for all of the segments, by a maximum of 29% for one segment and by a low of 3.3% for another segment, as indicated in the table.

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1 Watrous is located 0.17 miles south of Henderson Boulevard.

2 Gold Triangle Street is located 0.21 miles south of Columbus Dr.

3 Colby Road is located 0.36 miles north of Hudson Lane.

TABLE II-5 - ACCIDENT RATES COMPARED TO

STATEWIDE AVERAGES

Segment of Dale Mabry	Length (Mi.)	1983 No. of Accidents Reported	1983 Accident Rate (Acc/MVM)	1983 Statewide Average Rate	% Diff
S. of Euclid to North B (One Blk N. of Kennedy)	2.74	356	11.9	9.5[1]	25%
North B to Hillsborough	3.38	486	7.7	6.0[2]	28%
Hillsborough to N. of Busch	3.00	400	6.9	6.0	15%
N. of Busch to N. of Ehrlich	3.49	333	6.2	6.0	3.3%
N. of Ehrlich to US 41	7.54	84	2.2	1.7[3]	29%
TOTAL	20.15	1659			

[1] FDOT Statewide average for urban, 4-lane undivided highways.

[2] FDOT Statewide average for urban, 4-lane divided (separate rates not available for 6-lane highways).

[3] FDOT Statewide average for rural, 2-lane highway.

Engineering-related factors which may be contributing to the high accident rates include:

- high volume/capacity ratios for most segments.
- Substandard lane widths and lack of left-turn storage lanes for the segment south of Kennedy Boulevard.
- lack of access control for many segments with high frequency of commercial driveways.
- lack of street lighting north of Hillsborough Avenue.

Additional data concerning fatal accidents and pedestrian accidents are included in the Appendix.

III. PROJECTED CONDITIONS (YEAR 2010)

Future Traffic Demand

Projected travel demand for the design year of 2010 is shown in Figure III-1. Projections are given for both "with" and "without" the proposed Northwest Hillsborough (NWH) Expressway. Estimated demand for intermediate years as well as the sources of and methodology used to develop the estimated demand are contained in the Design Traffic Technical Memorandum (Reference 1). Projected intersection turning volumes for future years are included in Appendix F of this report. Projected year 2010 ADT's for major intersections are included in Table III-1 for both Dale Mabry and Himes Avenue along with 1983 ADT's.

A comparison of 1983 and 2010 ADT's for selected segments is given below in Table III-2.

Table III-2 - COMPARISON OF 1983 ADT'S WITH 2010 DEMAND

Location on Dale Mabry	1983 ADT	2010 ADT W/NWH	2010 & 1983 % Difference	2010 W/O NWH Exp.
S. of Van Dyke	11.5	30.6	+166%	40
N. of Ehrlich	28.9	43.6	+ 51%	54
N. of Linebaugh	55.8	86.6	+ 55%	96
N. of Hillsborough	54.2	85.2	+ 57%	99
N. of Columbus Drive	64.1	83.0	+ 29%	88
N. of Kennedy	38.3	37.2	-2.0%	41
N. of Euclid	24.4	42.0	+ 72%	42

(All ADT's expressed in 1000's)

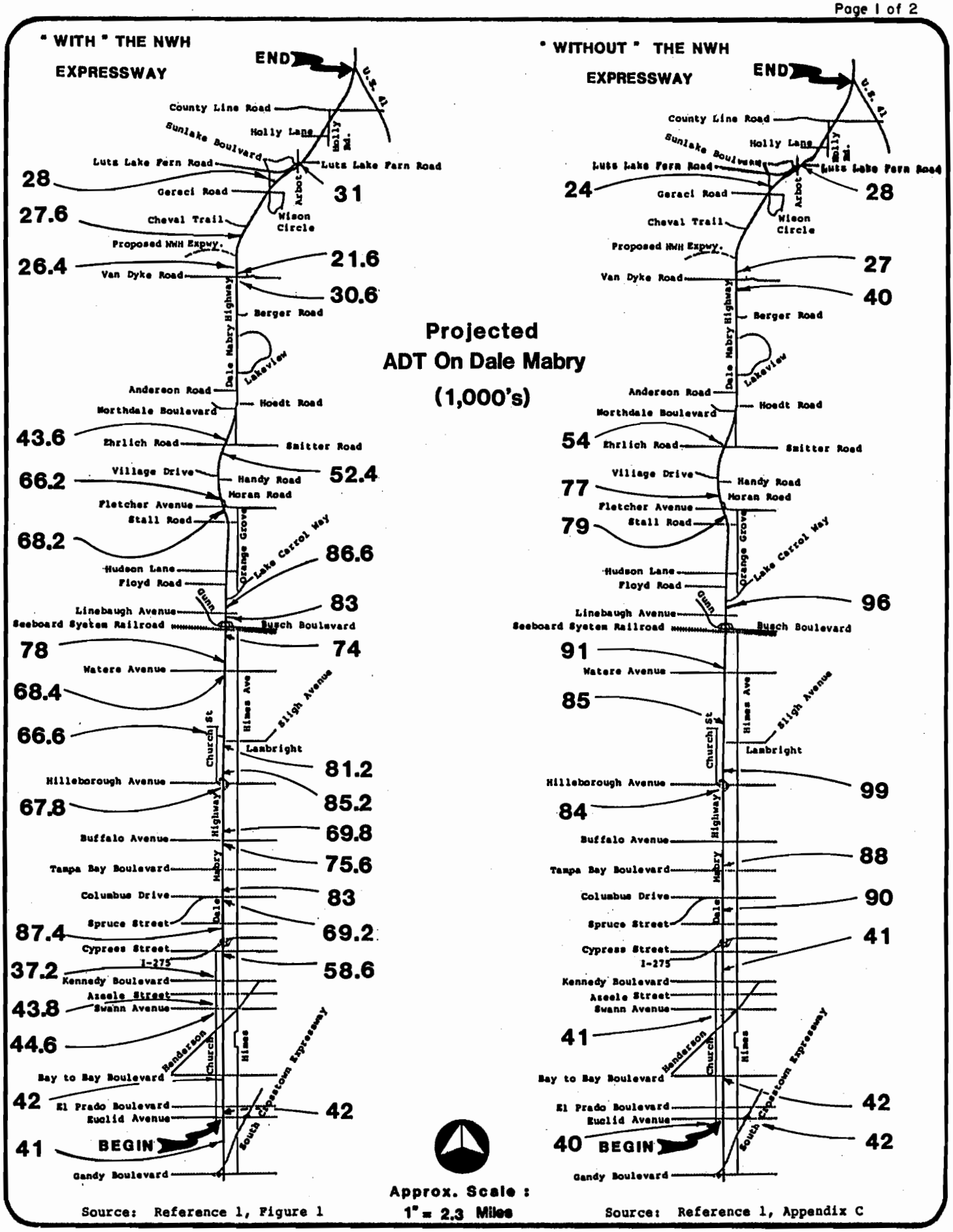
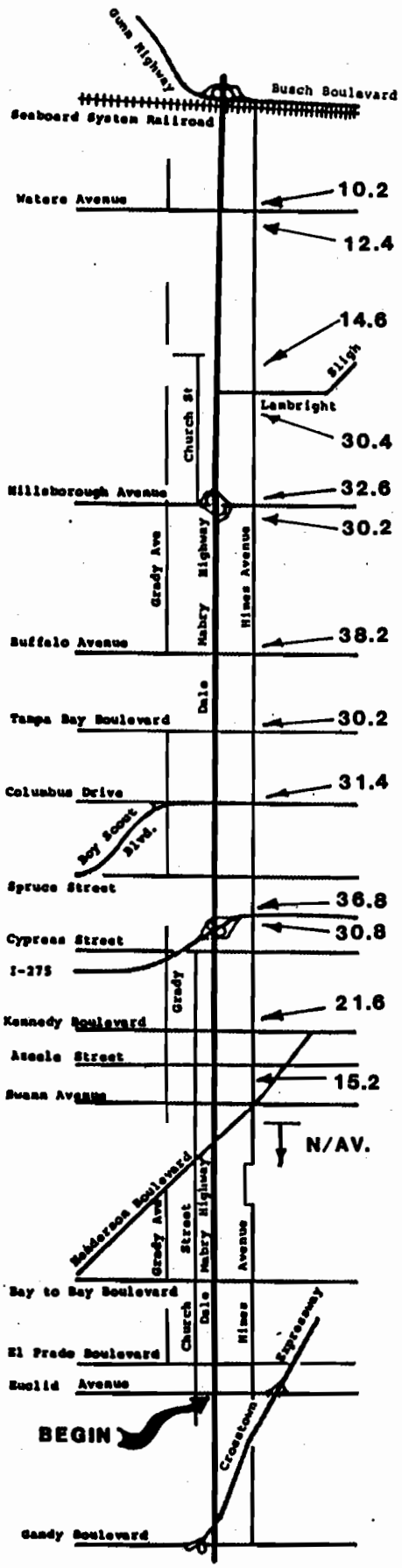


FIGURE III-1 YEAR 2010 PROJECTED TRAFFIC DEMAND

DALE MABRY HIGHWAY



Approx. Scale :
1" = 1.1 Miles

PROJECTED
ADT ON HIMES AVENUE
(1,000'S VPD)

(WITH THE NWH EXPRESSWAY)

FIGURE III - 1 YEAR 2010 PROJECTED TRAFFIC DEMAND

DALE MABRY HIGHWAY

TABLE III-1 - INTERSECTION ADT's FOR 1983 AND 2010

Intersecting Street	Dale Mabry Highway Entering ADT (VPD) 1983	2010 "with*"	2010 "without"
Lutz-Lake Fern Rd.	10,140	33,400+	31,500+
NWH Expressway	-	31,200	-
Van Dyke Rd.	14,400	32,000+	47,500+
Ehrlich Rd.	46,400	66,800	86,000
Fletcher Ave.	45,800	88,600+	108,000+
Linebaugh Ave.	59,300	88,600+	101,000+
Busch / Gunn	73,200	128,800	147,000
Waters Ave.	73,900	115,800	135,000
Lambright Ave.	62,100	105,000	116,500
Hillsborough Ave.	95,200	138,000	152,000
Buffalo Ave.	76,300	103,400	115,500
Tampa Bay Blvd.	75,000	93,600	-
Columbus Dr.	86,300	120,400	137,000
Spruce St.	62,600	-	-
I-275	154,850	304,800	297,000
Cypress St.	48,400	-	-
Kennedy Blvd	61,600	93,600	97,000
Azeele St.	40,700	-	-
Swann Ave.	37,400	53,800	52,500
Henderson Blvd.	48,000	80,600+	78,500
Bay-to-Bay Blvd.	36,700	57,000	57,000
El Prado Blvd.	31,500	-	-
Euclid Ave.	33,000	51,800	50,000

(See legend on next page)

TABLE III-1 - (Continued)

Intersecting Street	Himes Avenue Entering ADT (VPD) 1983	2010 "with*"	2010 "without"
Busch Blvd.	(N/Applic.)	56,200	61,000
Waters Ave.	32,600	54,400	59,400
Lambright Ave.	30,700	54,200	56,200
Hillsborough Ave.	56,000	86,000	90,000
Buffalo Ave.	46,000	82,400	84,400
Tampa Bay Blvd.	32,200	45,600	-
Columbus Dr.	40,900	65,400	70,900
Spruce St.	21,100	-	-
I-275	(N/Applic.)	307,000	309,000
Cypress St.	18,800	-	-
Kennedy Blvd.	30,400	64,600	66,100
Azeele St.	12,100	-	-
Swann / Henderson	23,600	46,600+	50,100+

* "with" the proposed Northwest Hillsborough Expressway.

+ Doesn't include volumes from local-street legs, therefore, actual ADT would be higher.

Source: Reference 1

Future Street and Highway Network

The year 2010 transportation network from the Tampa Urban Area Transportation Study (TUATS) (Reference 4) is reproduced in Figure III-2 for the study area only. This figure shows the planned new and improved facilities which are intended to be in place by the year 2010. These intended improvements were assumed to be in place for purposes of estimating year 2010 signalized intersection capacities. The TUATS plan shows Dale Mabry Highway as a six-lane divided arterial for the entire study length with "arterial interchanges" at selected major intersections. This is also consistent with the Florida Transportation Plan which generally discourages construction of (nonaccess controlled) arterial highways with more than six through lanes (Reference 5).

Hillsborough County currently has plans to extend Casey Road (parallel with Dale Mabry and approximately 3/4 mile to the west) south of Gunn Highway to tie into Manhattan Avenue north of Waters. (No construction is shown in the current 5-year work program.) The TUATS 2010 plan shows the Casey-Manhattan connector to be a two-lane collector, and the latest TUATS year 2010 traffic assignment shows a maximum volume of 12,300 VPD (on the segment south of Fletcher). Based on the proposed functional classification and traffic assignment, the extension of Casey Road south of Gunn Highway is not expected to have a significant effect on the traffic demand for Dale Mabry Highway.

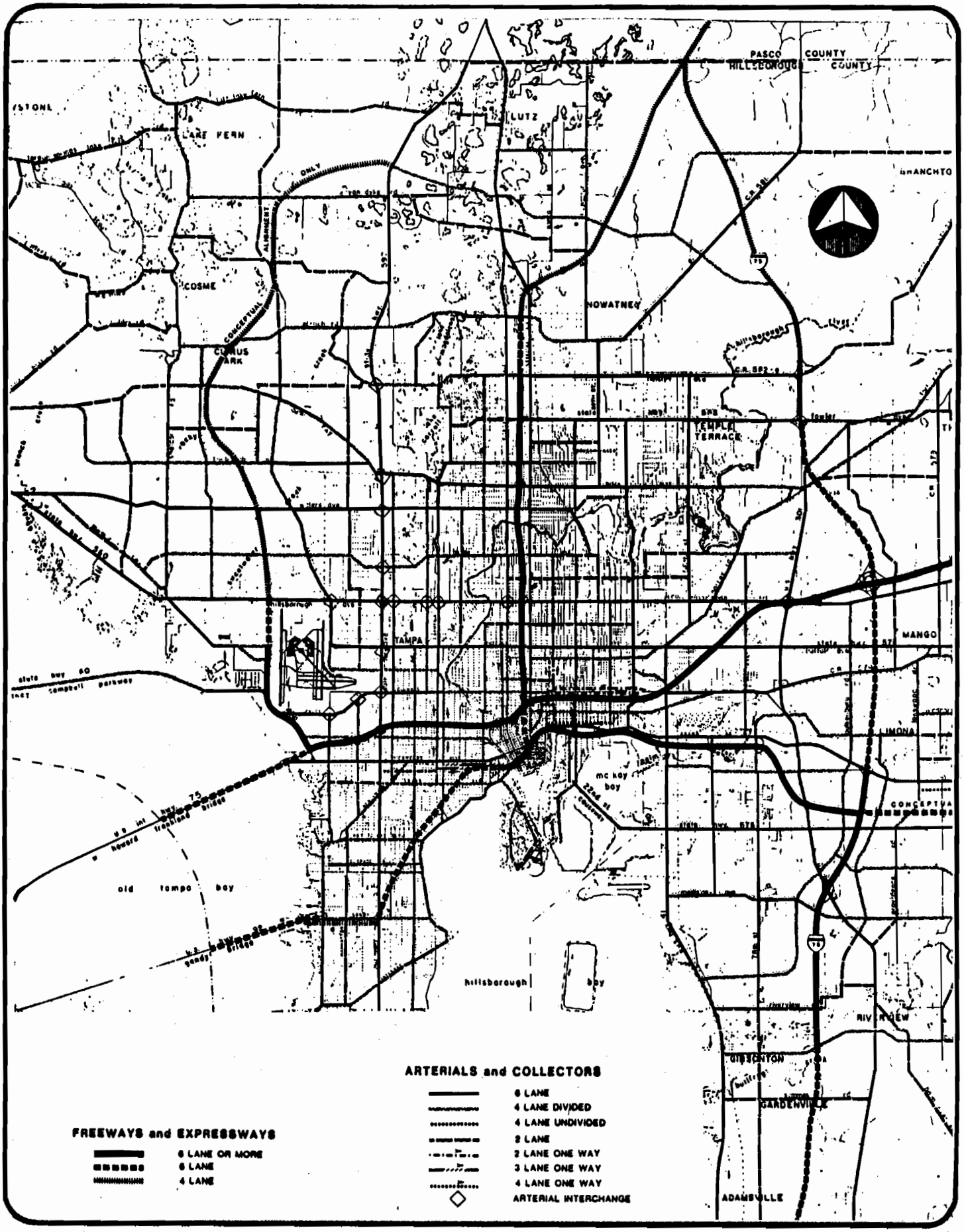


FIGURE III- YEAR 2010 TUATS STREET NETWORK

DALE MABRY HIGHWAY

At the present time, there are several studies under way which will impact Dale Mabry Highway, including the I-275/I-4 project development study, financial feasibility studies for the proposed Northwest Hillsborough Expressway, and the light rail transit corridor studies.

IV. NO-PROJECT ALTERNATIVES

The following sections introduce the no-project alternatives, which include the no improvement alternate, postponing the action, upgrading the existing facility (without adding through lanes), transit as an alternative mode, and upgrading facilities in other corridors.

No Improvement Alternate

A substantial transportation demand exists along Dale Mabry today, and it is projected to significantly increase over the next 25 years even with the construction of the proposed NWH Expressway. Traffic demand is expected to exceed 85,000 vehicles per day on several segments of Dale Mabry by the year 2010 even with construction of the NWH Expressway. Maximum capacity of an ideal six-lane divided arterial highway would be approximately 56,000 vehicles per day (VPD). Therefore, approximately 29,000 VPD would have to be diverted to other facilities. Moreover, at maximum capacity, Dale Mabry Highway traffic would be operating at speeds equal to or less than 15 miles per hour. Congestion would increase travel times for motorists, resulting in increased fuel consumption, higher levels of air pollutants, and greater delays for emergency services.

Conversely, if the project is not constructed, there would be no displacement of families or businesses, no wetland impacts would

occur, construction impacts would not occur, right-of-way would not have to be acquired, and funds would not have to be expended. However, these seemingly beneficial attributes of not constructing an improved facility would be only at the expense of increased adverse impacts resulting from congestion and spillover onto parallel roadways, including in some cases, residential streets not designed or intended to carry heavy traffic volumes.

Postponing the Action

Postponing major upgrading of Dale Mabry Highway would, depending on the length of postponement, have impacts similar to the no-improvement alternative.

Postponing the action may also jeopardize the future economic feasibility of the project. Based on current escalation of construction costs, project costs would double within 15 years.

Upgrading the Existing Facility

All of Dale Mabry Highway between Kennedy Boulevard and Van Dyke Road is or will be six-lane divided by approximately 1990. Minor increases in capacity could be achieved by adding dual left-turn lanes and exclusive right-turn lanes at major intersections. However, little could be done to substantially increase the capacity of the roadway other than by providing additional through lanes or constructing interchanges.

Transit as an Alternative Mode

The Tampa Urban Area Transportation Study has indicated that 4.2 percent of the person trips within a one-half mile service area of transit routes in Hillsborough County will be using mass transit by the year 2000. This indicates that transit usage would not be sufficient to serve as an alternative to upgrading and improving Dale Mabry Highway. Light rail transit and busways are discussed separately in the section on Mass Transit Alternatives.

Alternative Corridors

Due to existing patterns of development both west and east of Dale Mabry Highway, there are no feasible alternative corridors, other than those which would utilize existing residential streets and, in turn, have an adverse impact on neighborhoods. Corridors to the west of Dale Mabry are discussed in the section on One-Way Pair Alternatives. There are a number of public land uses adjacent to Dale Mabry (e.g., Tampa International Airport, Horizon Park, Hillsborough Community College, Tampa Stadium) which present significant obstacles to the development of potential alternative corridors.

Existing parallel arterial facilities include Himes Avenue to the east. Substantial increases in traffic on Himes Avenue are also projected by the year 2010, with some sections of Himes likely to require six-laning. The six-laning-of-Himes-only would not provide sufficient additional corridor capacity to serve as an alternative to improving Dale Mabry Highway.

V. CAPACITY ANALYSIS FOR YEAR 2010 DEMAND

Methodology and Assumptions

Capacity analyses for signalized intersections were performed for projected year 2010 design hour volumes, using the planning analysis methodology (critical movement analysis) of TRB Circular #212 (Reference 3). The following assumptions generally apply:

- The number of lanes for the cross streets is as shown in the TUATS year 2010 plan.
- K-factor of 9% was used (Reference 1).
- A peak-hour directional factor of 60% was used (Reference 1).
- An exclusive right-turn lane was shown where the design hour volume (DHV) in either the AM or PM exceeds 300 vehicles/hour (vph).
- Dual left-turn lanes were shown where the peak hour volume exceeded 300 vph.
- In most cases, where dual left turn lanes are warranted on one approach, they were also added on the opposite approach, for reason of alignment as much as capacity considerations.

The planning analysis methodology was used to provide a basic

assessment of whether or not capacity was likely to be exceeded for the 25-year forecasted traffic demand. All capacity analyses used DHV based on the assumption that the proposed NWH Expressway would be built by the year 2010, unless noted otherwise.

Geometry Required to Satisfy Year 2010 Demand

The results of capacity analyses for the southern section of Dale Mabry, between Euclid and Kennedy, are included in Table V-1. The results indicate that a six-lane divided arterial will generally handle the year 2010 DHV, with probable bottlenecks occurring at Henderson Boulevard, at Swann Avenue, and at Kennedy Boulevard. To help reduce the probable congestion at Henderson, one option would be to construct a partial "at-grade split diamond" (Reference 6) by making a short portion of Henderson Boulevard part of a one-way pair. This is discussed more fully at the end of Section IX. Another probable bottleneck is at Swann Avenue, due to the TUATS 2010 plan calling for only two lanes on the west side of Dale Mabry. A practical solution to increase the capacity of the intersection to a more acceptance level would be to simply widen Swann to four lanes west of Dale Mabry (for several hundred feet at least) to take advantage of the capacity of the four lanes proposed on Swann east of Dale Mabry. This would result in probable a.m. and p.m. levels of service of D and C, respectively, as shown in the Table. Another probable bottleneck is at Dale Mabry and Kennedy, where even an at-grade split diamond (AGSD) intersection with six lanes on Dale Mabry is likely to be at or near capacity. Another option for this

TABLE V-1 - YEAR 2010 CAPACITY ANALYSIS FOR DALE MABRY, EUCLID TO KENNEDY

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Maximum Sum of Critical Volumes (VPH) and Probable Levels of Service

Dale Mabry at		Dale Mabry 6-Lane Typical		Dale Mabry 8-Lane Typical		AGSD* 6-Lane	AGSD* 8-Lane
Kennedy Blvd.	AM	1580	F	1510	F***	1420 E	1310 D
(6-Lanes)**	PM	1650	F	1510	F***	1360 E	1220 D
Azeele St.	AM	---	---	(Year 2010 Volumes Incomplete)			
(2-4 Lanes)**	PM	---	---				
Swann Ave.	AM	1220	D	1020	C		
(2-4 Lanes)**	PM	1280	E	1090	C		
(4-4 Lanes)	AM	1160	D				
	PM	1060	C				
Henderson	AM	1420	E	1280	E	1200 D	1010 C
(4-Lanes)**	PM	1390	E	1240	D	1230 D	1020 C
Bay-to-Bay	AM	1140	D				
(4 Lanes)**	PM	1030	C				
El Prado	AM	---	---	(Year 2010 Volumes Incomplete)			
(4 Lanes)**	PM	---	---				
Euclid Ave.	AN	1220	D				
(2-4 Lanes)**	PM	1240	D				
(4-4 Lanes)	AM	1040	C				
	PM	1110	C				

*AGSD = "at-grade, split diamond intersection" or partial AGSD.
**Lanes as shown in TUATS 2010 plan.
(N-N) = No. of lanes on west and east sides of Dale Mabry, respectively.
***With 8 thru lanes on Dale Mabry either side of Kennedy.

intersection would be an urban interchange either by itself or in combination with the expressway alternative north of Kennedy. A six-lane overpass could be constructed in a north-south direction on a westerly alignment in such a manner as to avoid cost-prohibitive damages to Tampa Commons on the northeast corner of Dale Mabry and Kennedy. A capacity analysis of this alternative shows conditions to be near capacity, LOS E (p.m. peak criticl sum of 1270) or slightly over capacity, LOS F (a.m.; critical sum of 1440) depending on the volume of U-turn traffic which would be generated in the vicinity of the interchange due to the limited access.

Capacity analyses were also performed for the central portion of the study corridor, between Kennedy Blvd. and Ehrlich Road, assuming an eight-lane Dale Mabry (widening Dale Mabry from six to eight lanes results in a capacity increase of approximately 20%) with a four-lane Himes Avenue (the TUATS 2010 plan shows Himes as being four-lane divided). The results of these analyses are included in Table V-2. Most of the intersections on Dale Mabry would be over capacity (LOS F), and a number of intersections along Himes Avenue would be near or over capacity as well (LOS E and F).

Prohibiting left turns as a means of increasing intersection capacities (and hence corridor capacities) was also investigated. An approximate 5% increase in capacity would be expected per eliminated phase due to less lost time per cycle; however, in practice, the increase could be smaller, depending on whether or not the rerouted left turners are sent through the traffic signal twice, as in the

Table V-2 CAPACITY ANALYSIS RESULTS FOR 8-LANE DALE MABRY WITH 4-LANE HIMES

Year 2010 Critical Volume Sum and Probable Level of Service

Intersecting Street	Dale Mabry (8)		Himes Ave. (4)	
	AM	PM	AM	PM
Ehrlich (4)	1110 D	1140 D	--	--
Fletcher Ave. (4)	1670 F	1440 F	--	--
*Linebaugh (2)	1460 F	1430 F	--	--
Busch/Gunn (6)	1550 F	1480 F	1020 B	1090 C
Waters (6)	1610 F	1710 F	1340 E	1170 D
Lambright (4)	1660 F	1630 F	1110 D	1320 E
Hillsborough (6)	1180 C	1050 B	1420 F	1520 F
Buffalo (6)	1470 F	1590 F	1720 F	1540 F
Tampa Bay (4)	1230 E	1220 D	1030 C	1030 C
Columbus (6)	1720 F	1730 F	1400 F	1340 E
*Spruce (2)	1890 F	1810 F	N/Av	N/Av
I-275	1340 E	1790 F	1080 C	1260 D
Cypress (4)	1230 E	1320 E	N/Av	N/Av
Kennedy (6)	1590 F	1630 F	1460 F	1320 E

Legend

(X) - Number of through lanes assumed, based on TUATS 2010 Plan.

*Not included on TUATS 2010 plan at Dale Mabry.

case of a far-side jug handle. In addition, rerouting left turners often leads to operational problems elsewhere, depending on how the movement is rerouted.

Levels of service for other alternatives (e.g. one-way pair, expressway, and elevated freeway) for this segment between Kennedy and Ehrlich are given in Sections VIII and X.

Capacity analysis results for a 6-lane Dale Mabry north of Fletcher are given in Table V-3, assuming that Dale Mabry becomes four-lane divided north of Van Dyke.

TABLE V-3 - YEAR 2010 CAPACITY ANALYSIS FOR A 6-LANE DALE MABRY EHRLICH TO VAN DYKE

Dale Mabry at	Peak Period	Critical Vol. Sum	Probable Level of Service
Van Dyke (4 lanes w. of Dale Mabry 2 lanes e. of Dale Mabry)	AM	896	B
	PM	899	B
Ehrlich (4 lanes)	AM	1285	E
	PM	1254	E

The results of Table V-3 indicate that a six-lane divided arterial will probably be adequate north of Ehrlich Road (construction of a 6-lane divided Dale Mabry between Hillsborough Avenue and Van Dyke Road is already programmed). At Ehrlich, Dale Mabry would either have to be eight lanes (LOS D) or have an interchange (LOS A/C (AM/PM) for an urban interchange in 2010).

The section of Dale Mabry between Van Dyke and U.S. 41 is projected to carry approximately 31,000 VPD with the NWH Expressway or 28,000 VPD without the Expressway. This level of traffic can be handled by a four-lane divided arterial at level of service D or better.

VI. MASS TRANSIT ALTERNATIVES

Light Rail Transit

At the present time, the Hillsborough Area Regional Transit Authority (HART), in cooperation with the Florida Department of Transportation (FDOT) and other agencies, is conducting studies of possible corridors for a future light rail transit (LRT) system to serve Hillsborough County. This system is being studied for possible implementation in the 1990's.

Initial studies have identified seven potential corridors, all of which radiate from the City of Tampa's central business district. Further analysis has identified three of the corridors as having the highest potential for attracting fixed guideway transit trips; these include the "north central", the "northwest", and the "east" (Brandon) corridors. Dale Mabry Highway falls within the broad area designated as the "northwest" corridor (Reference 7).

At the time of this writing, corridor environmental and engineering studies of these three corridors are anticipated to begin around July, 1986. Around January, 1987, HART expects to select one of the three highest-priority corridors for further engineering and environmental studies (Reference 8). The results of these studies may have a significent effect on projected automobile travel demand

for the Dale Mabry corridor, depending on the LRT alignment selected and the estimated ridership for that alignment.

Busways and HOV Lanes

Bus-only lanes (busways) and high occupancy vehicle (HOV) lanes were evaluated for both the no-build and build alternatives. The evaluation also considered contraflow HOV lanes. This section briefly summarizes the results of the analysis; more detailed information is included in the Appendix.

Future usage of a busway was estimated using a manual mode choice procedure (Reference 9). The estimated percentage of auto drivers changing travel mode (from auto to express bus) due to preferential treatment (the designation of a busway) varied from 24 for the build (Expressway) alternate to 31 for the no-build alternate. The projected number of busses using the busway in the design year 2010 peak hour ranged from 8 - 19 for the build alternate to 11 - 23 for the no-build alternate. The projected transfer of auto drivers from the private vehicle mode to express bus resulted in a reduction in DHV (from previous forecasts where a busway was not considered), ranging from 350 - 840 for the build alternate to 450 - 1025 for the no-build alternate.

Due to projected low usage (a maximum of 23 express busses in the peak hour), exclusive bus lane(s) (a busway) are unwarranted. The lane(s) designated as a busway would be underutilized and the

remaining general purpose lanes would experience excessive congestion.

HOV lanes were evaluated both as fixed direction and as a contraflow lane. Under the HOV/contraflow lane concept, private vehicles with two or more occupants would share the designated lane(s) with busses. With projected year 2010 peak hour traffic conditions, both the designated HOV/contraflow lane(s) and general purpose lanes would operate at LOS F (under the no-build alternate). For the build (expressway) alternate, the HOV/contraflow lane(s) would operate at LOS A and the general purpose lanes at LOS D. Therefore, the HOV/contraflow lane concept is presented herein as an option to be considered with the limited access segments of the build alternative only. (Note: See Appendix A for detailed evaluation.)

VII. ALTERNATIVE ROADWAY DESIGNS

Engineering and Planning Criteria

To develop an improved roadway facility that is in the best overall public interest, certain engineering factors and urban development conditions must be taken into consideration. These criteria have a direct bearing on the selection of the preferred roadway design and alignment for each roadway segment.

Traffic Demand - The improved roadway facility should be designed to safely and efficiently accommodate bicycle and pedestrian traffic, as well as projected future year motor vehicle traffic. It is recommended that any design concept approved for Dale Mabry Highway include provisions to accommodate bicyclists since the Dale Mabry corridor is included in the County's comprehensive bicycle plan (approved by the MPO on October 22, 1985). This can be accomplished by the provision of wide curb lanes (minimum 14' width) in urban sections or paved shoulders (minimum 4' width) in rural areas. This design treatment is consistent with Florida DOT's policy of giving special emphasis to the needs of bicyclists and pedestrians in and near urban areas.

Land Use - To minimize community impacts it is desirable that additional right-of-way taking minimize impacts on certain land uses. These include churches, schools, residences, businesses, non-profit agencies, public parks, and other public uses such as Tampa International Airport and Tampa Stadium.

Environment - Design and alignment of an improved roadway must consider sensitive environmental conditions and areas. In accordance with Executive Orders 11990 and 11988, wetland and floodplain impacts must be avoided where practical. There should not be significant air, noise or water pollution impacts, Section 4(f) involvements, or impacts on endangered species, critical habitat, and archaeological or historical sites, if at all possible.

Construction Staging - Roadway alignment, particularly at bridge sections, should be placed so as to maximize the possibilities for construction staging.

Safety - The engineering design characteristics must meet applicable safety standards. Access control techniques to promote safe and efficient operation are discussed elsewhere in this section.

Median Width and Type

For the conventional multi-laning alternatives, median widths evaluated include 14-foot (for continuous two-way left turn lanes) and widths of 16', 22', and 28' - 30'. In terms of accident reduction, analysis by Glennon, et. al. (Ref. #16) found that the continuous two-way left turn lane is inferior to the raised median where frequent driveways (>60 per mile) are in combination with high traffic volumes (>15,000 ADT). The sections of Dale Mabry Highway south of I-275, where new rights-of-way are required to provide an additional two basic lanes, are characterized by having more than 60 driveways per mile with an average ADT in excess of 30,000.

A median width of less than 20 feet does not provide sufficient area to "shadow" a vehicle crossing perpendicular to Dale Mabry. The 22' raised median does provide sufficient area to "shadow" a vehicle and also provides pedestrian refuge. The 14' continuous two-way left turn lane provides the highest degree of access and, because of the narrower width, requires less right-of-way to install. It does not provide protection for pedestrians, however.

A net present worth analysis of median types and widths was performed on South Dale Mabry and elsewhere when new rights-of-way were required to provide needed basic lanes. The net present worth analysis was used to compare the differences in traffic accident savings and public agency capital costs between a raised median and a continuous two-way left turn lane (TWLTL). Specifically, between Euclid Ave. and Kennedy Blvd., a 22' wide raised median was compared to a 14' TWLTL (Appendix C). The resultant 0.4 benefit-cost ratio shows that the wider 22' raised mediam is not a cost-effective solution. Therefore a 14' TWLTL is recommended for South Dale Mabry between Euclid Avenue and Kennedy Boulevard. Except for a short 0.13 mile segment at Swann Avenue, there is presently no median on Dale Mabry between Euclid Avenue and Kennedy Blvd.

Between Kennedy Blvd. and Cypress Street, where a 20' raised median exists, a separate net present worth analysis was performed (Appendix C). The result, comparing the difference between accident savings and capital costs for a continuous 14' TWLTL and a 22' raised median, was a benefit - cost ratio of 0.67. The wider raised median is not a cost-effective solution. However, the proximity of

this section to I-275 warrants some medial access restriction. Therefore, a narrow, 14', raised median is recommended.

No widening or median changes are recommended within the I-275 interchange area. North of I-275, where a 200-foot right-of-way typically exists, the safer raised median is recommended (Ref. #16). The recommended minimum median width is 22 feet. The typical existing median width is 18' - 20' south of Waters Avenue and 40' north of Waters.

An exception to the typical 200' existing right-of-way width north of I-275 is the segment between Hillsborough and Waters where the right-of-way narrows to as little as 140 feet. Construction is scheduled to widen the existing 4-lane roadway with an 18' raised median (varies) to 6 lanes with a 14' painted median. Therefore, a 16' raised median is recommended for the 8-lane widening alternative. The raised median is safer and with the 16' width, additional right-of-way would not be required on this segment. However, under the expressway alternative, new right-of-way will be required, and a 22' wide median with a barrier wall is recommended.

The 22' minimum raised median recommended for the urban developed segments north of I-275, (with an exisiting 200 foot right-of-way) meets the FDOT "Green Book" minimum standards for an urban type design with 45-50 MPH design speeds (Ref. #11, p. III-33). At locations where dual left turns are required, a 30' median width is recommended. The raised type median is also recommended to facilitate access control and provides protection for pedestrains.

For the rural area north of Van Dyke Road, a 40' depressed grass median is recommended using a rural typical section and a 22' raised median using an (optional) urban typical section with frontage roads. Dale Mabry north of Van Dyke is a two-lane rural roadway in a 200' right-of-way. Additional right-of-way would not be required with either the urban or rural typical section median width (but some new right-of-way would be required at frontage road intersections under the urban option).

Lane and Border Widths

Generally, a standard lane width of 12 feet is recommended due to the projected truck usage (9.0% daily) and projected high traffic speeds and volumes. To accommodate bicyclists, curb lanes of 14 feet are recommended (for combined bicycle and motor vehicle traffic) for urban sections. For rural sections, a 4-foot minimum paved shoulder would be required for bicyclists.

To provide for utilities, sidewalks, sight distance for motorists exiting driveways, and a roadside recovery area, a minimum border width of 10 feet (including 2' curb and gutter section) is recommended. A more desirable width would be 12 feet or more, depending on availability of R/W.

Right-of-way cost estimates were made using both 10' and 12' borders (in combination with 14' and 22' median widths) where additional right-of-way was required for either or both.

For the segment between Euclid Ave. and Cypress Street, the difference in right-of-way cost between the wider cross-section, with 12' borders, and the narrow cross-section, with 10' borders was substantial ($3± million). This reflects the proximity of existing development to the existing roadway. Therefore, the narrow cross-section with 10' border widths is recommended for this segment (see Figure IX-2).

The only other segment where right-of-way widths are insufficient for adding two-lanes with 12' borders (and with a 22' median) is between Hillsborough and Waters Avenue. For this segment, 12' border widths (with a 16' median) can be constructed within the existing right-of-way and, for the widening alternative, 12' border widths (in combination with a 16' raised median) are recommended.

For the remainder of the widening alternative, sufficient right-of-way exists to provide 12' borders and 12' border widths are recommended.

For the expressway alternative, 12' border widths are recommended from the beginning of the expressway at Kennedy Blvd. to Ehrlich Road. Twelve-foot borders can be provided within existing rights-of-way except between Kennedy Blvd. and Cypress Street, and between Hillsborough Avenue and Waters Avenue. Substantial additional right-of-way will be required to construct the expressway alternative within those two segments and the difference in right-of-way costs between 10' and 12' border widths is not cost prohibitive.

North of Ehrlich Road, sufficient right-of-way exists to provide desirable 12' border widths and 12' border widths are recommended under both the multilane widening and expressway alternatives.

Cross Section Types

The three basic types of cross sections considered include rural (ditch/swale drainage), urban (curb and gutter with an underground drainage system), and a combination urban/rural section (ditch on one side, underground drainage on the other). Typical sections meeting the above median, lane width, and border width requirements are illustrated in Section IX. The cross sections shown are minimum recommendations; wider border and median widths are preferred where R/W width permits. In addition, wider medians would be required at locations where dual lefts are recommended.

Alternative Alignments

For those sections where additional R/W would be required for roadway widening, four different types of alignments were evaluated:

- Western aligment (holding the east existing R/W line).
- Centered alignment (taking additional R/W roughly equally from both sides).
- Eastern alignment (holding the west existing R/W line).
- Combination alignment (transitioning back and forth among the above alignment types to minimize community and environmental impacts).

These are discussed, where applicable, on a segment-by-segment basis in Section IX.

Access Control Options

Due to the high functional classification and heavy volume of traffic projected for Dale Mabry Highway, some type of access control is recommended to protect the utility of the highway and to insure safe and efficient operation. Some of the specific control measures investigated include:

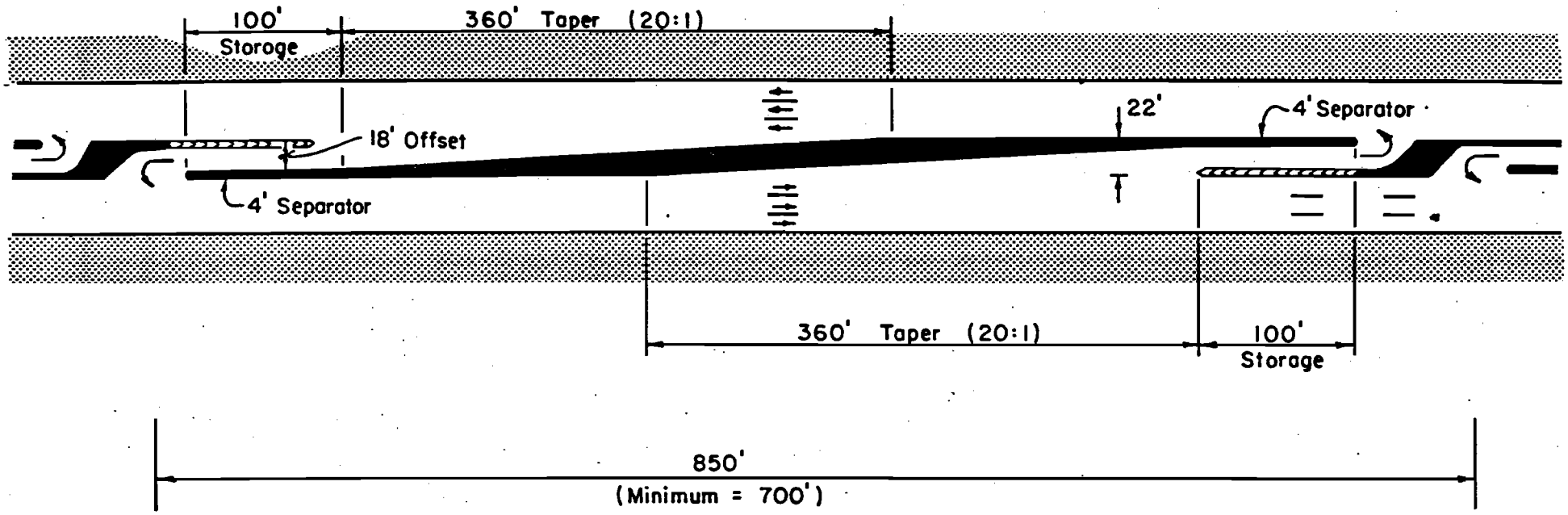
- Conventional raised medians with deceleration lanes for left turns.
- Median channelization to prevent left-turn ingress and/or egress movements to/from driveways.
- Two-way left-turn lanes.
- Medial storage for left-turn egress vehicles.
- Continuous right-turn lanes.

The option recommended in conjunction with any multi-laning improvements between Kennedy Blvd. and Ehrlich is to use channelization provided by raised medians to prevent left-turn egress movements from driveways and minor street approaches, similar to the design proposed for S.R. 60 in Brandon, Florida. Special back-to-back median openings would be provided to allow U-turns at regular intervals (> 700') as shown in Figure VII-1. (The same type of median treatment would be used with any eight-lane alternative.) In addition, single storage bays would be provided for U-turns immediately

upstream of signalized intersections. This type of design treatment would provide for safe deceleration and storage of U-turn passenger vehicles and allow access to businesses fronting Dale Mabry Highway. Intersections with minor side streets would be channelized similar to Figure VII-2, again to prevent left-turn egress movements from minor approaches.

The raised median would also afford some degree of protection to pedestrians wishing to cross Dale Mabry Highway half way at a time.

6-LANE ARTERIAL WITH 22' MEDIAN



Scale : 1"= 100'

FIGURE VII-1 TYPICAL MIDBLOCK MEDIAN OPENING

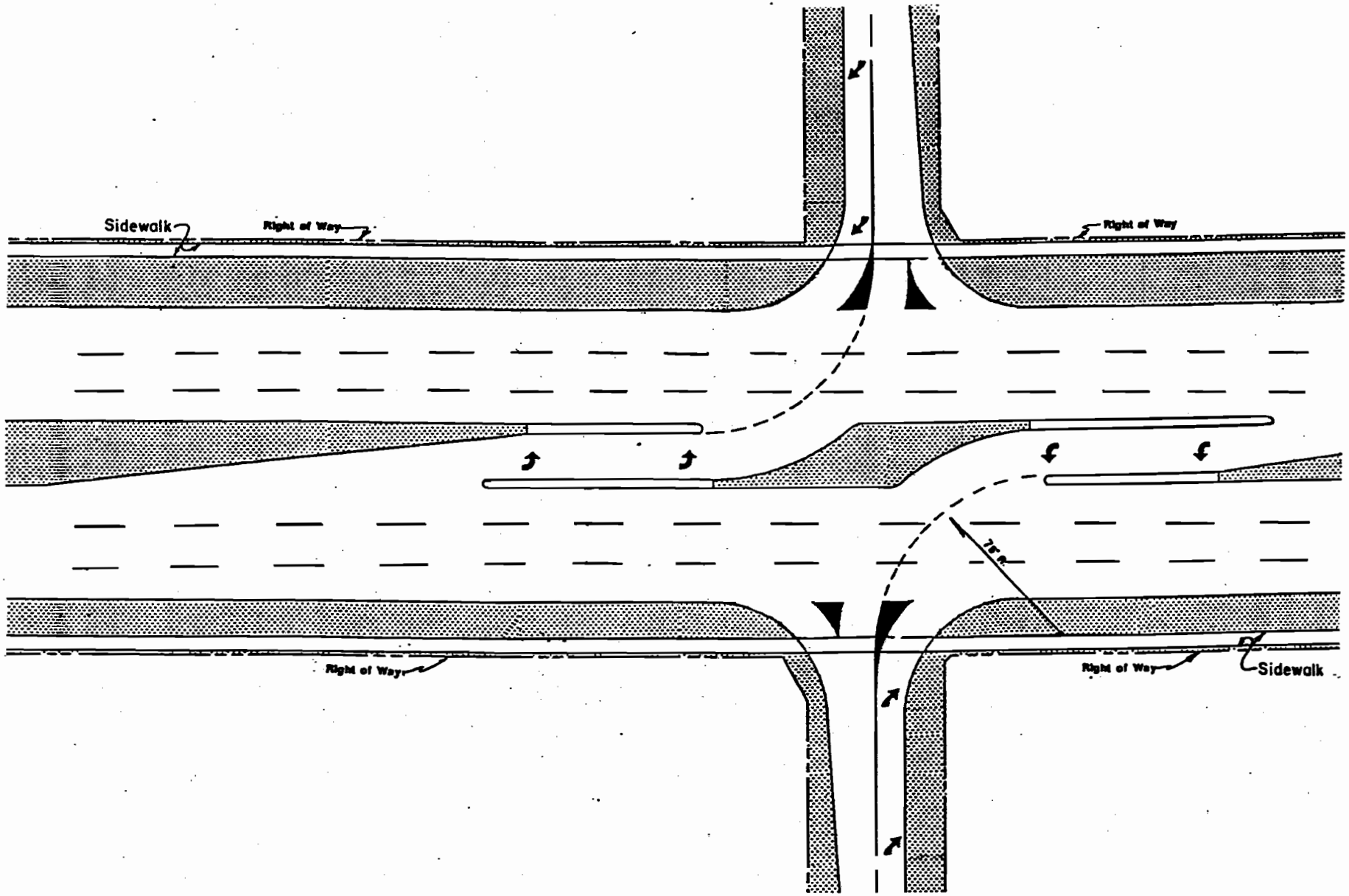


FIGURE VII-2 TYPICAL MINOR INTERSECTION

Expressway Design Criteria

Recommended design criteria for the expressway alternative are included in Table VII-1. These design criteria are based on the FDOT Manual on Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Reference 11) and 1984 AASHTO Policy on Geometric Design of Highways and Streets (Reference 10). These criteria are also consistent with the criteria approved by FHWA for the U.S. 19 expressway design concepts for Pinellas, Pasco and Hernando Counties (Appendix of Reference 12). Both desirable and minimum values are given for many of the design parameters.

TABLE VII-1 - RECOMMENDED DESIGN CRITERIA FOR EXPRESSWAY ALTERNATIVE

PARAMETER	MAINLINE	FRONTAGE RDS
Design Speed (MPH)	60/55	45/40
Slip Ramps	50/40	
Loop Ramps	30/25	
Lane Widths	12'	11'
Turning Lanes	12' min.	14' *Outside
Ramps (single-lane)	23'/15'	
Shoulder Widths		
Inside	10'	--
Outside	8' + 3.5' gutter	--
Median Width	22' (incl. med. barrier)	--
Vertical Clearance	16.5' min.	16.5' min.
Vertical Alignment		
Grades	3% des.	--
	4% max.	--
Minimum K Values		
Crest vert. curve	160	70/55
Sag vert. curve	105	65/55
Horizontal Alignment		
Degree of Curve	4° max.	Slip ramps 6° max.
Minimum Length of Curve	400'	400'

XX/XX - Desirable/Minimum

*to accommodate bicycles as well as motor vehicles

VIII. ONE-WAY PAIR ALTERNATIVES

Dale Mabry with Two Parallel One-Way Roadways

This alternative would utilize the existing and programmed six-lane two-way Dale Mabry with Himes one-way northbound and portions of Grady and Church Streets (with short sections of other streets) one-way southbound (Figure VIII-2, left half). The one-way roadways were evaluated as five-lane typical sections, since it would be relatively easy to convert a four-lane divided roadway such as Himes to a five-lane one-way section (Figure VIII-1).

Figure VIII-1 - Typical Section, 5-Lane One-Way Roadway

South of Columbus Drive, a southbound one-way roadway between Lois Avenue and Dale Mabry Highway is not considered to be a plausible alternative. These streets are discontinuous and major widening or extension would adversely impact several neighborhoods including a minority neighborhood.

Both Church Avenue and Grady Street traverse residential neighborhoods, with Church Avenue already functioning as a neighborhood "collector" (Figure VIII-3). Because of neighborhood concern about increasing traffic volumes and speeds on Church Avenue, the City of Tampa used a consultant to study the Church Avenue/Dale Mabry corridor, south of Kennedy Boulevard several years ago (Reference 13). The study did not make any recommendations; rather, it outlined recommended procedures for City staff to follow in conducting a "neighborhood traffic diversion" type of study.

In addition to the potential divisive effect on neighborhoods both north and south of Kennedy Boulevard, an overpass across I-275 would be required to provide sufficient length and continuity for the one-way pair. This would be both cost prohibitive and visually intrusive since this would require constructing an overpass over an already partially-elevated section of I-275 between Cypress and Dale Mabry.

On the southern end, depending on where the transition occurred, transitioning Grady Street back to Dale Mabry would either involve

bisecting a Little League field or a portion of the neighborhood. If Church Street were used instead, Grady Elementary School would be adversely impacted unless the transition was made somewhere north of Morrison, in which case densely-developed residential land or commercial land or both would be required.

For the corridor section between I-275 and Columbus Drive, a southbound one-way roadway is not considered practical due to the need for an overpass over I-275, the need to transition back to Dale Mabry at Columbus Drive (due to the airport), and potentially heavy impacts to a minority residential area and to businesses west of Dale Mabry.

Between Columbus Drive and Hillsborough Avenue, serious operational problems would result in attempting to merge a five-lane southbound roadway into the three (already existing) southbound lanes of Dale Mabry (Figure VIII-4). To avoid eight southbound lanes, lane drops would be required on each roadway. Assuming two dropped lanes on Grady and one lane drop on Dale Mabry, this would still result in five southbound lanes on Dale Mabry as well as considerable congestion and delay associated with dropping lanes.

In addition to operational problems, an alignment utilizing Grady Street (the most plausible of the two streets for this section) would require bisecting a large shopping center on the south side of

YEAR 2010 PM PEAK SUM OF CRITICAL LANE VOLUMES (VPH) AND PROBABLE LEVELS OF SERVICE

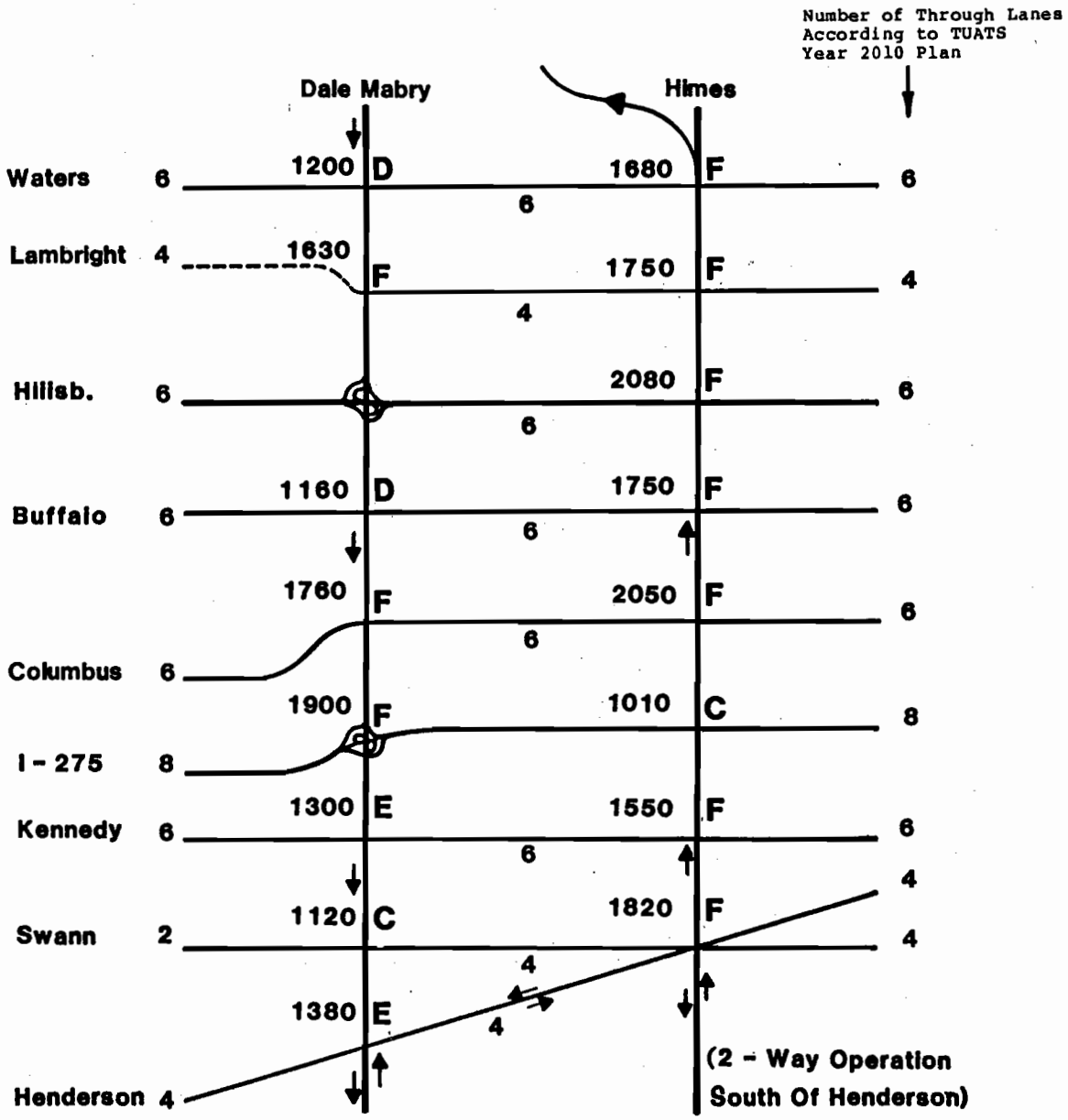


FIGURE VIII-6 ONE-WAY PAIR PROBABLE LEVELS OF SERVICE IN YEAR 2010

a maximum number of six intersection approach lanes. The figure shows that, in the p.m. peak period, every intersection in the heaviest north-south direction (northbound Himes) except for one would be over capacity (LOS F). Two of the intersections (Himes and Hillsborough; Himes and Columbus Drive) would be approximately 50% over capacity in the p.m. design hour. In the light direction (southbound Dale Mabry), only three of the intersections would be LOS F, with two others near capacity. However, the a.m. peak period would tend to be a reverse of the p.m. peak period, resulting in most of the intersections along Dale Mabry being over capacity.

Using the most congested intersection (Himes and Hillsborough) as the control and keeping the TUATS year 2010 street geometry, the Dale Mabry / Himes one-way pair will handle at LOS E approximately 67% of the year 2010 traffic demand. Unfortunately, this level of traffic demand (67% of year 2010 ADT of 86,000 or 57,600 VPD) was already reached sometime in 1984. At Dale Mabry and Hillsborough, 67% of the year 2010 demand was reached sometime prior to 1983.

The five-lane Dale Mabry / Himes one-way pair was also evaluated at Hillsborough Avenue using existing system (1983) volumes (with K=9%, D=60%) for the p.m. peak period. The intersection of Himes and Hillsborough was over capacity (LOS F) using both a four-lane and

six-lane divided Hillsborough Avenue. (The maximum sums of the critical lane volumes were 1770 and 1510, respectively.)

In general, one-way pair systems result in an average 70% reduction in stopped time for motorists and an average 30% reduction in accidents (Reference 14, Chapter 6). A big advantage is the improved ability to provide traffic signal progression which accounts for the large reduction in stopped time. One study notes a 25 to 50 percent increase in capacity for urban arterials when a conversion is made from two-way to one-way operation (Reference 15). In the case of a Dale Mabry / Himes one-way pair, the existing overpass on Dale Mabry at Hillsborough Avenue would result in a superior level of service for southbound motorists in the a.m. while northbound motorists in the p.m. would no longer have a grade separation at Hillsborough and Himes. Other disadvantages of a one-way pair system include overall increased vehicle miles of travel and more concentrated turning movements at some intersections.

Possible transition areas for the north end of a one-way pair are illustrated in Figure VIII-8. The southernmost alternative would require constructing a roadway through a large wetland area. The northernmost alternative would require an additional grade crossing on Busch west of the existing intersection of Himes and Busch. For both alternatives, it would be necesary to drop two of the five

northbound lanes in order to tie in to the three northbound lanes already programmed for construction on Dale Mabry.

Conversion to a one-way pair would also require extensive modifications to several ramps at two interchanges on Dale Mabry: at Hillsborough Avenue and at I-275. Figure VIII-9 illustrates possible revised ramp configurations to handle one-way traffic flows at the respective interchanges. The top figure includes two different alternatives for handling the southbound-to-eastbound left turn: the first one would require signal control and the second one would require modifying one of the existing loop ramps to provide a semi-direct connection with a merging lane on the south side of Hillsborough Avenue.

Due to the inability of the Dale Mabry / Himes one-way pair system to handle projected traffic increases and due to the potential environmental effects (depending on where the transitions were to occur) the one-way pair alternative is considered to be a nonviable alternative for improving the capacity of the Dale Mabry / Himes corridor.

An urban typical section is recommended, to minimize R/W acquisition. The six-lane urban design requires a recommended R/W of 110' (124' where dual left-turn lanes are recommended). The outside lanes would be 14' wide to accommodate bicyclists along with motor vehicles. Sidewalks, where provided, would be set back 2' from the R/W line to potentially eliminate the need for temporary construction easements. In this segment of Dale Mabry, a minimum of 50' of additional R/W would be required in some segments and 30' of additional R/W would be required in others. To derive the optimum cross-section, four different types of alignments were evaluated using both 110' and 122' R/W six-lane typical sections: western, centered, eastern, and combination. (The 122' R/W typical section utilizing a raised 22' median was found to cost significantly more as previously mentioned in Section VII.) In some areas it may be possible to salvage portions of the existing pavement to utilize in the new cross section.

A summary of the costs and impacts of the various alignment alternatives is included in Section XI. Additional at-grade improvement options for Dale Mabry at Henderson Boulevard are discussed in the "Major Intersection Options" section following the segment-by-segment alternatives descriptions.

Kennedy to Cypress

This segment of Dale Mabry is already six-lane divided; the existing R/W and typical sections are indicated in Figure II-1.

A plausible widening alternative for this segment would be to construct an eight-lane urban section (Figure IX-3). This would require a minimum of 14' of additional R/W. The outermost lane on each side would be dropped at the I-275 - Dale Mabry interchange.

West, east, and centered alignments have been evaluated with respect to potential costs and impacts. These costs and impacts are summarized in Section XI of the report. Regardless of the alignment selected, it would have to transition to match the existing alignment at I-275 and any to-be-constructed Dale Mabry alignment south of Kennedy.

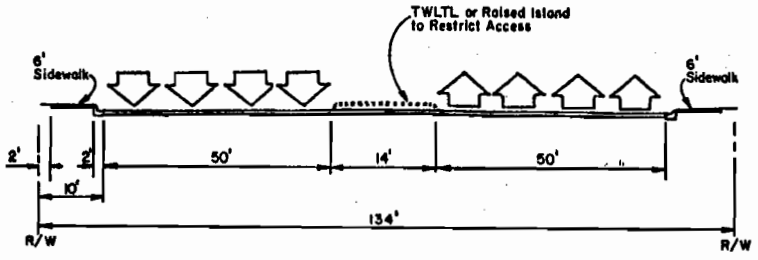


Figure IX-3 - Eight-Lane Urban Typical Section

Cypress to Buffalo

This segment of Dale Mabry is also already six-lane divided; the existing R/W and typical section are illustrated in Figure II-1. In addition, portions of Dale Mabry between Cypress and Spruce Street are currently 8-lane or programmed for 8-laning as part of an FDOT project (already programmed) to widen and signalize the ramps at Dale Mabry and I-275.

A plausible multi-laning improvement for this segment would be to construct an eight-lane urban roadway within the existing 200' R/W. The recommended typical section is shown in Figure IX-4. A 30 ft. median is recommended due to the need for dual left-turn lanes at major intersections as well as the ability to construct this within the existing R/W. The costs of this alternative are included in Section XI of the report.

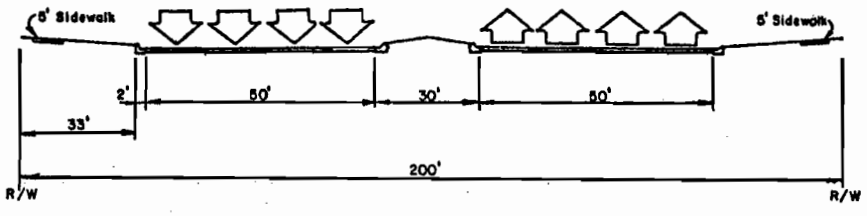


Figure IX-4 - Eight-Lane Urban Typical Section for 200-Ft R/W

Buffalo to Hillsborough

This segment of Dale Mabry is also already six-lane divided; the existing R/W and typical section are illustrated in Figure II-1. A distinguishing feature of this segment is that drainage is provided primarily by a large ditch which runs parallel to Dale Mabry on the east side; the bottom of the ditch is inside of Horizon Park (outside of the 200' Dale Mabry R/W).

Plausible multi-laning improvement alternatives for this segment include construction of an eight-lane urban typical section (Figure IX-4) and construction of an eight-lane combination urban-rural typical section (Figure IX-5). The combination section has two major advantages: it is less costly to construct, and the existing ditch on the east side of Dale Mabry could be used for stormwater detention and treatment, thereby reducing the need to acquire additional costly R/W for detention ponds. For these reasons, the combination typical section is recommended. Costs are included in Section XI of the report.

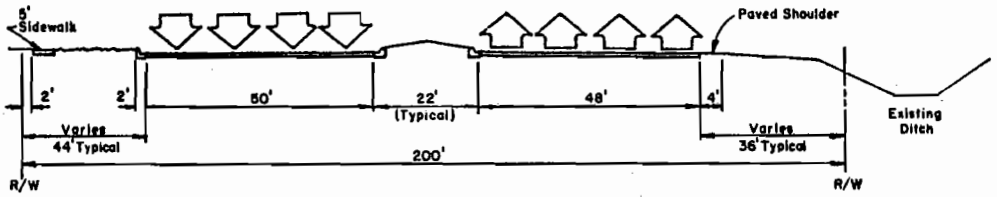


Figure IX-5 - Eight-Lane Combination Urban-Rural Typical Section

Hillsborough to Waters

This segment of Dale Mabry is currently four-lane divided rural; however, construction is programmed for widening this segment to six-lane urban (Figure II-1). Existing R/W varies from 140' to 165' (except for short segments where it widens further).

A plausible multi-laning improvement alternative for this segment would be to widen to an eight-lane divided urban section with a 16' raised median, as shown in Figure IX-6. Using the 16' median, acquisition of additional right-of-way would not be required. (A 146' typical section using a 22' raised median was analyzed and compared to a 14' flush median. Accident savings using the raised median were insufficient to offset the high right-of-way costs incurred with the wider median.)

As part of the eight-laning scenario, it would be possible to utilize most of the to-be-constructed 6-lane urban pavement. The costs of this alternative are included in Section XI of the report.

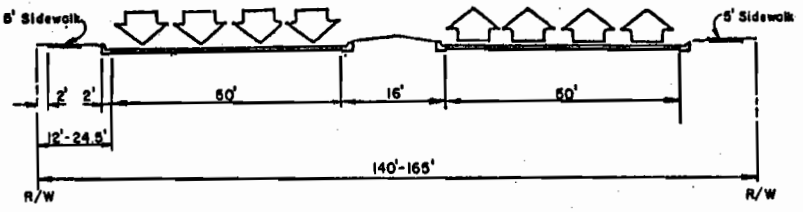


Figure IX-6 - Eight-Lane Urban Typical Section for 140-165 Ft. R/W

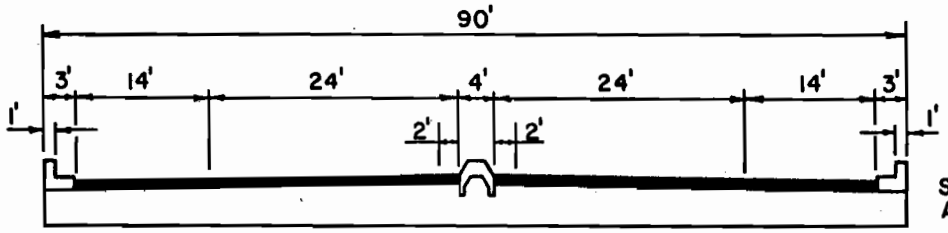
The bridge over Hillsborough Avenue would have to be widened to accommodate six through lanes; the outside lanes of the eight-lane sections north and south of the interchange would become "auxillary lanes" connected to the on and off ramps. Existing and proposed bridge typical sections are illustrated in Figure IX-7. The proposed bridge typical section is of a restricted design to minimize the amount of reconstruction required of the existing loop ramps.

Waters to North of Ehrlich

This segment of Dale Mabry is also programmed for six-lane construction (Figure II-1). A plausible multi-laning improvement alternative for this segment would be to construct an eight-lane divided, urban section within the existing 200' R/W (Figure IX-4). The eight-lane section is recommended to be terminated approximately 550' north of Ehrlich, where it would transition (250') to the six-lane section presently programmed for construction. This is because the eight lanes would be needed to provide sufficient intersection capacity at Ehrlich and Dale Mabry (Table V-2).

At Busch Boulevard/Gunn Highway, the existing bridge is already programmed for widening to eight lanes with shoulder and a 22-foot median with barrier (Figure IX-8). However, the two outermost lanes will be utilized as acceleration/deceleration lanes for the loop ramps, leaving six through lanes. Therefore, in the immediate area of the bridge, it would be necessary to drop and add lanes at the off and on ramps, respectively, for both northbound and southbound directions, as part of the eight-laning scenario.

EXISTING BRIDGE TYPICAL SECTION



PROPOSED BRIDGE TYPICAL SECTION

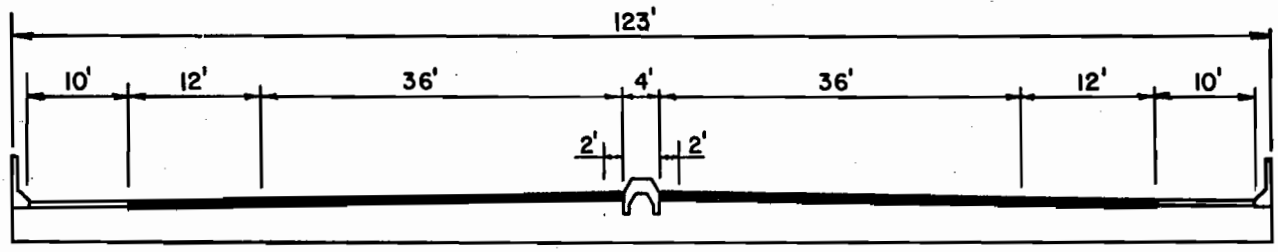


FIGURE IX-7 DALE MABRY BRIDGE OVER HILLSBOROUGH AVE

DALE MABRY HIGHWAY

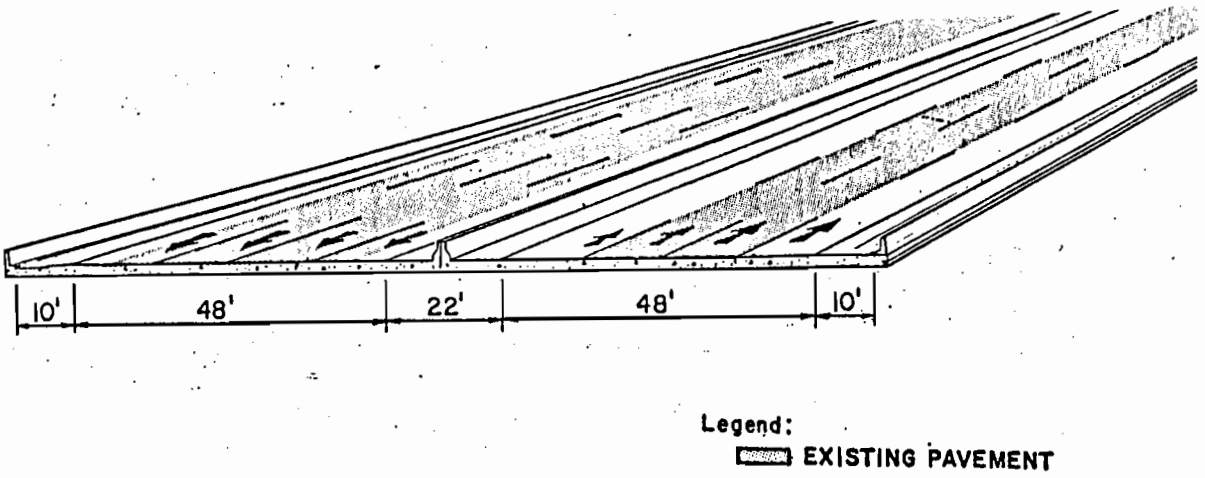


Figure IX-8 - Programmed Bridge Section at Busch Boulevard

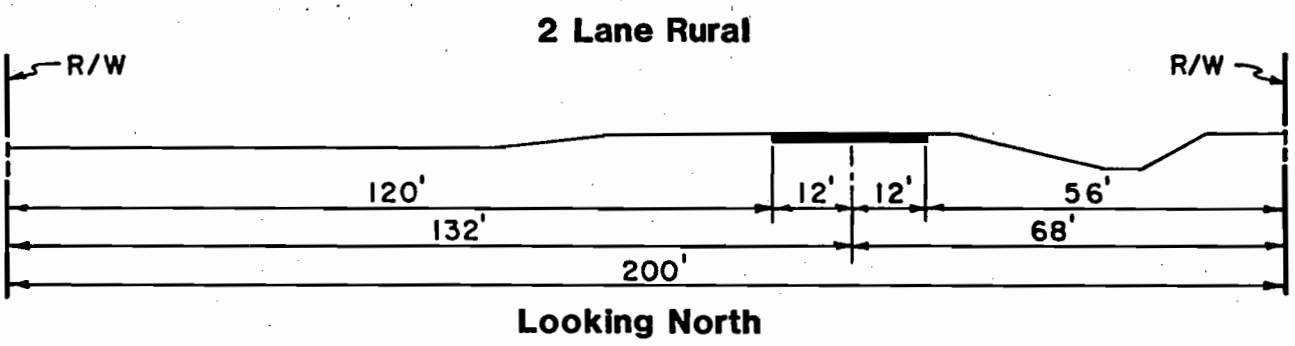
North of Ehrlich to Van Dyke

This segment is part of the six-laning project presently programmed for construction (Figure II-1). Capacity analysis of year 2010 design hour volumes shows that a six-lane arterial will be adequate for this segment. Therefore, no further improvements are recommended at this time.

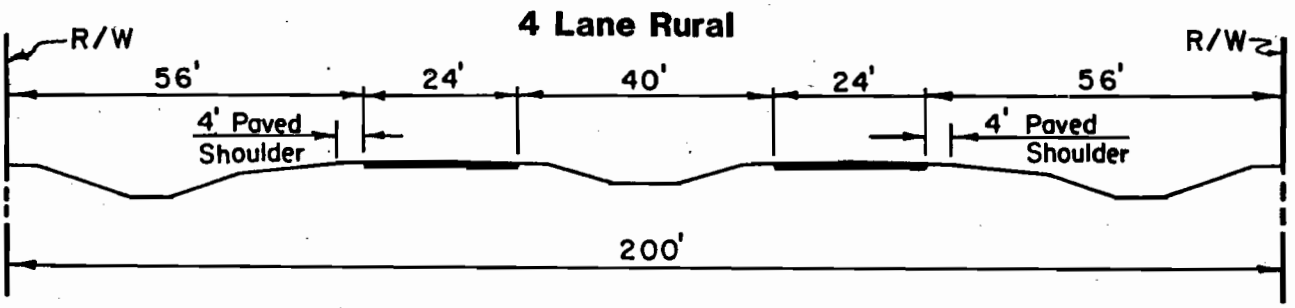
Van Dyke to U.S. 41

This segment of Dale Mabry is currently two-lane rural in a 200' R/W (Figure IX-9). Capacity analysis for year 2010 shows that a four-lane divided highway will be required to adequately handle the projected demand. Two plausible alternatives evaluated for this segment include:

EXISTING TYPICAL SECTION



ALTERNATES CONSIDERED



4- Lane Urban Expandable to 6 Lanes with Two-Way Frontage Roads

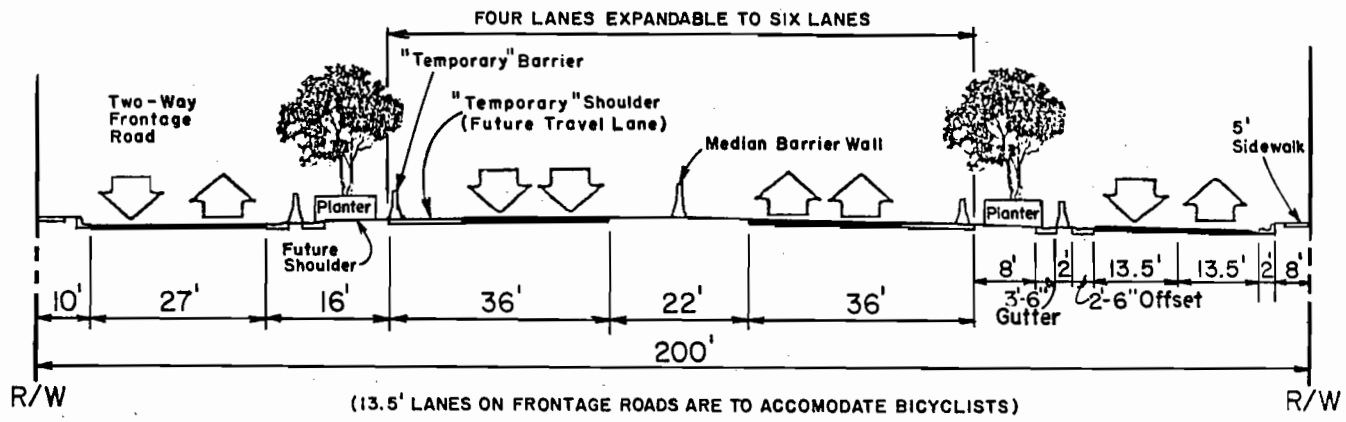


FIGURE IX-9 TYPICAL SECTIONS CONSIDERED: VAN DYKE to US 41

- A four-lane divided rural design (Figure IX-9).
- A four-lane divided urban limited access design with two-lane urban frontage roads on either side (Figure IX-9).

The first alternative would utilize the existing two-lane roadway as the two northbound lanes; a new two-lane roadway would be constructed west of the existing roadway to serve southbound traffic. A minimum four foot paved shoulder would be provided on the outside of each roadway to serve bicyclists.

The second alternative provides a controlled access design. Two-way frontage roads are recommended due to the rural nature and long distances between existing intersections. Two-way frontage roads would minimize the need for future intersections and median crossovers.

Either alternative typical section could be constructed within the existing 200' R/W; however, the second alternative would require R/W acquisition at the intersections of the frontage roads with existing roadways which intersect Dale Mabry, since the frontage roads must intersect these cross streets at a desirable distance of about 600' from Dale Mabry, to avoid severe intersection operational problems which would result from a too-close spacing of intersections.

The costs and impacts of each of these alternatives are included in Section XI along with the results of a benefit-cost analysis.

Major Intersection Options

Major intersection options evaluated (involving at-grade improvements) consist of the "at-grade split diamond" (AGSD) intersection and the "partial at-grade split diamond" intersection (Figure IX-10). Specifically, these were evaluated at the intersection of Dale Mabry Highway and Henderson Boulevard since capacity analysis showed that the intersection would likely be near capacity (LOS E) in 2010 with a six-lane Dale Mabry (Table V-1). The partial AGSD intersection was found to result in an approximate 12-15% reduction in the critical volume sum, making the intersection LOS D in 2010. The partial AGSD would involve splitting only Henderson Boulevard into a limited-length one-way pair and leaving Dale Mabry two-way (Figure IX-11). Although the figure shows a widened Dale Mabry utilizing an eastern alignment, the intersection would operate the same regardless of which side of Dale Mabry were widened.

The additional costs and impacts of this intersection option at Henderson & Dale Mabry are included in Section XI of the report; these costs and impacts represent the incremental difference over and above the six-laning only of South Dale Mabry Highway.

An AGSD intersection was also evaluated for the intersection of Kennedy and Dale Mabry; however, in addition to having probable capacity problems (Table V-1), an AGSD intersection at this location would require the use of residential streets and have major impacts on both residences and businesses. Therefore, it is not considered a plausible alternative at this location.

X. ALTERNATIVES INVOLVING ADDITIONAL GRADE SEPARATIONS

Expressway with Frontage Roads

An expressway alternative was evaluated assuming the southernmost interchange at Kennedy Boulevard and the northernmost interchange at Ehrlich Road (Figure X-1). (The alternative is referred to as an expressway rather than a freeway since there would be traffic signals on Dale Mabry at I-275 and at Cypress Street, as a minimum, and there would be only partial control of access in the segments between Kennedy and Columbus Drive.) The at-grade expressway would have six-lanes on the mainline with two-lane, mostly continuous oneway frontage roads on either side. Typical sections are illustrated in Figure X-2. For those areas where frontage roads are not needed (adjacent to Redlands Training Center north of Columbus Drive and adjacent to Horizon Park between Buffalo and Hillsborough), a paved pathway is recommended to provide continuity for bicyclists and pedestrians. In addition, a paved pathway across the railroad tracks south of Busch Boulevard is also recommended for bicyclists and pedestrians.

Types of existing and proposed interchanges by location are illustrated in Figure X-3. For most of the interchanges, the urban interchange design (with frontage roads) is recommended to minimize the amount of additional R/W required and impacts to businesses (Figure X-4). However, at Columbus Drive, a partial cloverleaf

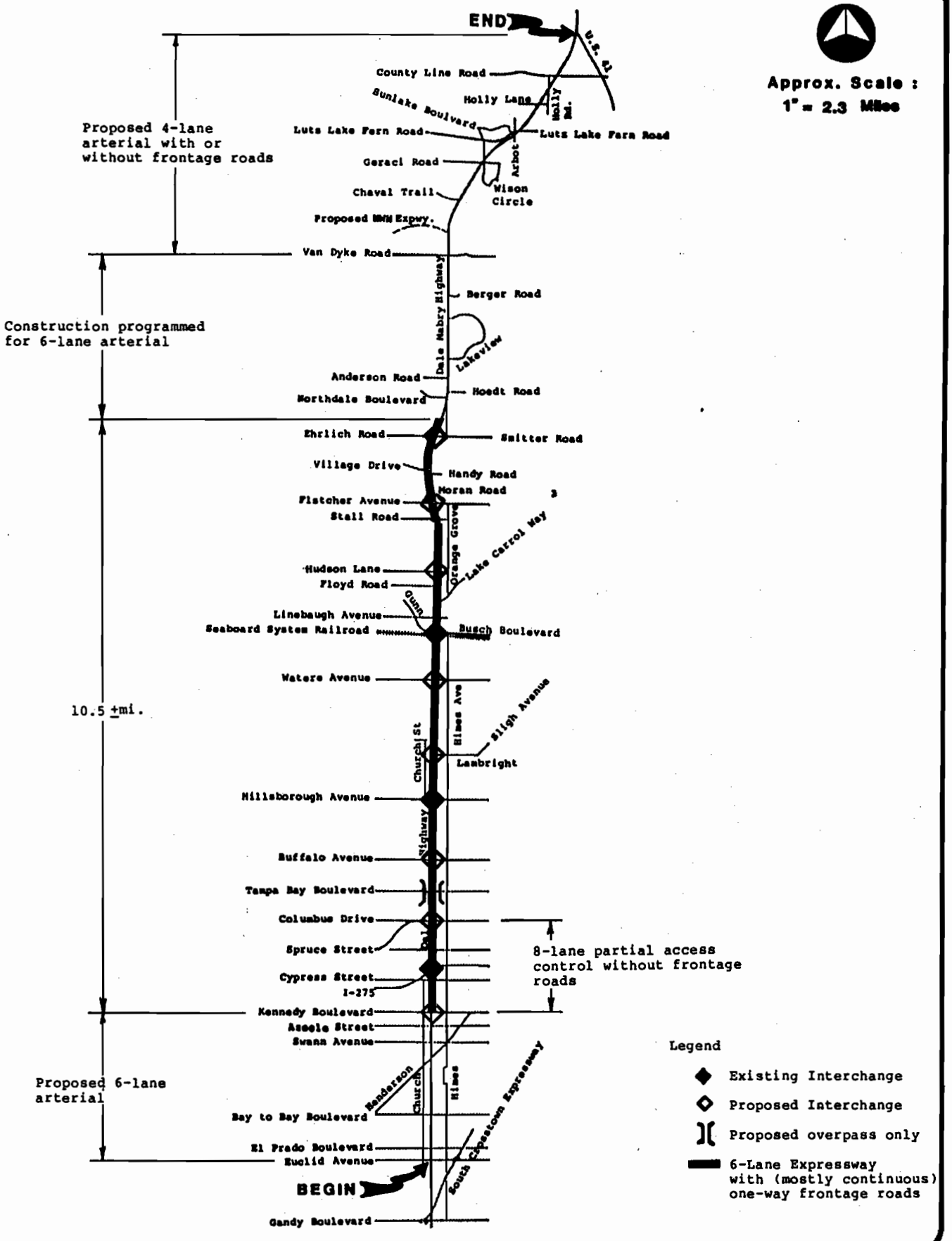
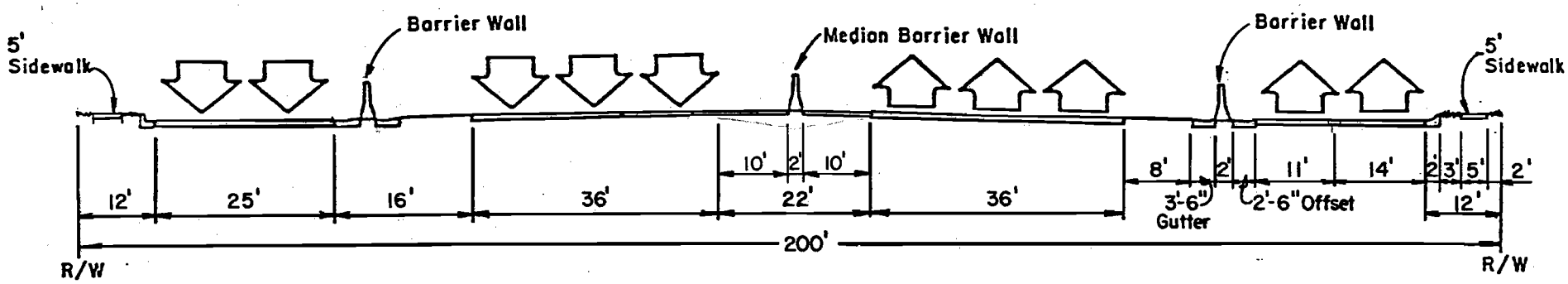
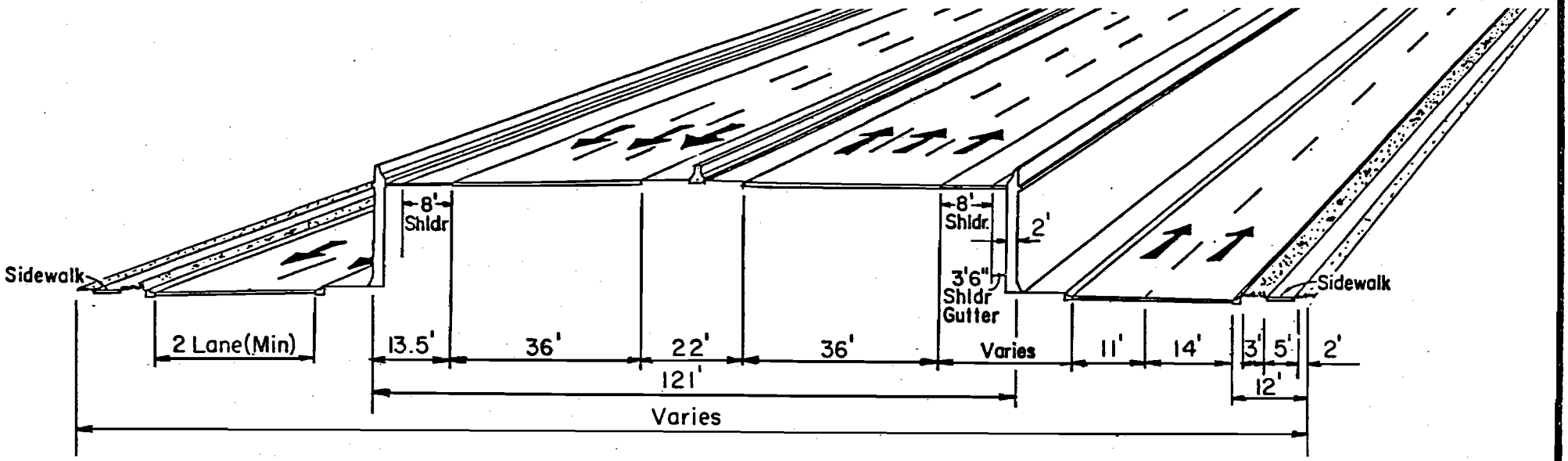


FIGURE X-1 DALE MABRY EXPRESSWAY ALTERNATIVE

DALE MABRY HIGHWAY



6 LANE FREEWAY WITH 2 LANE ONE-WAY FRONTAGE ROADS



TYPICAL CROSS SECTION IN INTERCHANGE AREA

FIGURE X-2 EXPRESSWAY TYPICAL SECTIONS

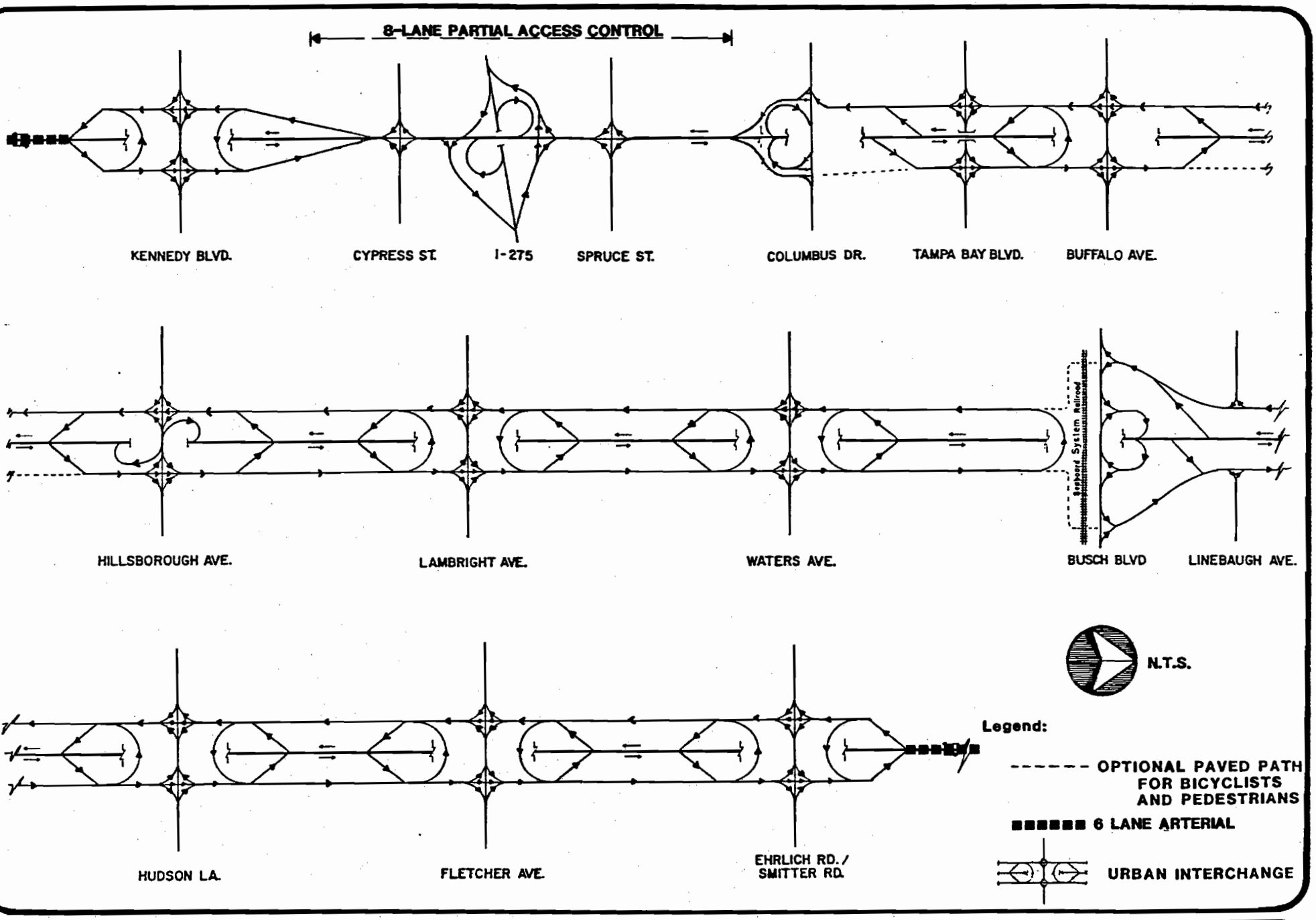
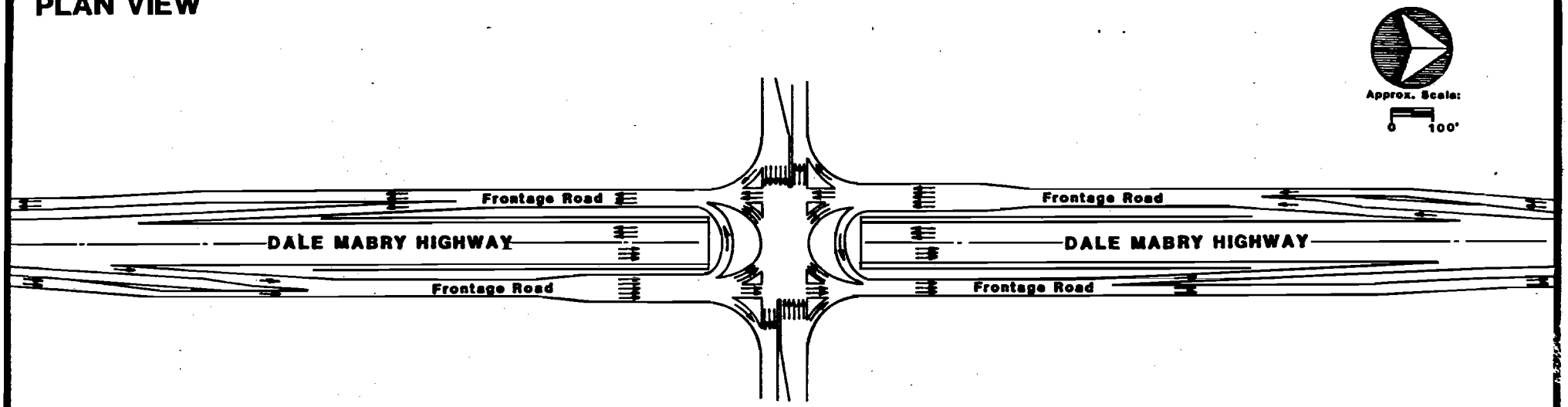


FIGURE X-3 DALE MABRY EXPRESSWAY WITH FRONTAGE ROADS DESIGN CONCEPT

DALE MABRY HIGHWAY

PLAN VIEW



TYPICAL PROFILE

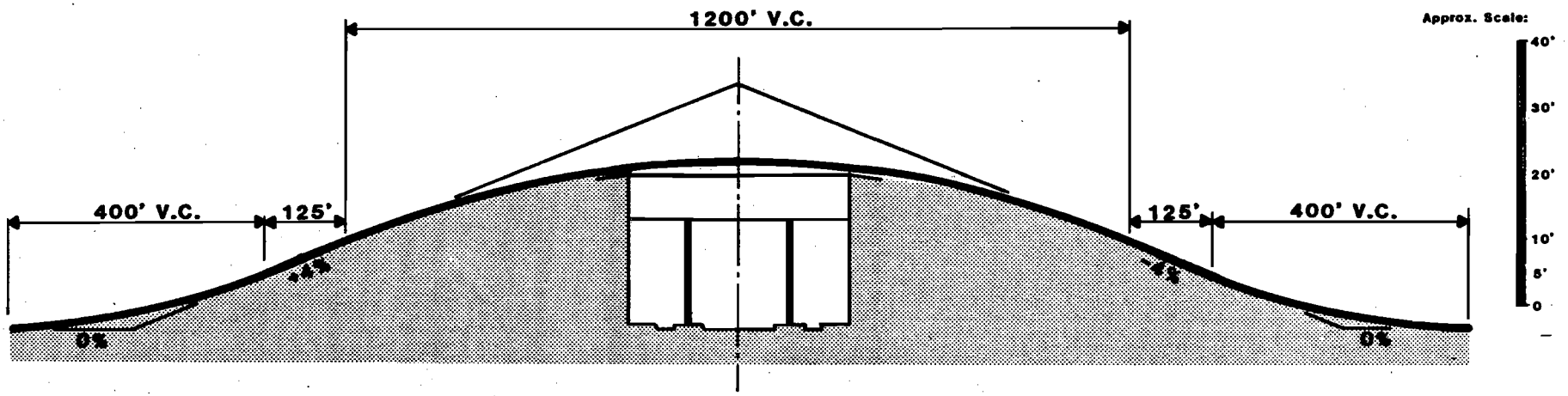
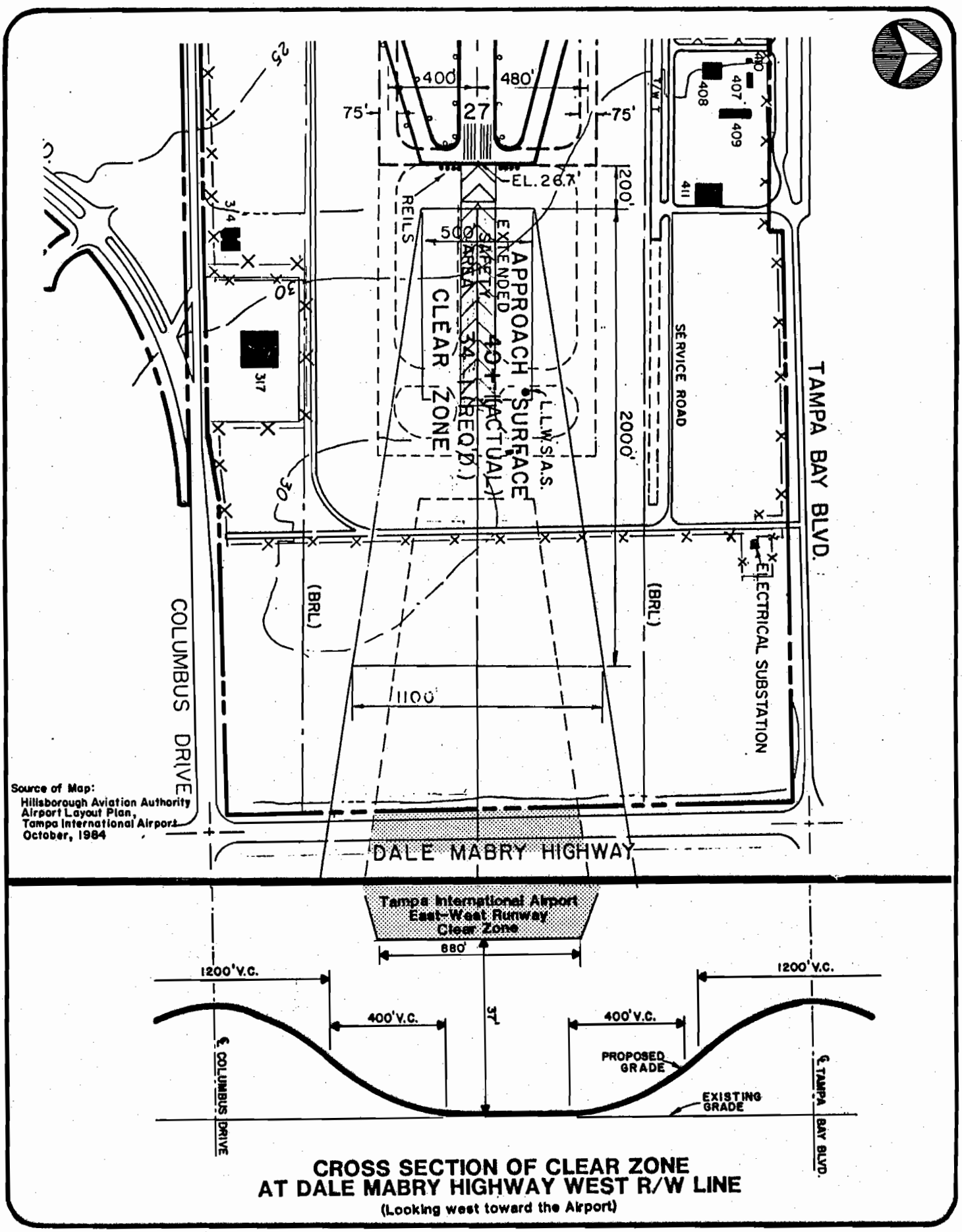


FIGURE X-4 URBAN INTERCHANGE PLAN AND PROFILE

DALE MABRY HIGHWAY

design is recommended to avoid taking any Tampa Aviation Authority land (at Tampa International Airport) and land owned by the Tampa Sports Authority (potential "4(f)" land). At Tampa Bay Boulevard, an overpass is recommended to facilitate access to Hillsborough Community College and parking areas for Tampa Stadium via the frontage roads and Tampa Bay Boulevard. Under this expressway scenario, a total of eight new interchanges would be required plus an overpass at Tampa Bay Boulevard. Average spacing between existing and new interchanges would be about one mile. Overpasses could be constructed at Columbus Drive and at Tampa Bay Boulevard without encroaching on the airport's east-west runway clear zone (Figure X-5).

If an interchange is included at Kennedy and Dale Mabry, widening Dale Mabry on the west side is recommended to avoid major impacts to Tampa Commons on the northeast corner of Dale Mabry and Kennedy. The remaining section of Dale Mabry between the interchanges at Kennedy and at I-275 would be too short to provide frontage roads. However, the existing six-lane typical section could be widened to provide auxillary lanes between the two interchanges to facilitate weaving, resulting in a short eight-lane urban section. This would require some additional R/W acquisition south of Cypress Street beyond that which would be required for an interchange at Kennedy and Dale Mabry. Medial-access-control-only could be provided by the use of a continuous raised median between Kennedy and I-275, except for a break at Cypress Street which would remain an at-grade signalized intersection. The TUATS 2010 plan shows Cypress Street to be a



Source of Map:
Hillsborough Aviation Authority
Airport Layout Plan,
Tampa International Airport
October, 1984

CROSS SECTION OF CLEAR ZONE AT DALE MABRY HIGHWAY WEST R/W LINE
(Looking west toward the Airport)

FIGURE X-5 PLAN AND CROSS SECTION OF AIRPORT RUNWAY CLEAR ZONE
DALE MABRY HIGHWAY

four-lane collector street carrying over 30,000 VPD. Unfortunately it is too close to I-275 to be grade separated from Dale Mabry.

For the section of Dale Mabry between I-275 and Columbus Drive, an eight-lane divided urban section is also recommended here, to provide auxillary lanes for weaving between the two closely spaced interchanges. Frontage roads would not be practical due to the types of interchanges and close spacing. Medial access control is again recommended by the use of a continuous raised island or median barrier. No additional R/W would be required for this section to construct the eight-lane section, other than that required for the interchange at Columbus Drive.

Probable year 2010 mainline levels of service for a six-lane expressway/freeway are given in Table X-1. All mainline sections would operate at level of service (LOS) "C" or better (using K=9% and D=60%). Table X-2 shows the same design hour volumes applied to a four-lane expressway/freeway, for comparison purposes. The capacity of the section of Dale Mabry between Kennedy and Columbus Drive would be constrained due to the need for traffic signals on Dale Mabry at I-275 and at Cypress Street. In addition, a traffic signal is likely to be reinstalled on Dale Mabry at TampaSphere, a large mixed-use development currently under construction on the east side of Dale Mabry, north of I-275. Capacity analysis of the Dale Mabry/I-275 interchange (assuming no widening of the existing structure) reveals that Dale Mabry at the southern ramp intersection would probably be operating at LOS F in 2010. One option which would

Table X-1. YEAR 2010 MAINLINE LEVELS OF SERVICE FOR A SIX-LANE EXPRESSWAY

	AM Peak, D = 60% Southbound			
Segment of Dale Mabry	Mainline DHV	DDHV (D=60%)	Average Volume Per Lane	Mainline Probable L.O.S.
Ehrlich to Fletcher	4970	2980	994	B
Fletcher to Hudson Lane	5850	3510	1170	C
Hudson Lane to Busch	5840	3500	1170	C
Busch to Waters	6660	4000	1330	C
Waters to Lambright	5910	3550	1180	C
Lambright to Hillsborough	6770	4060	1350	C
Hillsborough to Buffalo	6100	3660	1220	C
Buffalo to Columbus Drive	5150	3090	1030	B
Columbus Drive to I-275 (8-lane partial acc. control)	8500	5100	1280	C

Notes: 1. Levels of service based on Table 3-12 of 1985 Highway Capacity Manual, Transportation Research Board Special Report 209, using a 70 mph design speed, 5% trucks, and level terrain.

2. Excludes frontage road traffic, where applicable.

Table X-2. YEAR 2010 MAINLINE LEVELS OF SERVICE FOR A FOUR-LANE EXPRESSWAY

	AM Peak, D = 60% Southbound			
Segment of Dale Mabry	Mainline DHV	DDHV (D=60%)	Average Volume Per Lane	Mainline Probable L.O.S.
Ehrlich to Fletcher	4970	2980	1490	C
Fletcher to Hudson Lane	5850	3510	1760	D
Hudson Lane to Busch	5840	3500	1750	D
Busch to Waters	6660	4000	2000	F
Waters to Lambright	5910	3550	1780	D
Lambright to Hillsborough	6770	4060	2030	F
Hillsborough to Buffalo	6100	3660	1830	E
Buffalo to Columbus Drive	5150	3090	1550	D
Columbus Drive to I-275 (8-lane partial acc. control)	8500	5100	1280	C

Notes: 1. Levels of service based on Table 3-12 of 1985 Highway Capacity Manual, Transportation Research Board Special Report 209, using a 70 mph design speed, 5% trucks, and level terrain.

2. Excludes frontage road traffic, where applicable.

increase the capacity of the I-275 / Dale Mabry interchange would be to construct a semi-direct connection "flyover" ramp for motorists southbound on Dale Mabry wishing to go east on I-275 (Figure X-6). This semi-direct connection could handle approximately 1,600 vehicles per hour (for a single-lane ramp), thereby reducing the volume of traffic needing to make an at-grade left-turn in opposition to northbound motorists on Dale Mabry. The incremental costs and impacts of this option are summarized in Section XI.

Several interchange ramps would likely be over capacity in 2010 unless they are constructed as two-lane ramps. In addition, the at-grade level of several interchanges would likely be over capacity in 2010, particularly where heavy U-turn movements are projected, such as at I-275 and at Columbus Drive. More detailed operational analyses will be performed if the expressway concept is selected as the preferred alternative.

In conjunction with the expressway alternative, the feasibility of using reversible lanes was investigated. A possible typical section for a four-lane expressway with two reversible lanes is shown in Figure X-7. The mainline typical section requires approximately 22 feet more R/W than the six-lane expressway, due to the additional shoulders required. Since a six-lane expressway is projected to operate at LOS C in 2010 (mainline LOS, apart from weaving and merging/diverging) there are no advantages from a capacity standpoint in having four lanes in the peak direction (two regular and two

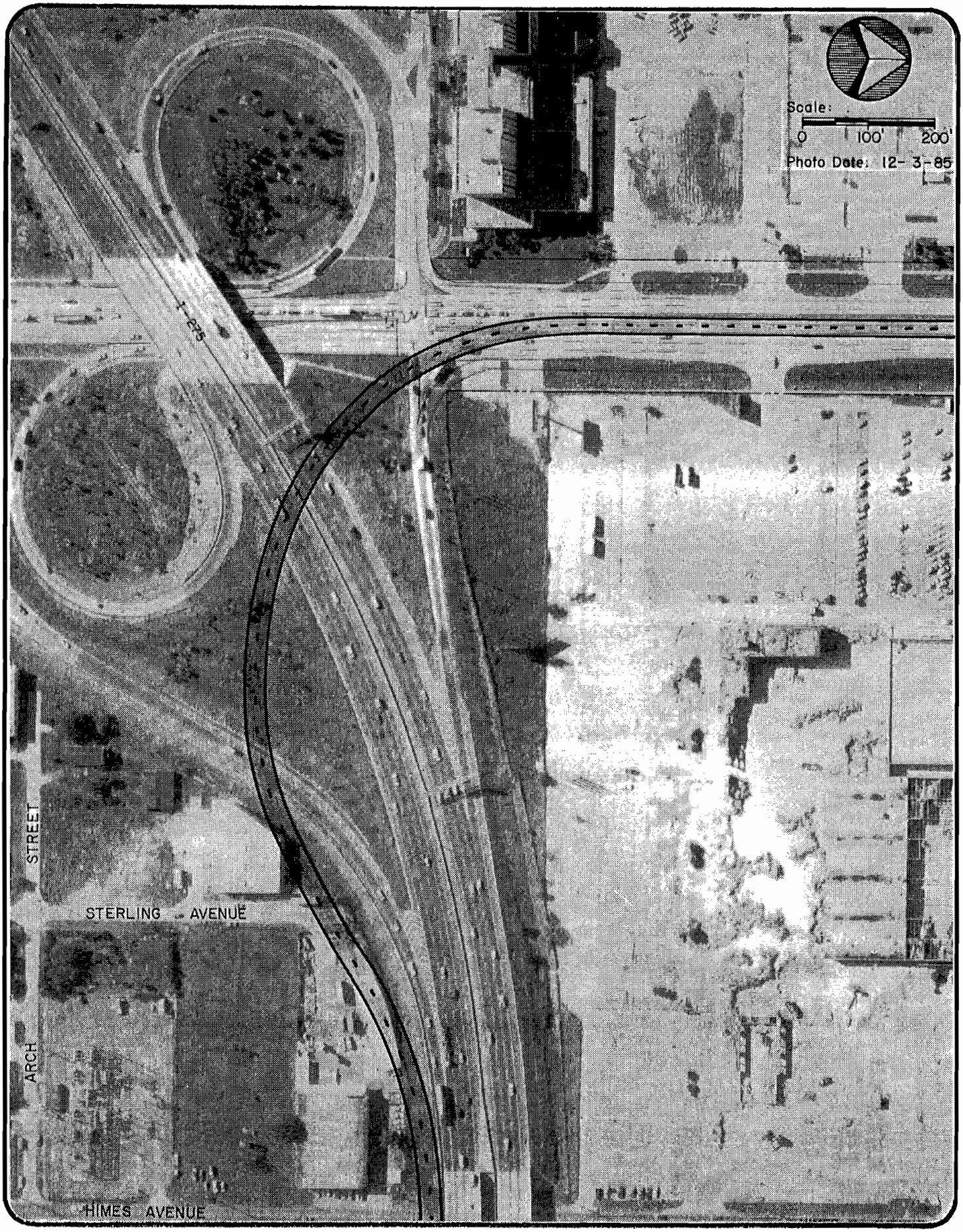


FIGURE X- SEMI-DIRECT CONNECTION AT DALE MABRY / I-275 INTERCHANGE

DALE MABRY HIGHWAY

4-LANE EXPRESSWAY WITH 2 REVERSIBLE LANES

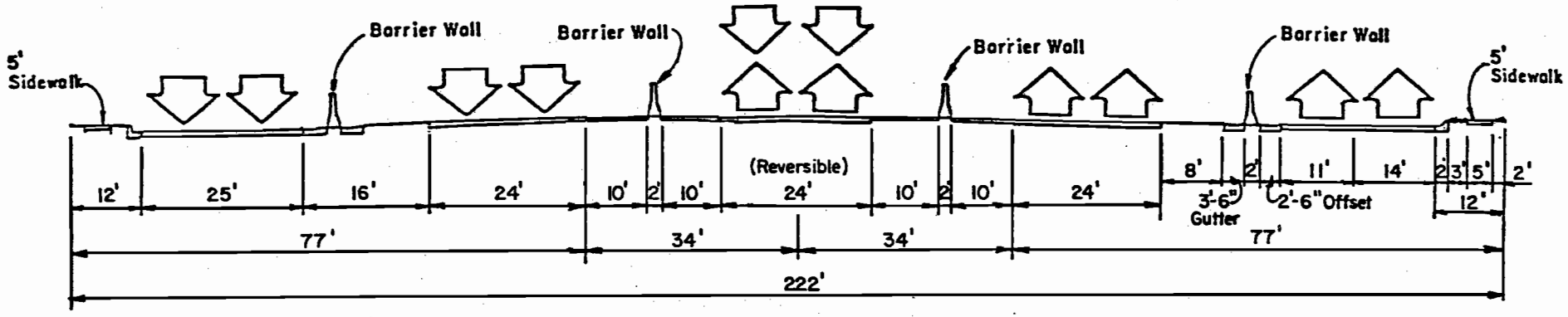


FIGURE X- EXPRESSWAY WITH REVERSIBLE LANES TYPICAL SECTION

DALE MABRY HIGHWAY

reversible). Moreover, in view of the requirements for additional R/W (as compared to the six-lane expressway) as well as the special design treatments required at the transition areas (e.g. multi-level interchanges or 8-lane freeway sections), reversible lanes are not recommended as part of the expressway alternative.

Construction costs, R/W requirements, and relocations are included in Section XI.

Elevated Freeway

According to an analysis of roadside origin-destination survey data, approximately one-half the trips using Dale Mabry Highway have trip lengths in excess of ten miles. These trips are separated herein as "likely users" of an elevated freeway (although it is not known that one-half of Dale Mabry motorists will elect to use it). The remaining trips, with trip lengths less than ten miles, are termed "local" trips. These short local trips are expected to use the existing ground level (Dale Mabry Highway).

Consideration was given to beginning the elevated freeway at I-275; however, the requirement for a multi-level interchange (over an already elevated I-275) in an existing (and proposed) heavily developed area made this cost prohibitive. Then too, there is a need for an interchange at Columbus Drive which is only 0.8 miles north of the I-275 ramps. At Columbus Drive, a partial cloverleaf (parclo AB) with the loops on the south side of Columbus, is required to avoid probable Section 4(f) land (Tampa Sports Authority) and Tampa International Airport lands. Extending the elevated freeway closer to I-275 than the Columbus parclo interchange ramps would further complicate the heavy demand for merging and weaving between close and high traffic volume interchanges. Immediately north of Columbus Drive, an elevated structure would violate the airport runway clear zone.

Due to the proposed extension of the general aviation runway at Tampa International Airport and air navigation clearance requirements (30' above the west right-of-way line on Dale Mabry), the elevated freeway would begin approximately 1100 feet south of Tampa Bay Boulevard and extend 7.9 miles north to Ehrlich Road (Figure X-8). Erlich Road is the northernmost interchange required based on recent traffic projections.

A typical section for the elevated freeway, both mainline and interchange, is shown in Figure X-9. The elevated freeway alternative has four traffic lanes on structure plus additional width for ramps in interchange areas. The mainline elevated structure would be constructed on single columns 100'± apart and located in the existing median where practical.

Interchanges are recommended at Hillsborough Avenue, Busch Boulevard, Fletcher Avenue and at Ehrlich Road. Additional right-of-way will be required at all four interchanges (the required right-of-way width at the physical elevated ramp nose is 250'). Access to the elevated freeway will be by left hand entrance ramps. The elevated freeway alternative will serve sections of Dale Mabry that are currently six-lanes or scheduled for future six-laning. Interchange ramp touchdown on existing Dale Mabry Highway will require realigning existing Dale Mabry traffic lanes to go around the ramps. Additional lanes will be required from the point of ramp touchdown to cross street intersection. Widening will also be required between interchanges where the existing median is less than 22 feet in width

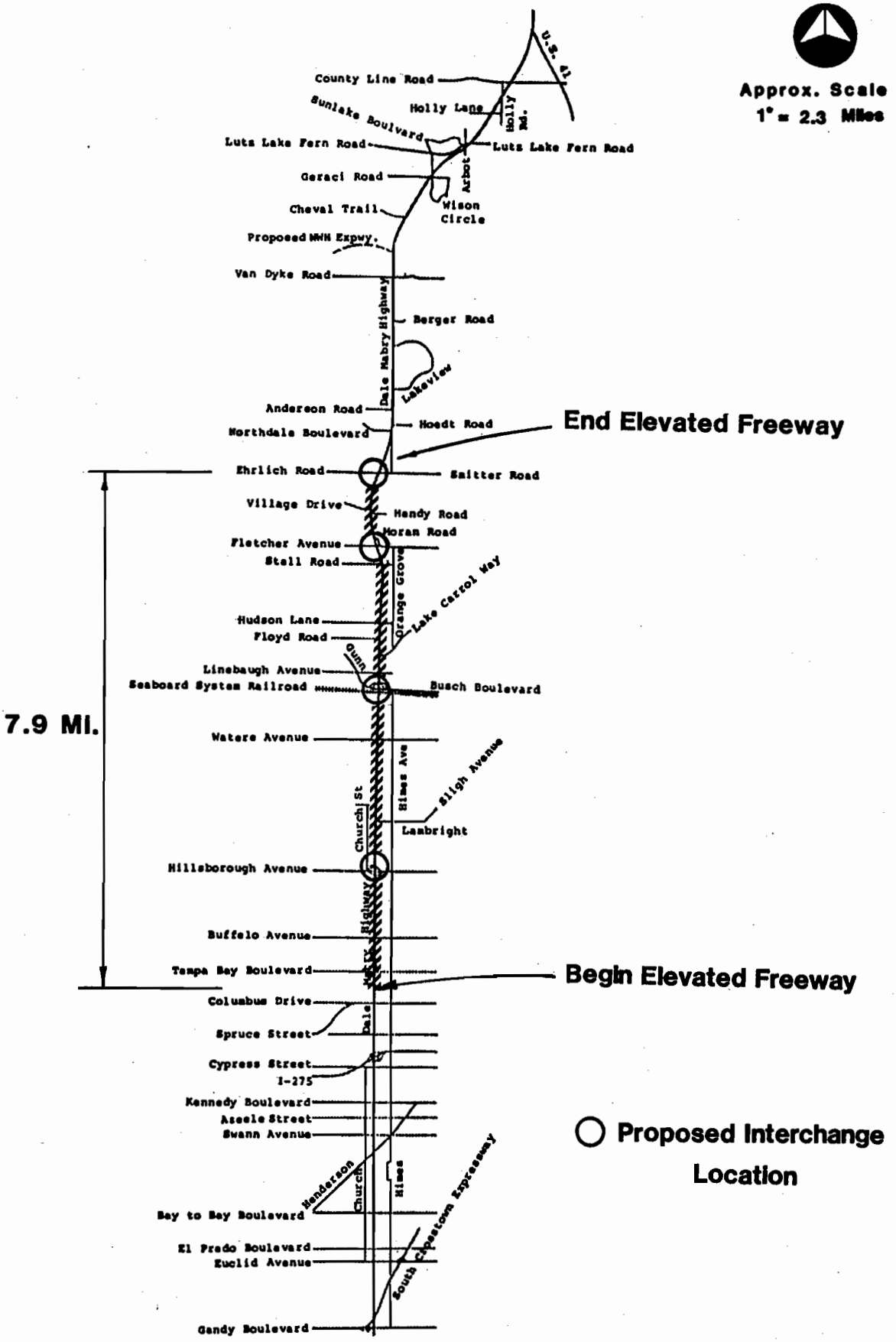
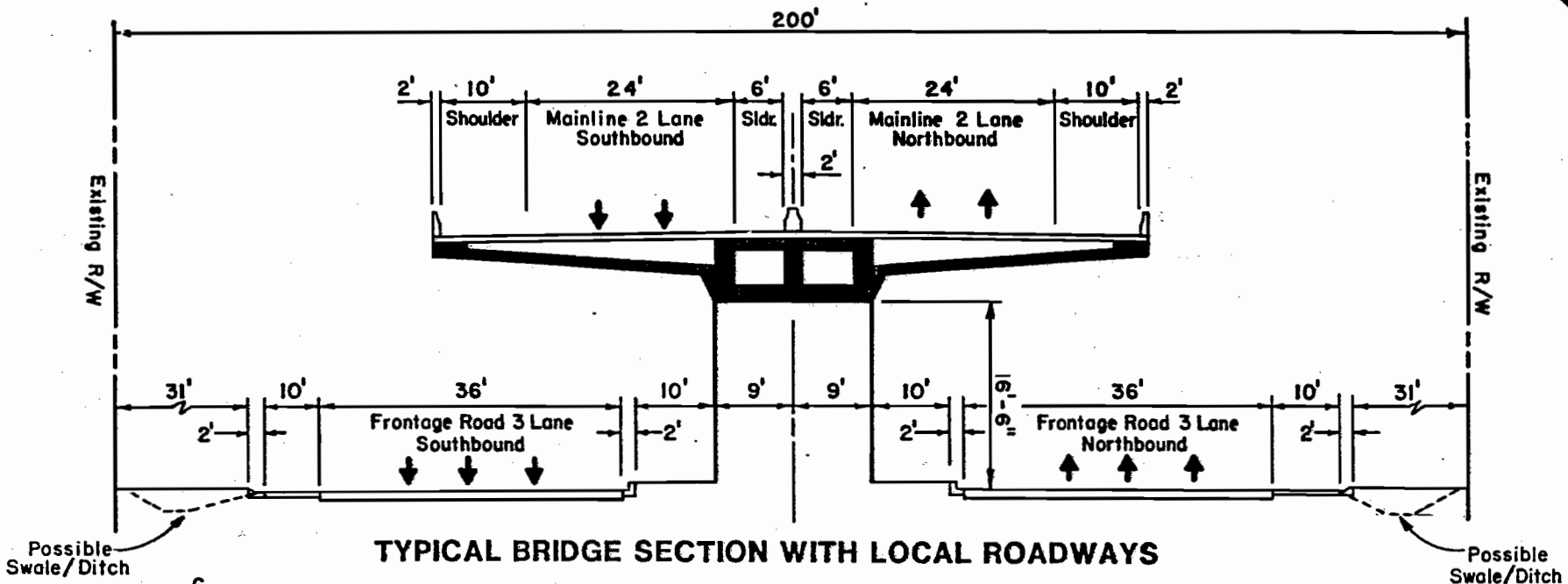
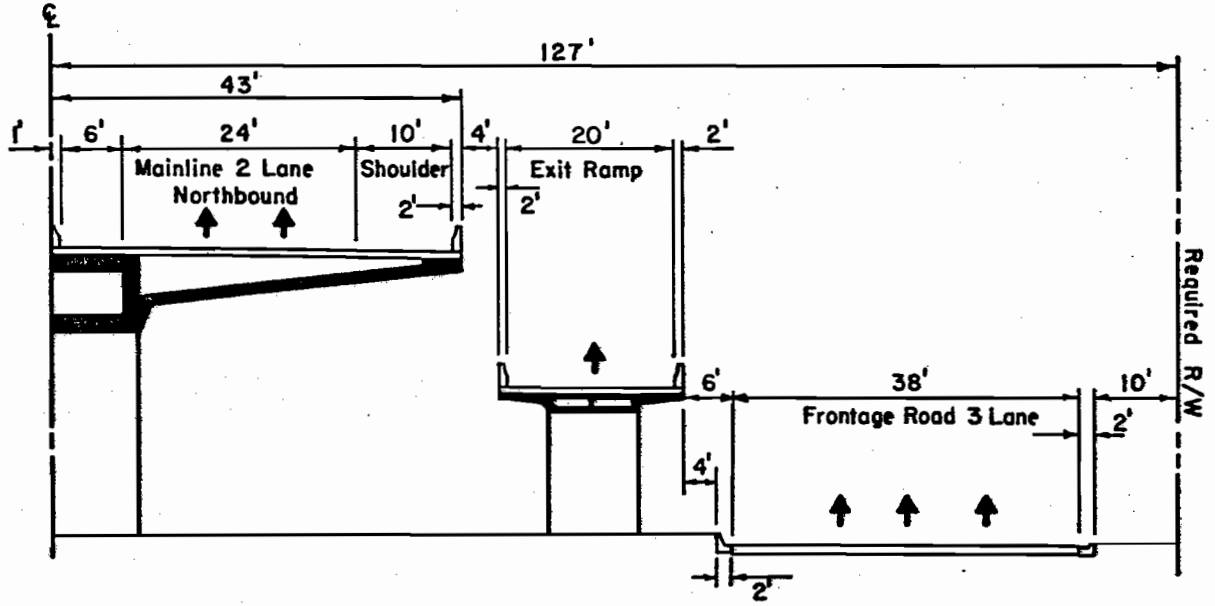


FIGURE X-8 ELEVATED FREEWAY ALTERNATIVE

DALE MABRY HIGHWAY



TYPICAL BRIDGE SECTION WITH LOCAL ROADWAYS



TYPICAL RAMP SECTION WITH LOCAL ROADWAY

Rev. 3-23-87

FIGURE X-9 ELEVATED FREEWAY TYPICAL SECTIONS

DALE MABRY HIGHWAY

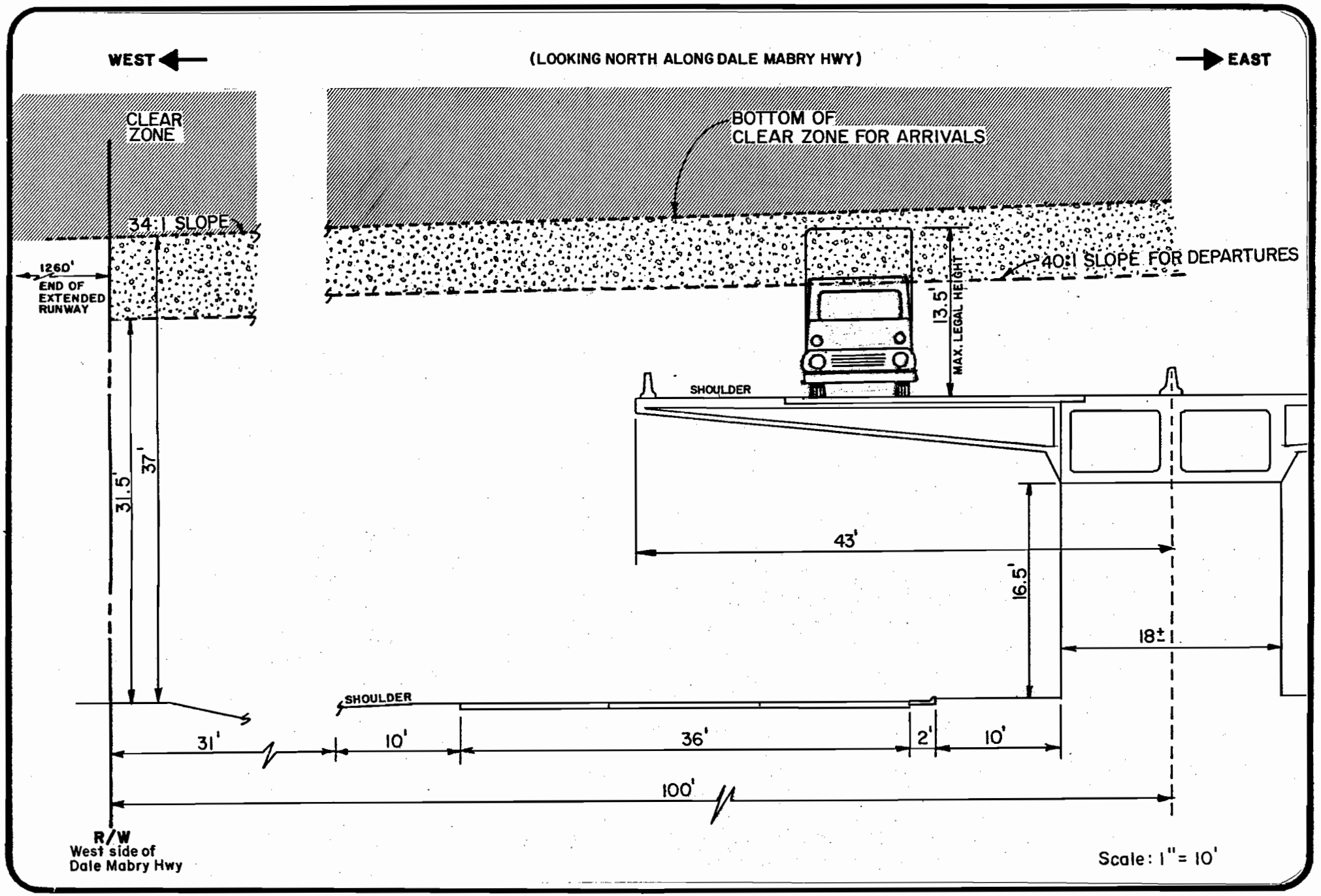


FIGURE X-10 ELEVATED FREEWAY ADJACENT TO TAMPA INTERNATIONAL AIRPORT

DALE MABRY HIGHWAY

and underground drainage will likely be required along existing Dale Mabry throughout the elevated section. Existing Dale Mabry interchanges at Hillsborough Avenue and Busch Boulevard will need to be removed or undergo extensive reconstruction to conform with the geometric requirements of a multi-level interchange. Construction of multilevel interchanges at Hillsborough and Busch would make the elevated freeway even more costly. Therefore, for cost estimating purposes, the existing interchanges were removed and replaced with new two level interchanges.

Capacity calculations show that a four-lane elevated freeway will operate at LOS C under projected year 2010 traffic conditions. A six basic lane at-grade Dale Mabry Highway for local traffic will operate at LOS D (under the same projected year 2010 traffic conditions). Traffic operational problems are likely, however, between ramp touchdown and cross street intersections due to heavier traffic concentrations (few interchanges) and attendant weaving problems.

Elevated freeway construction costs, including mainline plus interchange ramp costs (superstructure and substructure) and required improvements to Dale Mabry total an estimated $202 million (for 7.9 miles). Interchange construction, which requires widening Dale Mabry, would displace 13 businesses and cost an estimated additional $20 million for right-of-way (including property owner appraisals, staff support, administrative and legal costs and relocation assistance (Table XI-2). The total cost is estimated at $222 million for

this 7.9 mile section, or an average per mile cost of $28 million. This does not include additional drainage improvements on Dale Mabry between interchanges.

As shown in Table XI-2, for the elevated freeway, there is a $17.5 million savings in right-of-way cost over the expressway alternate for comparable sections (the 7.9 mile length of the elevated freeway). However, construction costs for the elevated freeway are more than twice those of the expressway alternative and total costs (right-of-way and construction) are 69 percent greater for the elevated freeway.

There are a number of design schemes that could be used for elevated freeway construction. The design scheme selected for the Dale Mabry corridor was the "spine-wing" design tested and used in Texas. Construction costs vary by $10± per square foot depending on foundation conditions and design scheme. Consequently, similar studies for elevated structures in the Tampa Bay Region and other areas were reviewed. A comparison of costs used in these studies versus those used herein is shown in Appendix B. The costs used on the Dale Mabry elevated freeway are comparable to those used by others for comparable facilities.

The aforementioned similar studies by others were also reviewed for column widths required for single column elevated structure construction. T.Y. Lin International analyzed various design schemes and recommended a ten foot wide concrete column to support a "spine-wing" design superstructure width of 58 feet. Greiner Engineering,

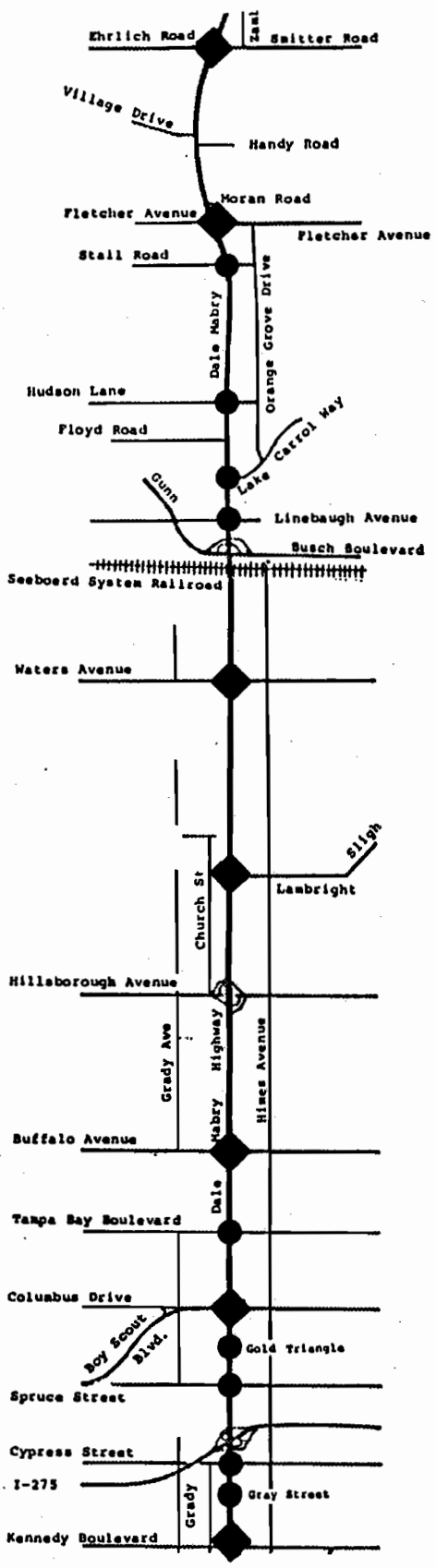
Inc., based on double deck concepts they prepared for use in Texas, used an 18 foot wide concrete column to support an 84 foot wide superstructure. An 18 foot wide column was used herein to support an 86 foot wide superstructure. The width of the column is a function of the construction materials used. With more reinforcement steel in the columns, the column widths would likely be narrower (and more costly). Column design was beyond the scope of this study. The 18 foot column width used is comparable to column widths used elsewhere on similar facilities.

Due to the estimated high construction cost and the attendant traffic operational problems produced on Dale Mabry between ramp touchdown and cross street intersection, the elevated freeway is not considered to be a viable alternative for Dale Mabry Highway. Therefore, it is recommended that the elevated freeway alternative be dropped from further consideration.

Adding Interchanges Only to Six-Lane Dale Mabry

This alternative would involve adding interchanges only (without continuous frontage roads) to the existing and programmed-for-construction six-lane divided Dale Mabry Highway, between Kennedy Blvd. and Ehrlich Rd., inclusive (Figure X-10). The only costs involved would be the construction of the interchanges themselves, including the ramps and the approaches to the structure plus the costs of interchange right-of-way where required. Using the locations shown in Figure X-10 and the same types of interchanges recommended in the expressway alternative, the cost would be about $75 million (1985 dollars), or about 43% of the cost of the Dale Mabry expressway alternate (between DeLeon and Ehrlich). This alternative is consistent with that shown in the TUATS 2010 plan.

Operationally, there would be major problems associated with this alternative. While year 2010 DHV's are not available for most of the minor signalized intersections, where volumes are available, all of the intersections would be operating over capacity (LOS F), as shown in column 2 of Table X-3. Access to and from businesses fronting Dale Mabry would be very difficult due to the high traffic volumes, and motorists on minor cross streets would have major difficulty finding acceptable gaps to cross or turn onto Dale Mabry. Due to the lack of access control and projected heavy volumes, there would likely be a high accident rate as well.



Approx. Scale :
1" = 1.1 Miles

Legend

◆ Possible Location for New "Arterial Interchange"

● At-grade signalized intersections

FIGURE X-10 ADDITIONAL INTERCHANGES ONLY ALTERNATIVES

DALE MABRY HIGHWAY

Table X-3.- PROBABLE LEVELS OF SERVICE FOR ADDING INTERCHANGES ONLY ALTERNATIVES

(1) Remaining Signalized Intersections	(2) Year 2010 Probable Intersection Levels of Service (AM/PM)** 6-LD Dale Mabry	(3) 8-LD Dale Mabry
Stall Rd.	*	*
Hudson Lane	*	*
Lake Carrol Way	*	*
Linebaugh	F/F	F/F
Tampa Bay Blvd.	F/F	E/D
Gold Triangle	*	*
Spruce.	F/F	F/F
Cypress	F/F	E/E
Gray.	*	*

*Year 2010 DHV unavailable
**Based on Himes being 4-lane divided and construction of the proposed NWH Expressway

Due to the capacity restrictions created by the signalized intersections as well as the probable operational and safety problems, this alternative is not considered to be a viable one, and it is recommended it be dropped from further consideration.

Adding Interchanges Only to An Eight-Lane Dale Mabry

This alternative is similar to the previous one except that it would require the entire reconstruction of Dale Mabry to an eight-lane arterial (between Kennedy and Ehrlich) as well as the construction of interchanges (at the same locations pictured in Figure X-10). The total cost of this alternative would be about $118 million, or 68% of the cost of the expressway-with-frontage-roads alternative (between Kennedy and Ehrlich). The probable levels of service for the remaining at-grade signalized intersection in year 2010 are given in Table X-3, column 3. Despite the additional capacity created by two additional lanes on Dale Mabry, all of the intersections would be operating at level of service E or F.

Due to the probable poor operating conditions and high accident rate, this alternative is also considered to be a nonviable alternative for improving the capacity of the Dale Mabry corridor.

XI. COMPARISON AND EVALUATION OF ALTERNATIVES

Introduction

Capacity analysis of year 2010 projected design hour volumes (DHV) has indicated that, for some segments of Dale Mabry Highway, conventional roadway widening to provide additional through lanes will provide sufficient additional capacity to handle the projected demand. Specifically, between Euclid Ave. and Kennedy Blvd., providing a six-lane typical section will be sufficient, in general, with the probable need for major intersection options (e.g. at-grade split diamond or urban interchange) at Henderson Blvd. and at Kennedy Blvd. by the year 2010 (Table V-1). For the segment between Kennedy and north of Fletcher, widening Dale Mabry to an eight-lane arterial will <u>not</u> provide sufficient additional capacity to handle the projected year 2010 DHV (Table V-2). For the segment between north of Ehrlich and Van Dyke, the six-laning of Dale Mabry (already programmed for construction) should provide sufficient capacity through the design year 2010 (assuming construction of the NWH Expressway). For the segment of Dale Mabry between Van Dyke and U.S. 41, widening to a four-lane divided roadway should also provide sufficient capacity through 2010.

Alternative alignments, where applicable, are discussed for the above multilaning alternatives. Following this discussion, other alternatives involving grade separations are compared with the eight-lane alternative for the central portion of the Dale Mabry

study area, between roughly Kennedy and Fletcher (the segment for which an eight-lane arterial will not provide sufficient capacity in 2010).

Multilaning Alignment Alternatives

Table XI-1 gives the costs and impacts of the various alignment alternatives for the multilaning improvement options. Additional R/W required for stormwater detention/treatment ponds is listed separately for each segment. For the 6-lane urban (110' R/W) segment between Euclid and Kennedy, taking additional R/W on the west side only would minimize the R/W (and total) costs, and therefore, a western alignment is the recommended option. Of the $30.0 million required for widening (including stormwater detention costs) approximately 73% of the costs would be for R/W and relocation. (If an urban interchange is eventually constructed at the intersection of Kennedy & Dale Mabry (with a north-south overpass), a western alignment would also minimize damages to Tampa Commons and avoid damages to the American Legion Cemetery on the south side of Kennedy, east of Church Avenue). At the intersection of Dale Mabry and Henderson, a partial at-grade-split diamond intersection (Fig. IX-II) is recommended for consideration in addition to the six-laning of Dale Mabry to alleviate the capacity restriction at the intersection (Table V-1). The additional costs and impacts of this option are included in Table XI-1.

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TABLE XI-1 DALE MABRY HIGHWAY ARTERIAL WIDENING ALTERNATIVE

COST & IMPACTS

R = Recommended Subalternate

Segment	Side Widened	Cross Section & (Min. R/W Req'd)	Length (Mi.)	New R/W (acres)	Displacements				ESTIMATED COST (In Millions of 1986 Dollars)		
					Res.	Bus.	NPO**	Totals	R/W	Constr.	Total
Euclid-Kennedy*	West	6 LD Urban (110')	2.5	8.7	6	82	-	88	18.9	8.0	26.9 R
	East	6 LD Urban		8.7	9	78	1	88	22.0	8.0	30.0
	Symmetrical	6 LD Urban		8.7	6	56	1	63	20.7	8.0	28.7
	Combination	6 LD Urban		8.7	4	72	-	76	19.6	8.0	27.6
	Partial AGSD Option		--	(1.0)	-	(3)	-	(3)	(2.4)	(1.3)	(3.7)
	Stormwater Detention			4.0	-	10	-	10	3.1	-	3.1
					Western Alignment Totals w/ Stormwater Ponds			98	22.0	8.0	30.0

* Includes widening both Henderson Blvd. approaches at Dale Mabry to provide dual-left turn lanes.
Includes widening north and south approaches at Kennedy Blvd. to provide dual-left turn lanes.
Excludes any widening on Kennedy Blvd. at Dale Mabry.

**NPO = Non-Profit Organization

TABLE XI-1 DALE MABRY HIGHWAY ARTERIAL WIDENING ALTERNATIVE

COST & IMPACTS

R = Recommended Subalternate

Segment	Side Widened	Cross Section	Length (Mi.)	New R/W (acres)	Displacements			ESTIMATED COST (in Millions of 1985 Dollars)		
					Res.	Bus.	NPO*	R/W	Constr.	Total
Euclid-Kennedy	West	6 LD Urban	2.5	8.7	6	82	-	15.5	6.4	21.9 R
	East	6 LD Urban		8.7	9	78	1	18.3	6.4	24.7
	Symmetrical	6 LD Urban		8.7	6	56	1	17.1	6.4	23.5
	Combination	6 LD Urban		8.7	4	72	-	16.1	6.4	22.5
	Partial AGSD Option		—	(1.0)	-	(3)	-	(2.2)	(1.3)	(3.5)
	Stormwater Detention			7.0	25	1	-	5.7	-	5.7
Kennedy-Cypress	West	8 LD Urban	0.5	1.1	-	6	-	2.3	1.3	3.6
	East	8 LD Urban		0.6	-	1	-	1.3	1.3	2.6
	Symmetrical	8 LD Urban		0.8	-	3	-	1.9	1.3	3.2
	Combination	8 LD Urban		0.7	-	4	-	1.6	1.3	2.9 R
	Stormwater Detention			1.5	-	1	-	0.7	-	0.7
Cypress-Columbus	Symmetrical	8 LD Urban	1.0	-	-	-	-	-	2.6	2.6
	Stormwater Detention			5.9	-	2	-	4.1	-	4.1
Columbus-Buffalo	Symmetrical	8 LD Urban	1.0	-	-	-	-	-	3.9	3.9
Buffalo-Hillsborough	Symmetrical	8 LD Combin. Urb.-Rural	1.0	-	-	-	-	-	3.0	3.0
Hillsborough Ave. Bridge Widening			-	-	-	-	-	-	0.4	0.4
Hillsborough-Waters	Symmetrical	8 LD Urban	2.0	-	-	-	-	-	5.8	5.8
Waters-Busch	Symmetrical	8 LD Urban	0.8	-	-	-	-	-	3.1	3.1
	Stormwater Detention			2.8	-	-	-	1.1	-	1.1

TABLE XI-1 DALE MABRY HIGHWAY ARTERIAL WIDENING ALTERNATIVE (Continued)

COST & IMPACTS

R = Recommended Subalternate

Segment	Side Widened	Cross Section	Length (Mi.)	New R/W (acres)	Displacements			ESTIMATED COST (in Millions of 1985 Dollars)		
					Res.	Bus.	NPO*	R/W	Constr.	Total
Busch-Fletcher	Symmetrical	8 LD Urban	2.0	-	-	-	-	-	8.2	8.2
	Stormwater Detention			9.1	-	1	-	5.5	-	5.5
Fletcher-Ehrlich		8 LD Urban	1.4	-	-	-	-		4.6	4.6
	Stormwater Detention			8.0	1	-	-	5.5	-	5.5
Ehrlich-Van Dyke		6 LD Rural	3.0	-	-	-	-		**	**
Van Dyke - U.S. 41		4 LD Rural	4.6	-	-	-	-	-	7.5	7.5 R
		4 LD Urban w/Frt. Rds		2.0	-	-	-	0.5	26.6	27.1
Subtotals	West		19.8	9.8-12.8	6	88-91	0	$17.8-20.5	$46.8-67.2	$64.6-87.7
	East			9.3-12.3	9	79-82	1	19.6-22.3	46.8-67.2	66.4-89.5
	Symmetrical			9.5-12.5	6	59-62	1	19.0-21.7	46.8-67.2	65.8-88.9
	Combination			9.4-12.4	4	76-79	0	17.7-20.4	46.8-67.2	64.5-87.6
	Total Stormwater Detention			34.3	26	5	0	$22.6	-	$22.6
Totals w/Stormwater	West			44.1-47.1	32	93-96	0	40.4-43.1	46.8-67.2	87.2-110
	East			43.6-46.6	35	84-87	1	42.2-44.9	46.8-67.2	89.0-112
	Symmetrical			43.8-46.8	32	64-67	1	41.6-44.3	46.8-67.2	88.4-111
	Combination			43.7-46.7	30	81-84	0	40.3-43.0	46.8-67.2	87.1-110

*nonprofit organization (NPO) consists of a Methodist Church on the east side
**this segment is already programmed for 6-laning within the current 5-year work program

For the segment of Dale Mabry between Kennedy Blvd. and Cypress St., (directly south of I-275) widening on the east side (8 LD urban, 134' R/W) would result in fewer relocations than the west-side widening and lower cost; however, any widening improvement would have to match the typical section north of Cypress St. (resulting in an approximately centered alignment at that end) and whatever typical section is constructed on Dale Mabry south of Kennedy. Therefore, due to the short length of this segment (0.5 mi.) and the need to match future typical sections on either end, a combination alignment is recommended for this segment (transitioning from the westerly alignment south of Kennedy to a centered alignment at Cypress St.).

The segment of Dale Mabry between Cypress St. and Spruce St. (which includes the I-275 interchange) is currently programmed for widening improvements (including widening and signalization of the ramps) within the current 5-year work program. Only a small additional amount of widening would be required (on the north end of this segment on the west side) to provide a full 8-lane divided typical section on either side of the I-275 interchange. No additional R/W would be required. (Major reconstruction of the existing interchange would be required to avoid having to drop through lanes at the interchange, including widening underneath the overpass structure and reconstruction of the loop ramps. Interchange reconstruction to widen Dale Mabry is not recommended.)

The segment of Dale Mabry between Spruce St. and Columbus Dr. could be widened to an 8-lane divided urban section within the existing R/W; the construction cost is approximately $2.6 million excluding additional R/W for stormwater detention (Table XI-1). (Due to the need to convert from a mostly rural to an urban section, it would not be feasible to simply widen the existing six-lane pavement.)

The segment of Dale Mabry between Columbus Drive and Buffalo could also be widened to an 8-lane urban typical section within the existing R/W, at a cost of about $3.9 million. (Due to the existing rural type cross section, it would not be feasible to simply widen the existing pavement).

The segment of Dale Mabry between Buffalo and Hillsborough Avenue could be widened to an 8-lane combination urban-rural typical section within existing R/W, at a cost of about $3.0 million. The existing ditch on the east side of Dale Mabry would be used for stormwater detention and treatment. The west side would have curb and gutter.

Under this 8-laning scenario, it would be necessary to widen the existing bridge over Hillsborough Avenue to accommodate six through lanes plus acceleration and deceleration lanes for the loop ramps (Figure IX-7). The outermost lanes of the 8-lane typical section would be dropped at the Hillsborough Avenue interchange between the off and on ramps for each direction; otherwise, the entire interchange would have to be reconstructed with larger radii ramps. The

estimated cost of adding two lanes to this structure as well as 10' shoulders (structure widening only) is approximately $400,000 (1985 dollars).

The segment of Dale Mabry between Hillsborough and Waters is currently programmed to be widened to a six-lane urban section within the existing variable-width R/W (140'-190'). This six-lane section could be widened to eight-lanes within the existing R/W by utilizing a 16' raised median (Figure IX-6). The 16' median will provide sufficient width for left turn lanes with a 4' wide separator for safety and appropriate traffic signs. The estimated cost of this construction is about $5.8 million. The to-be-constructed 6-lane urban pavement could be widened on each side to provide eight through lanes.

The segment of Dale Mabry between Waters Avenue and Busch Boulevard/ Gunn Highway is currently programmed to be widened to a six-lane rural typical section within the existing 200' R/W. This could be reconstructed to an 8-lane urban arterial within existing R/W at a cost of approximately $3.1 million, excluding stormwater detention costs. However, the two outermost lanes of the 8-lane section would have to be dropped in the vicinity of the bridge over Busch Boulevard in order to match the programmed-for-construction typical section for the bridge, which consists of six through lanes plus acceleration and deceleration lanes for the loop ramps (Figure IX-8).

The segment of Dale Mabry between Busch Boulevard/Gunn Highway and Van Dyke is also currently programmed to be widened to a six-lane rural typical section within the exisitng 200' R/W. The portion of this segment between Busch Blvd. and several hundred feet north of Ehrlich could be reconstructed to an 8-lane urban typical section within the existing 200' R/W at an approximate cost of $12.8 million excluding stormwater detention costs (Table XI-1).

Beginning 500'± north of Ehrlich, the 8-lane section would transition (250') to the programmed-for-construction 6-lane rural section. From that point to Van Dyke, the 6-lane typical should be adequate through year 2010 from a capacity standpoint.

Dale Mabry between Van Dyke and U.S. 41 is presently 2 lane rural in a 200' R/W; no improvements are currently programmed. A four-lane arterial will be required by 2010 to handle the projected traffic demand. Two alternative cross sections were evaluated: a four-lane rural typical section and a four-lane urban typical section with two two-lane urban frontage roads on either side. The lower accident rate expected with the urban accesscontrolled design with frontage roads is insufficient to justify the additional $21 million in R/W and construction costs; see benefit/ cost analysis in Appendix C. Therefore, the four-lane rural typical section is recommended between Van Dyke and U.S. 41. The total cost for this segment would be approximately $7.5 million (Table XI-1).

Comparison of Alternatives for the Central Portion of Dale Mabry

This section compares three plausible alternative design concepts for the central portion of Dale Mabry, between Kennedy Boulevard and Ehrlich Road. The three design concepts are the 8-laning alternative, the expressway-with-frontage-roads alternative, and the elevated freeway ("double deck") alternative.

The 8-laning alternative has been discussed in detail on a segment-by-segment basis; the costs and impacts were previously given in Table XI-1. For either the expressway or elevated freeway concept to work, additional system improvements would be required both north and south of the expressway or elevated freeway limits, for the corridor as a whole to function property. Table XI-2 compares the latter two alternatives on a system basis, by including the six-laning or four-laning improvements required in conjunction with either alternative. Compared on a total 20-mile± system basis, the "expressway-with-frontage-roads plus" alternate (including all of the options mentioned in the Table) totals $230 million versus $320 million for the "elevated freeway plus" alternate. Total displacements for the "expressway system plus" alternate are approximately 214 homes and businesses, versus 192 homes and businesses for the "elevated freeway plus" alternate. (This difference is largely due to the fact that the elevated freeway scenario includes only four interchanges, while the expressway includes eight new interchanges.) Of the total 214 displacements for the "expressway plus" alternate, approximately 53% of these would occur in the southernmost 2-mile

TABLE XI-2 DALE MABRY CONTROLLED ACCESS ALTERNATIVES COSTS AND IMPACTS

Segment	Improvement Type	Length (mi.)	Additional R/W Req'd (acres)		Displacements of Residences, Businesses, & N.P. Organiz.						Est. Costs (Millions 1985 Dollars)					
					Exprwy.			Elevated			Expressway			Elevated		
			X-way	Elev.	R	B	NPO	R	B	NPO	R/W	Const.	Total	R/W	Const.	Total
Euclid Ave. - DeLeon St.	6 L Urban[1]	2.0	7.4	7.4	6	79	-	6	79	-	14.2	6.1	20.3	14.2	6.1	20.3
	AGSD[2] (option)		(1.0)	(1.0)		(3)			(3)		(2.2)	(1.3)	(3.5)	(2.2)	(1.3)	(3.5)
	Stormwater Detention		6.5	6.5	24	1	-	24	1	-	5.3	-	5.3	5.3	-	5.3
DeLeon - I-275	Exprwy.	1.1	5.5	5.5	-	42	-	-	42	-	9.0	11.6	20.6	9.0	11.6	20.6
	Stormwater Detention		2.7	2.7	3	1	-	3	1	-	1.5	-	1.5	1.5	-	1.5
I-275 - Columbus	Exprwy.	0.9	10.0	10.0	-	4	-	-	4	-	7.8	8.8	16.6	7.8	8.8	16.6
	Flyover (option)		(0.6)	(0.6)							(1.1)	(3.4)	(4.5)	(1.1)	(3.4)	(4.5)
	Stormwater Detention		5.9	5.9	-	2	-	-	2	-	4.1	-	4.1	4.1	-	4.1
Columbus - 1100'± S. of Tampa Bay Blvd.	Exprwy.	0.3	-	-	-	-	-	-	-	-	-	1.1	1.1	-	1.1	1.1
1100'± S. Tampa Bay - Hillsborough Ave.	Exprwy.	1.7	2.6		-	3	-				2.6	24.3	26.9			
	Elevated[3]	1.7		4.4				-	7	-				5.4	48.9	54.3
Hillsborough - Busch Blvd.	Exprwy.[1]	2.8	15.8		2	26	-				17.0	29.1	46.1			
	Elevated[3]	2.8		3.0				-	6	-				4.0	66.8	70.8
	Stormwater Detention		3.2	3.2	-	-	-	-	-	-	1.3	-	1.3	1.3	-	1.3
Busch - Fletcher Ave.	Exprwy.[1]	2.0	7.7		-	4	-				11.8	26.2	38.0			
	Elevated[3]	2.0		3.0				-	-	-				4.4	50.0	54.4
	Stormwater Detention		10.2	9.4	-	13	-	-	13	-	6.7	-	6.7	6.2	-	6.2

TABLE XI-2 DALE MABRY CONTROLLED ACCESS ALTERNATIVES COSTS AND IMPACTS (Continued).

Segment	Improvement Type	Length (mi.)	Additional R/W Req'd (acres)		Displacements of Residences, Businesses, & N.P. Organiz.						Est. Costs (Millions 1985 Dollars)					
					Exprwy.			Elevated			Expressway			Elevated		
			X-way	Elev.	R	B	NPO	R	B	NPO	R/W	Const.	Total	R/W	Const.	Total
Fletcher - Ehrlich Rd.	Exprwy.[1]	1.4	5.4		-	-	-				5.7	14.3	20.0			
	Elevated[3]	1.4		3.1				-	-	-				5.8	36.2	42.0
	Stormwater Detention		8.9	8.4	1	-	-	1	-	-	6.1	-	6.1	5.7	-	5.7
Ehrlich - Van Dyke Rd.	Scheduled [1] 6 L adequate	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Van Dyke - U.S. 41	4 L Rural[1]	4.6	-	-	-	-	-	-	-	-	-	7.5	7.5	-	7.5	7.5
Subtotals (without options)		19.8 7.9	54.4	36.4	8	158	0	6	138	0	68.1	129	197	50.6	237	288
Subtotals (with options shown in parenthesis)			56.0	38.0	8	161	0	6	141	0	71.4	134	205	53.9	242	296
Total Stormwater Detention			37.4	36.1	28	17	0	28	17	0	25	-	25	24	-	24
Totals (without options)		19.8 7.9	92	73	36	175	0	34	155	0	93	129	222	75	237	312
Totals (with options shown in par.)			93	74	36	178	0	34	158	0	96	134	230	78	242	320

[1]The widening improvement is included to complete the alternative between project terminii. An expressway is needed from south of Kennedy Boulevard to north of Ehrlich Road (based on year 2010 traffic projections). All expressway alternatives north of Hillsborough Avenue presume scheduled widening to six lanes will be completed as programmed. These costs are not included herein.

[2]At Grade Split Diamond (AGSD) intersection is presented as optional improvement to reduce congestion at Dale Mabry/Henderson/Morrison intersection. All costs shown in this table in parenthesis are optional improvements.

[3]The elevated freeway begins 1100± ft. south of Tampa Bay Boulevard and ends with the Ehrlich Road interchange; a total elevated freeway length of 7.9 miles. Costs and impacts of full interchanges are included in segment where cross street first listed.

segment between Euclid and DeLeon in conjunction with the widening to a 6-lane arterial. In addition, approximately 21% of the displacements are associated with detention ponds.

On the basis of total system costs, the expressway alternative is by far the least expensive of the two limited-access alternatives.

In addition to the total cost and impacts system-wide comparisons, Table XI-3 includes a generalized per mile comparison for the central portion only of Dale Mabry Highway; this same data is presented graphically in Figure XI-1. On a generalized capacity basis, the eight-laning alternative would only handle about 74% of the year 2010 demand at LOS E, or 63% of the demand at LOS D. On the basis of projected traffic demand for the Dale Mabry/Himes corridor, the eight-lane alternative would be operating at LOS E by 1990, and LOS F by 1993, assuming construction of the NWH Expressway. In actuality, the corridor would break down sooner, since:

- The generalized demand and capacity are based on averages -- specific intersections would have higher V/C ratios than the averages.

- The generalized capacities for year 2010 are based on the TUATS 2010 street network, which assumes that most of the east-west collectors/arterials will be 6 lanes. Since these intersecting roadways are unlikely to all be widened by the early 1990's, the generalized corridor capacity will be lower than the 2010 generalized capacity, which is based on the 2010 network.

TABLE XI-3 - GENERALIZED COMPARISON OF ALTERNATIVES FOR CENTRAL PORTION OF STUDY AREA[1]

Alternative	Year 2010 Corridor Demand[2] (VPD)	Generalized Corridor Capacity[3] (VPD)	Demand/ Capacity Ratio	Capacity in Excess of 2010 Demand	Approx. Cost/Mile Const. & R/W ($ millions)	Total No. of Displacements[6] Res	Bus	NPO
8-Laning of Dale Mabry (w/Himes 4 LD)	DM: 76,000 H: 20,000 Sum: 96,000	DM: 44,000 H: 26,000 Sum: 70,000	1.4	-26,000	$2.8[4]	-	4	-
6-Lane Expressway w/ Two-Lane One-Way Frontage Roads (w/Himes 4 LD)	96,000	Exp: 114,000 Frd: 12,000 H: 26,000 Sum: 152,000	0.63	+56,000	$17[5]	2	79	-
4-Lane Elevated Freeway w/ 6-Lane Service Rd. at grade level (w/Himes 4 LD)	96,000	Elev. 76,000 G-L 36,000 H. 26,000 Sum 138,000	0.70	+42,000	$28[5]	-	59	-

[1]Approximately Kennedy to Busch.

[2]Corridor demand assuming construction of the NWH Expressway. Demand is the average for the corridor portion between Hillsborough and Busch.

[3]For the exp. and elevated freeway, capacities based on Table 3-12 of 1985 Highway Capacity Manual for LOS E, level terrain, 5% trucks. For one-way and two-way arterials, capacities derived using intersection critical sum of 1400 as capacity (from planning methodology), 10% left turns, D=50%, K=10%, and G/C ratio of 0.47 for two-way arterials and 0.42 for one-way arterials (assumes 10% and 9% lost time per cycle, respectively). G/C ratios estimated from CMA's for year 2010 for Dale Mabry and Himes, for both the two-way and one-way pair scenarios. The generalized capacities are only hypothetical since actual corridor capacities are restrained by the most restricted intersections.

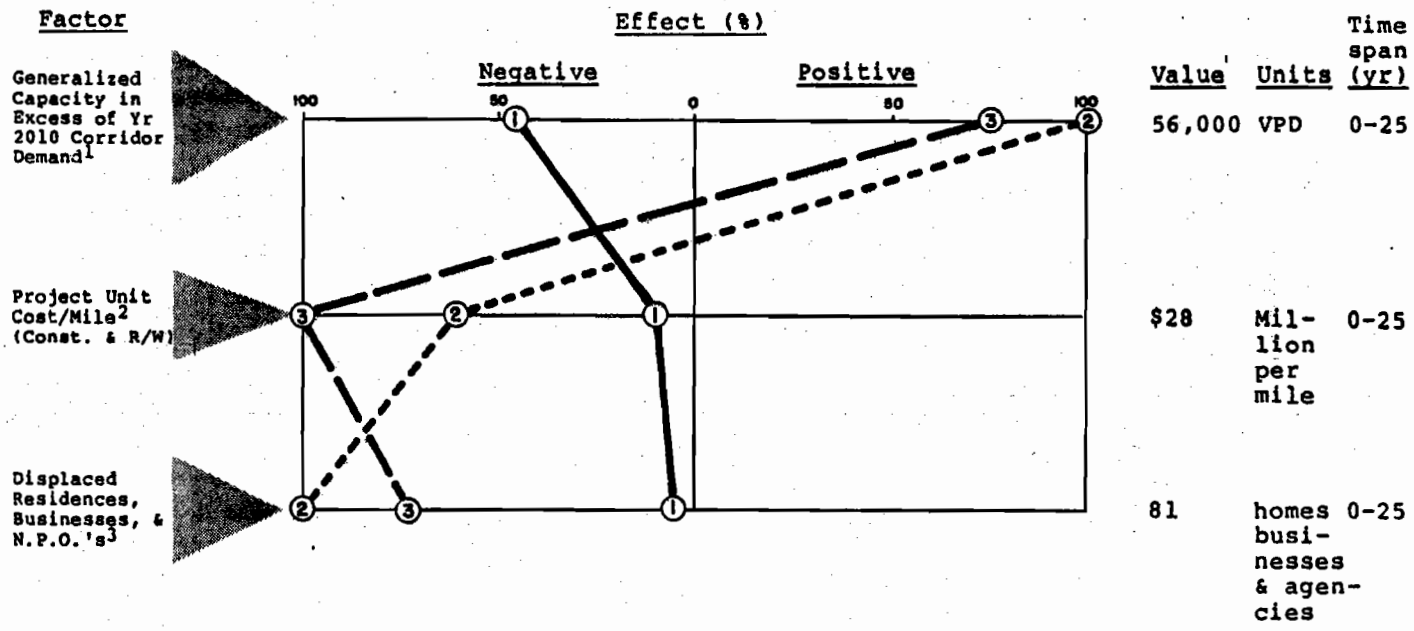
[4]Includes cost of 8-laning Dale Mabry only. All costs are in 1985 dollars.

[5]Does not include any costs associated with Himes Avenue. Costs compared for the 7.9 mi. elevated Freeway segment

[6]For the segment from DeLeon to Ehrlich; Himes Avenue not included.

Excluding additional costs and impacts associated with stormwater retention/ detention and treatment

Dale Mabry Highway Alternatives Graphical Comparison for Central Portion of Study Area



Legend

① ——— 8-lane Dale Mabry with 4-lane Himes

② - - - - 6-lane Expressway with Frontage Rds; Himes 4 lane

③ — — — 4-lane Elevated Freeway with 6-lane Service Road; Himes 4 lane

[1]Average corridor (Himes & Dale Mabry) demand, measured between Hillsborough & Busch. 1983 corridor ADT = 65,000. 2010 ADT=95,000 maximum corridor demand = 152,000 for alt. 2. 152,000-65,000=87,000= additional demand handled in excess of 1983 volumes.

[2]All costs are in 1985 dollars. Costs are from Table XI-3. Excludes additional costs and impacts associated with stormwater detention ponds.

[3]For the segment from DeLeon to Ehrlich. NPO = Non-profit organization

FIGURE XI-1 GRAPHICAL COMPARISON OF ALTERNATIVES

From Table XI-3, as well as previous capacity analysis results (Table V-2), it is evident that the Dale Mabry 8-laning alternative (along with the completed 4-laning of Himes to Busch Boulevard) would not provide sufficient corridor capcity to handle year 2010 traffic demand. A possible exception would be construction of an 8-lane facility in conjunction with a high-capacity light rail transit system; however, potential ridership of such a system in the Dale Mabry corridor is presently unknown and the subject of separate ongoing studies by others.

From a cost standpoint, the elevated freeway is 47% higher than the expressway on a per-mile basis, while the number of displacements is approximately 27% fewer than the expressway alternative.

On the basis of the data contained in Table XI-2 and XI-3, it is recommended that the expressway-with-frontage-roads be selected as the "preferred" or "viable build" alternate. As part of this alternate, other multilaning improvements would be required both north and south of the expressway limits, as shown in Table XI-2.

XII. REFERENCES

1. Technical Memorandum: Design Traffic, for Dale Mabry Highway Project Development and Environmental Study, Barr, Dunlop & Associates, Inc., and DSA Group, Inc., March, 1986.

2. Highway Capacity Manual, Special Report 209, Transportation Research Board, 1985.

3. Interim Materials on Highway Capacity. Transportation Research Circular No. 212, Transportation Research Board, 1980.

4. Summary Report -- Year 2010 Long Range Transportation Plan for Hillsborough County. Tampa Urban Area Metropolitan Planning Organization, Hillsborough County City-County Planning Commission, March 1986.

5. Florida Transportation Plan. Florida Department of Transportation, Division of Planning and Programming. Draft, February, 1986.

6. Marcuson, Joel K. "The At-Grade Split Diamond Intersection," I.T.E. Journal, February, 1986. Institute of Transportation Engineers.

7. Hillsborough County Mass Transit Corridor Identification Study, prepared by Booz, Allen & Hamilton Inc. in association with Reynolds, Smith & Hills. December, 1985.

8. Phone conversation between Bill Riggs of DSA and Dennis Hinebaugh of HART, May 13, 1986.

9. Quick-Response Urban Travel Estimation Techniques and Transferable Parameters -- User's Guide. NCHRP Report No. 187, 1978, Transportation Research Board.

10. A Policy on Geometric Design of Highways and Streets. 1984. American Association of State Highway and Transportation Officials (AASHTO).

11. Manual on Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways. Florida Department of Transportation. June, 1984.

12. Design Alternatives Report for U.S. 19, Greiner Engineering Sciences, April 1986.

13. Dale Mabry Highway/Church St. Corridor Study Design by Kimley-Horn and Associates. August, 1979. Prepared for the City of Tampa.

14. Urban Transportation Operations Training - Design of Urban Streets. 1983 U.S. DOT, FHWA.

15. Bruce, J., "One-Way Major Arterial Streets," HRB Special Report No. 93, Highway Research Board, 1967.

16. Synthesis of Safety Research Related to Traffic Control and Roadway Elements (Volume 1). U.S. DOT, FHWA, 1982.

XIII. APPENDICES

A. Mass Transit Alternatives

   Bus Only Lanes (Busways)
   - Existing Express Bus Service
   - Future Express Bus Volumes

   High Occupancy Vehicle (HOV) Lanes
   - No Build Alternative
   - Build Expressway Alternative

   Contraflow HOV Lane
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B. Elevated Freeway Cost Comparison

C. Benefit/Cost Analysis of Alternatives for Various Segments of Dale Mabry Highway

D. Stormwater Detention Requirements

E. Data on Fatal and Pedestrian Accidents

F. Project Design Volumes for 2010 and Intermediate Years

APPENDIX A - MASS TRANSIT ALTERNATIVES

BUS ONLY LANES (BUSWAYS)

An alternative designating specific highway travel lanes for the exclusive use of busses, a "busway", was considered.

In densely populated areas, busways using an existing highway travel lane(s), or proposed lanes(s), within existing rights-of-way are generally considered to have the potential for alleviating capacity related highway problems. Busways are most effective, when used by express busses, between densely populated residential areas and major employment or commercial centers. Under these conditions, busses are far more efficient than automobiles since busses have the potential of carrying 50 people in a single vehicle -- a potential space economy of around 20:1 over the private automobile.

Within the Dale Mabry Highway study corridor, development is essentially low density residential with extensive linear commercial and public uses. Office buildings are dispersed throughout the southern one-half of the study corridor. Consequently, express busses are presently underutilized and have only a minor positive effect on highway traffic volumes. HART is presently analyzing the use of a circular type system in the Westshore area as a means to increasing ridership on the Dale Mabry express bus routes.

Existing Express Bus Service

Express bus service in the study area is in operation weekdays during AM and PM peak periods. Inbound (AM) Dale Mabry corridor

express service originates at two park-and-ride lots off North Dale Mabry (the North Lakeview Park 'N' Ride and the Casey Road Park 'N' Ride). Another express bus service route from the Citrus Park Park "N" Ride lot was initiated in February, 1986. Four express bus routes serve the Dale Mabry corridor. Inbound service hours vary from 6:35 a.m. - 8:00 a.m. depending on the specific route. Express bus service is provided from North Lakeview to downtown Tampa; from Casey Road to the Westshore area; from North Lakeview to the Westshore area; and from North Lakeview to MacDill Air Force Base. These trips are reversed (outbound) in the PM peak with outbound trips originating at AM (inbound) routes end. Outbound service runs begin, depending on route, between 4:05 and 7:25 p.m. Express bus fares are $1.00 and transfer (to express bus) fares are $0.40. Two of the four express routes actually follow Himes Avenue between Busch Boulevard and Columbus Drive, but they serve the same general north-south corridor and were included in the analysis as in the Dale Mabry corridor.

Except for the North Lakeview - downtown service, the Dale Mabry corridor express bus routes ranked in January, 1986, as the worst of the HART 16 route express system. Average ridership per trip on the three routes ranged from 2.4 to 5.7. The downtown express route had an average ridership, per trip, of 20.2; it ranked 10th out of 16 express routes in terms of performance as measured by several operations indices. The downtown route is considered an effective route by HART as it continues to experience growth in ridership however.

Future Express Bus Volumes

To estimate future busway usage, a manual mode-choice analysis procedure was selected.[1] This procedure produces order of magnitude travel estimates, by mode, caused by varying transit and automobile operating characteristics.

The appropriateness of the manual mode-choice analysis for use in this study was verified by applying it to the base year situation. The mode-choice analysis was then used with future travel estimates on Dale Mabry Highway to obtain order of magnitude estimates of express transit usage of a busway. Parameters used in the mode-choice analysis include, for transit, transit fare, transit access mode, and distance between traffic zones to estimate transit impedance; for autos, auto parking rates, operating costs, operating speeds, and distance between traffic zones to estimate auto travel impedance. In applying the mode-choice procedure, both existing and planned transit service was considered[2]. The analysis area included the north-south Dale Mabry corridor plus downtown Tampa and traffic zone 24 (which includes the Yukon Park 'N' Ride stop for express bus service from North Dale Mabry to downtown).

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[1] Quick Response Urban Travel Estimating Techniques and Transferable Parameters Users Guide. National Cooperative Highway Research Program Report 187. Transportation Research Board, National Research Council, 1978, Chapter 4.

[2] "Tampa Urban Area Metropolitan Planning Organization Tentative Year 2010 Transit Plan for Hillsborough County," December 11, 1985.

In applying the mode-choice procedure to future travel projections, auto operating speeds were estimated for the "No-Build" alternative at 15 mph and for the "Build Expressway" alternative at 40 mph.[3] Express bus fares were recently increased to $1.00 and there are no plans at present to increase it further. Therefore, the $1.00 fare was held constant throughout the study period. Downtown auto parking rates currently estimated to average around $30.00 per month ($1.50 per weekday) were anticipated to increase, but to average no more than $2.50 per weekday. Parking costs outside the downtown area were estimated to average less than $0.75 per weekday and this was held constant throughout the study period. A flow chart for the manual mode-choice estimation procedure is shown in Figure A-1.

Using the aforementioned variables with auto operating costs > $0.15 per mile, the mode-choice analysis is basically a procedure using nomographs and curves in the Users' Guide.[4] Since the major purpose of this study was to determine the effect of a busway auto trip data were readily available, auto trips were substituted for person trips in Figure A-1.

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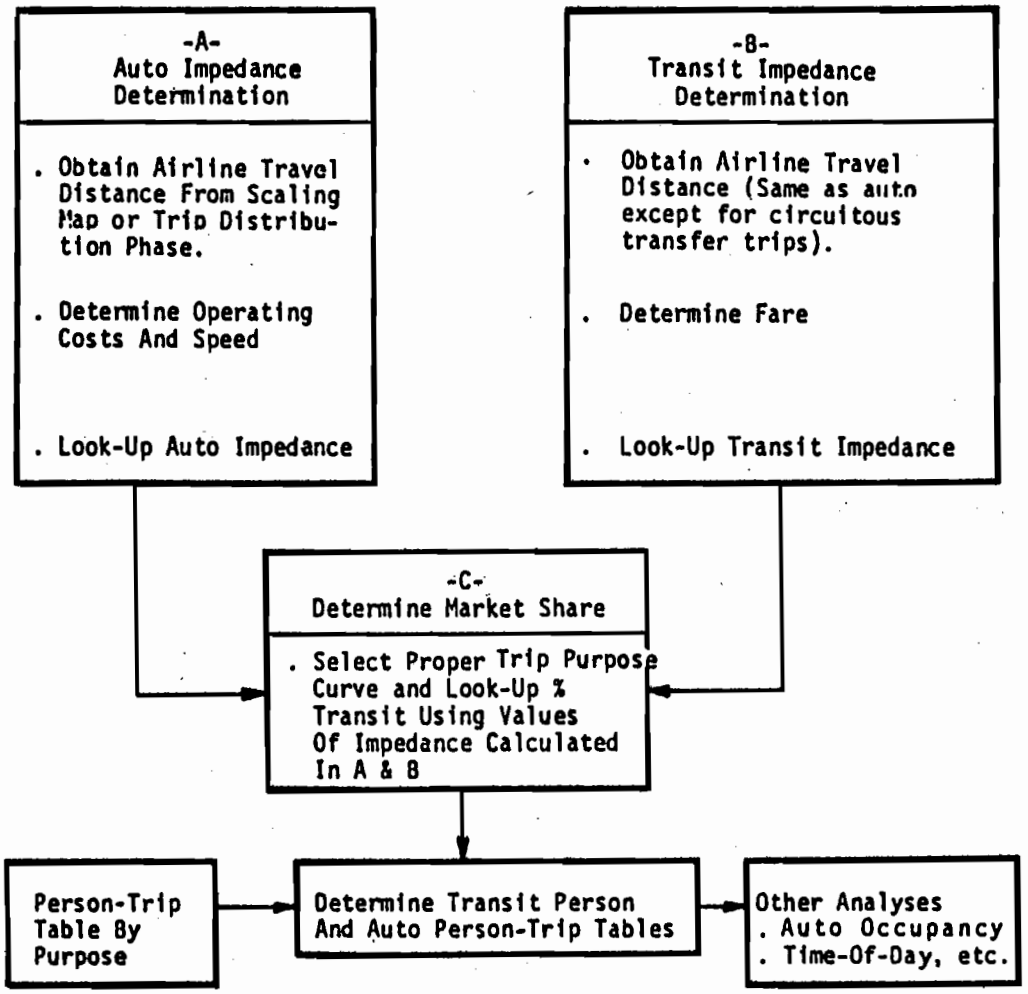
[3] Highway Capacity Manual, 1965, Highway Research Board Special Report 87, Washington, Table 9.1.

[4] "Quick Response Urban Travel Estimating Techniques and Transferable Parameters Users Guide." Op. at. pp. 67-81.



Source: NCHRP Report No. 187, Transportation Research Board, 1978

FIGURE A1 - FLOW CHART OF THE MANUAL MODE-CHOICE ESTIMATION PROCEDURE

Peak hour travel consists largely of home-based work (HBW) trips. Thus, the HBW curves in the Users' Guide[5] were used together with auto and transit impedances to estimate the percent transit market share. This percentage was applied to vehicle trip buildup in the peak hour between areas outside the Hillsborough Area Regional Transit (HART) service area and inside the HART service area. The result was an estimate of the number of auto drivers transferring to the transit mode. The appropriateness of applying the manual mode-choice procedure in this manner was verified by applying it to the existing situation and closely reproducing the number of express busses currently using the Dale Mabry corridor. (Note: Number of express busses equals the number of autos changing travel mode multiplied by the average number of HBW trip purpose auto occupants (1.12) divided by the average seating capacity of an express bus (50±).)

The results of the manual mode-choice analysis as applied to peak hour traffic buildup between rural fringe and developed urban land was an estimate of the number of auto driver trips changing travel mode to express bus and, in turn, using the busway. The estimated percentage of peak hour auto drivers opting to park and ride express busses into town varied from 24 for the Build Expressway Alternative to 31 for the No-Build Alternative. Travel in areas outside the HART service area was presumed to be by auto as was travel inside the urban area for locations more than 1/4 mile from a bus route.

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[5] Ibid. p. 78.

The number of private vehicle occupants transferring to express busses using the busway was estimated to range from 505-1145 in the year 2010 peak hour for the No-Build Alternative (Figure A2). This represented an estimated reduction of from 450-1025 private vehicles using Dale Mabry in the year 2010 peak hour.

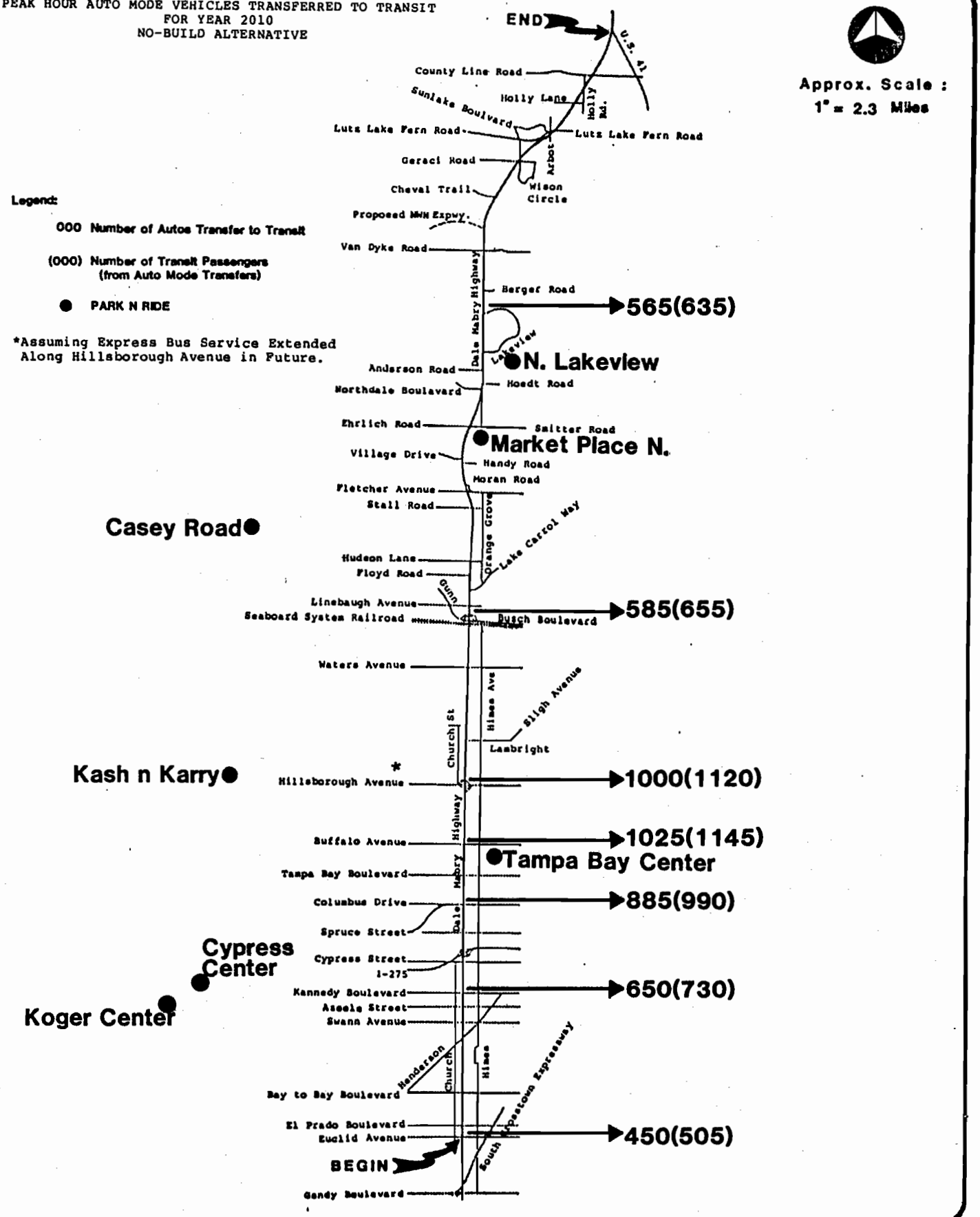
For the "Build Expressway" Alternative, the number of private vehicle occupants transferring to express busses using the busway was estimated to range from 390-940 in the year 2010 peak hour. This represented an estimated reduction of from 350-840 vehicles in the year 2010 peak hour (Figure A3).

Converting private vehicle occupants @ 1.12 persons per vehicle (the 1984 home based work trip average) and using average 50 passenger busses, the estimated year 2010 peak hour express busway use on Dale Mabry Highway ranged from 11-23 busses for the "No-Build" Alternative.

For the "Build Expressway" Alternative, year 2010 peak hour busway use ranged from 8-19 busses.

The busway is unwarranted with estimated maxium usuage of 19-23 busses in the design year peak hour. The lane(s) set aside for a busway would be underutilized and result in excessive congestion on the remaining general purpose lanes. To use the "excess capacity" on the busway, consideration was given to allowing other high occupancy vehicles to use the reserved lane. (Note: Where bus volumes

FIGURE A2
PEAK HOUR AUTO MODE VEHICLES TRANSFERRED TO TRANSIT
FOR YEAR 2010
NO-BUILD ALTERNATIVE



Legend:

000 Number of Autos Transfer to Transit

(000) Number of Transit Passengers (from Auto Mode Transfers)

● PARK N RIDE

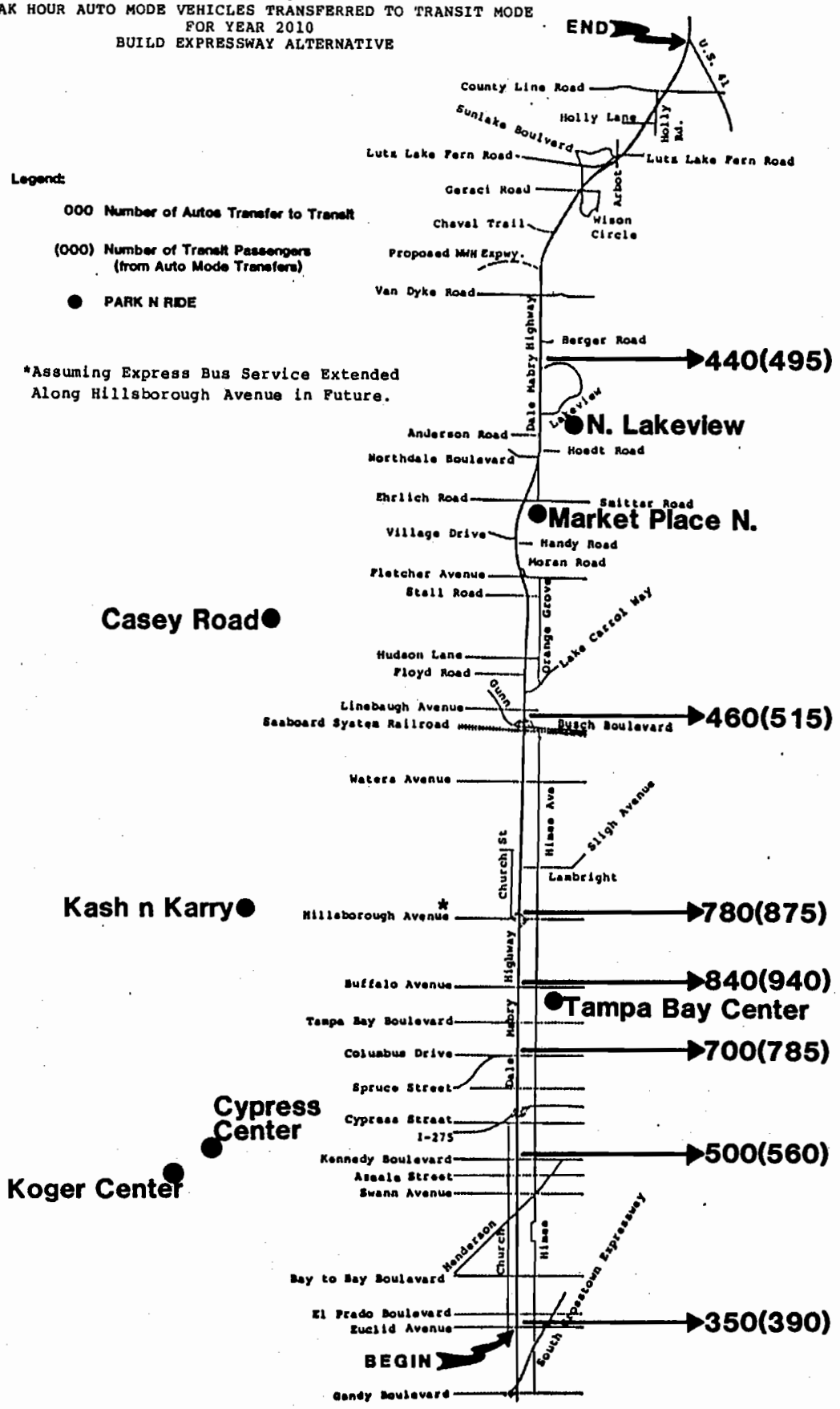
*Assuming Express Bus Service Extended Along Hillsborough Avenue in Future.

Approx. Scale : 1" = 2.3 Miles

FIGURE A-2 NO-BUILD ALTERNATIVE SHIFT TO TRANSIT

DALE MABRY HIGHWAY

FIGURE A3
PEAK HOUR AUTO MODE VEHICLES TRANSFERRED TO TRANSIT MODE
FOR YEAR 2010
BUILD EXPRESSWAY ALTERNATIVE



Legend:

000 Number of Autos Transfer to Transit

(000) Number of Transit Passengers (from Auto Mode Transfers)

● PARK N RIDE

*Assuming Express Bus Service Extended Along Hillsborough Avenue in Future.

Approx. Scale : 1" = 2.3 Miles

FIGURE A-3 BUILD EXPRESSWAY ALTERNATIVE SHIFT TO TRANSIT

DALE MABRY HIGHWAY

exceed 100 busses per hour, carpools have typically not been permitted to use the reserved bus lane.[6] Since a Dale Mabry busway projected usage was only 19-23 busses per hour, other vehicles with 2 or more or 3 or more occupants, depending on lane capacity, could be allowed to use the reserved lane as explained in the following section.)

HIGH OCCUPANCY VEHICLE (HOV) LANES

As stated above, consideration was given to allowing the HOV's to use the busway (now HOV) lane due to the estimated low number of busses anticipated to use the busway.

From the 1984 origin-destination survey, it was determined that only 5.3% of all vehicles passing the roadside interview stations had 3 or more occupants and 19.5% (inclusive) had 2 or more occupants. These vehicle occupancy rates were held constant throughthe design year.

An analysis was performed on the feasibility of designating an HOV lane (in each direction) on the existing and/or planned six-lane section of Dale Mabry Highway (from Kennedy Boulevard to Van Dyke Road) for the "No-Build Alternative" as well as the Build Expressway Alternative.

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[6] High Occupancy Vehicle Development Operation and Enforcement, Implementation Package FHWA-IP-82-1, v.1. U.S. Department of Transportation, Federal Highway Administration, April, 1982. p. 176.

No-Build Alternative

Based on projected design year 2010 peak hour traffic demand, designating an HOV lane and allowing vehicles with two or more occupants to use it would put traffic service at Level of Service (LOS) F for the more heavily traveled sections of Dale Mabry between I-275 and Fletcher Avenue. The remaining general purpose lanes would also be at LOS F in both directions of travel. With the designation of existing lanes as HOV lanes, the remaining general purpose lanes are forced to serve twice the traffic volume of the HOV lanes, 1325 vehicles per hour vs. 3200, making the situation even more intolerable.

For year 2000 peak hour traffic, the HOV lane in the heavy travel direction would operate at LOS F only for the projected highest volume section between Busch Boulevard and Fletcher Avenue. All general purpose lanes would operate at LOS F on the higher volume sections (from I-275 to Fletcher Avenue). HOV lanes could function satisfactorily until the late 1990's. However, transferring 80.5% of the traffic into the four remaining lanes will exacerbate an intolerable traffic operations situation. Therefore, it is recommended further consideration not be given to designating existing, or programmed, general purpose lanes as HOV lanes.

Build Expressway Alternative

A six-lane fully controlled access facility will accommodate design year 2010 peak hour traffic in the heavy direction at LOS D.

Designating one $\geq$ 2 occupant HOV lane in each direction forces 80.5% of the traffic into the remaining two (directional) lanes. These general purpose lanes would be more congested, but still within LOS D. The HOV lanes would operate at LOS A.

For the Build Expressway Alternative, HOV lanes could be designated and general purpose lanes would still function at tolerable levels. Therefore, HOV lanes are presented as a possible option for the Build Expressway Alternative.

CONTRAFLOW HOV LANE

A contraflow lane on Dale Mabry Highway would use the inside lane of the "light" direction of peak traffic flow and reverse the flow on that lane only during the AM and PM peak hour(s). Reversing the traffic flows on an existing traffic lane requires special signalization and daily (weekday) manual placement of protective lane dividers.

One of the advantages of a contraflow lane is that it can be installed on multi-lane highways (like the existing and scheduled six-lane sections of Dale Mabry) without acquiring expensive new rights-of-way. Contraflow lanes are most effective where there are marked differences in peak directional flows (e.g., > 70% in heavy direction). Directional factors, as determined from 1980-1984 turning movement counts along Dale Mabry (within the urban part of the project limits) varied from 51% to 68%. The April, 1984, origin-destination survey conducted at two roadside interview

stations, located between Columbus Drive and Buffalo Avenue and between Lambright Avenue and Waters Avenue, exhibited directional factors of 57% and 54%, respectively. Dale Mabry Highway is characterized more by peak-hour balanced flows than unbalanced flows. Balanced flows defeat the reason for a contraflow lane: to use excess capacity in the light flow direction to relieve congestion in the heavy flow direction.

Contraflow lanes fall into the same transportation system management (TSM) category as HOV lanes. Where feasible, contraflow lanes could be installed. They are not recommended, however, for existing two-way roadways of less than three (directional) lanes due to the need for breakdown lanes, passing, and emergency vehicle access. Although the current near balance in directional splits indicates a contraflow lane should not be installed, an analysis using project overall recommended directional splits for future years was made for both the No-Build and Build Expressway Alternatives. Recommended overall Dale Mabry project directional factors for years 1990, 2000, and 2010 are 65%, 63%, and 60%, respectively. The following analysis is based on the recommended overall project directional factors. The specific Dale Mabry Highway sections analyzed were the highest traffic volume section (between Busch Boulevard and Fletcher Avenue and between Hillsborough and Waters Avenue).

No-Build Alternative

Installation of a contraflow lane for this alternative, which allows use by all vehicles with two or more occupants, results in year 2010 traffic service at LOS F. Not only is the contraflow lane at LOS F, but so are all general purpose lanes (in both directions). The contraflow lane will operate at LOS D-E at projected year 2000 traffic levels and improving to LOS D at projected 1990 traffic levels. However, all general purpose lanes will operate at LOS F. Restricting contraflow lane usage to vehicles with three or more occupants leads to lane underutilization (on the contraflow lane) and further congestion on the general purpose lanes.

Build Expressway Alternative

Installation of a contraflow lane on this alternative which allows usage by all vehicles with two or more occupants results in projected design year 2010 traffic operations at LOS A (on the contraflow lane) and LOS C on the general purpose lanes. Without the contraflow lane, the Build Expressway Alternative would operate at LOS D (tolerable).

Reducing the number of general purpose lanes on the expressway to four plus a contraflow lane allowing use by two or more occupant vehicles (in year 2010 peak hour), the contraflow lane would operate at LOS A and the general purpose lanes at LOS D-E in the heavy direction and LOS C in the lesser direction.

Based on general capacity analyses and recommended overall project future year directional factors, a contraflow lane on existing and previously scheduled six-lane sections of Dale Mabry could function within design capacity until the late 1990's (if only busses and two or more person carpools are allowed to use it). All other general purpose lanes would function at LOS F. Special signalization will be required along with twice daily (weekday) manual placement of lane dividers and police enforcement.

For the Build Expressway Alternative, a contraflow lane would function at LOS A in year 2010 (if used by busses and two or more person carpools only). Constructing a contraflow lane on a fully controlled access roadway, however, involves major construction. Safety barriers separating the contraflow lanes are required as are special contraflow lane ingress-egress ramps. These construction costs would likely offset any cost reductions resulting from less right-of-way.

APPENDIX B
ELEVATED FREEWAY COST COMPARISON

Data Source	Location	Cost Unit	Cost Estimate R/W	Cost Estimate Construction	Cost Estimate Total	Explanation
DSA Group, Inc., "Dale Mabry Highway Engineering Alternatives Report," June, 1986	Dale Mabry Hwy. (SR 597/600) Hillsborough Co., FL	Interchange Mile (Mainline) Sq.Ft. (Mainline) Sq.Ft. (Ramps)	$4,900,000 - - $10-12	$30,000,000 17,300,000 38 33	$34,900,000 17,300,000 - -	R/W costs include appraisals, relocation, administrative, and support costs. Additional R/W required only at interchanges. Costs are for Elevated Freeway Alternative plus required improvements to existing Dale Mabry due to construction of elevated freeway ramps. Cost for engineering and contingencies not included.
Greiner Engineering, Inc. "Draft Memorandum #1" dated Sept. 18, 1984. US 19 EIS/ Corridor Study - Double Deck Alternative	US 19 from Gandy Blvd. to Alt. US 19 (in Pasco Co.) Pinellas Co., FL	Interchange Mile (Mainline) Sq.Ft. (Interchange)	$4,600,000 200,000 8.50	$29,100,000 17,800,000 40	$33,700,000 18,000,000 -	Cost for elevated freeway (double decking) alternative. Existing US 19 still requires widening and would add to the cost. R/W costs for mainline are for retention-detention sites. R/W for "real property" estimated at $8.50 SF. Costs for engineering & contengencies were not broken out. R/W costs include business damages, court awards, & administration but does not include cost of appraisals.
H.W. Lochner, "Alternatives Report, US 19," Dec., 1985	US 19 fr. N. of Alt. 19 to N. of Fivay Road Pasco Co., FL	Mile	$4,200,000	$16,800,000	$21,000,000	Costs are for mixed facility involving both surface expressways and elevated freeway. 27%± of this (mixed facility) alternative is on structure. R/W costs include relocation. Engineering and contingencies not included.
Howard, Needles, Tammen and Bergendoff, "Engineering Alternatives Report, Northwest Hillsborough Expressway (Phase II - Draft Environmental Impact Statement)." (1984 costs)	NWH Expressway Hillsborough Co., FL	Mile	$5,300,000	$ 9,100,000	$14,400,000	Costs are for mixed alternative involving both surface expressway and elevated freeway. 48%± of project alternative is on structure. R/W cost estimate includes relocation.
T.Y. Lin International, "Downtown "Y" Improvement Project," Personal Communication, April 14, 1986 (1985 costs)	Downtown "Y" Improvement Project, San Antonio, TX	Square Foot	-	35-37	-	Elevated freeway cost using composite wing girder design. Initially estimated at $40.73 SF in 1982 and later revised downward as indicated.
T.Y. Lin International, personal conversation, June, 1986. Current cost estimate.	Airline Highway, Baton Rouge, LA	Square Foot	-	38	-	Elevated freeway cost using composite wing girder ("spine-wing") design. Study under way at time of writing and costs subject to further refinement.

APPENDIX C - BENEFIT/COST ANALYSIS OF ALTERNATIVES FOR VARIOUS SEGMENTS OF DALE MABRY HIGHWAY

Median Type Benefit Cost Analysis from Euclid Ave. to Kennedy Blvd.
(Analysis section length: 2.5 miles)

Total no. accidents in 1983 = 308

Economic loss due to accidents, 1983 = $1,595,000

Economic loss per accident = $5,179

To adjust to 1985 costs, increase 1983 economic loss per accident @ 4%/annum. Therefore, 1985 economic loss per accident = $5,600

Analysis period = 25 years
Total no. of accidents over analysis period = 308 x 25 = 7700

Alt. 'A' = 6-lane urban typical section with 14' continuous 2-way left turn lane

Alt. 'B' = 6-lane urban typical section with 22' raised median

No. accidents saved using Alt. 'A' median type[1] =
(7700)(.286) = 2202

No. accidents saved using Alt. 'B' median type[1] =
(7700)(.312) = 2402

Accidents saved Alt. 'B' - Alt. 'A' = 200

Present worth of accident savings in 1985 dollars = 200 x $5600 = $1,120,000

Public agency capital costs using Alt. 'A' = $21.9 million
Public agency capital costs using Alt. 'B' = $24.6 million
Cost difference Alt. 'B" - Alt. 'A' = $2.7 million

Therefore, Benefits/Costs = $1.12 million/$2.7 million = 0.41. The wider raised median is not cost effective.

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[1]Synthesis of Safety Research Related to Traffic Control and Roadway Elements, Federal Highway Administration, December, 1982, v. 1, p. 4-14.

Median Type Benefit Cost Analysis from Kennedy Blvd. to Cypress Street (Analysis Section Length: 0.5 mile)

Total no. of accidents in 1983 = 114

Economic loss due to accidents in 1983 = $564,000

Economic loss per accident = $4947

To adjust 1983 accident costs to 1985 costs, increase @ 4% per annum = $5350

Analysis period = 25 years
Total no. of accidents over analysis period = 114 x 25 = 2850

Alt. 'A' = 8-lane urban typical section with 14' continuous 2-way left turn lane

Alt. 'B' = 8-lane urban typical section with 22' raised median

Total no. accidents saved using Alt. 'A'[1] = (2850)(.286) = 815

Total no. accidents saved using Alt. 'B'[1] = (2850)(.312) = 889

Total no. accidents saved Alt. 'B' - Alt. 'A' = 74

Present worth of accidents saved, in 1985 dollars, = 74 x $5350 = $396,000 (say $0.4 million)

Public agency capital costs using Alt. 'A' = $3.6 million
Public agency capital costs using Alt. 'B' = $4.2 million
Cost difference Alt. 'B' - Alt. 'A' = $0.6 million

Therefore Benefits/Costs = $0.4 million/$0.6 million = 0.67. The wider raised median is not cost effective.

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[1] Synthesis of Safety Research Related to Traffic Control and Roadway Elements, Federal Highway Administration, December, 1982, p. 4-14.

Median Type Benefit Cost Analysis from N. of Hillsborough Avenue to S. of Waters (Analysis Section Length: 1.6 Miles)

Total no. of accidents in 1983 = 173

Economic loss due to accidents in 1983 = $1,963,000

Economic loss per accident in 1983 = $11,347

To adjust 1983 economic loss per accident to 1985 costs, increase 1983 costs @ 4% per annum = $12,300

Analysis period = 25 years
Total no. of accidents over analysis period = 173 x 25 = 4,325

Alt. 'A' = 8-lane urban typical section with 14' continuous 2-way left turn lane

Alt. 'B' = 8-lane urban typical section with 22' raised median

Total no. accidents saved using Alt. 'A'[1] = (4,325)(.286) = 1237

Total no. accidents saved using Alt. 'B'[1] = (4,325)(.312) = 1349
Accident savings Alt. 'B' - Alt. 'A' = 112

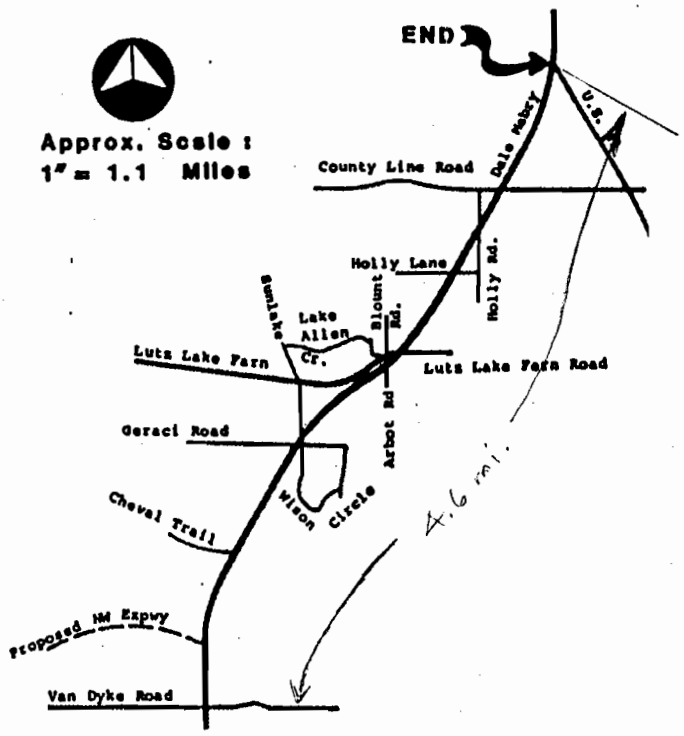
Present worth of accident savings in 1985 dollars = 112 x $12,300 = $1,377,600 (say $1.4 million)

Public agency capital costs using Alt. 'A' = $4.6 Million
Public agency capital costs using Alt. 'B' = $6.1 Million
Cost difference, Alt. 'B' - Alt. 'A' = $1.5

Therefore Benefits/Costs = $1.4 million/$1.5 million = 0.93. The wider raised median which requires right-of-way acquisition is not cost effective. A raised median not requiring new right-of=way (e.g. 16' median) would be cost effective.

[1] Synthesis of Safety Research Related to Traffic Control and Roadway Elements, Federal Highway Administration, December, 1982, p. 4-14

BENEFIT/COST ANALYSIS OF ALTERNATIVES FOR
THE NORTHERNMOST SEGMENT OF DALE MABRY



The segment studied is illustrated to the left. The two alternatives evaluated include:

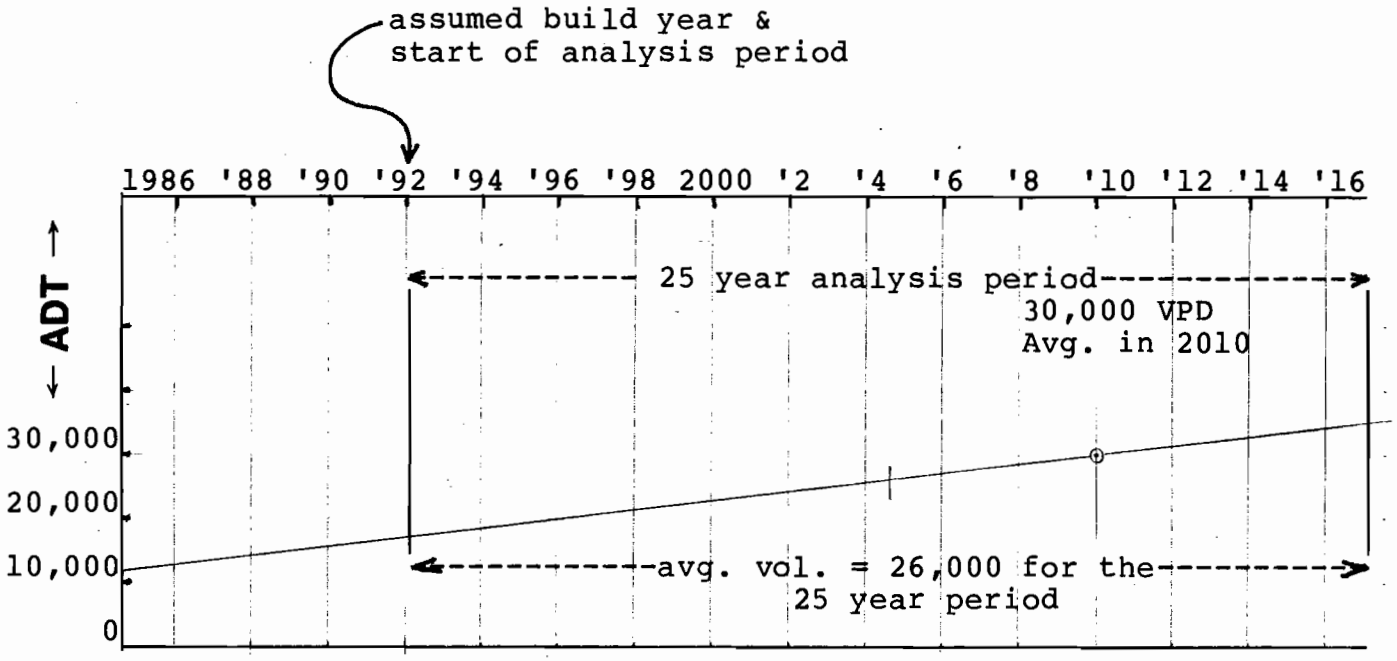
A - 4 LD rural typical section

B - 4 LD rural with 2-lane 2-way frontage roads on each side.

The average projected ADT for this segment in 2010 is approximately 30,000 VPD (with the NWH Exp.)

Using an accident rate table provided in the AASHTO 1977 A Manual on User Benefit Analysis of Highway and Bus Transit Improvements (Table attached), the estimated accident rates for the nonaccess-controlled highway versus the limited-access highway are 2.09 vs. 1.24 accidents/MVM. (These seem reasonable when compared with Table 4 from Synthesis of Safety Research Related to Traffic Control and Roadway Elements, FHWA, 1982, also attached. This table shows that for highways with >15,000 VPD, the accident rate is approximately 2.2 times higher for a high level of development (>60 driveways per mile) compared to a low level of development (<30 driveways per mile).)

The graph below illustrates the 25-year analysis period and the projected growth in traffic volumes over the period.



The average cost per accident for use in this analysis is derived as follows:

> 1983 accident statistics for Dale Mabry, Colby to U.S. 41 (9.9 mi.)
>
> economic loss ÷ total number accidents = ($2,400,000) ÷ (243) + $9900 per accident. To adjust to 1985 costs, increase 4% per year. 1985 avg. cost per accident = $11,000 per accident.

Using the average ADT of 26,000 VPD for the analysis period, the average annual VMT = (26,000)(4.6 mi.)(365) = 44 MVM

The expected number of accidents saved for the average year = (2.09 - 1.24 Acc/MVM)(44 MVM) = 37 accidents

Total accidents saved = (37 acc/avg. year)(25 years) = 925 accidents

Present worth of accident savings (in 1985 dollars) = ($11,000)(925 acc.) = $10.2 million (say $10 Million)

Initial costs of each alternative ($ millions) are:

Alternative	Constr.	R/W	R/W-detention	Total
4 LD Rural	$ 7.5	$ 0	$ 0	$ 7,5
4 LD Urban w/Frontage Roads	$26.6	$0.5	$1.6	$28.7

Present worth of difference in initial costs for Alternatives A and B = $21 million, in 1985 dollars.

Therefore, incremental $\frac{B}{C} = \frac{\$10 \text{ million}}{\$21 \text{ million}} = 0.48$

Based on the B/C ratio, it would not be cost-effective to construct the 4 LD urban-with-frontage-roads alternative.

TABLE 4 - Annual Number of Driveway Accidents per Mile by Frequency of Access and Traffic Volumes

Level of Development (Driveways Per Mile)		Highway ADT (Vehicles Per Day) Low <5,000	Medium 5,000 15,000	High >15,000
Low	<30	12.6	25.1	37.9
Medium	30 - 60	20.2	39.7	59.8
High	>60	27.7	54.4	81.7

Source: FHWA TS-82-233 Synthesis of Safety Research

Table 12

ACCIDENT RATES AND COSTS BY ROAD TYPE

Location and Road Type	Fatal Accidents			Injury Accidents			Property Damage Only Accidents			Total Accidents	
	Number per MVM	Cost ($/KVM)	Fatal % of Total	Number per MVM	Cost ($/KVM)	Injury % of Total	Number per MVM	Cost ($/KVM)	PDO % of Total	Number per MVM	Cost ($/KVM)
Rural											
No access control											
2 lanes	0.070	$ 9.98	62%	0.94	$4.22	26%	1.39	$1.94	12%	2.39	$16.14
4 or more lanes, undivided	0.047	6.69	50	0.89	4.00	30	1.95	2.73	20	2.89	13.43
→ 4 or more lanes, divided	0.063	8.89	63	0.77	3.49	25	1.25	1.75	12	2.09	14.13
Subtotal	0.069	9.82	62	0.92	4.16	26	1.39	1.95	12	2.38	15.93
Partial access control											
2-lane expressway	0.051	7.28	68	0.52	2.34	22	0.76	1.06	10	1.33	10.67
→ Divided expressway	0.038	5.43	64	0.44	1.98	23	0.76	1.07	13	1.24	8.48
Total Nonfreeway	0.061	8.71	63	0.79	3.54	25	1.20	1.68	12	2.05	13.93
Freeway	0.025	3.54	65	0.27	1.23	23	0.49	0.68	13	0.79	5.45
Total Rural	0.044	6.23	63	0.54	2.43	25	0.86	1.20	12	1.44	9.86
Urban											
No access control											
2 lanes	0.045	5.06	37	1.51	5.30	39	3.38	3.38	25	4.94	13.73
4 or more lanes, undivided	0.040	4.52	28	2.12	7.43	45	4.49	4.89	27	6.65	16.44
4 or more lanes, divided	0.027	3.06	25	1.65	5.76	48	3.19	3.19	27	4.86	12.01
Subtotal	0.032	3.54	27	1.71	5.99	46	3.43	3.43	26	5.17	12.95
Partial access control											
2-lane expressway	0.033	3.73	53	6.65	2.28	32	1.05	1.05	15	1.73	7.06
Divided expressway	0.022	2.51	30	1.08	3.76	45	2.04	2.04	25	3.14	8.32
Total Nonfreeway	0.031	3.45	28	1.65	5.77	46	3.29	3.29	26	4.97	12.51
Freeway	0.012	1.39	37	0.40	1.39	37	1.01	1.01	27	1.43	3.79
Total Urban	0.016	1.78	33	0.64	2.22	41	1.45	1.44	26	2.10	5.45

Source: AASHTO 1977 Manual On User Benefit Analysis...

APPENDIX D

STORMWATER DETENTION REQUIREMENTS

Preliminary Stormwater Detention Requirements by Drainage Area -- Conventional Widening Alternative

Note: Costs and impacts (displacements) are tabulated elsewhere

Existing Dale[1] Mabry Subbasin Area No.	Approx. From & To Points	Lineal Distance (ft.)	Proposed[2] R/W (ft.)	Proposed[2] Type C.S.	R/W Area (lxw) (Sq.Ft.)	R/W Area (lxw) (acres)	Proposed Area Req'd[3] for Detention (acres)	Comments
1	Euclid to 500' N. of Euclid	500'	114'	6 LD Urban	57,000	1.3	--	Alternate Treatment System recommended such as exfiltration due to short segment length
2	550' N. of Euclid to San Pedro	2700'	114'	" "	307,800	7.1	1.4	
3	San Pedro to San Jose	1900'	114'	" "	216,600	5.0	1.0	
4	San Jose to Watrous	3200'	114'	" "	364,800	8.4	1.7	
5	Watrous to Swann	2100'	114'	" "	239,400	5.5	1.1	
6	Swann to Cleveland	1900'	114'	" "	216,600	5.0	1.0	
7	Cleveland to North A	800' 400'	114' 146'	6 LD Urban 8 LD Urban	91,200 58,400	3.4	0.7	
					Subtotals		6.9 acres	
8	North A to Cypress St.	2200'	146'	8 LD Urban	321,200	7.4	1.5	
9	Cypress St. to Laurel	1400	--	8 LD Urban	(Little or no constr. req'd on this segment, to be constructed to 8 lanes in current work program)			
10	Laurel to Cherry	2000'	200'	8 LD Urban	400,000	9.2	1.8	
11	Cherry to Tampa Bay	4500'	200'	8 LD Urban	900,000	21	4.1	
12	Tampa Bay to Crest	7300'	200'	8 LD Comb. Urban-Rural	1,460,000	34	--	Use berms with existing ditch on e. side of DM between Buff. & Hills. to provide det. & treatment
13	Crest to ditch N. of Hillsb.	2200'	--	--	--	--	--	Existing R/W in interchange area could be used for detention & treatment, if necessary
14	Ditch N. of Hills. to Sligh	4000'	140' min.	8 LD Urban	--	--	--	Segment is currently under design for 6-L urban typical section with two detention areas planned; 8-laning could take place within existing R/W, therefore no additional detention areas proposed
15	Sligh to Waters	5300'	140' min.	8 LD Urban	--	--	--	
16	Waters to Lazy Lane	3100'	200'	8 LD Urban	620,000	14	2.8	
17	Lazy Lane to Linebaugh	2400'	--	--	--	--	--	Existing R/W in interchange area and state-owned wetlands S/E of DM at Busch could be used for stormwater detention/retention.
18	Linebaugh to 550' S. of Hudson Ln	3500'	200'	8 LD Urban	700,000	16	3.2	
19	550' S. of Hudson Ln to 1500' No. of Hudson Ln	2100'	200'	8 LD Urban	420,000	9.6	1.9	
20	1500' N. of Hudson Ln to 600' N. of Fletcher	4400'	200'	8 LD Urban	880,000	20	4.0	
21	600' N. of Fletcher to 2600' S. of Ehrlich	3900'	200'	8 LD Urban	780,000	18	3.6	
22	2600' S. of Ehrlich to 2200' N. of Ehrlich	4800'	200'	8 LD Urban	960,000	22	4.4	

Preliminary Stormwater Detention Requirements by Drainage Area — Conventional Widening Alternative
(Continued)

Existing Dale[1] Mabry Subbasin Area No.	Approx. From & To Points	Lineal Distance (ft.)	Proposed[2] R/W (ft.)	Proposed[2] Type C.S.	R/W Area (lxw) (Sq.Ft.)	R/W Area (lxw) (acres)	Proposed Area Req'd[3] for Detention (acres)	Comments
23	2200' N. of Ehrlich to 4400' N. of Northdale	5600'		No additional constr. proposed for this segment beyond the 6-laning which is already designed and programmed for construction				-
24	4400' N. of Northdale to Sta. 1005	2500'						-
25	Sta. 1005 to Sta. 1030 (Lk Park)	2500'						-
26	Sta. 1030 to Van Dyke	3000'						-
—	Van Dyke to U.S. 41	4.6 mi.	200'	4 LD Rural		-	-	Treatment and detention proposed using grass swales with berms
					Subtotal (Areas 8-26)		27.3 acres	
					Total (Areas 1-26)		34.2 acres	

Notes:

[1]Sources of drainage information:

Euclid to Hillsborough: City of Tampa drainage atlas and SWFWMD aerials with elevation contours.

North of Hillsborough: FDOT drainage maps.

Drainage boundaries are only approximate due to differences in City of Tampa and FDOT drainage boundaries.

[2]Does not include additional R/W for dual-left turn lanes and/or exclusive right-turn lanes, in some cases.

[3]Based on 20% additional acreage required for stormwater retention or detention and treatment.

Preliminary Stormwater Detention Requirements by Drainage Area
Van Dyke to U.S. 41 — Urban Section (4 LD) with Two-Way, Two-Lane Frontage Roads

Existing Dale[1] Mabry Subbasin Area No.	Approx. From & To Points	Lineal Distance (ft.)	Proposed[2] R/W (ft.)	Proposed[2] Type C.S.	R/W Area (lxw) (Sq.Ft.)	R/W Area (lxw) (acres)	Proposed Area Req'd[3] for Detention (acres)	Comments
27	Van Dyke (Sta. 1060) to Sta. 1110	5000'	200'		1,000,000	23	4.6	
28	Sta. 1110 to Sta. 1130	2000'	200'		400,000	9.2	1.8	Total R/W costs for detention est. as follows: assume 1 parcel/pond = $19,000 x 8 ponds = $152,000 Land @ $1.00/SF = $960,000 + 50% admin. support = $1,590,000 total (say $1.6 million)
29	Sta. 1130 to Sta. 1160	3000'	200'		600,000	14	2.8	
30	Sta. 1160 to Sta. 1190	3000'	200'		600,000	14	2.8	
31	Sta. 1190 to Sta. 1210	2000'	200'		400,000	9.2	1.8	
32	Sta. 1210 to Sta. 1225	1500'	200'		300,000	6.9	1.4	
33	Sta. 1225 to Sta. 1255	3000'	200'		600,000	14	2.8	
34	Sta. 1255 to Sta. 1300	4500'	200'		900,000	21	4.1	
					Subtotals	111 acres	22 acres	

Note: Additional R/W outside of the 200' is required where the frontage roads intersect roads crossing Dale Mabry; however, part of that additional R/W required will be available for use for stormwater treatment and detention.

Expressway Alternative (from S. of Kennedy to N. of Ehrlich)
Preliminary Stormwater Detention Requirements by Drainage Area

Existing Dale[1] Mabry Subbasin Area No.	Approx. From & To Points	Lineal Distance (ft.)	Proposed[2] R/W (ft.)	Type C.S.	R/W Area (lxw) (Sq.Ft.)	(acres)	Proposed Area Req'd[3] for Detention (acres)	Comments
1	Euclid to 500' N. of Euclid	500'	114'	6 LD Urban	57,000	1.3	—	Alt. treatment system such as exfiltration recommended due to short length of system
2	500' N. of Euclid to San Pedro	2700'	114'	" "	307,800	7.1	1.4	
3	San Pedro to San Jose	1900'	114'	" "	216,600	5.0	1.0	
4	San Jose to Watrous	3200'	114'	" "	364,800	8.4	1.7	
5	Watrous to Swann	2100'	114'	" "	239,400	5.5	1.1	
6	Swann to Cleveland	1900'	varies; avg.=150'		285,000	6.5	1.3	
7	Cleveland to North A	1200'	varies; avg.=230'		276,000	6.3	1.3	
					Subtotals		7.8 acres	
8	North A to Cypress St.	2200'	varies; avg.=180'		396,000	9.1	1.8	
9	Cypress St. to Laurel	1400'	—	8 LD Urban (Little or no const. req'd. in this segment; already 8-lanes)				
10	Laurel to Cherry	2000'	200'		400,000	9.2	1.8	
11	Cherry to Tampa Bay	4500'	200'*		900,000	21	4.1	*Additional R/W req'd at Col Drive; however, area within interchange could be used for stormwater detention
12	Tampa Bay to Crest	7300'	varies		1,600,000	37	—	Use berms with existing ditch on E. side of D.M. between Buffalo and Hillsb. to provide detention and treatment
13	Crest to ditch N. of Hillsb.	2200'	—		—	—	—	Existing R/W in interchange area could be used for detention & treatment
14	Ditch N. of Hillsb. to Sligh	4000'	varies		940,000	22	—	6.4 acre det. pond to be constructed as part of 6-laning project
15	Sligh to Waters	5300'	varies		1,100,000	25	—	40 acre wetland site to be used in conjunction with programmed 6-laning project

Expressway Alternative (from S. of Kennedy to N. of Ehrlich)
Preliminary Stormwater Detention Requirements by Drainage Area
(Continued)

Existing Dale[1] Mabry Subbasin Area No.	Approx. From & To Points	Lineal Distance (ft.)	Proposed[2] R/W (ft.)	Proposed[2] Type C.S.	R/W Area (lxw) (Sq.Ft.)	R/W Area (lxw) (acres)	Proposed Area Req'd[3] for Detention (acres)	Comments
16	Waters to Lazy Lane	3100'	varies		710,000	16	3.2	
17	Lazy Lane to Linebaugh	2400'	—		—	—	--	Existing R/W in interchange area & state-owned wetlands S.E. of DM & Busch could be used for detention & treatment
18	Linebaugh to 550' S. of Hudson Ln	3500'	varies		730,000	17	3.4	
19	550' S. of Hudson Ln to 1500' N. of Hudson Ln	2100'	varies		500,000	11	2.3	
20	1500' N. of Hudson Ln to 600' N. of Fletcher	4400'	varies		980,000	23	4.5	
21	600' N. of Fletcher to 2600' S. of Ehrlich	3900'	varies		820,000	19	3.8	
22	2600' S. of Ehrlich to 2200' N. of Ehrlich	4800'	varies		1,100,000	25	5.1	
23	2200' N. of Ehrlich to 4400' N. of Northdale	5600'	No additional constr. proposed for this segment beyond the 6-laning which is already designed and programmed for construction					-
24	4400' N. of Northdale to Sta. 1005	2500'						-
25	Sta. 1005 to Sta. 1030 (Lk Park)	2500'						-
26	Sta. 1030 to Van Dyke	3000'						-
—	Van Dyke to U.S. 41	4.6 mi.	200'	4 LD Rural				Treatment and detention proposed using grass swales with berms
						Subtotal (Areas 8-26)	30 acres	
						Total (Areas 1-26)	37.8 acres	

R/W & Relocation Costs for Stormwater Detention

Drainage Area No.	Tentative Pond Location	Multi-Lane Widening						Expressway Alternative					
		Pond Size (ac.)	No. Parcels	Total Cost[1] ($1,000)	Displacements[2] R	B	N	Pond Size (ac.)	No. Parcels	Total Cost ($1,000)	Displacements R	B	N
2	N. side of El Prado, west of Dale Mabry	1.3	4	974	4	-	-			(same)			
3,4	N. side of Palmira, west of Dale Mabry	2.7	11	2340	11	-	-			(same)			
5	N. side of Morrison, west of Church Ave.	1.1	4	970	4	-	-			(same)			
6	N. side of Swann, west of Dale Mabry	1.0	4	680	3	1	-	1.4	6	1030	5	1	-
7	N. side of Cleveland bet. Church & D.M.	0.9	3	701	3	-	-			(same)			
8	Between Cass & Lemon St. Ditch, E. of D.M.	1.5	1	674	-	1	-	1.8	1	791	-	1	-
10	S. side of Spruce west of Dale Mabry	1.8	1	2440	-	1	-			(same)			
11	Near Palmetto, west of D.M., s. of drainage canal	4.1	1	1630	-	1	-			(same)			
16	At Channel H, north of Waters, w. of D.M.	2.8	1	1120	-	-	-	3.2	2	1292	-	-	-
18	North of Linebaugh, w. side of Dale Mabry	3.2	1	1270	-	-	-	3.4	1	1353	-	-	-
19	Sweetwater Creek, N. of Hudson Lane (e. and/or w. side)	1.9	2	2075	-	1	-	2.3	3	3390	-	13	-
20	South of Stall Rd. w. side of D.M.	4.0	1	2110	-	-	-	4.5	1	2373	-	-	-
21	North of Moran e. side of D.M. (next to a lake)	3.6	2	2560	1	-	-	3.8	2	2700	1	-	-
22	Near Ehrlich either side of Dale Mabry	4.4	1	2894	-	-	-	5.1	1	3350	-	-	-
	Totals	34.3		22,400	26	5	-	37.4		25,300	28	17	-

[1]Costs include R/W support & prop. owner appraisal fees at $19,000/parcel, land costs (vary between $1-12/s.f.), cost of land improvements (structures) @ $30-40/sf, administrative & legal settlement (50% of land & improvements), and relocation costs of $7,000 per business or residence.

[2]Displacements include residences, businesses, and non-profit organizations.

APPENDIX E

DATA ON FATAL AND PEDESTRIAN ACCIDENTS

Part One -- Summary of Characteristics of Fatal Accidents, Dale Mabry Highway, Euclid to U.S. 41 in Pasco County

Accidents by Year*

	'83	'84	'85	Sum
Fatal	10	10	11	31
Total #Acc.	1647	1014	1005	3666
%Fatal	0.61%	0.99%	1.1%	0.84%
#Fatalities	11	12	12	35

By Accident Type

(45%)	14	right-angle collisions
(23%)	7	collisions with pedestrians
	3	hit fixed object/utility pole
	2	head-on
	2	left-turn
	1	collision w/bicyclist
	1	overturned
	1	sideswipe
Total	31	Accidents

By Lighting Condition

(42%)	13	Daylight
	1	Dusk/dawn
	6	Dark (st. lighted)
	11	Dark (not lighted)
Total	31	Accidents

By Site Location

(55%)	17	Not an intersection/RR Xing or bridge
(35%)	11	At Intersection
	2	Influenced by Intersection
	1	Exit Ramp
Total	31	Accidents

By No. of Vehicles Involved

8	One Vehicle
16	Two Vehicle
5	Three Vehicle
2	Four or more
Total 31	Accidents

*reporting criteria changed beginning January, 1984.

APPENDIX E (Continued)

Part Two - Summary of Characteristics of Pedestrian Accidents

Accidents by Year*

	'83	'84	'85	Sum
Ped. Acc.	13	9	7	29
Total Acc.	1647	1014	1005	3666
%Ped.	0.79%	0.89%	0.70%	0.79%

Accidents by Site Location

12	Not at intersection/RRXing/Bridge
13	At intersection
4	Influenced by Intersection
Total 29	

Accidents by Lighting Condition

(38%) 11	Daylight
1	Dusk/Dawn
9	Dark
8	Dark
Total 29	

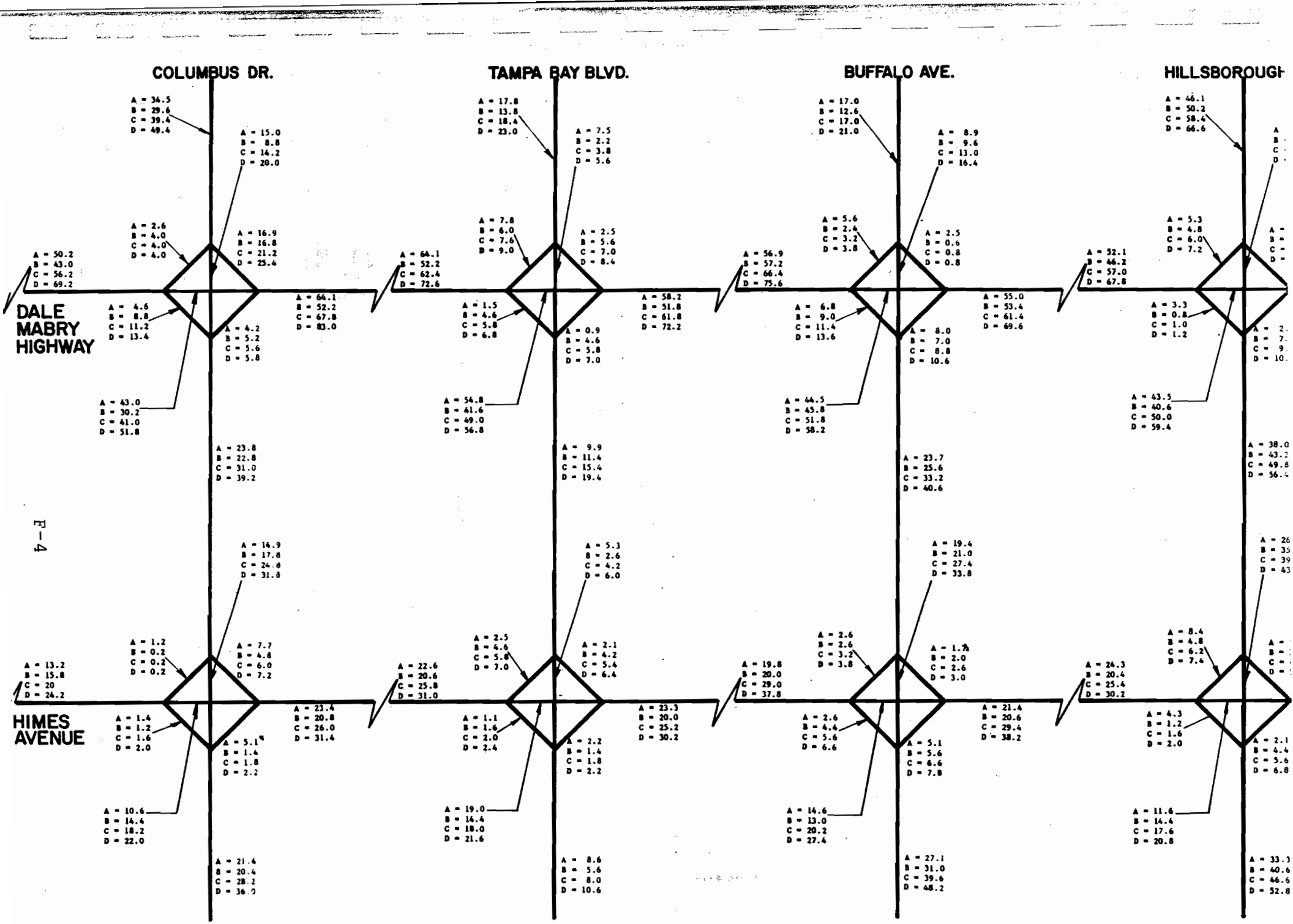
Accidents by Severity

7 out of 29 (or 24%) involved fatalities

*reporting criteria changed beginning January, 1984.

APPENDIX F

Project Design Volumes for
2010 and Intermediate Years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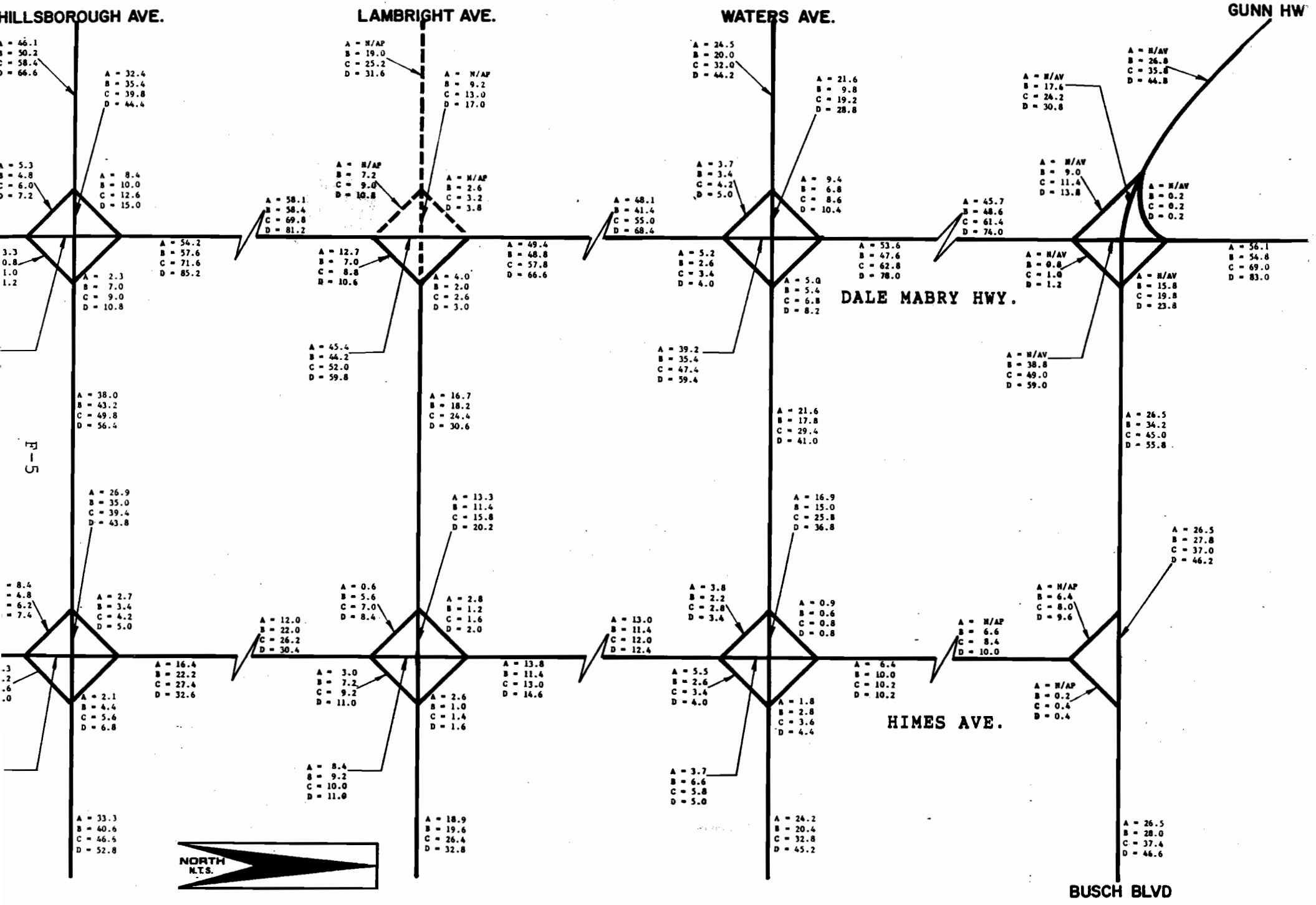
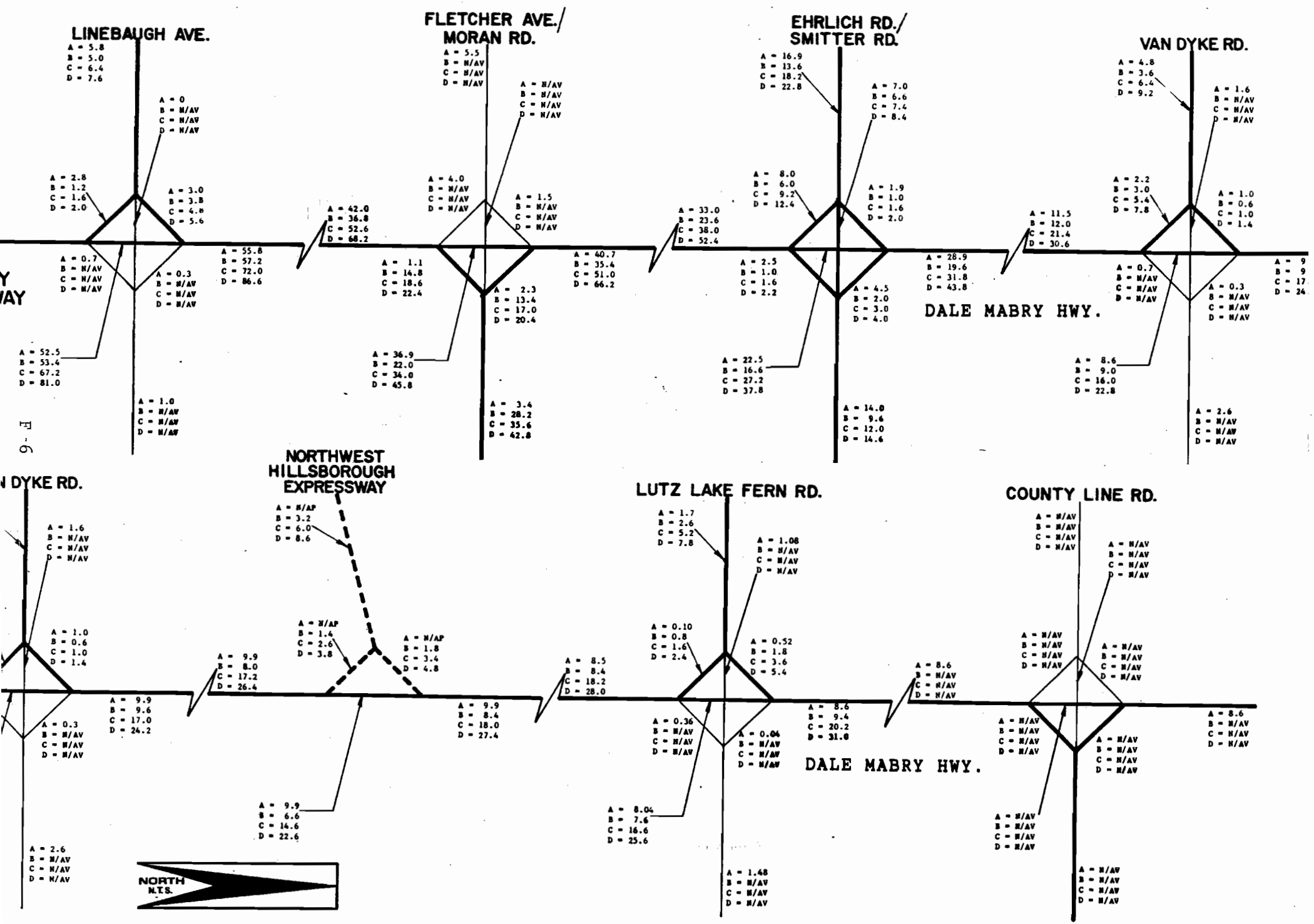
HILLSBOROUGH
DALE MABRY HIGHWAY
HIMES AVENUE
NORTH
N.T.S.


HILLSBOROUGH AVE.
LAMBRIGHT AVE.
WATERS AVE.
GUNN HW
DALE MABRY HWY.
HIMES AVE.
BUSCH BLVD
NORTH
N.T.S.


LINEBAUGH AVE.
FLETCHER AVE./
MORAN RD.
EHRLICH RD./
SMITTER RD.
VAN DYKE RD.
DALE MABRY HWY.
NORTHWEST
HILLSBOROUGH
EXPRESSWAY
LUTZ LAKE FERN RD.
COUNTY LINE RD.
DALE MABRY HWY.
NORTH
N.T.S.

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