

Task A.5.b.13 Noise Report

TAMPA INTERSTATE STUDY

State Project No. 99007-1402, WPI No. 7140004, FAP No. IR-9999(43)

Interstate 275 (I-275) from the Howard Frankland Bridge/Kennedy Boulevard ramps to the Dale Mabry Highway interchange on the east and just north of Cypress Street on Memorial Highway (S.R. 60), Hillsborough County.

Prepared For The FLORIDA DEPARTMENT OF TRANSPORTATION

**Prepared By
GREINER, INC.**

**In Association With
KNIGHT APPRAISAL SERVICES, INC.
PIPER ARCHAEOLOGICAL SERVICES**

JUNE 1992

EXECUTIVE SUMMARY

This report contains the results of a noise impact analysis conducted for the proposed improvements to Interstate 275 (I-275) from the Howard Frankland Bridge/Kennedy Boulevard ramps to the Dale Mabry Highway interchange and Memorial Highway (S.R. 60) from Cypress Street to I-275, in Hillsborough County, Florida. These improvements involve expanding the roadway to include high occupancy vehicle (HOV) lanes, additional mainline lanes, and collector-distributor lanes. In accordance with Title 23 CFR, Part 772, this analysis examines both existing and future noise levels; identifies potential noise impacts associated with the project; and addresses the feasibility of noise abatement measures, whenever necessary.

The distance from the roadway centerline to the 65 and 67 dBA noise contour is predicted to increase with the proposed improvements to the Tampa Interstate System. This is a result of higher, future-year Level-of-Service (LOS) C peak hour traffic volumes related to the expanded roadway network and the addition of travel lanes. The results of the analysis also indicate that under existing and future No-Build conditions, approximately 154 Category B noise sensitive sites located within 5 noise sensitive areas approach, or exceed, the Federal Highway Administration's (FHWA) Noise Abatement Criteria. Impacted noise sensitive sites within the areas include single family residences, multi-family residences and churches. For the Preferred Alternative (2010), the number of noise sensitive sites approaching or exceeding FHWA Noise Abatement Criteria is predicted to decrease to 138. The decrease is a result of property acquisition for additional right-of-way.

The noise abatement measures examined included alternative roadway alignment, traffic system management, noise barriers and property acquisition. It was determined through a noise barrier analysis that economically reasonable barriers could protect approximately 93 Category B impacted receptors in two of the noise sensitive areas. In addition, it is recommended that future noise impacts could be mitigated through local land use ordinances involving zoning, building setbacks and building construction materials.

The predicted increases in noise levels and associated noise impacts are an unavoidable consequence of the project.

TABLE OF CONTENTS

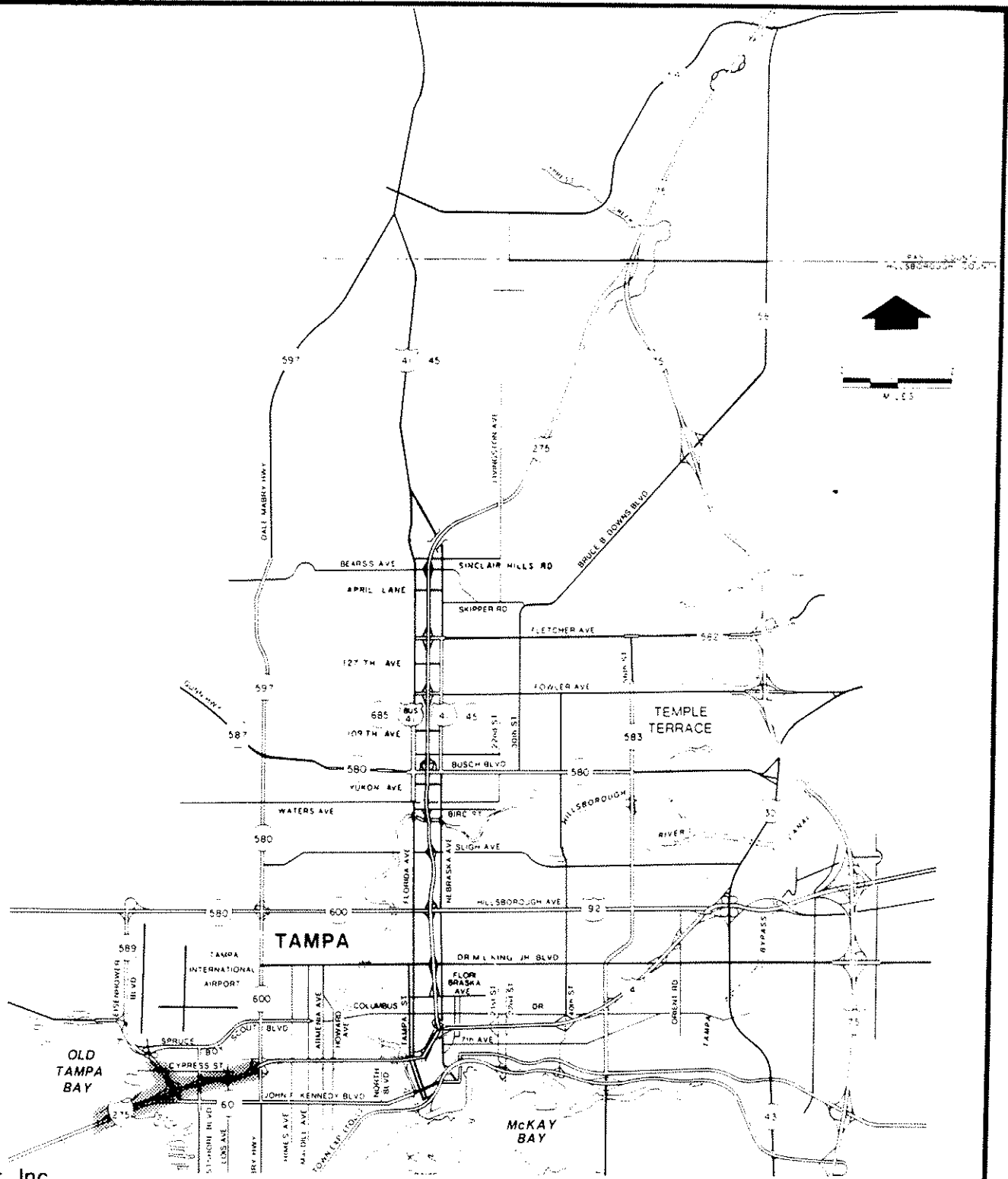
	<u>Page</u>
Executive Summary	i
List of Tables	iii
List of Exhibits	iv
I. INTRODUCTION	1
A. Purpose of the Noise Report	1
B. Project Description	1
II. NOISE ANALYSIS	3
A. Noise Sensitive Areas	3
B. FHWA/FDOT Noise Abatement Guidelines	3
C. Measured Noise Levels	5
D. Predicted Noise Levels	7
III. NOISE ABATEMENT MEASURES	12
A. Alignment Selection	12
B. Traffic System Management Measures	13
C. Property Acquisition	13
D. Land Use Controls	13
E. Noise Barriers	13
IV. CONSTRUCTION NOISE	17
V. COORDINATION WITH LOCAL OFFICIALS	18
REFERENCES	
APPENDICES	
Appendix A - Roadway Typical Sections	
Appendix B - Traffic Data for Noise Analysis	
Appendix C - Modeled Receptors	
Appendix D - Addendum: Vehicle Speeds	
Appendix E - Addendum: Transition Segment	

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
1	FHWA Noise Abatement Criteria	4
2	Noise Monitoring Data Summary	6
3	Noise Isopleths	9
4	Noise Impact Summary	11
5	Noise Barrier Summary	16


LIST OF EXHIBITS

<u>Exhibit No.</u>	<u>Title</u>	<u>Follows</u>
1	Location Map	Page 1
2	Project Study Limits	Page 2
3	Generalized Land Uses	Page 3
4	Noise Study Areas	Page 8
5	Substantial Increase Criteria	Page 12
6	Typical Section, Northwest Expressway at Cypress Street	Appendix A
7	Typical Section, I-275 at Trask Street	Appendix A
8	Typical Section, I-275 at Marie Avenue	Appendix A
9	Existing (1990) Traffic Data	Appendix B
10	Design Year (2010) Traffic Data	Appendix B



Greiner, Inc.

LEGEND

 Study Area

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT TAMPA INTERSTATE STUDY PHASE II

Hillsborough County, Florida

LOCATION MAP

EXHIBIT 1

I. INTRODUCTION

A. Purpose of the Noise Report

The purpose of this report is to document existing noise levels, analyze future year noise levels and associated impacts, and evaluate the feasibility of potential noise mitigation measures associated with the proposed improvements to the Tampa Interstate System. This report was prepared using methodology established in Title 23 CFR, Part 772, U.S. Department of Transportation Federal Highway Administration (FHWA), Procedures for Abatement of Highway Traffic Noise and Construction Noise.^[1]

B. Project Description

The project location is shown on Exhibit 1 and includes Interstate 275 (I-275) from the Howard Frankland Bridge/Kennedy Boulevard ramps to the Dale Mabry Highway interchange and Memorial Highway (S.R. 60) north of Cypress Street to I-275.

Beginning at the Howard Frankland Bridge, the existing eastbound roadway consists of two lanes to Memorial Highway, three lanes from Memorial Highway to Westshore Boulevard and then four lanes (three through lanes and one auxiliary lane) to Lois Avenue. East of Lois Avenue, I-275 again has three lanes to the end of the study area.

Westbound I-275, beginning just west of the Himes Avenue overpass, consists of three lanes to Westshore Boulevard. West of Westshore Boulevard, four lanes are provided to allow for a two-lane northbound exit ramp for Memorial Highway (S.R. 60). The two remaining lanes cross over Memorial Highway and continue westbound over the Howard Frankland Bridge.

Existing interchanges within the study area are provided at Kennedy Boulevard, Memorial Highway, Westshore Boulevard, Lois Avenue and Dale Mabry Highway. The posted speed limit throughout the I-275 mainline segment is 55 miles per hour (mph), except for the Memorial Highway area where a 50 mph speed limit is posted.

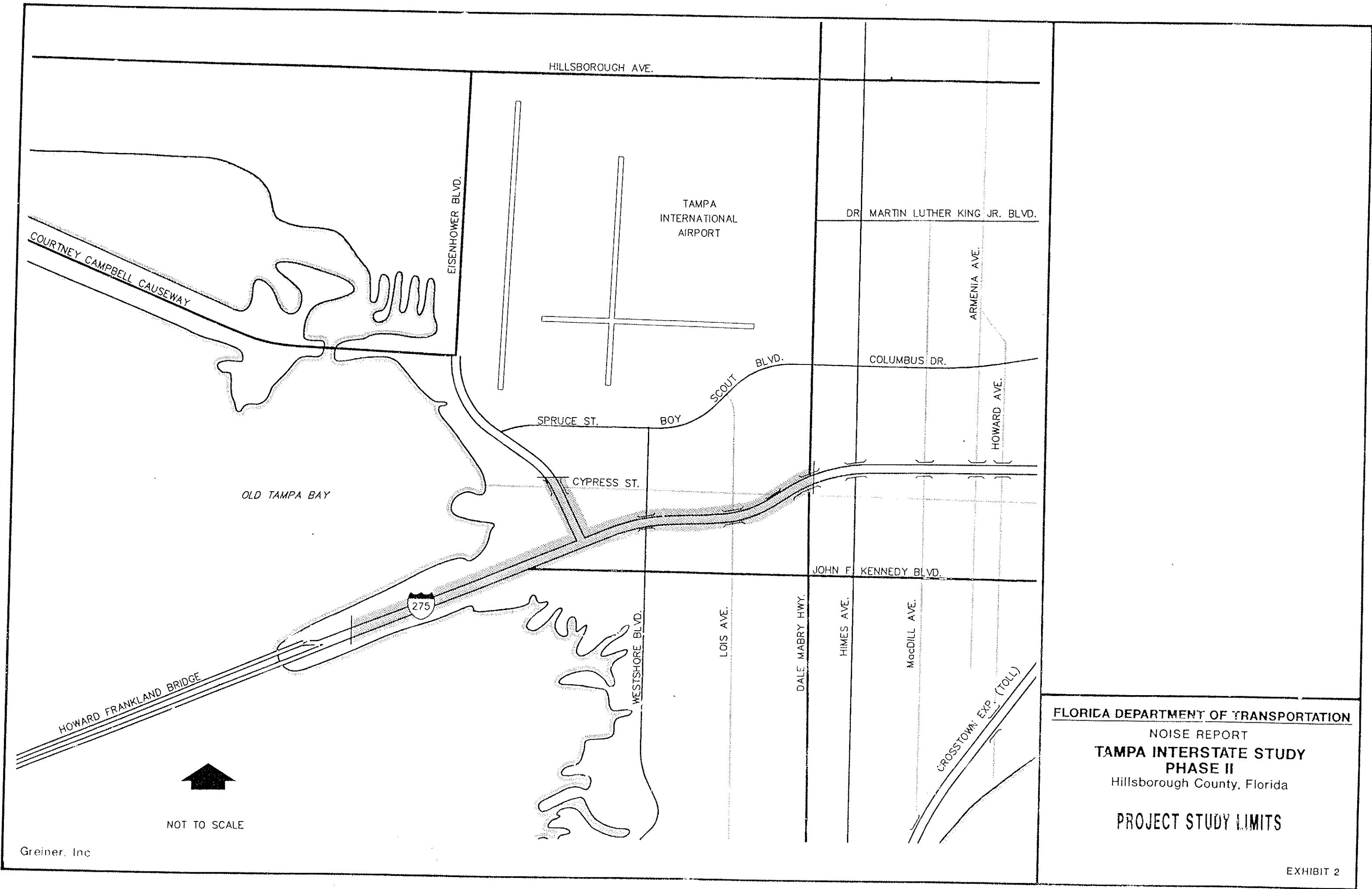
Cross streets within the project limits include Memorial Highway, Westshore Boulevard, Lois Avenue, Dale Mabry Highway and Cypress Street.

The proposed I-275 improvements consist of a four-lane roadway from the Howard Frankland Bridge to Memorial Highway and six lanes from Memorial Highway to east of the Dale Mabry Highway interchange. An auxiliary lane will be provided for the eastbound weaving section between the Westshore Boulevard and Lois Avenue interchanges.

High occupancy vehicle (HOV) priority ramps will be provided to, and from, the east on I-275 at Trask Street. A full-directional interchange will be included for the I-275 connection to the Northwest Hillsborough Expressway, and direct access will be provided from Memorial Highway and Kennedy Boulevard to the Expressway.

Existing interchange locations at Kennedy Boulevard, Westshore Boulevard, Lois Avenue and Dale Mabry Highway will remain. New arterial improvements include (1) a Sherrill Street extension north from Memorial Highway and Kennedy Boulevard across I-275 to Spruce Street and (2) the new Lemon Street Connector to Westshore Boulevard from Occident Street.

The project study limits are shown on Exhibit 2. Illustrations of typical roadway sections are contained in Appendix A. Further details concerning the existing



FLORIDA DEPARTMENT OF TRANSPORTATION
NOISE REPORT
**TAMPA INTERSTATE STUDY
PHASE II**
Hillsborough County, Florida
PROJECT STUDY LIMITS

roadway and design alternatives are available in the Tampa Interstate Study Draft Engineering Report,^[2] published separately and available at the District 7 office of the Florida Department of Transportation.

II. NOISE ANALYSIS

A. Noise Sensitive Areas

The existing land uses in the Tampa Interstate System study corridor are primarily commercial, light industrial and residential as shown on Exhibit 3. A description of noise sensitive sites organized by FHWA activity category is given in Table 1. Noise sensitive sites located within the study area include single family residences, apartments, schools and churches. These sites are in FHWA Activity Category B. No libraries or hospitals are within the study area and no interior noise levels (Category E) were included in the noise study.

B. FHWA/FDOT Noise Abatement Guidelines

FHWA Noise Abatement Criteria, summarized in Table 1, establish guidelines for traffic noise impact assessment with respect to various land uses. When the traffic noise associated with a roadway project is predicted to approach, or exceed, the FHWA criteria, noise abatement measures must be considered. FDOT considers the term "approach" to normally mean within 2 dBA of the FHWA criteria. For this analysis, noise impacts were identified for locations predicted to exceed a noise level of 2 dBA less than the FHWA criteria for the appropriate activity category. For example, while the FHWA criteria for Activity Category B is 67 dBA, a value of 65 dBA was used in this evaluation to determine noise impacts.

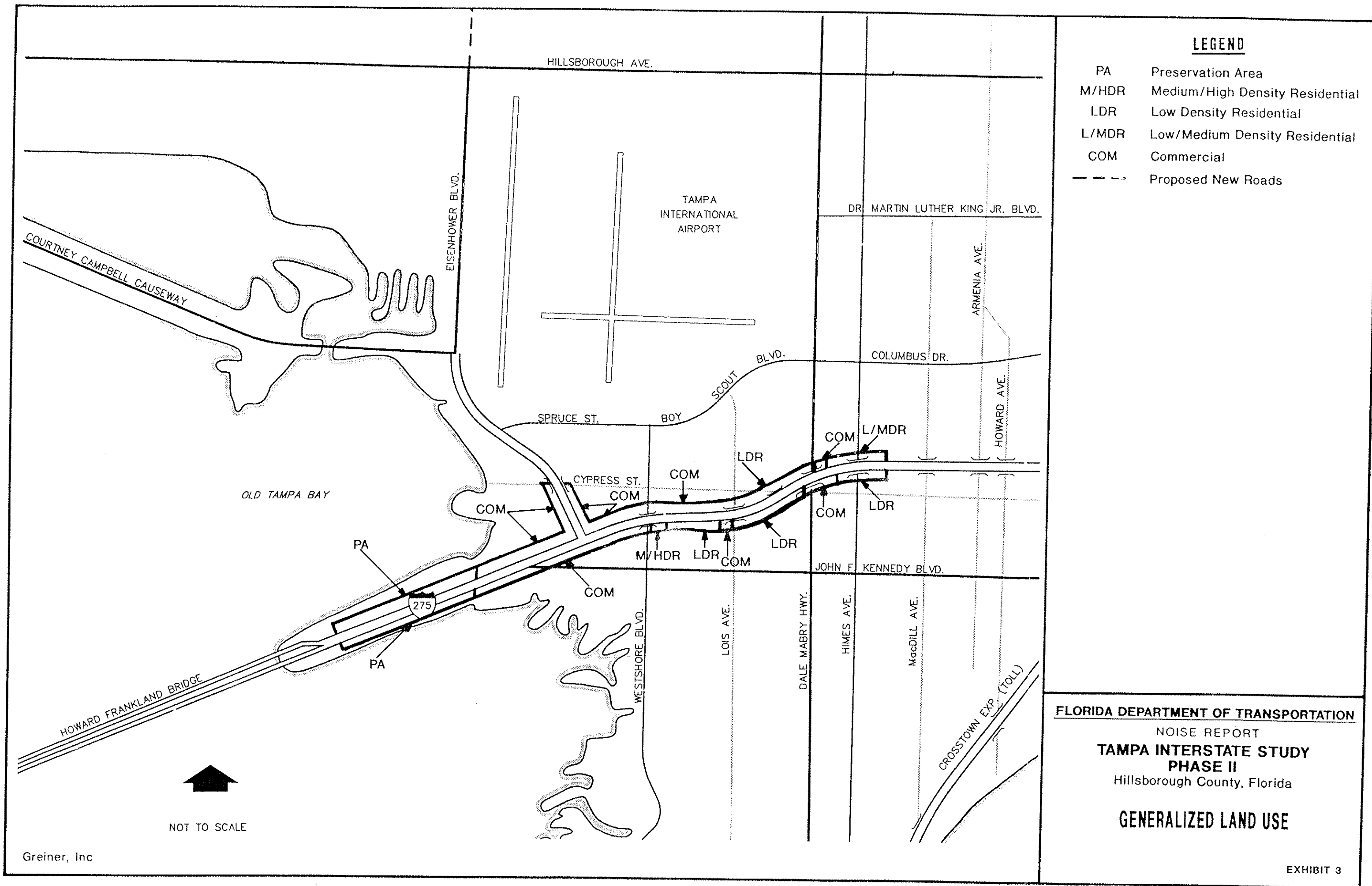


TABLE 1
FHWA NOISE ABATEMENT CRITERIA
Tampa Interstate Study
Noise Report

<u>Activity Category</u>	<u>Description of Activity Category</u>	<u>Leq (h)</u>
A	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.	57 (Exterior)
B	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.	67 (Exterior)
C	Developed lands, properties, or activities not included in Categories A or B above.	72 (Exterior)
D	Undeveloped lands.	N/A
E	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.	52 (Interior)

Source: Code of Federal Regulations, Title 23, Part 772.

N/A = No Standard for this Activity Category, therefore not applicable.

C. Measured Noise Levels

Noise monitoring was conducted by Greiner, Inc. personnel in the project area on April 7 and 8, 1988 to measure existing noise levels and to validate the computer model used in the noise prediction analyses. The noise monitoring procedures were based on the methodologies contained in the two FHWA reports, Fundamentals and Abatement of Highway Traffic Noise[3] and Sound Procedures for Measuring Highway Noise. [4]

The unit of noise measurement utilized for both the monitoring and prediction analyses is the hourly equivalent sound level, $Leq(1)$. $Leq(1)$ is defined as the equivalent steady state sound level which, in an hour, would contain the same acoustic energy as the time-varying sound level during the same period. Leq is measured in A-weighted decibels (dBA) which closely approximates human frequency response.

Noise measurements were taken at four sites in the vicinity of the project which were selected as being representative of the various land use and traffic conditions throughout the study area. Measurements were taken with a Larson-Davis Model 700 sound level meter. Concurrent traffic volume, speed and vehicle mix were also recorded. As shown in Table 2, measured Leq noise levels ranged from 66 to 73 dBA at the four noise monitoring sites. The highest level was measured at Site No. 3 located approximately 206 feet from the center of the nearest travel lane of Memorial Highway (S.R. 60).

TABLE 2
NOISE MONITORING DATA SUMMARY
Tampa Interstate Study
Noise Report

Site	Hourly Leq (dBA)		Diff.*	Hourly Vehicle Volume						Distance in Feet to Center of Near Lane	Posted Speed (mph)	Note
	Measured	Predicted		Near Lanes			Far Lanes					
				A	MT	HT	A	MT	HT			
1	67	70	3	4,136	372	168	3,864	288	132	162	55	Church on Lois Avenue
2	66 ^a	--	--	--	--	--	--	--	--	606	55	Ramada Inn on Kennedy Boulevard
3	73 ^a	--	--	--	--	--	--	--	--	206	50	Hyatt Hotel
4	67	68	1	2,160	36	60	2,088	60	12	104	40	Skyway Park on Eisenhower Avenue

Note: a = Ambient Site, traffic count not taken.

A = Automobiles

MT = Medium Trucks

HT = Heavy Trucks

* = Difference between measured and predicted hourly Leq.

D. Predicted Noise Levels

1. Model and Methodology

Existing and future year noise levels within the Tampa Interstate System study area were further evaluated with the FHWA computer model STAMINA 2.0.[5] The model was validated with the existing traffic and noise level data gathered during the noise monitoring program by comparing measured values with predicted values. As shown in Table 2, the results are within an acceptable difference of 3 dBA. Based on this comparison, the STAMINA model was determined to be a reliable model for the prediction of traffic-related noise levels associated with this project.

In accordance with FDOT guidelines, traffic input data used in the STAMINA model represent peak hour "Demand" or Level-of-Service (LOS) "C" conditions, whichever was less. The exhibits in Appendix B show the traffic volumes utilized in this analysis. Within the exhibits, asterisks have been placed by the traffic volumes which represent peak hour "Demand". The "Demand" volumes that did not exceed LOS "C" volumes were used in the analysis. Peak hour "Demand" volumes that exceed LOS "C" volumes are shown in brackets next to corresponding LOS "C" volumes used in the analysis. These two conditions, which represent stable traffic flow patterns with most vehicles experiencing minimal delays and traveling near the posted speed limit, are considered to represent "worst-case" noise impacts for each scenario examined. Traffic volumes used in the analysis are based on the Tampa Interstate Study Traffic Memorandum, published separately.[6]

Noise levels were modeled for existing (1990) conditions and for the 2010 Preferred Alternative. For the existing year analysis, LOS "C" traffic volumes were used when modeling interstate traffic lanes in the vicinity of the noise sensitive sites. As a

worst-case, the same LOS "C" traffic volumes were used when considering the 2010 No-Build condition. Therefore, noise levels for the 2010 No-Build scenario are anticipated to be the same as those predicted in the existing conditions analysis.

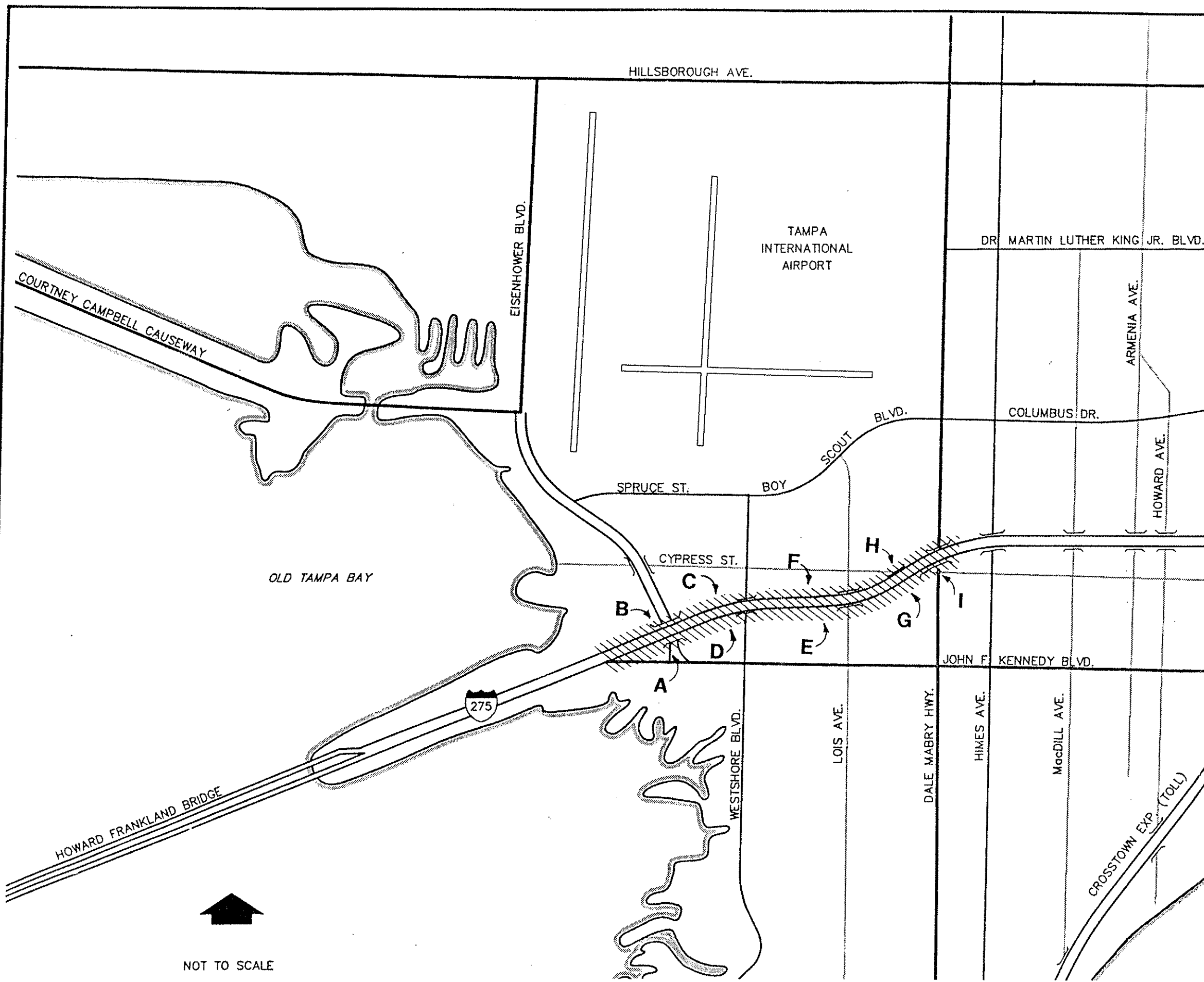
Modeled roadways include the interstate express freeway, HOV lanes, local access freeway and ramp systems. The project also includes upgrading arterials in the vicinity of interchanges. Sherrill Street, Memorial Highway, Westshore Boulevard, Lois Avenue and Dale Mabry were included in the analysis.


Based on traffic volumes, land uses and roadway geometry, nine separate noise study areas were established for this analysis. The locations of the noise study areas, designated A through I are shown in Exhibit 4. Land uses in each noise study area were analyzed to identify potential noise sensitive sites. Currently, single family residences, multi-family residences and/or churches are located in areas E, F, G, H and I. These five areas were further designated as noise sensitive areas.

Noise sensitive sites are located in the vicinity of Dale Mabry Highway interchange and Lois Avenue interchange. Representative receivers for these noise sensitive sites are included in the established noise study areas. The remaining arterial improvements included in the project are not in proximity to noise sensitive sites.

2. Results

The results of the STAMINA model noise analyses are summarized in Table 3 for existing (1990), 2010 No-Build condition and the 2010 Preferred Alternative. As shown, the distance between the centerline of I-275 and the 65 and 67 dBA contour



- LEGEND**
-  Noise Study Area
 - A** Area Designation

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NOISE REPORT
**TAMPA INTERSTATE STUDY
 PHASE II**
 Hillsborough County, Florida

NOISE STUDY AREAS

TABLE 3
NOISE ISOPLETHS
Tampa Interstate Study
Noise Report

Noise Study Area ^a	Location	Hourly LEQ (dBA)	Approximate Distance From Roadway Centerline (feet)		
			1990 Existing	2010 No-Build	2010 Preferred Alternative
A	West of Memorial Highway, south of I-275	67	220	220	310
		65	380	380	515
B	West of Memorial Highway, north of I-275	67	240	240	450
		65	370	370	550
C	Between Memorial Highway and Westshore Boulevard, north of I-275	67	350	350	350
		65	500	500	500
D	Between Memorial Highway and Westshore Boulevard, south of I-275	67	360	360	350
		65	500	500	500
E	Between Westshore Boulevard and Lois Avenue, south of I-275	67	295	295	380
		65	420	420	485
F	Between Westshore Boulevard and Lois Avenue, north of I-275	67	275	275	500
		65	425	425	590
G	Between Lois Avenue and Dale Mabry Highway, south of I-275	67	290	290	370
		65	400	400	480
H	Between Lois Avenue and Dale Mabry Highway, north of I-275	67	280	280	350
		65	400	400	575
I	Between Dale Mabry Highway and Himes Avenue, south of I-275	67	270	270	400
		65	400	400	500

^a See Exhibit 4 for Noise Study Area locations.

line is expected to increase with the proposed improvements to the Tampa Interstate System. The increase is a result of higher, future-year LOS C peak hour traffic volumes related to the expanded roadway network and the additional travel lanes.

Using the information in Table 3, combined with existing land use data and the effects of shielding from intervening structures and vegetation, the number of noise sensitive sites within the 65 dBA contour line was determined. All of these noise sensitive sites are classified as Category B from the FHWA Noise Abatement Criteria. It was further determined that noise levels approach or exceed the criteria at sensitive sites in noise study areas E, F, G, H and I. The impacted land uses include single- and multi-family residences and churches.

Under both the existing (1990) and 2010 No-Build conditions, 154 noise sensitive sites located within the noise study areas approach, or exceed, FHWA/FDOT noise level criteria. As shown in Table 4, there are 84 sites in Area E; 21 sites in Area G; 48 sites in Area H; and 1 site in Area I.

By the year 2010, the number of impacted sites in noise sensitive areas F and G are predicted to increase with the proposed improvements to the Tampa Interstate System. In contrast, a decrease in impacted noise sensitive sites is anticipated in noise sensitive areas E and H. The decrease is a result of property acquisition for additional right-of-way associated with the improved roadway system. Overall, the total number of noise sensitive sites is predicted to decrease to 138 with the project. There are 54 sites in Area E; 5 sites in Area F; 35 sites in Area G; 43 sites in Area H; and 1 site in Area I.

TABLE 4
NOISE IMPACT SUMMARY
Tampa Interstate Study
Noise Report

Noise Sensitive Area ^{a,b}	<u>Estimated Number of Noise Sensitive Sites^c</u>		
	<u>1990 Existing</u>	<u>2010 No-Build</u>	<u>2010 Preferred Alternative</u>
E	84	84	54
F	0	0	5
G	21	21	35
H	48	48	43
I	<u>1</u>	<u>1</u>	<u>1</u>
TOTAL	154	154	138

^a See Exhibit 4 for area locations.

^b In areas A through D, all sites within the 65 dBA contour are commercial and are not considered noise sensitive.

^c Number of noise sensitive sites within the 65 dBA contour.

Noise impacts are also considered to occur when noise levels are predicted to increase substantially yet not approach, or exceed, the FHWA Noise Abatement Criteria. These impacts occur primarily when proposed roadway improvements are planned in the vicinity of noise sensitive areas where existing noise levels are relatively low. FHWA defines a substantial increase as a 10 to 15 dBA increase above existing levels. The substantial increase criteria are shown graphically in Exhibit 5 and anticipated increases in noise levels are given in Appendix C for representative receptors. The projected increases are well below the 10-15 dBA range; therefore, no substantial increases as a result of this project are anticipated to occur within this portion of the Tampa Interstate System study area.

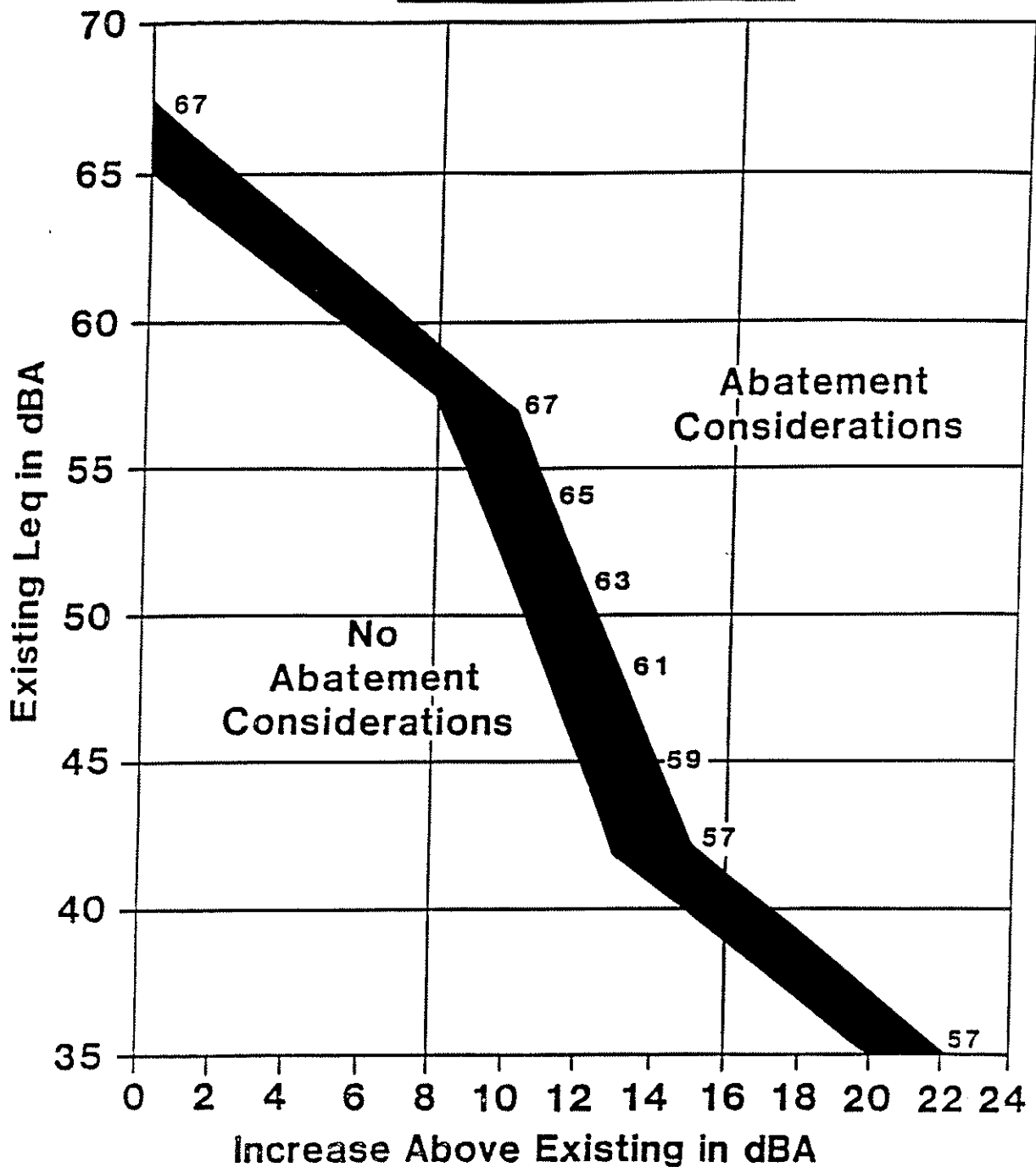
III. NOISE ABATEMENT MEASURES

The FHWA requires that when the noise levels of a proposed federally funded roadway project meet, or exceed, Noise Abatement Criteria, noise abatement measures must be evaluated. Because noise levels associated with the Tampa Interstate System were determined to approach and, in some cases, exceed the criteria, the feasibility of noise abatement measures was addressed. These measures include alignment selection, traffic system management, property acquisition, land use controls and noise barriers.

A. Alignment Selection

Alignment selection generally involves orientating and/or siting the roadway at sufficient distances from noise sensitive areas so as to minimize the noise impacts. The roadway alternatives developed for this project primarily follow the existing alignment throughout most of the study area.

Activity Category B



Greiner, Inc.

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II

Hillsborough County, Florida

SUBSTANTIAL INCREASE CRITERIA

EXHIBIT 5

B. Traffic System Management Measures

Traffic system management measures which limit motor vehicle type, travel speed, traffic volume, or time of operations are sometimes used as noise abatement measures. For this project, it was determined that a reduction in the speed limit of 10 miles per hour would only result in a noise level reduction of approximately 2 dBA. This is not considered appropriate or viable because most people cannot detect noise level differences of 2 to 3 dBA. Furthermore, the limitations on motor vehicle type, traffic volume or times of operation are not consistent with the project's goals for providing a modern urban interstate system.

C. Property Acquisition

Property acquisition programs to provide noise buffer zones or space for noise barrier construction are not recommended for this project due to the high cost and limited availability of land.

D. Land Use Controls

Another noise abatement measure is the use of proper land use controls to minimize future impacts. Local governmental and planning agencies with land use control can use the noise level isopleths provided in this report (see Table 3) to help develop policies that deter the location of noise sensitive land uses adjacent to the freeway.

E. Noise Barriers

Noise barriers reduce noise levels by blocking the sound path between a roadway and noise sensitive sites. Barriers are most often used on high speed, limited access

facilities where noise levels are high and there is adequate space for continuous barriers.

The noise barrier evaluation for this project was accomplished in two steps. First, a qualitative noise barrier location evaluation was performed to determine source/receiver relationships, impacted site densities and the availability of land for continuous barriers. Noise barriers were determined not to be practical at two of the five noise sensitive areas (F and I). Noise barriers are not effective in reducing noise levels at noise sensitive area F, which has five category B impacted receptors. Lois Avenue is the primary noise source in this area and noise barriers along I-275 would provide minimal abatement to these noise sensitive locations. Only one noise sensitive site, a single family residence is located in noise sensitive area I. The remainder of the property is commercial and not considered noise sensitive. Because of the sensitive site density, noise barriers would not be practical in noise sensitive area I.

For impacted noise sensitive areas E, G and H, where barriers appeared practical in the qualitative evaluation, a noise barrier analysis was conducted using the FHWA's noise barrier simulation model OPTIMA.[5] In accordance with FHWA/FDOT guidelines, the analysis was conducted by (1) developing barriers which would meet minimum noise reduction goals at impacted sites, (2) estimating the cost of the barrier and (3) determining the cost of the barrier per benefited receptor.

In order for a barrier to be considered reasonable and feasible, it must meet the following FDOT conditions:

1. Provide a minimum insertion loss (noise reduction) of at least 5 to 10 dBA, and
2. Cost no more than \$25,000 per benefited receptor.

However, other important factors such as community desires, adjacent land uses, safety and barrier constructability also play important roles. The results of the barrier modeling are discussed by noise sensitive area in the following paragraphs and summarized in Table 5.

Noise Sensitive Area E, located south of I-275 between Westshore Boulevard and Lois Avenue, has 54 Category B impacted receptors. A noise barrier comprised of two separate noise walls will provide an approximate 5 to 8 dBA reduction for all of the impacted receptors. Barrier No. 1 begins at Westshore Boulevard and extends approximately 1,500 feet east along the eastbound lanes of I-275. Barrier No. 2 begins approximately 1,300 feet east of Westshore Boulevard, crosses Lois Avenue and ends approximately 800 feet east of Lois Avenue.

The combined length of the two barriers is approximately 4,100 feet, with a recommended constant height of approximately 20 feet and an estimated cost of \$1,230,000. The cost per benefited receptor is \$22,800. According to FDOT guidelines, noise barriers in Noise Sensitive Area E are anticipated to be economically reasonable.

Noise Sensitive Area G, located south of I-275 between Lois Avenue and Dale Mabry Highway, has 35 Category B impacted receptors. A noise barrier comprised of two individual noise walls would provide an approximate 5 to 10 dBA reduction for 25 of the impacted receptors. Because of the site characteristics the remaining ten impacted receptors will receive less than a 5 dBA noise level reduction from these barriers. Barrier No. 3, an extension of Barrier No. 2 in Noise Sensitive Area E, is approximately 750 feet long with a height of 20 feet. Barrier No. 4, beginning approximately 550 feet east of the centerline of Lois Avenue and extending eastward along the eastbound lanes of I-275 for approximately 1,800 feet, is also 20 feet high.

The combined length of the two barriers is approximately 2,550 feet, with an estimated cost of \$765,000. The noise barriers will provide an approximate 5 to 10 dBA reduction for 25 of the 35 impacted receptors, and the cost per benefited receptor is approximately \$30,600. According to FDOT guidelines, noise barriers in Noise Sensitive Area G are not anticipated to be economically reasonable.

TABLE 5

NOISE BARRIER SUMMARY
Tampa Interstate Study
Noise Report

Noise Sensitive Area	Location	Barrier I.D. Numbers	Total Length (feet)	Average Height (feet)	Total Cost	Number of Impacted Receptors	Number of Benefited Receptors	Cost per Benefited Receptor
E	From Westshore Boulevard to Lois Avenue	1,2	4,100	20	\$1,230,000	54	54	\$22,800
G	From Lois Avenue to Dale Mabry Highway	3,4	2,550	20	\$765,000	35	25	\$30,600
H	From Lois Avenue to Dale Mabry Highway	5,6	2,800	18	\$840,000	43	39	\$21,500

aSee Exhibit 4 for area locations.

Noise Sensitive Area H, located north of I-275, between Lois Avenue and Dale Mabry Highway, has 43 Category B impacted receptors. A noise barrier comprised of two individual noise walls would provide an approximate 5 to 9 dBA reduction for 39 of the 43 impacted receptors. Because of the site characteristics four of the impacted receptors will receive less than a 5 dBA noise level reduction from these barriers. Barrier No. 5, beginning approximately 700 feet west of Lois Avenue and ending approximately 1,000 feet west of Dale Mabry Highway, is 18 feet high. Barrier No. 6, beginning approximately 1,200 feet west of Dale Mabry Highway and extending approximately 900 feet to the east, is also 18 feet high.

The combined length of the barriers is approximately 2,800 feet, with an estimated cost of \$840,000. The barriers will provide at least a 5 dBA noise reduction to 39 impacted receptors, and the cost per benefited receptor is approximately \$21,500. According to FDOT guidelines, noise barriers in Noise Sensitive Area H are anticipated to be economically reasonable.

The use of vegetation for noise barriers is not considered to be effective in the actual reduction of noise levels for this project. This is due to the substantial amount of right-of-way necessary to make vegetative barriers effective. Research conducted by the FHWA has shown that vegetative barriers should be composed of closely spaced, densely foliated, trees and shrubs and should be approximately 100 feet wide in order to provide a 5 dBA reduction in noise levels. Therefore, substantial amounts of additional right-of-way would be required. The cost to acquire the right-of-way and to plant the vegetation is estimated to exceed the economically reasonable requirements.

IV. CONSTRUCTION NOISE

The construction and development of the proposed Tampa Interstate System project will result in temporary noise increases within the study area. The noise would be

generated primarily from heavy equipment used in hauling materials and building the roadway improvements. Sensitive areas located close to the construction area may temporarily experience increased noise levels. Construction noise can be minimized to the greatest extent practicable through the adherence to controls listed in the latest edition of FDOT's Standard Specifications for Road and Bridge Construction.^[7]

V. COORDINATION WITH LOCAL OFFICIALS

Federal Aid Highway Program Manuals (FHPM) 7-7-1, FHPM 7-7-5, and FHPM 7-7-3 delegate to highway agencies the responsibility for taking measures that are prudent and feasible to assure the location and design of highways are compatible with existing and planned land uses. The agency responsible for this project is the FDOT. The FDOT will promote compatibility between land development and the operation of the proposed facility. To accomplish this goal, the FDOT will cooperate with the Metropolitan Planning Organization and with local officials by furnishing:

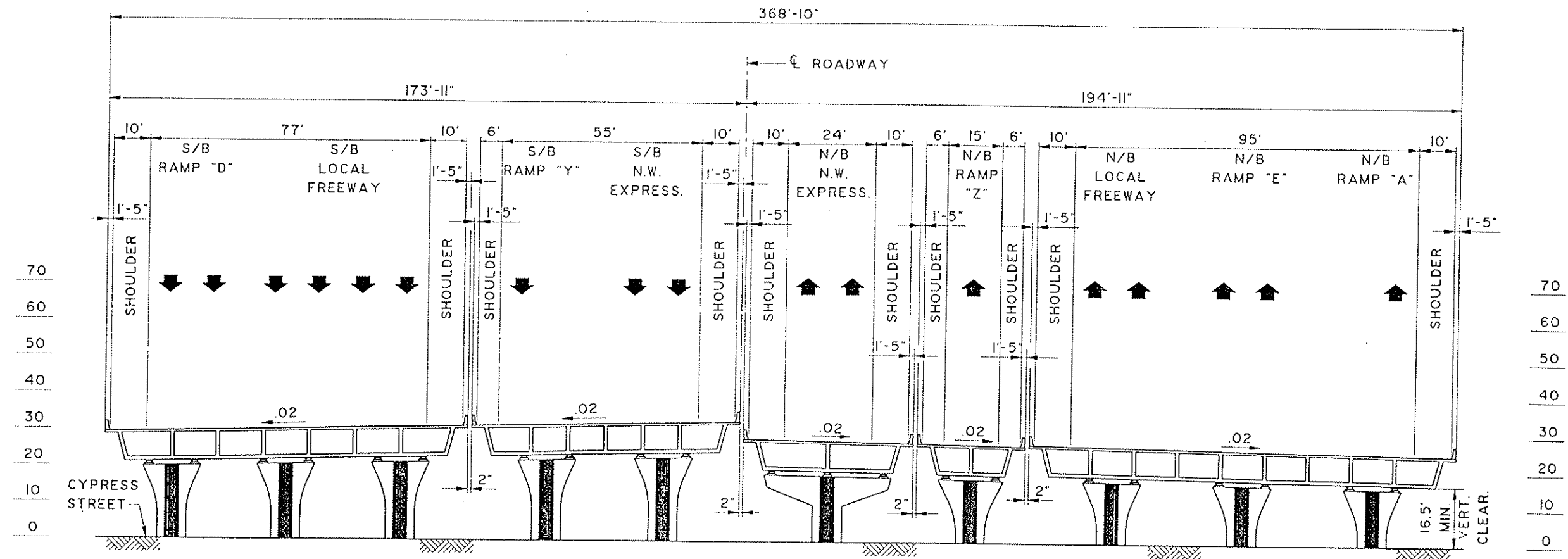
1. Appropriate generalized future noise levels (for various distances from highway improvement) for both developed and undeveloped lands or properties in the immediate vicinity of the project (Table 3);
2. Information that may be useful to local communities to protect future land development from becoming incompatible with anticipated highway noise levels; and
3. The FHWA policy regarding land use development or changes which are initiated after issuance of FHPM 7-7-3 [described in paragraph 12c (2) of that document].

Continued coordination with local agencies and officials has been conducted during the development of this study and a copy of this report will be provided to appropriate local planning authorities in order to assist in the development of compatible future land use criteria.

REFERENCES

1. Federal Highway Administration, Procedures for Abatement of Highway Traffic Noise and Construction Noise, Title 23 CFR Part 772, 1982.
2. Tampa Interstate Study, Draft Engineering Report, March 1991.
3. Federal Highway Administration, Fundamentals and Abatement of Highway Traffic Noise, 1973.
4. Federal Highway Administration, Sound Procedures for Measuring Highway Noise, 1981.
5. Federal Highway Administration, Noise Barrier Cost Reduction Procedures, STAMINA 2.0/OPTIMA USER'S GUIDE, 1982.
6. Tampa Interstate Study, Task A.2.g.1 Traffic Memorandum, 1991.
7. Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, 1990.

APPENDIX A
ROADWAY TYPICAL SECTIONS



STATION 234+50

FLORIDA DEPARTMENT OF TRANSPORTATION

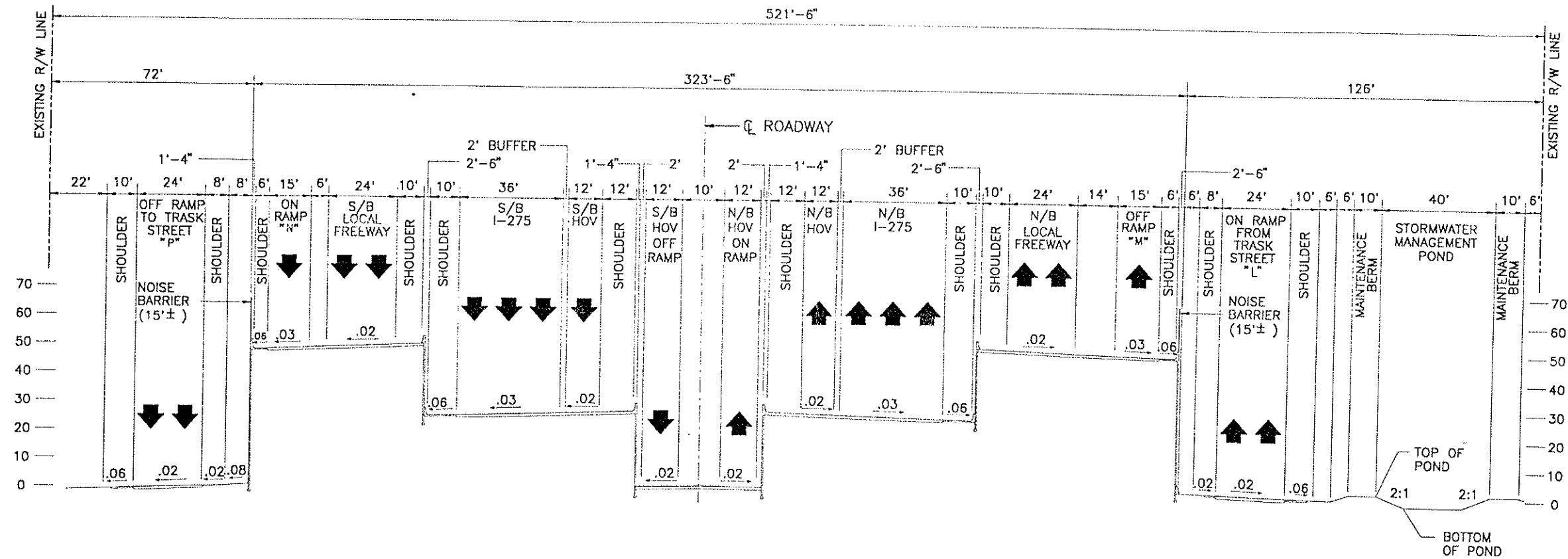
NOISE REPORT

TAMPA INTERSTATE STUDY
PHASE II

Hillsborough County, Florida

TYPICAL SECTION
NORTHWEST EXPRESSWAY AT CYPRESS ST.

EXHIBIT 6



STA. 190+00

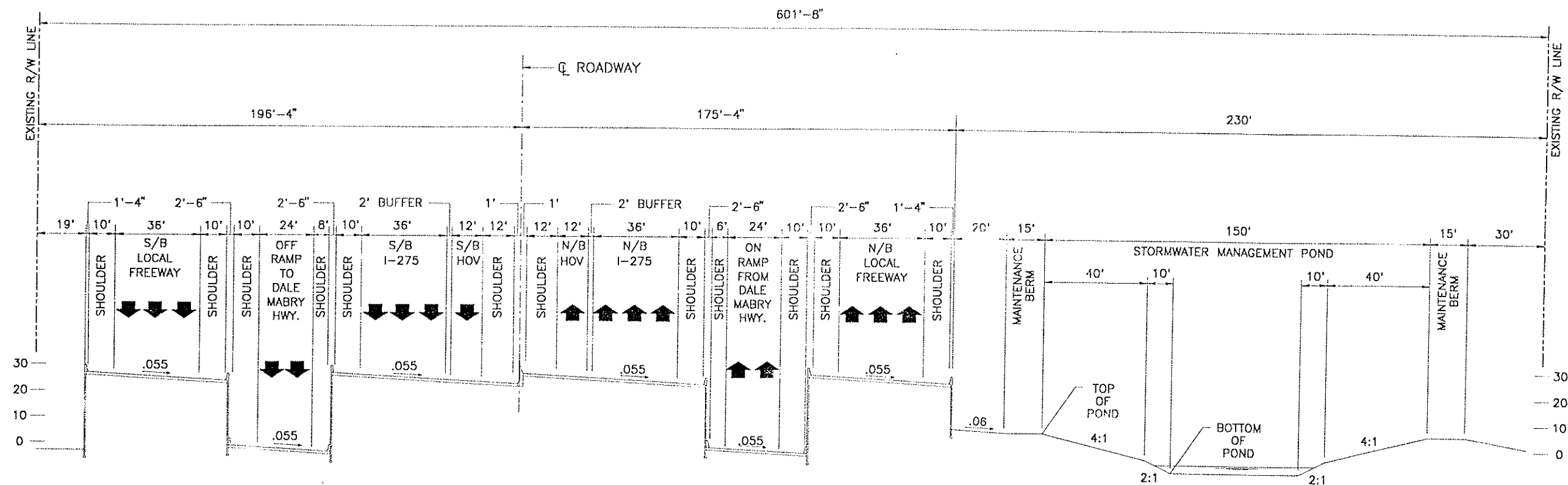
FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT

TAMPA INTERSTATE STUDY
PHASE II

Hillsborough County, Florida

TYPICAL SECTION I-275 AT TRASK ST.



STATION 249+00

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II

Hillsborough County, Florida

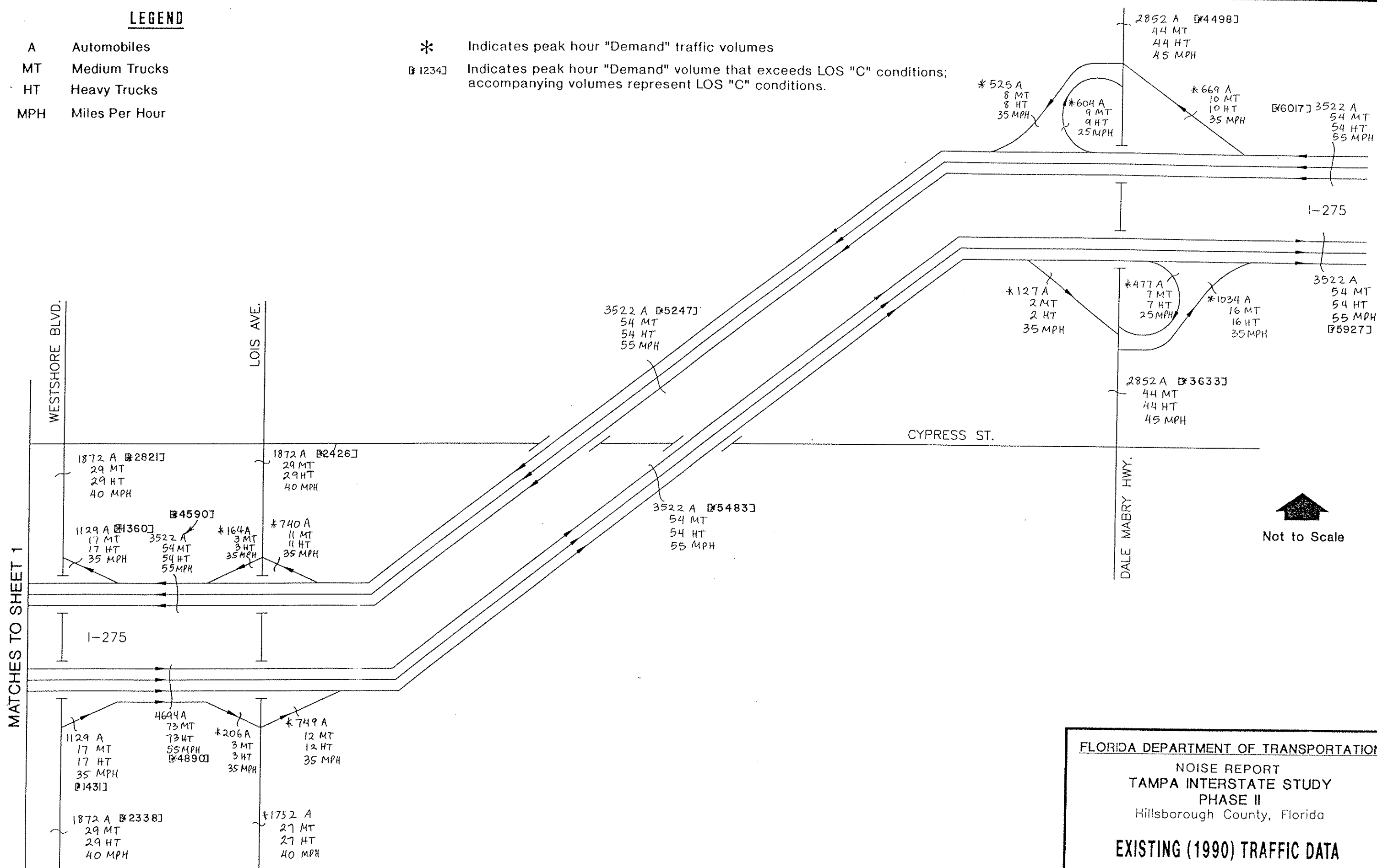
TYPICAL SECTION I-275 AT MARIE AVE.

APPENDIX B
TRAFFIC DATA FOR NOISE ANALYSIS

LEGEND

A Automobiles
MT Medium Trucks
HT Heavy Trucks
MPH Miles Per Hour

* Indicates peak hour "Demand" traffic volumes
[1234] Indicates peak hour "Demand" volume that exceeds LOS "C" conditions; accompanying volumes represent LOS "C" conditions.



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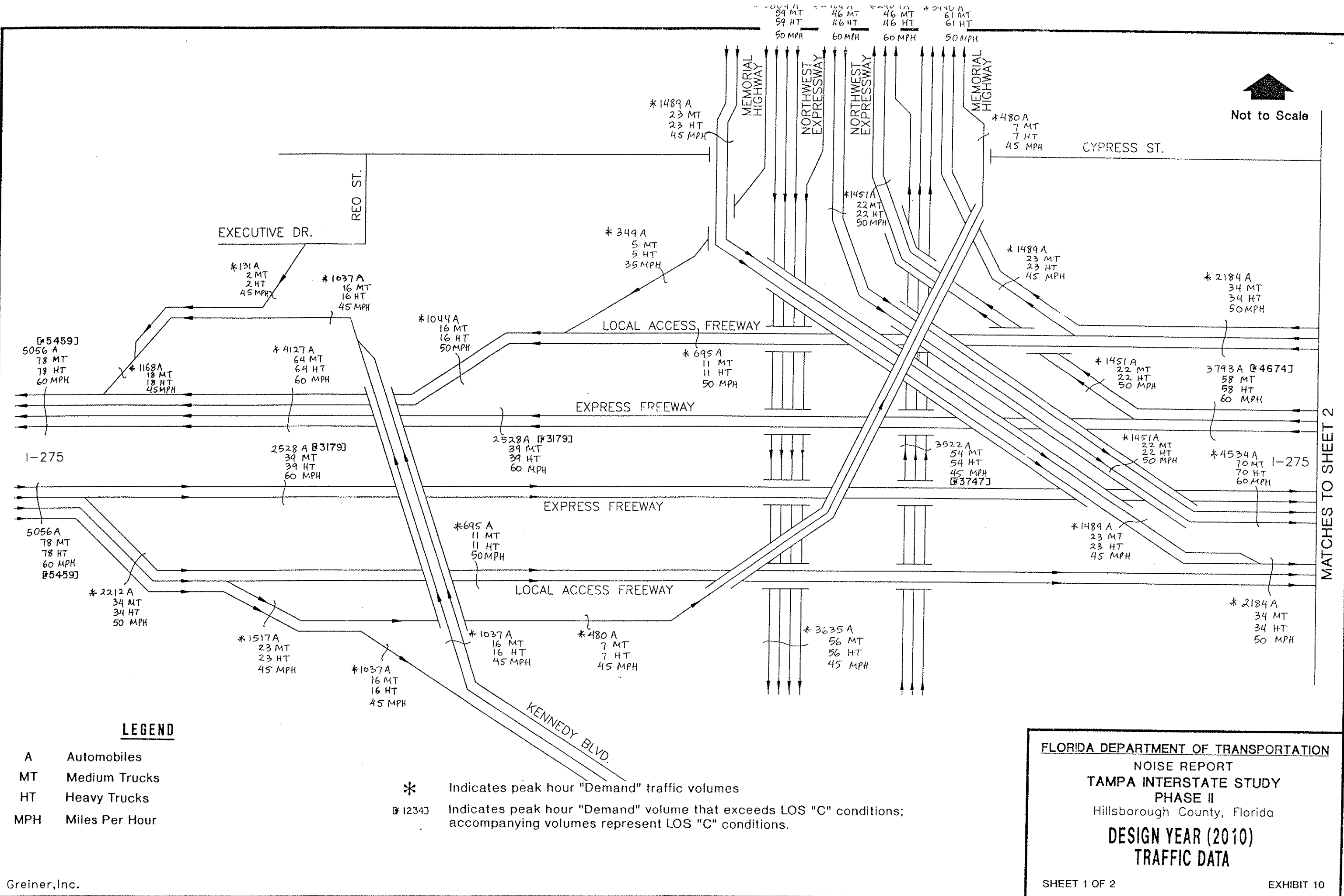
NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida

EXISTING (1990) TRAFFIC DATA

SHEET 2 OF 2

EXHIBIT 9

3A/C86-22/C238015/DMR2A.DWG/03.29.91



LEGEND

A Automobiles

MT Medium Trucks

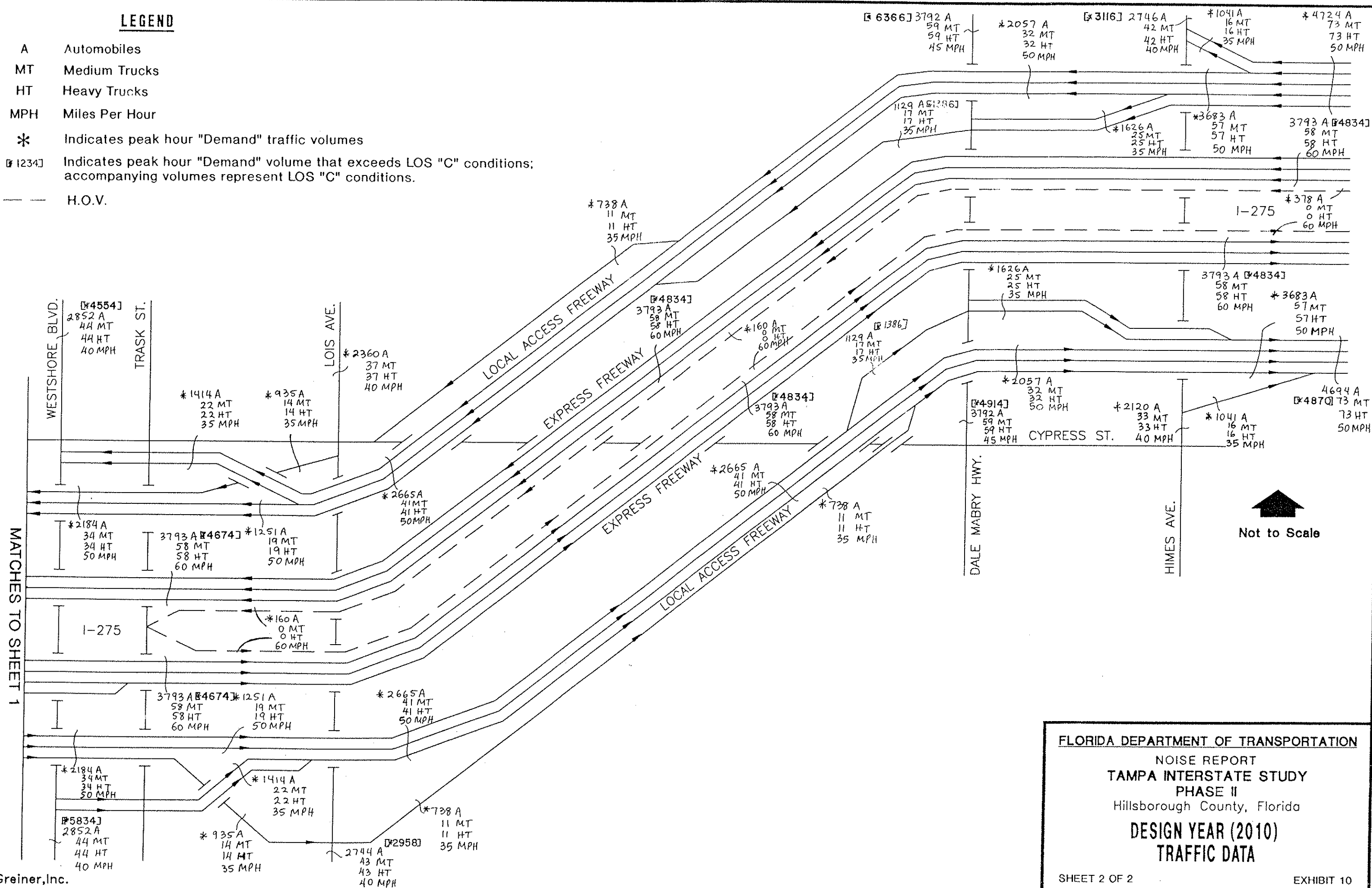
HT Heavy Trucks

MPH Miles Per Hour

* Indicates peak hour "Demand" traffic volumes

1234 Indicates peak hour "Demand" volume that exceeds LOS "C" conditions; accompanying volumes represent LOS "C" conditions.

H.O.V.



Not to Scale

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NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II

DESIGN YEAR (2010)
TRAFFIC DATA

SHEET 2 OF 2

EXHIBIT 10

APPENDIX C
MODELED RECEPTORS

MODELED RECEPTORS

NSA A

Receiver Number	Land Use Category	Distance to Centerline		Leq(h) in dBA		Change	Impact
		2010		2010			
		1990 Exist	Preferred Alternative	1990 Exist	Preferred Alternative		
1A	B	640	650	60	62	+2	N
7A	B	845	870	58	60	+2	N
12A	B	965	985	57	59	+2	N

MODELED RECEPTORS

NSA E

Receiver Number	Land Use Category	Distance to Centerline		Leq(h) in dBA		Change	Impact
		2010		2010			
		1990 Exist	Preferred Alternative	1990 Exist	Preferred Alternative		
6E	B	515	385	64	67	+3	Y
10E	B	700	555	58	62	+4	N
15E	B	520	380	63	66	+3	Y

MODELED RECEPTORS

NSA F

Receiver Number	Land Use Category	Distance to Centerline		Leq(h) in dBA		Change	Impact
		2010		2010			
		1990 Exist	Preferred Alternative	1990 Exist	Preferred Alternative		
14F	B	755	930	58	62	+4	N

MODELED RECEPTORS

NSA G

<u>Receiver Number</u>	<u>Land Use Category</u>	<u>Distance to Centerline</u>		<u>Leq(h) in dBA</u>		<u>Change</u>	<u>Impact</u>
		<u>2010</u>		<u>2010</u>			
		<u>1990 Exist</u>	<u>Preferred Alternative</u>	<u>1990 Exist</u>	<u>Preferred Alternative</u>		
3G	B	290	250	67	67	0	Y
10G	B	440	495	61	62	+1	N

MODELED RECEPTORS

NSA H

Receiver Number	Land Use Category	Distance to Centerline		Leq(h) in dBA		Change	Impact
		2010		2010			
		1990 Exist	Preferred Alternative	1990 Exist	Preferred Alternative		
8H	B	400	325	65	66	+1	Y
10H	B	420	345	64	66	+2	Y
12H	B	405	330	65	68	+3	Y
14H	B	910	835	56	58	+2	N

APPENDIX D
ADDENDUM
VEHICLE SPEEDS

ADDENDUM VEHICLE SPEEDS

Determining vehicle volumes and speeds to establish a realistic worst case condition is an important step in a noise study. Upon further review of the noise study, the 60 mph speed assigned to the express freeway and HOV lanes was concluded to be slightly high. A speed of 55 mph, the anticipated speed limit for the expressway freeway and HOV lanes, is considered a more appropriate speed for the worst case analysis. A limited analysis indicated that this small speed adjustment would decrease anticipated noise levels at the modeled receptor sites by about 0.5 dBA and move the 65 dBA noise contour approximately 40 feet closer to the proposed roadway. Since the 65 dBA contour was used to determine the number of impacted receptors and the number of receptors that would benefit from noise barriers, the effect of the speed adjustment on the determination of economical reasonableness for noise barriers was further investigated.

Noise barriers were found to be economically reasonable in two noise sensitive areas, E and H. In Area E, 54 Activity Category B sites were identified as impacted and all 54 sites benefited from a noise barrier yielding an abatement cost per benefited receptor of \$22,800. Reducing the speed to 55 mph would decrease the number of impacted and benefited receptors by 2 and increase the cost per benefited to \$23,600. According to FDOT guidelines, the barrier is still anticipated to be economically reasonable.

In Area H, 43 Activity Category B sites were identified and 39 sites benefited from a noise barrier yielding an abatement cost per benefited receptor of \$21,500. Reducing the speed to 55 mph would decrease the number of impacted and benefited receptors by 1 and increase the cost per benefited receptor to \$22,100. According to FDOT guidelines, the barrier is still anticipated to be economically reasonable.

This analysis indicates that reducing the modeled speed by 5 mph on the express freeway and HOV lanes would result in a slight decrease in the estimated number of impacted sites. However, the speed adjustment would not affect the original conclusions concerning the economical reasonableness of barriers.

APPENDIX E
ADDENDUM
TRANSITION SEGMENT

ADDENDUM TRANSITION SEGMENT

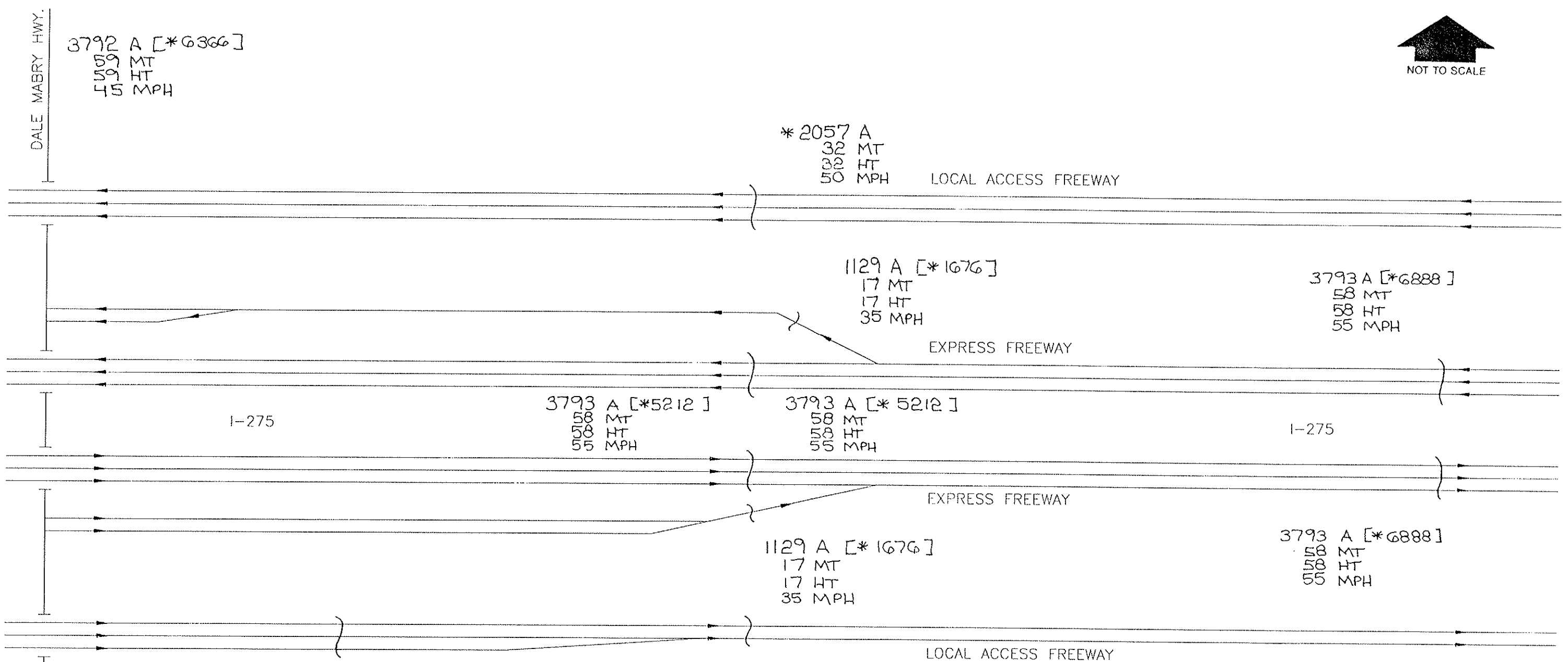
This addendum addresses noise impacts in the I-275 transition segment extending from Dale Mabry Highway to Armenia Avenue. The analysis was performed for the recommended I-275 transition geometry described as the EA Transitional Geometry (revised October 1991). The assessment methodology is consistent with the methodology developed and used previously for the Tampa Interstate Study.

Existing land uses located adjacent to the transition segment are characterized primarily as residential with some commercial, institutional and public uses. The MacFarlane Park Baptist Church, MacFarlane Elementary School, MacFarlane Park, Boys and Girls Clubs of Greater Tampa and single family residences are potential noise sensitive sites in this area. These sites fall into the FHWA Activity Category B previously described in Table 1.

For the purpose of this analysis, modeled roadways include the I-275 mainline freeway, local access freeway and ramp systems. Also included are the upgraded arterial intersections of Himes Avenue, MacDill Avenue and Armenia Avenue. Traffic volumes assigned to these roadways are shown in Exhibit A-1.

Two separate noise study areas were established for the analysis. Noise study area J and K are located south and north of I-275, respectively, and extend from Himes Avenue to Armenia Avenue. The noise study areas are shown in Exhibit A-2.

The results of the STAMINA model noise analysis are summarized in Table A-1 for existing (1990) conditions, 2010 No-Build conditions and the 2010 Build Alternative. The existing and 2010 No-Build results were taken from the noise impact analysis conducted previously for the adjoining segment of the Tampa Interstate Study which includes I-275 from the Dale Mabry Highway Interchange north to Dr. Martin Luther King Jr. Boulevard. The results are reported as the distance in feet from the existing I-275 centerline to the 65 and 67 dBA contour.



LEGEND

- A Automobiles
 - MT Medium Trucks
 - HT Heavy Trucks
 - MPH Miles Per Hour
 - * Indicates peak hour "Demand" traffic volumes
 - [*1234] Indicates peak hour "Demand" volume that exceeds LOS "C" conditions; accompanying volumes represent LOS "C" conditions.
- Greiner, Inc.

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT

TAMPA INTERSTATE STUDY

PHASE II

Hillsborough County, Florida

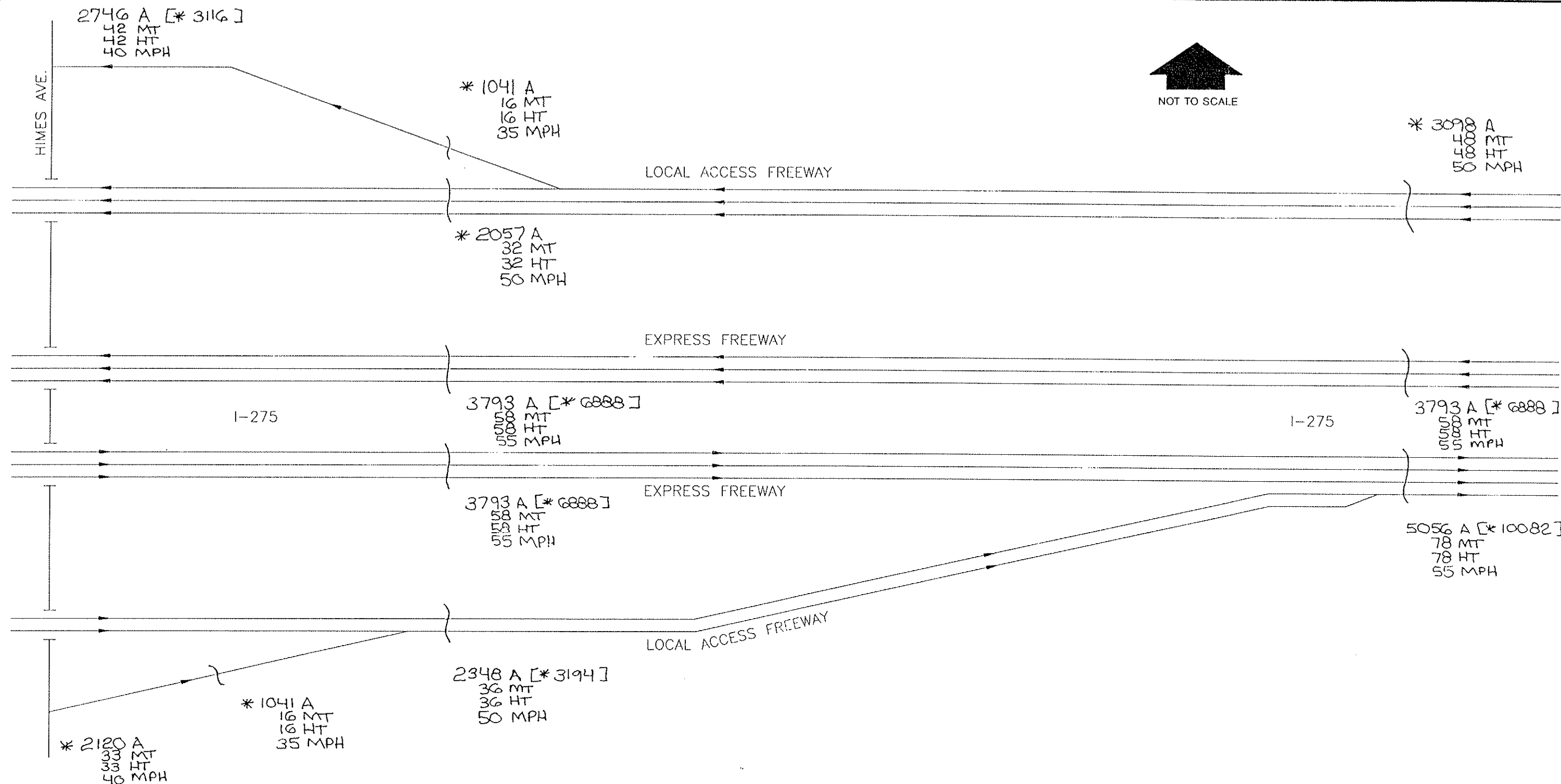
TRANSITION SEGMENT

DESIGN YEAR (2010)

TRAFFIC DATA

SHEET 1 OF 3

EXHIBIT A-1



LEGEND

A Automobiles
MT Medium Trucks
HT Heavy Trucks
MPH Miles Per Hour

* Indicates peak hour "Demand" traffic volumes

[*1234] Indicates peak hour "Demand" volume that exceeds LOS "C" conditions; accompanying volumes represent LOS "C" conditions.

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FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT

TAMPA INTERSTATE STUDY

PHASE II

Hillsborough County, Florida

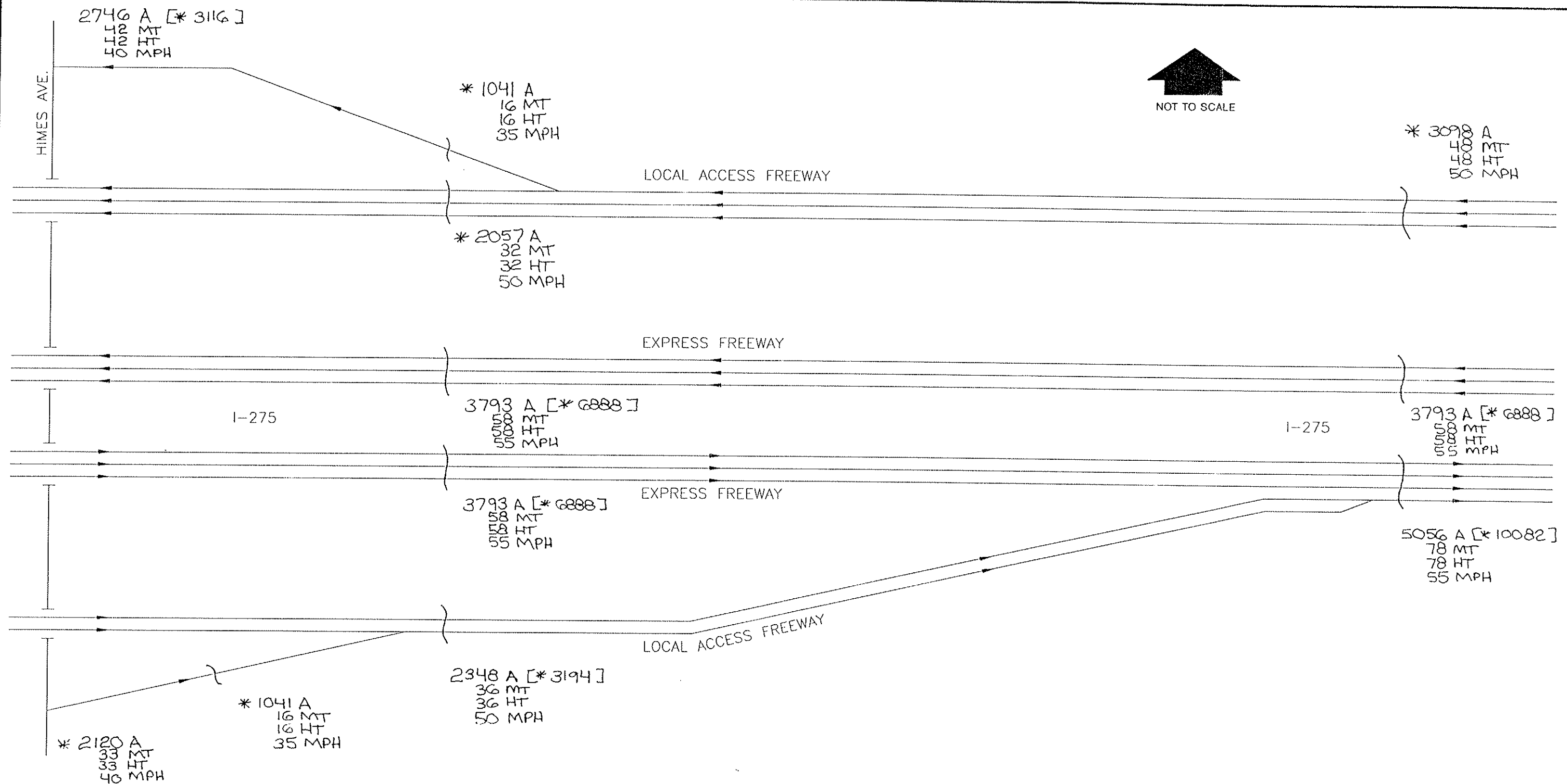
TRANSITION SEGMENT

DESIGN YEAR (2010)

TRAFFIC DATA

SHEET 2 OF 3

EXHIBIT A-1



LEGEND

A Automobiles
MT Medium Trucks
HT Heavy Trucks
MPH Miles Per Hour

* Indicates peak hour "Demand" traffic volumes

[*1234] Indicates peak hour "Demand" volume that exceeds LOS "C" conditions; accompanying volumes represent LOS "C" conditions.

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FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II

Hillsborough County, Florida

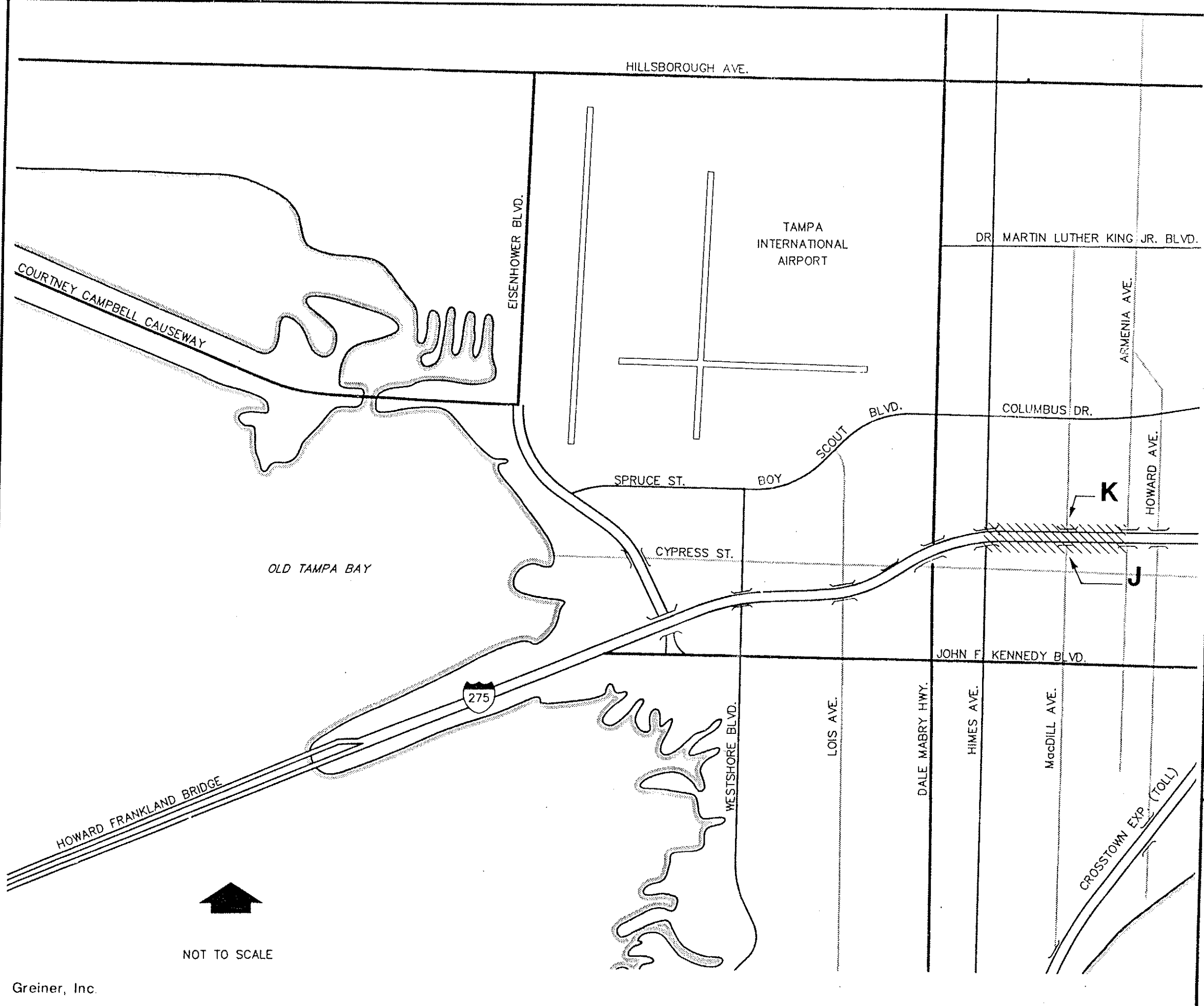
TRANSITION SEGMENT

DESIGN YEAR (2010)

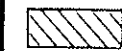
TRAFFIC DATA

SHEET 2 OF 3

EXHIBIT A-1



LEGEND

-  Noise Study Area
- J** Area Designation

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
**TAMPA INTERSTATE STUDY
PHASE II**
Hillsborough County, Florida

TRANSITION SEGMENT

TABLE A-1
NOISE ISOPLETHS
Tampa Interstate Study
Transition Segment

<u>Noise Study Area</u>	<u>Limits</u>	<u>Hourly LEO (dBA)</u>	<u>Approximate Distance From Roadway Centerline (feet)</u>		
			<u>1990 Existing</u>	<u>2010</u>	
				<u>No-Build</u>	<u>Build Alternative</u>
J	From Himes Avenue to Armenia Avenue, south of I-275	67	320	320	370
		65	420	420	505
K	From Himes Avenue to Armenia Avenue, north of I-275	67	340	340	350
		65	420	420	475

As shown, the distance between the centerline of I-275 and the 65 and 67 dBA contour line is expected to increase with the proposed improvements to the Tampa Interstate System. The increase is a result of higher, future-year LOS C peak hour traffic volumes related to the expanded roadway network and the additional travel lanes. The distances given for the 2010 Build condition will vary as travel lanes are added and dropped throughout the transition area. Distances are also influenced by the proximity of existing arterials and proposed ramps.

Using the information in Table A-1, combined with existing land use data and the effects of shielding from intervening structures and vegetation, the number of noise sensitive sites within the 65 dBA contour line was determined. Approximately 178 noise sensitive sites located in the noise study areas adjacent to the transition segment are predicted to experience noise levels that approach or exceed FHWA noise abatement criteria. There are approximately 97 impacted sites in noise study area J and 81 impacted sites in area K. Impacted land uses include single-family residences, the MacFarlane Baptist Church, MacFarlane Park and the Boys and Girls Club of Greater Tampa.

Noise impacts are also considered to occur when noise levels increase substantially yet do not approach, or exceed, the FHWA Noise Abatement Criteria. These impacts occur primarily when proposed roadway improvements are planned in the vicinity of noise

sensitive areas where existing noise levels are relatively low. FHWA defines a substantial increase as a 10 to 15 dBA increase above existing levels.

Tables A-2 and A-3 compare existing and 2010 Build Alternative noise levels for representative noise sensitive sites in noise study areas J and K, respectively. As shown, the projected increases are below the 10-15 dBA range, therefore, noise impacts caused by substantial increases are not anticipated.

TABLE A-2
PREDICTED NOISE LEVELS FOR NOISE STUDY AREA J
Tampa Interstate Study
Transition Segment

<u>Receiver Number</u>	<u>Land Use Category</u>	<u>Leq(h) in dBA</u>		
		<u>Existing (1990)</u>	<u>2010 Build Alternative</u>	<u>Change</u>
13J	B	58	61	+3
14J	B	63	64	+1
15J	B	53	56	+3
19J	B	59	60	+1
22J	B	61	65	+4

TABLE A-3
PREDICTED NOISE LEVELS FOR NOISE STUDY AREA K
Tampa Interstate Study
Transition Segment

<u>Receiver Number</u>	<u>Land Use Category</u>	<u>Leq(h) in dBA</u>		
		<u>Existing (1990)</u>	<u>2010 Build Alternative</u>	<u>Change</u>
14K	B	66	67	+1
15K	B	59	61	+2
17K	B	64	66	+2
25K	B	69	71	+2
26K	B	63	64	+1
28K	B	59	61	+2
33K	B	63	64	+1
37K	B	71	71	+0

In accordance with FHWA requirements, noise abatement measures were also evaluated for noise sensitive sites which approach or exceed the noise abatement criteria. Based on the discussion in Section III, Noise Abatement Measures, noise barriers were previously identified as a possible abatement measure.

In accordance with FHWA/FDOT guidelines, a noise barrier analysis was performed by (1) developing barriers which would meet minimum noise reduction goals at impacted sites, (2) estimating the cost of the barrier(s) and (3) determining barrier cost per benefited receptor.

As previously stated, in order for a noise barrier to be considered reasonable and feasible, it must meet the following two FDOT conditions:

1. Provide a minimum insertion loss (noise reduction) of at least 5 to 10 dBA, and
2. Cost no more than \$25,000 per benefited receptor.

However, other important factors such as community desires, adjacent land uses, safety and barrier constructability also play important roles. The results of the noise barrier analysis, by Noise Study Area, are discussed in the following report section and are summarized in Table A-4.

TABLE A-4
NOISE BARRIER SUMMARY
Tampa Interstate Study
Transition Segment

<u>Noise Sensitive Area^a</u>	<u>Location</u>	<u>Barrier I.D. Numbers</u>	<u>Total Length (feet)</u>	<u>Average Height (feet)</u>	<u>Total Cost</u>	<u>Number of Impacted Receptors</u>	<u>Number of Benefited Receptors</u>	<u>Cost per Benefited Receptor</u>
J	From Himes Ave. to Armenia Ave.	1, 2, 3	5,900	16.0	\$1,416,000	97	78	\$18,200
K	From Himes Ave. to Armenia Ave.	4, 5, 6, 7	6,370	16.0	\$1,528,000	81	71	\$21,500

^aSee Exhibit A-2 for area locations.

- * **Noise Study Area J**, located south of I-275 and bordered by Himes Avenue and Armenia Avenue, has 97 Category B impacted receptors. This noise barrier is comprised of three individual noise walls. Wall No. 1, beginning at Himes Avenue and ending where the ramp from Himes Avenue merges with I-275, is approximately 850 feet long and 16 feet high. Wall No. 2, beginning approximately 375 feet east of Himes Avenue and ending approximately 600 feet west of Armenia Avenue, is approximately 4,370 feet long and 16 feet high. Wall No. 3, beginning approximately 700 feet west of Armenia Avenue and ending at Armenia Avenue, is approximately 680 feet long and 16 feet high.

The combined length of the Noise Study Area J barrier is 5,900 feet, with an average height of 16 feet and an estimated total cost of \$1,416,000. The barrier will provide an approximate 5 to 10 dBA noise reduction benefit to 78 impacted receptors and the cost per benefited receptor is approximately \$18,200. Because of site characteristics, the remaining 19 impacted receptors would receive 4 dBA or less noise reduction from these barriers. Based on FDOT guidelines, noise barriers in Noise Study Area J are anticipated to be economically reasonable.

- * **Noise Study Area K**, located north of I-275 and bordered by Himes Avenue and Armenia Avenue, has 81 Category B impacted receptors. This noise barrier system is comprised of four individual noise walls. Wall No. 4, beginning approximately 220 feet east of Himes Avenue and ending where the ramp from westbound I-275 to Himes Avenue diverges from I-275, is approximately 900 feet long and 16 feet high. Wall No. 5, beginning approximately 650 feet east of Himes Avenue and ending approximately 400 feet west of MacDill Avenue, is approximately 2,430 feet long and 16 feet high. Wall No. 6, beginning at MacDill Avenue and ending approximately 450 feet east of Armenia Avenue, is approximately 2,130 feet long and 16 feet high. Wall No. 7, beginning approximately 500 west of Armenia Avenue and ending approximately 350 east of Armenia Avenue, is approximately 910 feet long and 16 feet high.

The combined length of the Noise Study Area K barrier is approximately 6,370 feet, with an average height of 16 feet and an estimated total cost of \$1,528,800. The barrier will provide an approximate 5 to 9 dBA noise reduction benefit to 71 of the 81 impacted receptors and the total cost per benefited receptor is approximately \$21,500. Because of the site characteristics, the remaining 10 receptors would receive 4 dBA or less noise reduction from these barriers. Again, based on FDOT guidelines, noise barriers in Noise Sensitive Area K are anticipated to be economically reasonable.