

Task A5b13 Noise Report

TAMPA INTERSTATE STUDY

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

The project consists of approximately 12 miles (19.31 km) of multi-lane improvements to I-275 from the Dale Mabry Highway interchange north to Dr. Martin Luther King, Jr. Boulevard and I-4 from I-275 (including interchange) to east of 50th Street (U.S. 41); a multi-lane controlled access facility (Crosstown Connector) on new alignment from I-4 south to the existing Tampa South Crosstown Expressway; and improvements to approximately 4.4 miles (7.08 km) of the Tampa South Crosstown Expressway from the Kennedy Boulevard overpass east to Maydell Drive, Hillsborough County.

Prepared For FLORIDA DEPARTMENT OF TRANSPORTATION

Prepared By
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In Association With
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DECEMBER 1994

EXECUTIVE SUMMARY

This report contains the results of a noise impact analysis conducted for the proposed improvements to Interstate 275 (I-275) from the Dale Mabry Highway interchange north to Dr. Martin Luther King, Jr. Boulevard (formerly Buffalo Avenue); the I-275 transition segment from Dr. Martin Luther King, Jr. Boulevard to Hillsborough Avenue; Interstate 4 (I-4) from the I-275 interchange to east of 50th Street (U.S. 41); the Crosstown Connector from I-4 southbound to the existing Tampa South Crosstown Expressway and the Crosstown Expressway between Kennedy Boulevard and Maydell Drive, in Hillsborough County, Florida. These improvements involve expanding the roadway to include high occupancy vehicle (HOV) lanes, additional mainline lanes, collector-distributor lanes and weaving 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 contour is predicted to increase with the proposed improvements to the Tampa Interstate System. This is a result of higher, future-year 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 (1990) and future No-Action (2010) conditions, there is a total of 1,264 noise sensitive sites that approach, or exceed, the Federal Highway Administration (FHWA) noise abatement criteria. For the Preferred Alternative (2010), the number of noise sensitive sites approaching or exceeding FHWA noise abatement criteria is expected to decrease to 1,213. This decrease is a result of property acquisition to attain sufficient right-of-way for the improved Tampa Interstate System.

Noise abatement measures were evaluated for sites approaching or exceeding FHWA criteria. 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 benefit approximately 877 Category B impacted receptors in thirteen of the noise study areas which contain single-family residences, condominiums, apartments, schools, parks, hospitals and/or churches. It is recommended that future noise impacts could also be mitigated through local land use ordinances involving zoning, building setbacks and building construction materials.

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

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I. INTRODUCTION

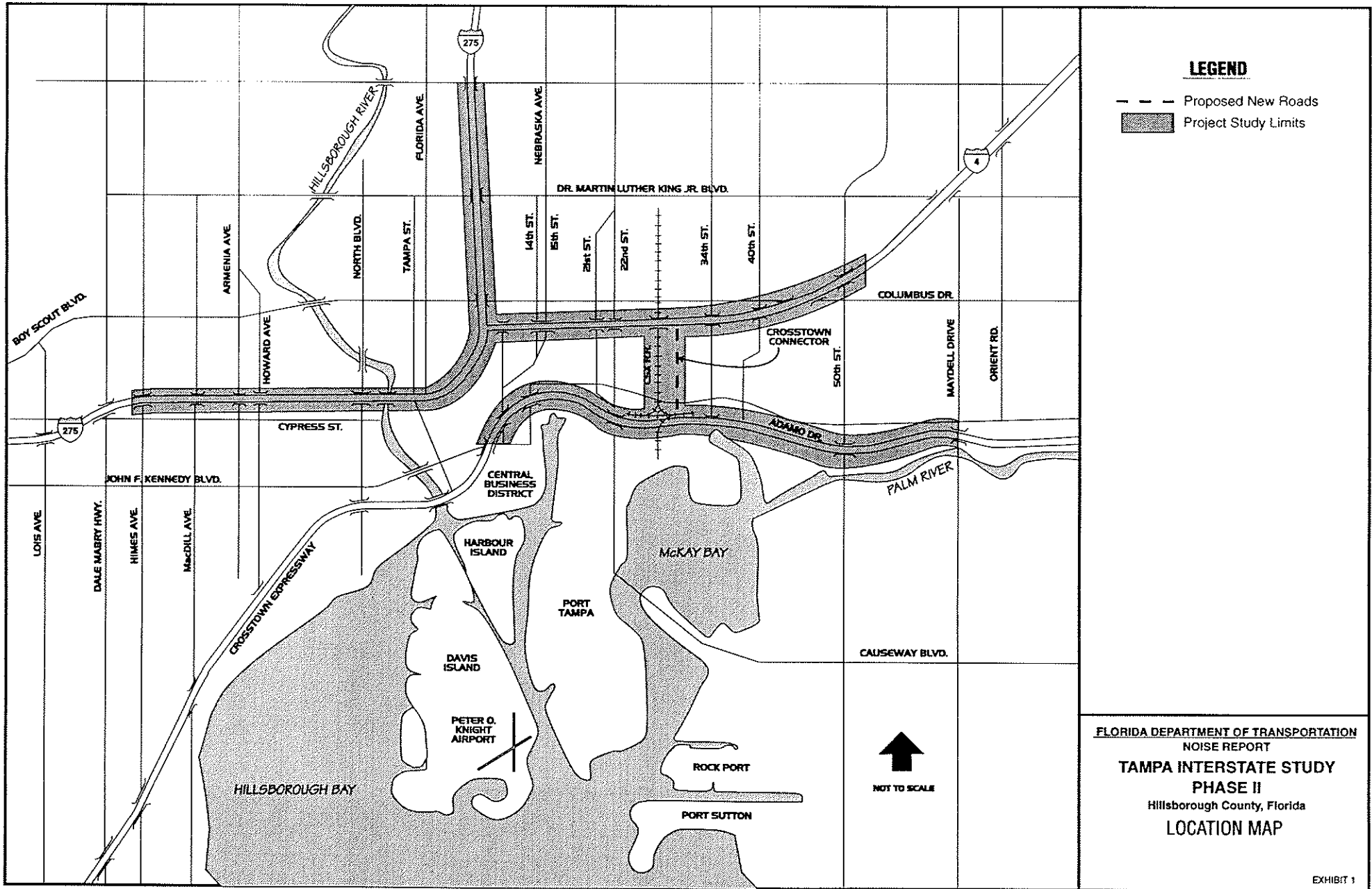
A. Purpose of the Noise Report

The purpose of this report is to document existing noise levels, analyze future-year noise levels and associated impacts, and evaluate the feasibility and economic reasonableness 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 study area is shown on Exhibit 1 and includes Interstate 275 (I-275) from Dale Mabry Highway north to Dr. Martin Luther King, Jr. Boulevard (formerly Buffalo Avenue), the I-275 transition segment from Dr. Martin Luther King, Jr. Boulevard to Hillsborough Avenue, Interstate 4 (I-4) from the I-275 interchange to east of 50th Street (U.S. 41); the Crosstown Connector from I-4 southward to the existing Tampa South Crosstown Expressway and the South Crosstown Expressway between Kennedy Boulevard and Maydell Drive.

Currently, I-275 consists of a six-lane facility east of Dale Mabry Highway to Howard Avenue and eight lanes from Howard Avenue to the Ashley Street ramps. From Ashley Street eastward through the Central Business District (CBD), six mainline lanes with various auxiliary lane segments are provided to the I-4/I-275 interchange. Between the I-4/I-275 junction and Dr. Martin Luther King, Jr. Boulevard, I-275 has eight lanes and north of Dr. Martin Luther King, Jr. Boulevard, I-275 has six lanes. On I-4, six lanes are provided from the I-4/I-275 junction to 21st Street and from 21st Street eastward beyond 50th Street, I-4 has four lanes. The existing South Crosstown Expressway is a four-lane facility.

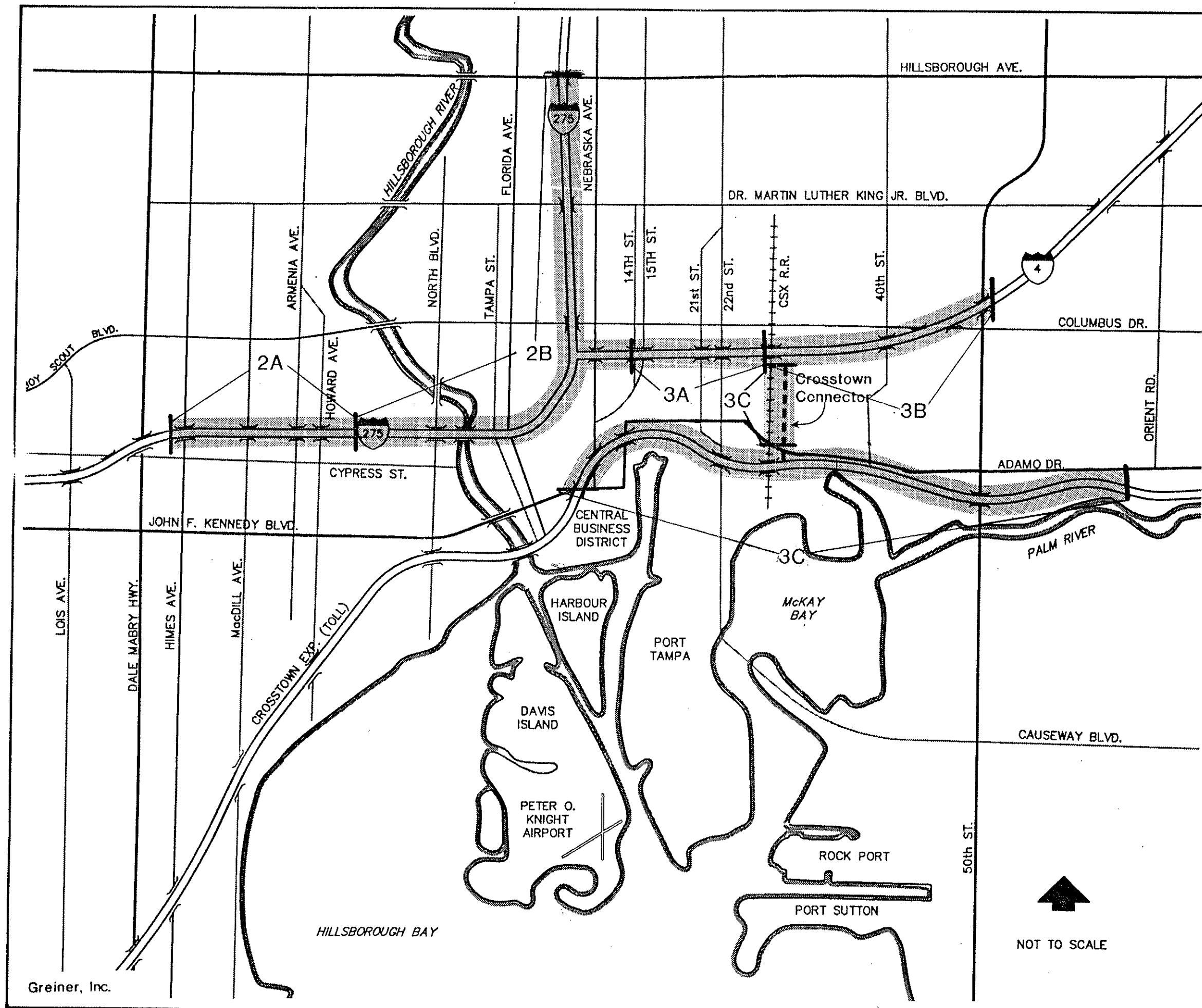


The recommended improvements to I-275 consist of a four-roadway system from east of Dale Mabry Highway to north of Dr. Martin Luther King, Jr. Boulevard. High Occupancy Vehicle (HOV)/Transitway lanes will be included. Interchange improvements include relocating the ramps at Himes Avenue; maintaining the split ramps at Howard and Armenia Avenues; modifying the ramps at Ashley, Scott and Kay Streets, to and from the west on I-275 to provide a west side CBD distributor interchange at Ashley/Tampa Streets; and providing a new west bank CBD interchange with ramps to and from the west on I-275 at North Boulevard.

I-4 improvements consist of a four-roadway system from I-275 eastward transitioning to a two-roadway system at 50th Street. Again, HOV lanes will be included. A new Ybor City/east side CBD split interchange will be included on I-4 at 14th and 15th Streets (with the extension of ramps at 14th and 15th Streets as parallel frontage roads to 21st and 22nd Streets). Also included is the removal of the 19th Street overpass and the maintenance of the 26th Street overpass. Other interchange improvements include the reconfiguration of the split interchange at Columbus Avenue and 50th Street, the removal of the interchange ramps at 40th Street and a new directional freeway-to-freeway interchange with the Crosstown Expressway Connector on I-4 in the vicinity of 30th Street. The proposed South Crosstown Connector will be a six-lane facility on a new alignment and improvements to the South Crosstown Expressway include a four-lane eastbound and three-lane westbound system with additional auxiliary lanes.

For purposes of this noise analysis, the Tampa Interstate System project is subdivided into five segments illustrated on Exhibit 2 and identified as follows:

- Segment 2A - I-275 from east of Himes Avenue to east of Rome Avenue;
- Segment 2B - I-275 from east of Rome Avenue to north of Dr. Martin Luther King, Jr. Boulevard and I-4 from the I-275/I-4 interchange to 14th Street; I-275 transition area from Dr. Martin Luther King, Jr. Boulevard to Hillsborough Avenue;
- Segment 3A - I-4 from 14th Street to east of 32nd Street;



FLORIDA DEPARTMENT OF TRANSPORTATION
NOISE REPORT
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PHASE II**
Hillsborough County, Florida
NOISE ANALYSIS STUDY SEGMENTS

EXHIBIT 2

- Segment 3B - I-4 from 32nd Street to east of 50th Street, the Crosstown Connector and the Crosstown Expressway; and
- Segment 3C - Proposed Crosstown Connector and the Crosstown Expressway from Kennedy Boulevard to Maydell Drive.

Illustrations of typical roadway sections are contained in Appendix A. Further details concerning the existing roadway and design alternatives are available in the Tampa Interstate Study Preliminary Engineering Report,^[2] published separately and available at the District 7 office of the Florida Department of Transportation (FDOT).

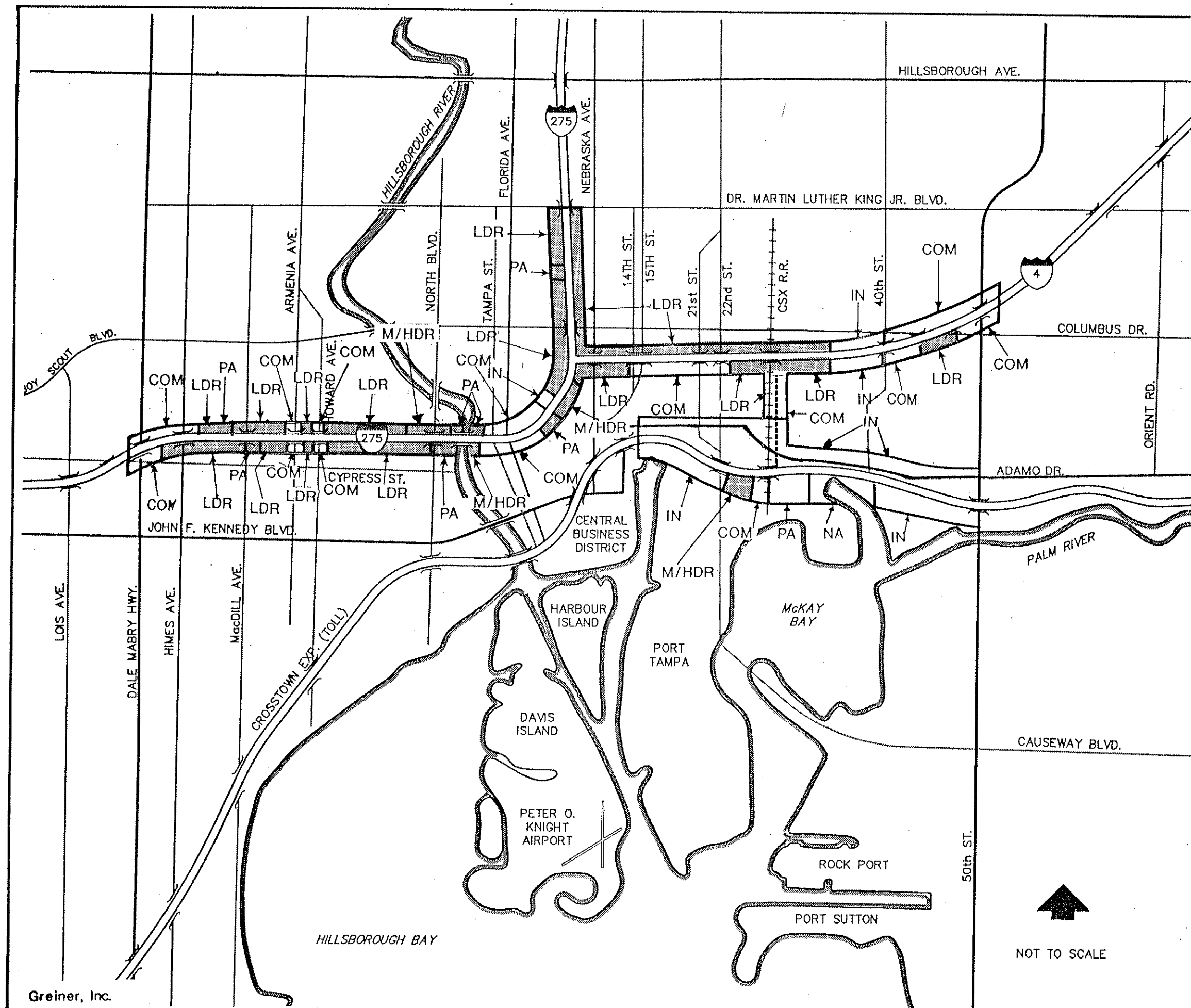
II. NOISE ANALYSIS

A. Noise Sensitive Areas

Existing land uses in the Tampa Interstate System study corridor are primarily residential, commercial and light-industrial, as illustrated 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, parks, churches and a library. These sites are in FHWA Activity Category B. 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 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 noise levels within 2 dBA of the FHWA criteria.



LEGEND

- LDR Low Density Residential
- M/HDR Medium/High Density Residential
- COM Commercial
- PA Public Areas
- IN Industrial
- NA Natural Areas
- Proposed New Roads
- ▨ Noise Sensitive Areas

Source: Hillsborough County City-County Planning Commission, 1985 Generalized Land Use, Including Field Verification

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
 Hillsborough County, Florida

EXISTING LAND USES
AND NOISE SENSITIVE AREAS

TABLE 1

FHWA NOISE ABATEMENT CRITERIA

Tampa Interstate Study

Noise Report

Activity Category	Description of Activity Category	Leq (h)
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)

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

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

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.

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 analysis. 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, $Leq_{(h)}$. $Leq_{(h)}$ 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. $Leq_{(h)}$ is measured in A-weighted decibels (dBA) which closely approximates the sound spectrum frequencies audible to the human ear.

Noise measurements were taken at 10 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 $Leq_{(h)}$ noise levels ranged from 57 to 71 dBA at the 10 noise monitoring sites. The highest level was measured at Site Nos. 3 and 6, located approximately 66 and 161 feet, respectively, from the center of the nearest travel lanes of I-275 and I-4, respectively.

TABLE 2

NOISE MONITORING DATA SUMMARY
Tampa Interstate Study - Phase II
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	57	59	2	984	144	108	874	84	132	406	55	Near Topp of Tampa Airport at new single-family residence subdivision
2	57	59	2	624	72	24	636	36	48	481	55	Piermaj Lane, in back of horse farm
3	71	74	3	2,340	60	84	1,500	84	24	66	55	Chalet Village Mobile Homes
4	68	70	2	3,024	60	108	2,352	48	60	151	55	109th and Central Avenue
5	63	66	3	1,704	180	132	1,956	144	144	366	55	In pasture near Himes Avenue and Falkenburg Road
6	71	73	2	3,624	114	108	3,294	180	168	161	55	North Boulevard at Church of Christ
7	67	70	3	3,660	168	60	3,792	114	162	156	55	Robles Park
8	66	69	3	2,792	150	108	2,472	180	174	251	55	South side of I-4
9	65	68	3	2,286	150	84	2,460	132	198	226	55	North side of I-4
10	70	73	3	4,492	258	138	4,518	180	138	62	55	MacDill Avenue and Laurel Street

Note: 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 a version of the FHWA computer model STAMINA 2.0 approved for use in Florida.^[5] The model was validated with 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 were 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 the 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 the corresponding LOS "C" volumes used in the analysis. These conditions represent stable traffic flow patterns with motor vehicles experiencing minimal delays and traveling near the posted speed limit and are considered to represent "worst-case" noise impact situations. Traffic volumes used in the analysis are based on the Tampa Interstate Study Traffic Memorandum, published separately.^[6]

Noise levels were predicted for existing (1990) conditions and for the Preferred Alternative in 2010. For the existing year analysis, LOS "C" traffic volumes were used when modeling interstate traffic lanes in the vicinity of noise sensitive sites. As a worst-case, the same LOS "C" traffic volumes were used when considering the 2010 No-Action Alternative. Therefore, noise levels for the 2010 No-Action scenario are anticipated to be the same as those predicted in the existing conditions analysis.

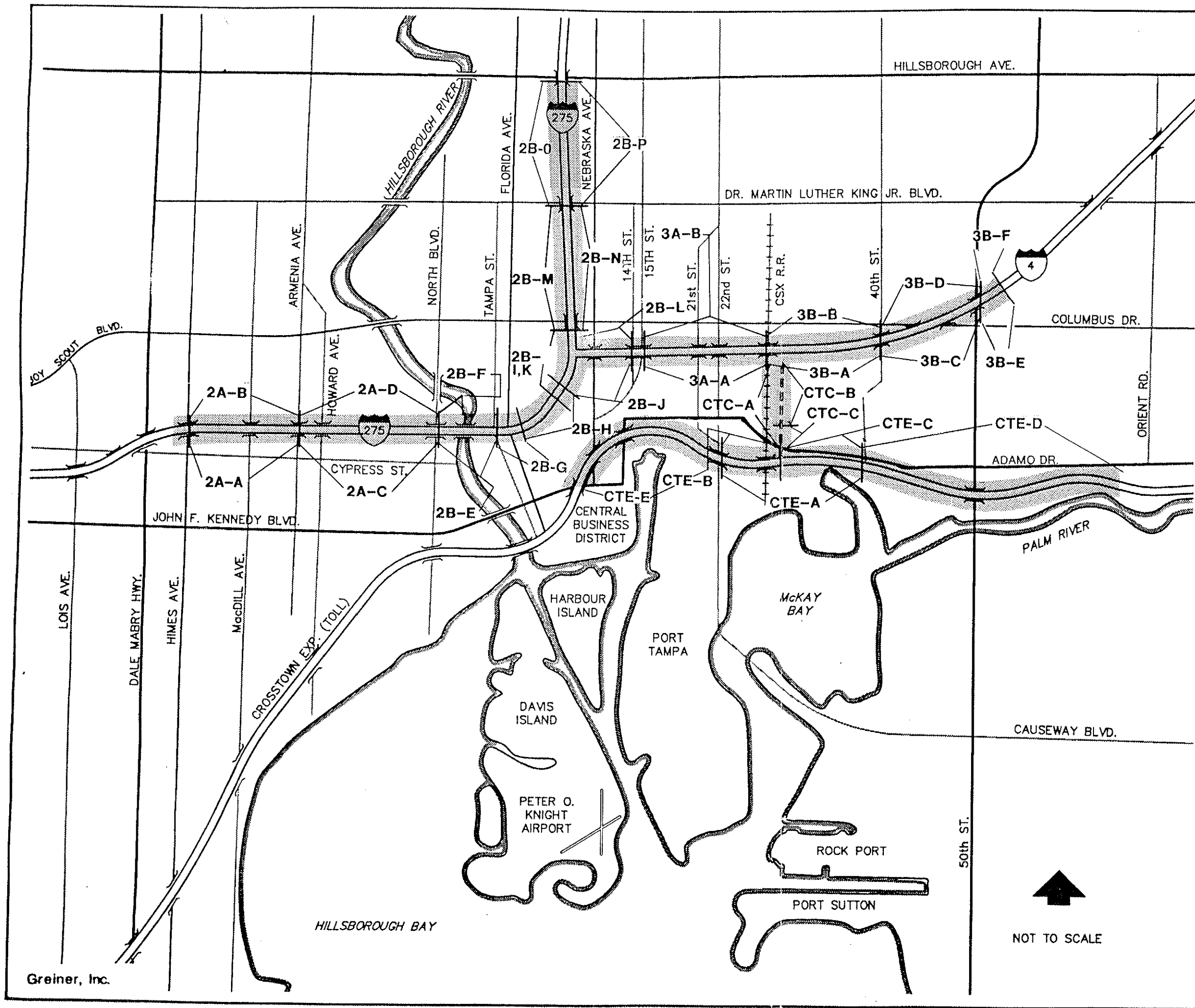
Based on traffic volumes, land uses and roadway geometry, 32 noise study areas were established as shown in Exhibit 4. Land uses in each noise study area were analyzed to identify potential noise sensitive sites. Single-family residences, multi-family residences, churches, schools and/or parks are located in areas 2A-A through 2A-D, 2B-E through 2B-P, 3A-A, 3A-B, 3B-A through 3B-F, CTC-B, CTE-A and CTE-D.

2. Results

The results of the STAMINA model noise analysis are summarized in Table 3 for both existing (1990), 2010 No-Action conditions and the 2010 Preferred Alternative. The results are reported as distances in feet from the I-275/I-4/Crosstown Connector/Crosstown Expressway centerline to the 65 or 67 dBA contour within each noise study area. As shown, the distance from the roadway centerline to the 65 and 67 dBA contour is predicted to increase with the proposed improvements to the Tampa Interstate System. This is a result of higher, future-year LOS C peak hour traffic volumes related to the expanded roadway network and additional travel lanes.

Using the information contained 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 Activity Category B from the FHWA Noise Abatement Criteria. It was further determined that noise levels approach or exceed the criteria at sensitive sites in 26 of the 32 noise study areas. The land use in noise study areas CTC-A, CTC-C, CTE-B, CTE-C and CTE-E is either commercial or industrial and noise will not interrupt activities in these areas. Noise sensitive sites in noise study area CTC-B are outside the noise impact area. The impacted land uses include single and multi-family residences, churches, schools and parks.

Under both the existing condition and the 2010 No-Action Alternative, 1,264 noise sensitive sites located within the noise study areas approach or exceed FHWA/FDOT noise level criteria. As shown in Table 4, there are 451 of these sites in Segment 2A; 505 sites in Segment 2B; 199 sites in Segment 3A; 93 sites in Segment 3B; and 16 sites in Segment 3C.



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FLORIDA DEPARTMENT OF TRANSPORTATION
NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida
NOISE STUDY AREAS

TABLE 3
NOISE ISOPLETHS
Tampa Interstate Study - Phase II
Noise Study

Noise Study Area	Limits	Approximate Distance From Roadway Centerline m (ft.)			
		Hourly LEQ (dBA)	1990 Existing	2010 No-Action	2010 Preferred Alternative
SEGMENT 2A					
A	From Dale Mabry Hwy. to Armenia Ave., south of I-275	67	98 (320)	98 (320)	125 (410)
		65	128 (420)	128 (420)	140 (460)
B	From Dale Mabry Hwy. to Armenia Ave., north of I-275	67	104 (340)	104 (340)	122 (400)
		65	128 (420)	128 (420)	143 (470)
C	From Armenia Ave. to North Blvd., south of I-275	67	94 (310)	94 (310)	125 (410)
		65	131 (430)	131 (430)	148 (485)
D	From Armenia Ave. to North Blvd., north of I-275	67	91 (300)	91 (300)	125 (410) ^a
		65	125 (410)	125 (410)	148 (485) ^a
SEGMENT 2B					
E	From North Blvd. to Ashley St., south of I-275	67	158 (520) ^b	158 (520) ^b	158 (520) ^b
		65	180 (590) ^b	180 (590) ^b	180 (590) ^b
F	From North Blvd. to Hillsborough River, south of I-275	67	122 (400)	122 (400)	116 (380) ^c
		65	152 (500)	152 (500)	125 (410) ^c
G	From Hillsborough River to Orange St.	67	88 (290)	88 (290)	177 (580)
		65	116 (380)	116 (380)	232 (760)
H	From Orange St. to I-4/I-275 Interchange	67	104 (340)	104 (340)	154 (505)
		65	152 (500)	152 (500)	183 (600)
I	From Morgan St. to Palm Ave. northwest of I-275	67	104 (340)	104 (340)	154 (505)
		65	152 (500)	152 (500)	183 (600)
J	From Palm Ave. to 14th St., south of I-4	67	111 (365)	111 (365)	125 (410)
		65	137 (450)	137 (450)	171 (560)
K	From Palm Ave. to Floribaska Ave. west of I-275	67	91 (300)	91 (300)	94 (310)
		65	128 (420)	128 (420)	146 (480)
L	From Floribaska Ave. to 14th St., I-275/I-4 Interchange	67	122 (400) ^d	122 (400) ^d	134 (440) ^d
		65	165 (540) ^d	165 (540) ^d	177 (580) ^d
M	From Floribaska Ave. to Dr. Martin Luther King, Jr. Blvd., west of I-275	67	91 (300)	91 (300)	94 (310)
		65	128 (420)	128 (420)	146 (480)

TABLE 3
NOISE ISOPLETHS
Tampa Interstate Study - Phase II
Noise Study
(Continued)

Noise Study Area	Limits	Approximate Distance From Roadway Centerline m (ft.)			
		Hourly LEQ (dBA)	1990 Existing	2010 No-Action	2010 Preferred Alternative
SEGMENT 2B					
N	From Floribraska Ave. to Dr. Martin Luther King, Jr. Blvd., east of I-275	67	99 (325)	99 (325)	116 (380)
		65	130 (425)	130 (425)	152 (500)
O	From Dr. Martin Luther King, Jr. Blvd. to Hillsborough Ave., west of I-275	67	87 (285)	87 (285)	101 (330)
		65	116 (380)	116 (380)	149 (490)
P	From Dr. Martin Luther King, Jr. Blvd. to Hillsborough Ave., east of I-275	67	87 (285)	87 (285)	105 (345)
		65	116 (380)	116 (380)	151 (495)
SEGMENT 3A					
A	From east of 15th St. to Crosstown Connector, south of I-4	67	85 (280)	85 (280)	123 (405)
		65	122 (400)	122 (400)	195 (640)
B	From east of 15th St. to Crosstown Connector, north of I-4	67	73 (240)	73 (240)	128 (420)
		65	110 (360)	110 (360)	204 (670)
SEGMENT 3B					
A	From east of 34th St. to 40th St., south of I-4	67	91 (300)	91 (300)	76 (250)
		65	175 (575)	175 (575)	172 (565)
B	From east of 34th St. to 40th St., north of I-4	67	84 (275)	84 (275)	113 (370)
		65	137 (450)	137 (450)	177 (580)
C	From east of 40th St. to 50th St. (U.S. 41), south of I-4	67	91 (300)	91 (300)	107 (350)
		65	137 (450)	137 (450)	168 (550)
D	From east of 40th St. to 50th St. (U.S. 41), north of I-4	67	76 (250)	76 (250)	131 (430)
		65	137 (450)	137 (450)	192 (630)
E	From 50th St. to 21st Ave., south of I-4	67	76 (250)	76 (250)	149 (490)
		65	146 (480)	146 (480)	192 (630)
F	From east of 50th St. to 26th Ave., north of I-4	67	76 (250)	76 (250)	149 (490)
		65	146 (480)	146 (480)	192 (630)

TABLE 3
NOISE ISOPLETHS
Tampa Interstate Study - Phase II
Noise Study
(Continued)

Noise Study Area	Limits	Approximate Distance From Roadway Centerline m (ft.)			
		Hourly LEQ (dBA)	1990 Existing	2010 No-Action	2010 Preferred Alternative
SEGMENT 3C					
CTC-A	Between 2nd and 10th Ave., west of Crosstown Connector	67	--	--	94 (310)
		65	--	--	128 (420)
CTC-B	Between 8th and 11th Ave., east of Crosstown Connector	67	--	--	52 (170)
		65	--	--	67 (220)
CTC-C	Between 2nd and 8th Ave., east of Crosstown Connector	67	--	--	52 (170)
		65	--	--	67 (220)
CTE-A	Long St. between Station 658 and 685, south of Crosstown Expwy.	67	67 (220)	67 (220)	76 (250)
		65	76 (250)	76 (250)	94 (310)
CTE-B	West of Crosstown Connector to 22nd St., Crosstown Expwy. north side	67	82 (270)	82 (270)	116 (380)
		65	113 (370)	113 (370)	137 (450)
CTE-C	East of Crosstown Connector to 39th St., Crosstown Expwy. north side	67	76 (250)	76 (250)	94 (310)
		65	116 (380)	116 (380)	146 (480)
CTE-D	From 39th St. to Maydell Dr., north and south of Crosstown Expwy.	67	70 (230)	70 (230)	98 (320)
		65	94 (310)	94 (310)	125 (410)
CTE-E	From S.R. 60 to 22nd St., north and south of the Crosstown Expwy.	67	70 (230)	70 (230)	98 (320)
		65	94 (310)	94 (310)	128 (420)

See Exhibit 3.8 for Noise Study Area locations.

^a In areas of extreme fill 4.6 to 6.1 m (15 to 20 feet), isopleths are 91 m (300 ft.) for LEQ 67 dBA and 113 m (370 feet) for LEQ 65 dBA.

^b Influenced by North Blvd. and Ashley St.

^c Due to elevation necessary to span Hillsborough River, the impact is decreased.

^d Centerline distance to center of I-275/I-4 interchange.

TABLE 4

NOISE IMPACT SUMMARY
Tampa Interstate Study - Phase II
Noise Study

Study Segment	Estimated Number of Noise Sensitive Sites^a		
	1990 Existing	2010 No-Build	2010 Preferred Alternative
2A	451	451	461
2B	505	505	463
3A	199	199	138
3B	93	93	140
3C	16	16	11
Total	1,264	1,264	1,213

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

See Exhibit 2 for Study Segment locations.

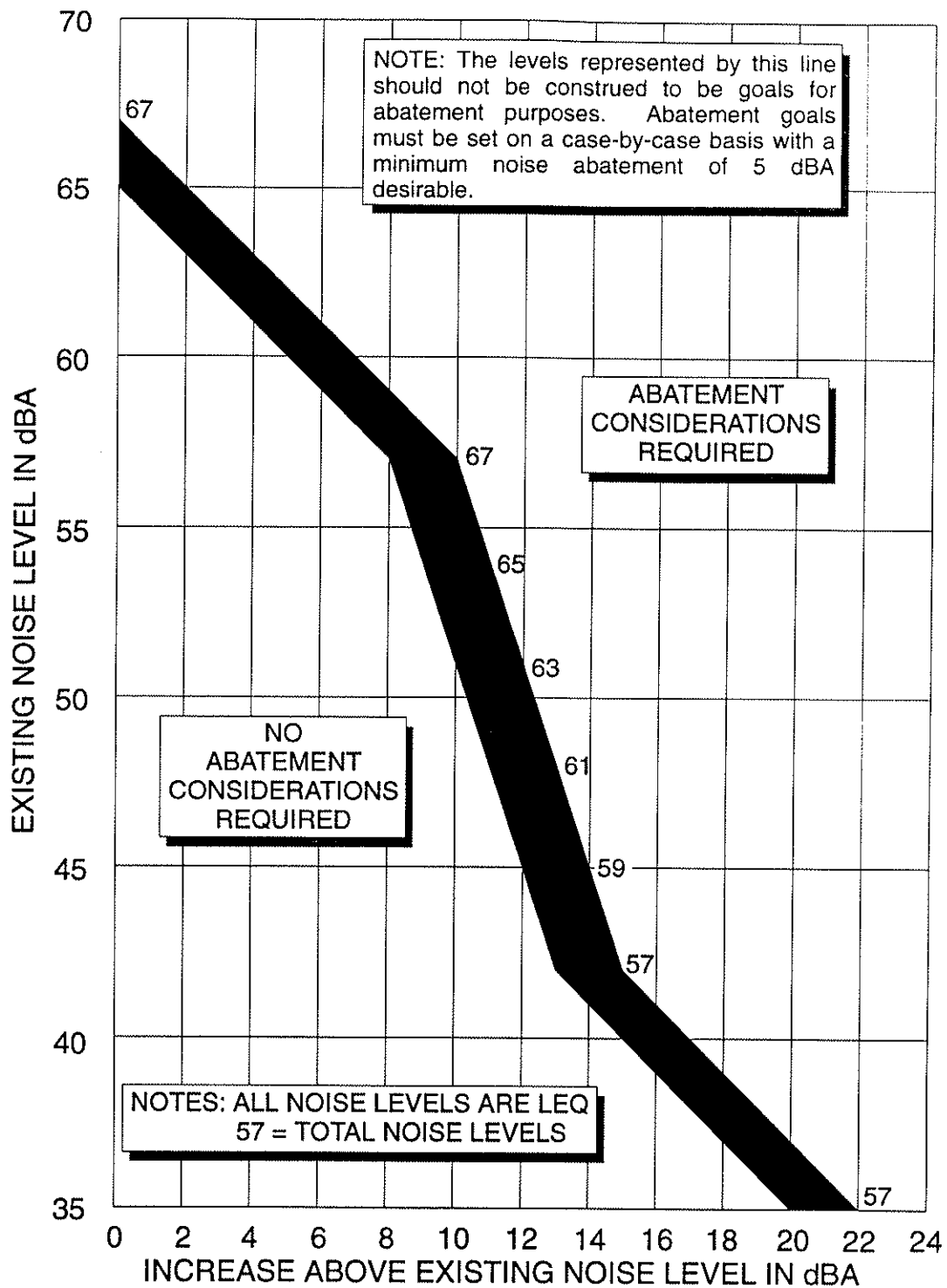
For the year 2010, the total number of impacted sites is predicted to decrease to 1,213 with the proposed improvements to the Tampa Interstate System. There are 461 sites in Segment 2A; 463 sites in Segment 2B; 138 sites in Segment 3A; 140 sites in Segment 3B, and 11 sites in Segment 3C. The decrease is a result of property acquisition to attain sufficient right-of-way for the improved roadway system.

Noise impacts may also occur when design year noise levels are predicted to increase above existing levels, 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. For noise sensitive sites with predicted design year noise levels between 57 and 65 dBA, FDOT considers a 10 to 15 dBA increase above existing as the range which is likely to foster sporadic to widespread complaints. No sites with predicted noise levels below 65 dBA are expected to experience a 10 to 15 dBA increase in noise from project-related traffic.

III. NOISE ABATEMENT MEASURES

As previously stated, all noise sensitive sites within the project limits are in Activity Category B. The criteria depicted in Exhibit 5 were used in determining where abatement considerations are warranted for Activity Category B. These criteria are based on the following rationale:

- When predicted design year noise levels exceed 65 dBA (Leq), abatement considerations are required, regardless of the increase (or decrease) in noise as compared to the no-build noise levels.
- When the predicted design year noise levels are equal to or less than 57 dBA (Leq), abatement considerations are not warranted. This level is equal to the noise abatement criterion for "lands on which serenity and quiet are of extraordinary significance" and also represents a level generally perceived to be half of the Activity Category B noise abatement criterion (NAC).



LEGEND



APPROACHING ABATEMENT CRITERIA
(ABATEMENT CONSIDERATIONS
NORMALLY REQUIRED)

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II

Hillsborough County, Florida

NOISE ABATEMENT CRITERIA
ACTIVITY CATEGORY B

EXHIBIT 5

- When the predicted design year noise levels are between 57 and 65 dBA (Leq), abatement considerations will be required when increases above existing levels of 10 to 15 dBA result. A 10 to 15 dBA increase reflects the generally accepted range which is likely to foster sporadic to widespread complaints. Maximum acceptable increases vary from 10 dBA (where this causes the NAC of 67 dBA (Leq), to be reached) to 15 dBA (where this causes the 57 dBA (Leq) level to be reached).

Noise abatement measures were considered for the 1,213 noise sensitive sites predicted to experience noise levels which approach or exceed the FHWA noise abatement criteria. 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 impact. The proposed alignment primarily follows the existing alignment, making full use of existing right-of-way. Shifting the alignment would reduce noise impacts on one side of the facility, but this would result in additional right-of-way costs and increased noise impacts on the other side of the facility. Therefore, it was determined that shifting the alignment was not a feasible noise abatement measure.

B. Traffic System Management Measures

Traffic 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 a viable noise reduction measure because most people cannot detect a noise level difference 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

Proper land use controls can effectively 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 develop policies that minimize the location and growth of noise sensitive land uses adjacent to the roadway. Proper land use controls can also be used to maintain existing buffer areas.

E. Noise Barriers

Noise barriers reduce noise levels by blocking the sound path between a roadway and noise sensitive sites. The use of vegetation for noise barriers is not considered to be feasible in the actual reduction of noise levels for this project. 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 of noise levels. The cost to acquire the additional right-of-way to provide a 100-foot buffer and to plant the vegetation is estimated to exceed economically reasonable requirements.

Structural noise barriers are most often used on high speed, limited access facilities where noise levels are high and there is adequate space for continuous barriers. A qualitative evaluation was performed to determine source/receiver relationships, impacted site densities, and the availability of land for continuous barriers. This preliminary evaluation resulted in candidate noise barrier locations in 22 noise study areas. These noise study areas include 2A-A, 2A-B, 2A-C and 2A-D in Segment 2A; 2B-E, 2B-H, 2B-I, 2B-J, 2B-K, 2B-L, 2B-M, 2B-N, 2B-O and 2B-P in Segment 2B; 3A-A and 3A-B in Segment 3A; 3B-A, 3B-B, 3B-C, 3B-D, 3B-E in Segment 3B; and CTE-A in

Segment 3C. The locations of these noise study areas and segments were shown previously on Exhibit 4.

The land use in noise study areas CTC-A, CTC-C, CTE-B, CTE-C, and CTE-E in Segment 3C is either commercial or industrial, and noise will not interrupt activities in these areas. Existing residences in noise study area 2B-F, located outside the proposed right-of-way, are to be relocated and, therefore, not impacted by noise. Furthermore, noise sensitive sites associated with the proposed Clara Frye High School in area 2B-F are anticipated to be outside the noise impact area. The number of noise sensitive sites in noise study areas 2B-G and CTE-D is two sites or less, and noise barriers are never economically reasonable for such low densities. Noise barriers in noise study area 3B-F are not feasible because 50th Street, an arterial roadway with unlimited access, is a major noise source. Finally, noise sensitive sites in noise study area CTC-B are outside the noise impact area.

A noise barrier analysis was conducted for the 22 noise study areas using the FHWA's noise barrier simulation model OPTIMA.^[5] In accordance with FHWA/FDOT guidelines, the economic reasonableness of a barrier was evaluated 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 to determine the economic reasonableness of a barrier, the following guidelines were used:

1. The barrier should provide a minimum insertion loss (noise reduction) of at least 5 dBA, and
2. The barrier should cost no more than \$25,000.00 per benefited receptor.

The results of the barrier analysis, by noise study area, are discussed in the following paragraphs and summarized in Table 5.

TABLE 5

NOISE BARRIER SUMMARY
Tampa Interstate Study - Phase II
Noise Study

Noise Study Area	Location	Total Length	Average Height	Total Cost	Number of Impacted Receptors	Number of Benefited Receptors	Cost per Benefited Receptor
2A-A	From Himes Ave. to Howard Ave. south of I-275	2,179 m (7,150 ft.)	6.0 m (20.0 ft.)	\$2,145,000	102	98	\$21,900
B	From Himes Ave. to Howard Ave. north of I-275	1,896 m (6,220 ft.)	6.0 m (20.0 ft.)	\$1,866,000	95	77	\$24,200
C	From Armenia Ave. to North Blvd. south of I-275	2,195 m (7,200 ft.)	6.0 m (20.0 ft.)	\$2,160,000	120	108	\$20,000
D	From Armenia Ave. to North Blvd. north of I-275	2,240 m (7,350 ft.)	5.8 m (19.2 ft.)	\$2,117,000	144	124	\$17,000
2B-E	From North Blvd. to Ashley St. south of I-275	549 m (1,800 ft.)	4.8 m (16.0 ft.)	\$432,000	48	12	\$36,000
H	From Orange St. to eastbound I-4 on ramp south of I-275	960 m (3,150 ft.)	5.2 m (17.2 ft.)	\$813,000	54	37	\$21,900
I, K	From Orange St. to Floribaska Ave. northwest of I-275 interchange	1,554 m (5,100 ft.)	5.3 m (15.0 ft.)	\$1,150,200	37	33	\$34,900
2B-J	From Palm Ave. to 14th St. south of I-275	579 m (1,900 ft.)	5.4 m (18.0 ft.)	\$513,000	19	15	\$34,200
L	Floribaska Ave. to 14th St. northeast of I-275 interchange	1,326 m (4,350 ft.)	6.0 m (20.0 ft.)	\$1,305,000	75	63	\$20,700
M	From Floribaska Ave. to Dr. Martin Luther King, Jr. Blvd. west of I-275	579 m (1,900 ft.)	4.2 m (14.0 ft.)	\$399,000	28	18	\$22,200 ^b
N	From Floribaska Ave. to Dr. Martin Luther King, Jr. Blvd. east of I-275	1,219 m (4,000 ft.)	4.2 m (14.0 ft.)	\$840,000	46	44	\$19,100 ^b
O	From Dr. Martin Luther King, Jr. Blvd. to Hillsborough Ave. west of I-275	2,454 m (8,050 ft.)	4.2 m (14.0 ft.)	\$1,691,000	78	76	\$22,300
P	From Dr. Martin Luther King, Jr. Blvd. to Hillsborough Ave. east of I-275	2,384 m (7,820 ft.)	4.2 m (14.0 ft.)	\$1,642,000	76	73	\$22,500
3A-A	From 14th St. to Crosstown Connector south of I-4	1,539 m (5,050 ft.)	4.7 m (15.7 ft.)	\$1,189,000	57	54	\$22,000
B	From 14th St. to Crosstown Connector north of I-4	2,118 m (6,950 ft.)	4.1 m (13.6 ft.)	\$1,411,000	81	76	\$18,600
3B-A	From 34th St. to 40th St. south of I-4	1,463 m (4,800 ft.)	3.9 m (12.8 ft.)	\$922,000	32	28	\$32,900
3B-B	From west of 34th St. to 40th St. north of I-4	564 m (1,850 ft.)	3.6 m (12.0 ft.)	\$333,000	11	10	\$33,300

TABLE 5

NOISE BARRIER SUMMARY
Tampa Interstate Study - Phase II
Noise Study
(Continued)

Noise Study Area ^a	Location	Total Length	Average Height	Total Cost	Number of Impacted Receptors	Number of Benefited Receptors	Cost per Benefited Receptor
C	From 40th St. to 50th St. south of I-4	1,143 m (3,750 ft.)	3.6 m (12.0 ft.)	\$675,000	35	29	\$23,300
D	From 40th St. to 50th St. north of I-4	183 m (600 ft.)	4.2 m (14.0 ft.)	\$126,000	12	4	\$31,500
E	From 50th St. to I-4 Sta. 630+00 south of I-4	1,250 m (4,100 ft.)	5.0 m (16.6 ft.)	\$1,021,000	44	30	\$34,100
CTE-A	From 22nd St. to 30th St. south of the Crosstown Expressway	680 m (2,230 ft.)	3.6 m (12.0 ft.)	\$401,000	10	10	\$40,100
TOTAL		32,086 m (105,270 ft.)	--	\$26,040,200	1,336	1,137	--

^a See Exhibit 4 for Noise Study Area location.

^b Noise barriers in 2B-M and 2B-N are cost reasonable when considered in combination with the cost reasonable barriers in segments 2B-O and 2B-P.

Segment 2A

Noise Study Area 2A-A - located south of I-275 and bordered by Himes Avenue and Armenia Avenue, has 102 Category B impacted receptors. This noise barrier is comprised of two individual noise walls. Barrier No. 1, beginning 101 m (330 ft.) west of Himes Avenue and ending 305 m (1,000 ft.) east of Himes Avenue, is approximately 396 m (1,300 ft.) long and 6.0 m (20 ft.) high. Barrier No. 2, beginning approximately 18 m (60 ft.) east of Himes Avenue and ending approximately 21 m (70 ft.) west of Armenia Avenue, is approximately 1,600 m (5,250 ft.) long and 6.0 m (20 ft.) high. Barrier No. 3, beginning approximately 219 m (720 ft.) west of Armenia Avenue and ending approximately 40 m (130 ft.) west of Armenia Avenue, is 183 m (600 ft.) long and 6.0 m (20 ft.) high.

The combined length of the three Noise Study Area 2A-A barriers is 2,179 m (7,150 ft.), with an average height of 6.0 m (20.0 ft.) and an estimated total cost of \$2,145,000. The barriers, in combination with Barrier No. 7 provided for Noise Study Area 2A-C, will provide an approximate 5 to 12 dBA noise reduction benefit to 98 impacted receptors and the cost per benefited receptor is approximately \$21,900. Because of site characteristics, the remaining 4 impacted receptors would receive 4 dBA or less noise reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2A-A are anticipated to be economically reasonable.

Noise Study Area 2A-B - located north of I-275 and bordered by Himes Avenue and Armenia Avenue, has 95 Category B impacted receptors. This noise barrier system is comprised of three individual noise walls. Barrier No. 4, beginning 152 m (500 ft.) east of Himes Avenue and ending 457 m (1,500 ft.) east of Himes Avenue, is approximately 305 m (1,000 ft.) long and 6.0 m (20 ft.) high. Barrier No. 5, beginning approximately 206 m (675 ft.) east of Himes Avenue and ending approximately 152 m (500 ft.) west of Armenia Avenue, is approximately 1,286 m (4,220 ft.) long and 6.0 m (20 ft.) high. Barrier No. 6, beginning approximately 267 m (875 ft.) west of Armenia Avenue and ending approximately 38 m (125 ft.) east of Armenia Avenue, is approximately 305 m (1,000 ft.) long and 6.0 m (20 ft.) high.

The combined length of the three Noise Study Area 2A-B barriers is approximately 1,896 m (6,220 ft.), with an average height of 6.0 m (20 ft.) and an estimated total cost of \$1,866,000. These barriers will provide an approximate 5 to 10 dBA noise reduction benefit to 77 of the 95 impacted receptors and the total cost per benefited receptor is approximately \$24,200. Because of the site characteristics, the remaining 18 receptors would receive 4 dBA or less noise reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2A-B are anticipated to be economically reasonable.

Noise Study Area 2A-C - located south of I-275 between Armenia Avenue and North Boulevard, has 120 Category B impacted receptors. This barrier system consists of three barriers. Barrier No. 7, a continuation of Barrier No. 3 from Noise Study Area 2A-A, begins approximately 40 m (130 ft.) west of Armenia Avenue and ends approximately 396 m (1,300 ft.) east of Howard Avenue, is approximately 640 m (2,100 ft.) long and 6.0 m (20 ft.) high. Barrier No. 8, beginning approximately 85 (280 ft.) east of Howard Avenue and ending approximately 131 m (430 ft.) west

of North Boulevard, is approximately 1,219 m (4,000 ft.) long and 6.0 m (20 ft.) high. Barrier No. 9, beginning approximately 314 m (1,030 ft.) west of North Boulevard and ending approximately 30 m (100 ft.) east of North Boulevard, is approximately 335 m (1,100 ft.) long and 6.0 m (20 ft.) high.

The combined length of the three Noise Study Area 2A-C barriers is approximately 2,195 m (7,200 ft.), with an average height of 6.0 m (20 ft.) and an estimated total cost of \$2,160,000. These barriers will provide an approximate 5 to 9 dBA reduction to 108 impacted receptors at a total cost per benefited receptor of approximately \$20,000. Because of the site characteristics, the 12 remaining impacted receptors will receive a 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2A-C are anticipated to be economically reasonable.

Noise Study Area 2A-D - located north of I-275 and bordered by Armenia Avenue and North Boulevard, has 144 Category B impacted receptors. This barrier system is comprised of three separate noise walls. Barrier No. 10, a continuation of Barrier No. 6 from Noise Study Area 2A-B, extends from approximately 38 m (125 ft.) east of Armenia Avenue to approximately 411 m (1,350 ft.) east of Howard Avenue, is approximately 579 m (1,900 ft.) long and 6.0 m (20 ft.) high. Barrier No. 11, beginning approximately 198 m (650 ft.) east of Howard Avenue and ending approximately 46 m (150 ft.) west of North Boulevard, is approximately 1,204 m (3,950 ft.) long and 6.0 m (20 ft.) high. Barrier No. 12, beginning approximately 305 m (1,000 ft.) west of North Boulevard and ending 152 m (500 ft.) east of North Boulevard, is approximately 457 m (1,500 ft.) long and 4.8 m (16 ft.) high.

The combined length of the Noise Study Area 2A-D barriers is approximately 2,240 m (7,350 ft.), with an average height of 5.8 m (19.2 ft.) and an estimated total cost of \$2,117,000. These barriers will provide an approximate 5 to 10 dBA reduction for 124 of 144 impacted receptors at a cost per benefited receptor of approximately \$17,000. Because of the site characteristics, the 20 remaining impacted receptors will receive a 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2A-D are anticipated to be economically reasonable.

Segment 2B

Noise Study Area 2B-E - located south of I-275 between North Boulevard and Ashley Street, has 48 Category B impacted receptors. Barrier No. 13, which begins approximately 198 m (650 ft.) east of North Boulevard and ends approximately 76 m (250 ft.) south of Laurel Place, is approximately 549 m (1,800 ft.) long, 4.8 m (16 ft.) high and is estimated to cost \$432,000. This barrier will provide an approximately 5 to 10 dBA reduction for 12 of the 48 impacted receptors and has a cost per benefited receptor of approximately \$36,000. Because of the site characteristics the remaining 36 impacted receptors receive 4 dBA or less reduction from these barriers. According to FDOT guidelines, the noise barrier is not anticipated to be economically reasonable.

Noise Study Area 2B-H - located south of I-275 between Orange Street and I-4, has 54 Category B impacted receptors. This noise barrier is comprised of two noise walls. Barrier No. 14, beginning

approximately 91 m (300 ft.) north of the intersection of Orange and Cass Streets, paralleling Orange Street, and ending 152 m (500 ft.) north of Scott Street, is approximately 442 m (1,450 ft.) long and 4.2 m (14 ft.) high. Barrier No. 15, beginning 43 m (140 ft.) east of Jefferson Street and ending approximately 70 m (230 ft.) west of Palm Avenue, is approximately 518 m (1,700 ft.) long and 6.0 m (20 ft.) high.

The combined length of the two Noise Study Area 2B-H barriers is 960 m (3,150 ft.), with an average height of 5.2 m (17.2 ft.), and an estimated total cost of \$813,000. The barriers will provide an approximate 5 to 8 dBA noise reduction for 37 of the 54 impacted receptors and the cost per benefited receptor is approximately \$21,900. Because of the site characteristics, the remaining 17 impacted receptors receive 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2B-H are anticipated to be economically reasonable.

Noise Study Area 2B-I, K - located northwest of I-275 between the Hillsborough River and Floribruska Avenue, has 37 Category B impacted receptors. The noise barrier is comprised of three noise walls. Barrier No. 16, beginning at Jefferson Street and ending approximately 122 m (400 ft.) north of Columbus Drive, is approximately 1,006 m (3,300 ft.) long and averages 4.7 m (15.6 ft.) high. Barrier No. 17, beginning approximately 15 m (50 ft.) northeast of Jefferson Street and ending 46 m (150 ft.) northeast of Oak Avenue, is approximately 305 m (1,000 ft.) long and 4.2 m (14 ft.) high. Barrier No. 39, beginning at Oak Avenue and ending approximately 15 m (50 ft.) northeast of Ross Avenue, is approximately 244 m (800 ft.) long and 4.2 m (14 ft.) high.

The total cost of the three barriers in this system is estimated to be \$1,150,200, and by providing an approximate 5 to 7 dBA reduction for 33 of 37 impacted receptors, the cost per benefited receptor is \$34,900. Because of the site characteristics, the 4 remaining impacted receptors would receive a 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2B-I, K are not anticipated to be economically reasonable.

Noise Study Area 2B-J - located south of the I-275/I-4 interchange between Palm Avenue and 14th Street/Nick Nuccio Parkway, has 19 Category B impacted receptors. Barrier No. 18, beginning 6.0 m (20 ft.) north of Nebraska Avenue and ending 137 m (450 ft.) east of 10th Street, is approximately 579 m (1,900 ft.) long, 5.4 m (18 ft.) high, and will provide an approximate 5 to 7 dBA reduction to 15 of the impacted receptors at an estimated cost of \$513,000. The cost per benefited receptor is approximately \$34,200. Because of the site characteristics the remaining 4 impacted receptors receive 4 dBA or less reduction from these barriers. According to FDOT guidelines, the noise barrier is not anticipated to be economically reasonable.

Noise Study Area 2B-L - located northeast of the I-275/I-4 interchange between 14th Avenue and Floribruska Avenue, has 75 Category B impacted receptors. This noise barrier is comprised of two noise walls. Barrier No. 35, beginning approximately 61 m (200 ft.) east of Nebraska Avenue and ending approximately 30 m (100 ft.) west of 14th Street, is approximately 594 m (1,950 ft.) long and 6.0 m (20 ft.) high. Barrier No. 36, beginning approximately 99 m (325 ft.) east of Nebraska Avenue and ending 15 m (50 ft.) east of 15th Street, is approximately 732 m (2,400 ft.) long and 6.0 m (20 ft.) high.

The combined length of the two Noise Study Area 2B-L barriers is approximately 1,326 (4,350 ft.) with an average height of 6.0 m (20 ft.) and an estimated cost of \$1,305,000. These barriers will provide an approximate 5 to 9 dBA reduction to 63 of the 75 impacted receptors at a cost per benefitted receptor of \$20,700. According to FDOT guidelines, the noise barriers are anticipated to be economically reasonable. The remaining 12 impacted receptors will receive a 4 dBA or less reduction because of noise impacts from elevated ramps in the I-275/I-4 interchange or 14th Street, neither of which can be attenuated by noise barriers.

Noise Study Area 2B-M - located west of I-275 between Floribraska Avenue and Dr. Martin Luther King, Jr. Boulevard, has 28 Category B impacted receptors. The noise barrier is comprised of two separate noise walls. Barrier No. 19, which begins 137 m (450 ft.) south of Floribraska Avenue and ends approximately 162 m (530 ft.) south of Dr. Martin Luther King, Jr. Boulevard, is approximately 1,158 m (3,800 ft.) long and 3.6 m (12 ft.) high. Barrier No. 20, beginning approximately 320 m (1,050 ft.) south of Dr. Martin Luther King, Jr. Boulevard and ending approximately 30 m (100 ft.) south of Dr. Martin Luther King, Jr. Boulevard, is approximately 274 (900 ft.) long and 3.6 m (12 ft.) high.

The combined length of the two Noise Study Area 2B-M barriers is approximately 1,433 m (4,700 ft.), with a height of 3.6 m (12 ft.), and an estimated cost of \$846,000. These barriers will provide an approximate 5 to 8 dBA reduction for 22 impacted receptors at a cost per benefitted receptor of \$38,450. According to FDOT guidelines, noise barriers in Noise Study Area 2B-M are not anticipated to be economically reasonable.

Although noise barriers designed to protect the entire length of Noise Study Area 2B-M are not economically reasonable, modifying the barrier to abate just the northern residences and extending noise barriers for the adjacent Noise Study Area 2P-O is anticipated to be economically reasonable. A reduced Barrier No. 19, extending from 427 m (1,400 ft.) north of Floribraska Avenue to 152 m (500 ft.) south of Dr. Martin Luther King, Jr. Boulevard, would be approximately 579 m (1,900 ft.) long and 4.2 m (14 ft.) high. At an estimated cost of \$399,000, Barrier No. 19, in combination with barriers for Noise Study Area 2B-O, will provide a 5 to 8 dBA reduction to 18 impacted receptors at a cost per benefitted receptor of \$22,200. According to FDOT guidelines, the modified noise barrier for Noise Study Area 2B-M is anticipated to be economically reasonable.

Noise Study Area 2B-N - located east of I-275, has 46 Category B impacted receptors. This noise barrier is comprised of one noise wall. Barrier No. 21, beginning approximately 122 m (400 ft.) south of Floribraska Avenue and ending approximately 91 m (300 ft.) south of Dr. Martin Luther King, Jr. Boulevard, is approximately 1,219 m (4,000 ft.) long and 4.2 m (14 ft.) high.

At an estimated cost of \$840,000, Barrier No. 21, in combination with barriers for Noise Study Area 2B-P, will provide a 5 to 8 dBA reduction to 44 impacted receptors at a cost per benefitted receptor of \$19,100. Because of the site characteristics the remaining 2 impacted receptors receive 4 dBA or less reduction from these barriers. According to FDOT guidelines, the noise barrier for Noise Study Area 2B-N is anticipated to be economically reasonable.

Noise Study Area 2B-O - located west of I-275 between Dr. Martin Luther King, Jr. Boulevard and Hillsborough Avenue, has 78 Category B impacted receptors. The noise barrier is comprised of three individual noise walls. Barrier No. T1, beginning approximately 259 (850 ft.) south and ending approximately 244 m (800 ft.) north of Dr. Martin Luther King, Jr. Boulevard, is approximately 503 m (1,650 ft.) long and 4.2 m (14 ft.) high. Barrier No. T2, beginning approximately 46 m (150 ft.) north of Dr. Martin Luther King, Jr. Boulevard and ending approximately 61 m (200 ft.) south of Hillsborough Avenue, is approximately 1,524 m (5,000 ft.) long and 4.2 m (14 ft.) high. Barrier No. T3, beginning approximately 320 m (1,050 ft.) south and ending approximately 91 m (300 ft.) north of Hillsborough Avenue, is approximately 427 (1,400 ft.) long and 4.2 m (14 ft.) high.

The combined length of the three barriers is approximately 2,454 m (8,050 ft.) with a height of 4.2 m (14 ft.) and an estimated cost of \$1,691,000. The noise barriers would provide a 5 to 8 dBA reduction to 76 impacted receptors at a cost per benefited receptor of approximately \$22,300. Because of the site characteristics the remaining 2 impacted receptors receive 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2B-O are anticipated to be economically reasonable.

Noise Study Area 2B-P - located east of I-275 between Dr. Martin Luther King, Jr. Boulevard and Hillsborough Avenue, has 76 Category B impacted receptors. The noise barrier is comprised of three individual noise walls. Barrier No. T4, beginning approximately 244 m (800 ft.) south and ending approximately 244 m (800 ft.) north of Dr. Martin Luther King, Jr. Boulevard, is approximately 503 m (1,650 ft.) long and 4.2 m (14 ft.) high. Barrier No. T5, beginning approximately 46 m (150 ft.) north of Dr. Martin Luther King, Jr. Boulevard and ending approximately 122 m (400 ft.) south of Hillsborough Avenue, is approximately 1,463 m (4,800 ft.) long and 4.2 m (14 ft.) high. Barrier No. T6, beginning approximately 442 m (1,450 ft.) south and ending approximately 30 m (100 ft.) south of Hillsborough Avenue, is approximately 418 m (1,370 ft.) long and 4.2 m (14 ft.) high.

The combined length of the three barriers is approximately 2,384 (7,820 ft.) with a height of 4.2 m (14 ft.) and an estimated cost of \$1,642,000. The noise barriers would provide at least a 5 to 8 dBA reduction to 73 impacted receptors at a cost per benefited receptor of approximately \$22,500. Because of the site characteristics the remaining 3 impacted receptors receive 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 2B-P are anticipated to be economically reasonable.

Segment 3A

Noise Study Area 3A-A - located south of I-4 between 14th Street and the Crosstown Connector, has 57 Category B impacted receptors. The noise barrier is comprised of two noise walls. Barrier No. 23, beginning approximately 61 m (200 ft.) west of 14th Street and ending 15 m (50 ft.) east of 18th Street, is approximately 579 m (1,900 ft.) long and 4.8 m (16 ft.) high. Barrier No. 24, beginning approximately 76 m (250 ft.) west of 21st Street and ending at the CSX Transportation

railroad tracks, is approximately 960 m (3,150 ft.) long and ranges from 4.2 to 5.4 m (14 to 18 ft.) high.

The combined length of the two Noise Study Area 3A-A barriers is approximately 1,539 m (5,050 ft.) with an average height of 4.7 m (15.7 ft.), and an estimated total cost of \$1,189,000. The barriers will provide an approximate 5 to 7 dBA noise reduction for 54 impacted receptors at a cost per benefited receptor of approximately \$22,000. Because of the site characteristics, 3 impacted receptors would receive a 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 3A-A are anticipated to be economically reasonable.

Noise Study Area 3A-B - located north of I-4 between 14th Street and the Crosstown Connector, has 81 Category B impacted receptors. This noise barrier consists of four noise walls. Barrier No. 25, a continuation of Barrier No. 36 from Noise Study Area 2B-L, begins approximately 15 m (50 ft.) east of 15th Street and ends approximately 91 m (300 ft.) east of 18th Street, is approximately 457 m (1,500 ft.) long and 4.2 m (14 ft.) high. Barrier No. 26, beginning 69 m (225 ft.) east of 18th Street and ending approximately 23 m (75 ft.) west of 29th Street, is approximately 1,006 m (3,300 ft.) long and 4.2 m (14 ft.) high. Barrier No. 37, beginning approximately 15 m (50 ft.) east of 15th Street and ending approximately 15 m (50 ft.) east of 17th Street, is approximately 244m (800 ft.) long and 3.0 m (10 ft.) high. Barrier No. 38, beginning approximately 23 m (75 ft.) east of the CSX Transportation railroad tracks and ending approximately 38 m (125 ft.) east of 34th Street, is approximately 411 m (1,350 ft.) long and 4.2 m (14 ft.) high.

The combined length of the four Noise Study Area 3A-B barriers is approximately 2,118 m (6,950 ft.), with an average height of 4.1 m (13.6 ft.) and an estimated total cost of \$1,411,000. The barrier will provide an approximate 5 to 7 dBA noise reduction for 76 impacted receptors at a cost per benefited receptor of approximately \$18,600. Because of the site characteristics, 5 impacted receptors are expected to receive a 4 dBA or less reduction from these barriers. According to FDOT guidelines, noise barriers in Noise Study Area 3A-B are anticipated to be economically reasonable.

Segment 3B

Noise Study Area 3B-A - located south of I-4 between 32nd Street and 40th Street, has 32 Category B impacted receptors. Barrier No. 27, beginning at 10th Avenue and ending 168 m (550 ft.) east of 40th Street, is approximately 1,463 m (4,800 ft.) in length, ranges from 3.6 to 4.2 m (12 to 14 ft.) high, has an estimated cost of \$922,000 and would provide an approximate 5 to 7 dBA reduction for 28 impacted receptors at a cost per benefited receptor of \$32,900. Because of the site characteristics, 4 impacted receptors are expected to receive only a 4 dBA or less reduction from this barrier. According to FDOT guidelines, the noise barrier is not anticipated to be economically reasonable.

Noise Study Area 3B-B - located north of I-4 between 34th Street and 40th Street, has 11 Category B impacted receptors. Barrier No. 28, beginning at the CSX Transportation railroad tracks and ending 152 m (500 ft.) east of 40th Street, is approximately 564 m (1,850 ft.) in length, 3.6 m (12 ft.) high, has an estimated cost of \$333,000, and would provide an approximate 5 dBA reduction for

10 impacted receptors, at a cost per benefited receptor of \$33,300. Because of the site characteristics, the one remaining impacted receptor is expected to receive only a 4 dBA reduction from this barrier. According to FDOT guidelines, the noise barrier is not anticipated to be economically reasonable.

Noise Study Area 3B-C - located south of I-4 between 40th Street and 50th Street (U.S. 41), has 35 Category B impacted receptors. Barrier No. 29, beginning at 40th Street and ending 152 m (500 ft.) west of 50th Street, is approximately 1,143 m (3,750 ft.) in length, 3.6 m (12 ft.) high, has an estimated cost of \$675,000 and would provide an approximate 5 to 7 dBA reduction for 29 impacted receptors at a cost per benefited receptor of \$23,300. Because of the site characteristics, 6 impacted receptors are expected to receive only a 4 dBA or less reduction from this barrier. According to FDOT guidelines, the noise barrier is anticipated to be economically reasonable.

Noise Study Area 3B-D - located north of I-4 between 40th Street and 50th Street (U.S. 41), has 12 Category B impacted receptors. Barrier No. 30, beginning at Columbus Drive and ending approximately 183 m (600 ft.) east of Columbus Drive, is approximately 183 m (600 ft.) in length, 4.2 m (14 ft.) high, has an estimated cost of \$126,000, and would provide an approximate 5 to 6 dBA reduction for 4 impacted receptors at a cost per benefited receptor of \$31,500. Because of the site characteristics the remaining 8 impacted receptors receive 4 dBA or less reduction from these barriers. According to FDOT guidelines, this noise barrier is not anticipated to be economically reasonable.

Noise Study Area 3B-E - located south of I-4 and east of 50th Street, has 44 Category B impacted receptors. This noise barrier is comprised of two individual noise walls. Barrier No. 31, a continuation of Barrier No. 29 from Noise Study Area 3B-C, begins 152 m (500 ft.) west of 50th Street and ends approximately 335 m (1,100 ft.) east of 50th Street, is approximately 533 m (1,750 ft.) long and ranges from 3.6 to 4.2 m (12 to 14 ft.) high. Barrier No. 32, beginning 91 m (300 ft.) east of 50th Street along Ramp J and ending at approximately Station 636+00 of mainline I-4, is approximately 716 m (2,350 ft.) long and ranges from 4.8 to 6.0 m (16 to 20 ft.) high.

The combined length of the two barriers is approximately 1,250 m (4,100 ft.), with an average height of 5.0 m (16.6 ft.) and an estimated total cost of \$1,021,000. The barrier will provide an approximate 5 to 11 dBA reduction for 30 impacted receptors at a cost per benefited receptor of \$34,100. Because of the site characteristics, 14 impacted receptors are expected to receive a 4 dBA or less reduction from these barriers. According to FDOT guidelines, this noise barrier is not anticipated to be economically reasonable.

Additional Category B sites not impacted by the interstate improvements will be impacted by the proposed realignment of Columbus Drive. Noise barriers along I-4 provide minimal abatement to these noise Study locations. The arterial roadways that are the major noise sources at these sites are not limited access; therefore, noise barriers are not a feasible abatement measure for these sites.

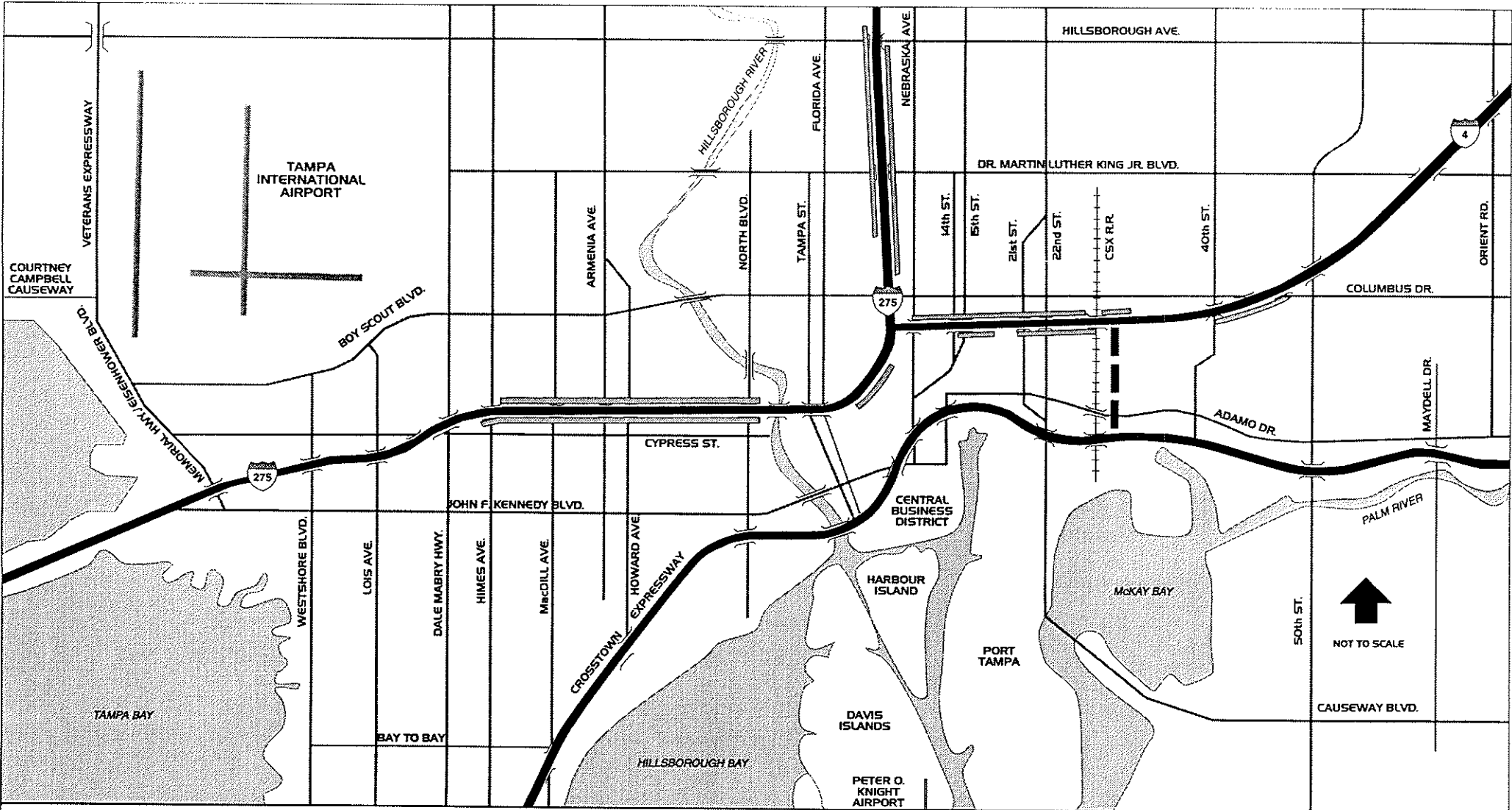
Segment 3C

Noise Study Area CTE-A - located south of the Crosstown Expressway and bordered by 22nd Street and 30th Street, has 10 Category B impacted receptors. Barrier No. 33, beginning 30 m (100 ft.) west of 26th Street and ending approximately 366 m (1,200 ft.) east of 26th Street, is approximately 396 m (1,300 ft.) long and 3.6 m (12 ft.) high. Barrier No. 34, beginning approximately 122 m (400 ft.) east of 26th Street and ending 396 m (1,300 ft.) east of 26th Street, is approximately 283 m (930 ft.) long and 3.6 m (12 ft.) high.

The combined length of the two noise barriers is approximately 680 m (2,230 ft.) with a height of 3.6 m (12 ft.) and an estimated total cost of \$401,000. The barriers will provide an approximate 5 to 7 dBA noise reduction for 10 impacted receptors and the cost per benefited receptor is approximately \$40,100. According to FDOT guidelines, noise barriers in Noise Study Area CTE-A are not anticipated to be economically reasonable.

In summary, the analysis indicates that barriers are economically reasonable in thirteen of the Noise Study Areas: 2A-A, 2A-B, 2A-C, 2A-D, 2B-H, 2B-L, 2B-M, 2B-N, 2B-O, 2B-P, 3A-A, 3A-B, and 3B-C. Locations where barriers were found to be economically reasonable are shown in Exhibit 6. Although noise barriers are anticipated to be economically reasonable at these locations, other important factors such as community desires, adjacent land uses, safety, and constructibility play important roles and require further consideration in determining the reasonableness and feasibility of the barriers.

Several factors strongly support the reasonableness of providing noise barriers. During the public involvement process, comments solicited from impacted property owners show strong support for providing noise barriers. Aesthetic issues have been addressed and discussed with the public. The interstate system bisected existing neighborhoods when first built, introducing noise impacts that were not abated. Many residences which currently exist as second or third row houses will lose shielding as first-row houses are displaced by the proposed interstate. While some residences will experience a 3 dBA or less increase over existing noise levels, others will experience a 6 to 8 dBA increase as existing shielding is removed. The increase over existing noise levels within a noise study area is highly variable and dependent on 1) the location of the noise sensitive site with respect to the interstate and crossing arterials; 2) horizontal and vertical alignment changes; and 3) displacement of existing structures for right-of-way acquisition.



LEGEND

 Noise Barriers

 Proposed Crosstown Connector

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
 PHASE II
 Hillsborough County, Florida

**ECONOMICALLY REASONABLE
 NOISE BARRIER LOCATIONS**

EXHIBIT 6

Noise abatement commitments are typically made two times during a project's development. The current analysis identifies noise impacted sites and establishes approximate barrier locations and heights for economically reasonable barriers. The factors discussed above will be further evaluated in the final design process.

The FDOT is committed to the construction of feasible noise abatement measures at the noise-impacted locations that were previously identified contingent upon the following conditions:

- Detailed noise analyses during the final design process support the need for abatement;
- Reasonable cost analyses indicate that the economic cost of the barrier(s) will not exceed the guidelines;
- Community input regarding desires, types, heights, and locations of barriers has been solicited by the District Office;
- Preferences regarding compatibility with adjacent land uses, particularly as addressed by officials having jurisdiction over such land uses has been noted;
- Safety and engineering aspects as related to the roadway user and the adjacent property owner have been reviewed; and
- Any other mitigating circumstances have been evaluated.

The noise analysis indicates that the project will result in increased noise levels and associated noise impacts as an unavoidable consequence. It is recommended that future noise impacts be mitigated through local land use ordinances involving zoning, building setbacks, and building construction materials.

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

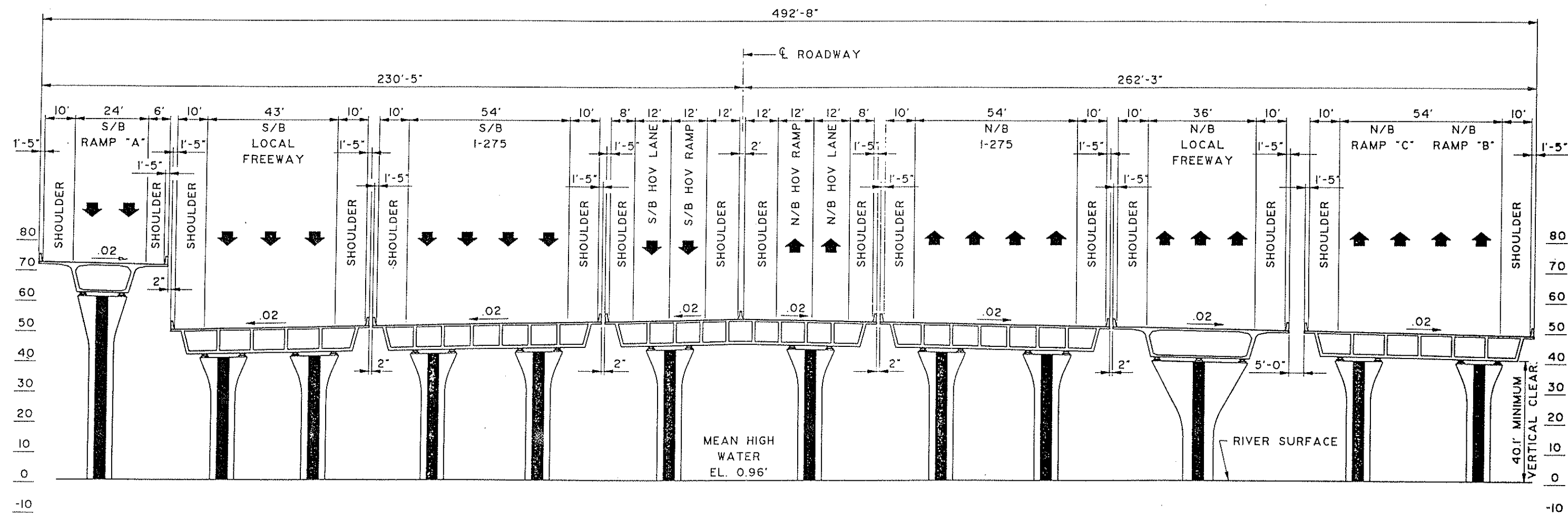
The FDOT will promote compatibility between land development and the operation of the proposed facility. To accomplish this goal, the FDOT will cooperate with the Metropolitan Planning Organization and with local officials by furnishing:

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. A copy of the American Association of State Highway and Transportation Officials' "Policy of Land Use and Source Control Aspects of Traffic Noise Attenuation".

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.

APPENDIX A

ROADWAY TYPICAL SECTIONS



STATION 421+00

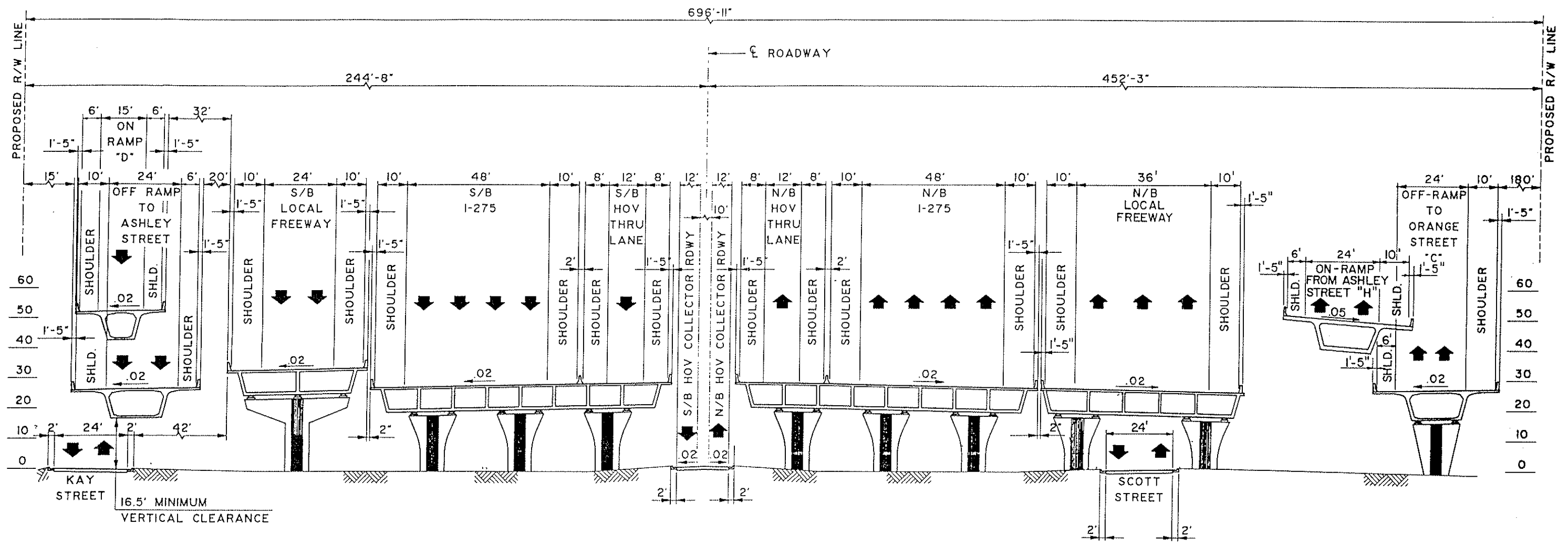
FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT

TAMPA INTERSTATE STUDY
PHASE II

Hillsborough County, Florida

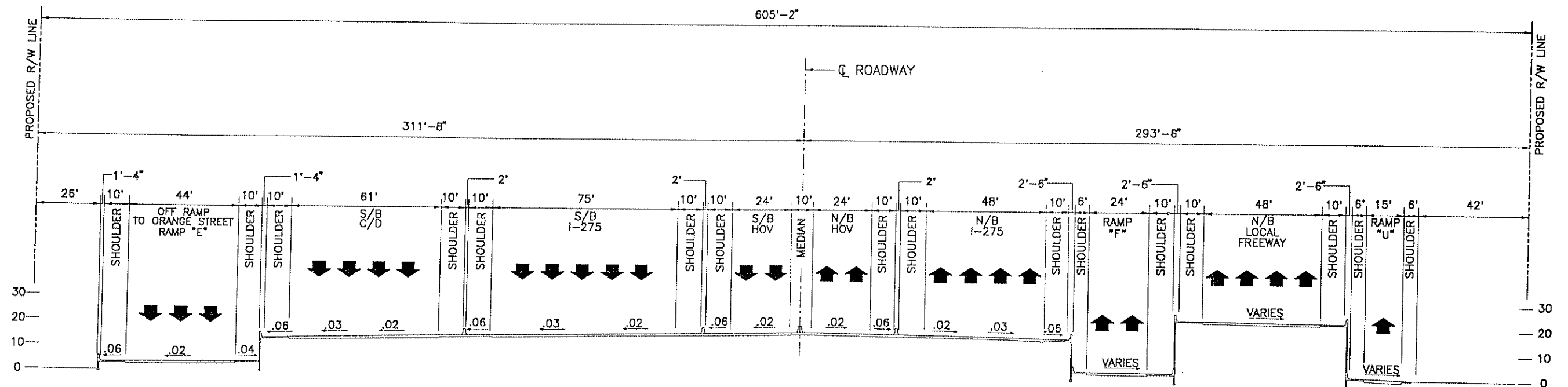
TYPICAL SECTION
I-275 AT HILLSBOROUGH RIVER



STATION 432 + 00

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

TYPICAL SECTION
I-275 AT TAMPA STREET

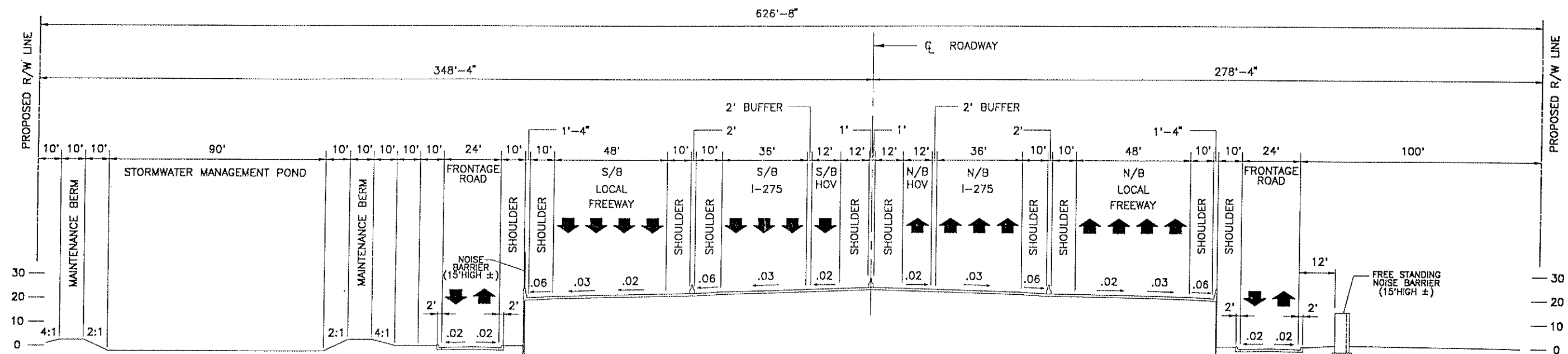


STATION 454+00

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida

TYPICAL SECTION
I-275 AT HENDERSON STREET

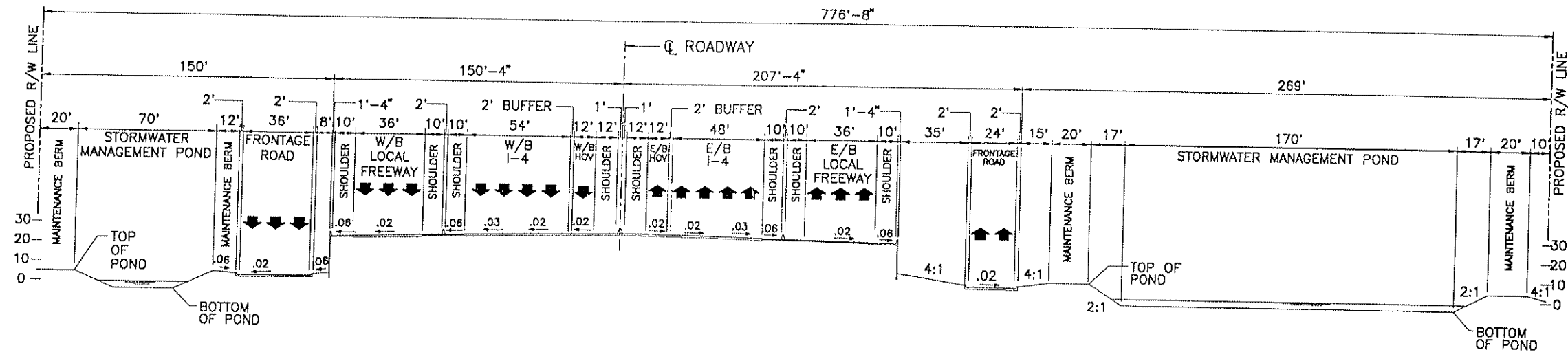


STATION 737+00

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida

TYPICAL SECTION
I-275 AT ROEBLES PARK

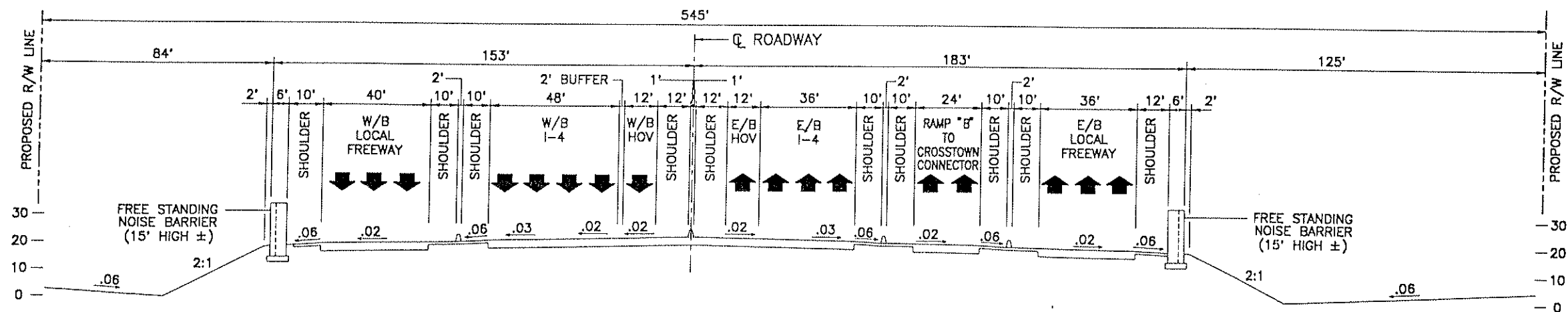


STATION 472+00

FLORIDA DEPARTMENT OF TRANSPORTATION

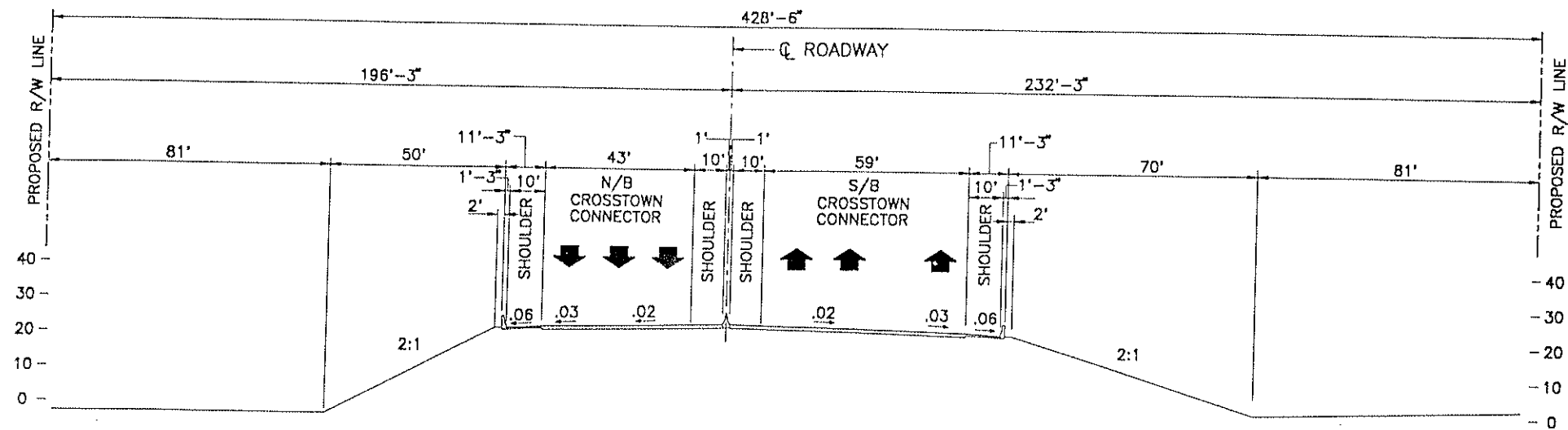
NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida

TYPICAL SECTION
I-4 AT 14TH AND 15TH STREETS



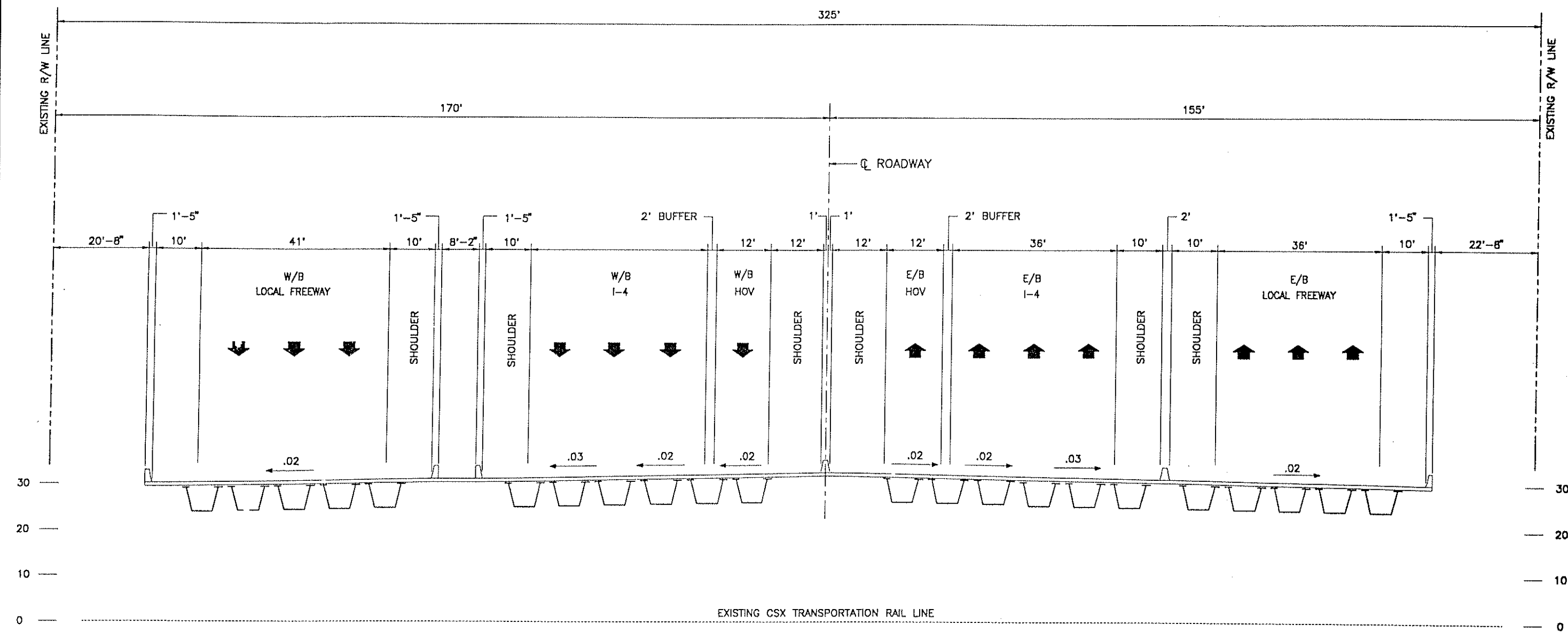
STATION 508+00

FLORIDA DEPARTMENT OF TRANSPORTATION
NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida
TYPICAL SECTION
1-4 AT 24TH STREET



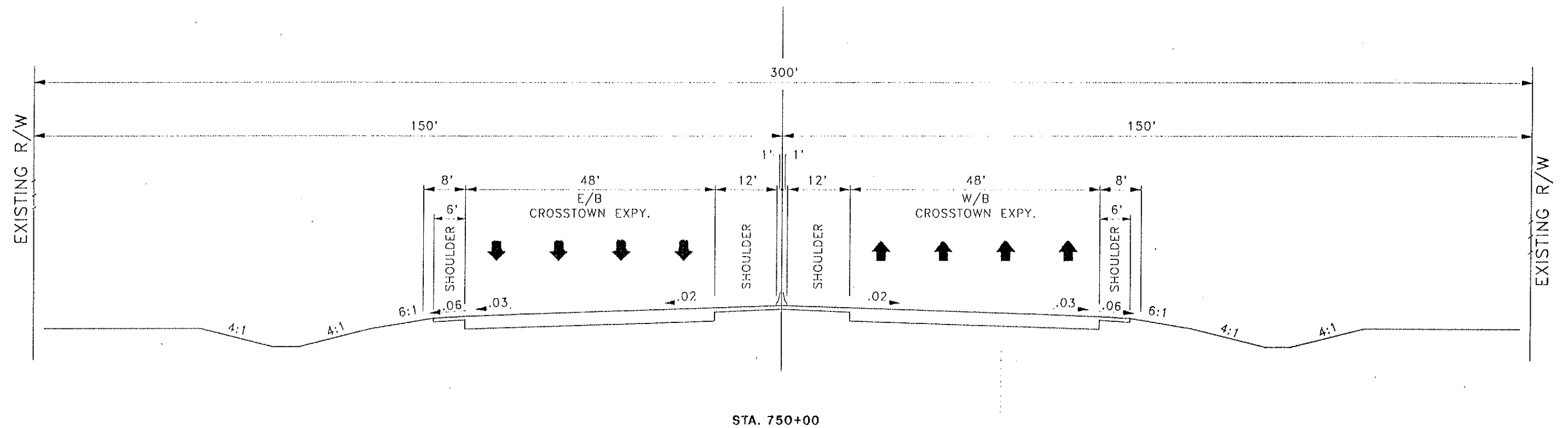
STATION 348+00

FLORIDA DEPARTMENT OF TRANSPORTATION
 NOISE REPORT
 TAMPA INTERSTATE STUDY
 PHASE II
 Hillsborough County, Florida
 TYPICAL SECTION
 CROSSTOWN EXPRESSWAY CONNECTOR



STATION 555+00

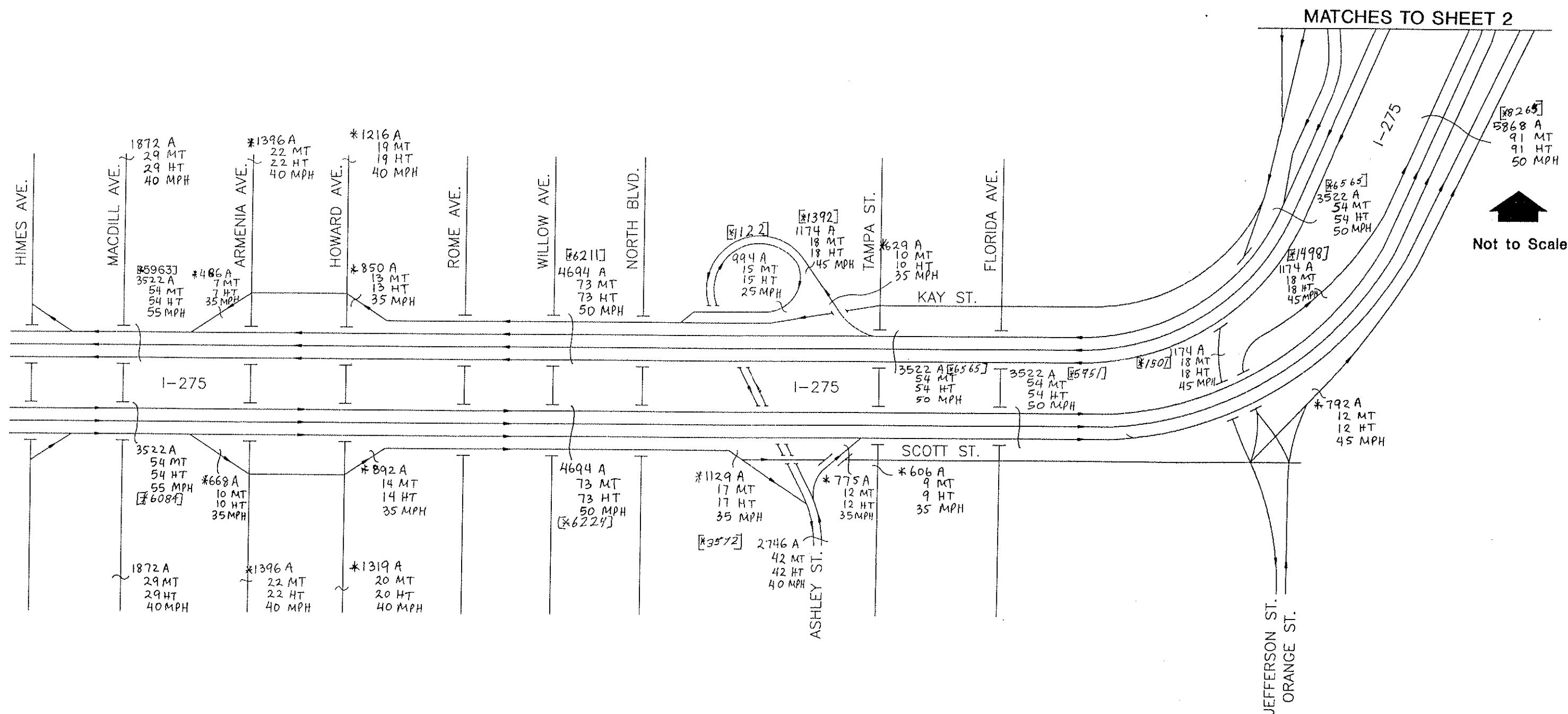
FLORIDA DEPARTMENT OF TRANSPORTATION
 NOISE REPORT
 TAMPA INTERSTATE STUDY
 PHASE II
 Hillsborough County, Florida
 TYPICAL SECTION
 I-4 AT C.S.X. TRANSPORTATION CORRIDOR



FLORIDA DEPARTMENT OF TRANSPORTATION
 NOISE REPORT
 TAMPA INTERSTATE STUDY
 PHASE II
 Hillsborough County, Florida
**TYPICAL SECTION
 CROSSTOWN EXPRESSWAY**

APPENDIX B

TRAFFIC DATA FOR NOISE ANALYSIS



Not to Scale

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT

TAMPA INTERSTATE STUDY

PHASE II

Hillsborough County, Florida

EXISTING (1990) TRAFFIC DATA

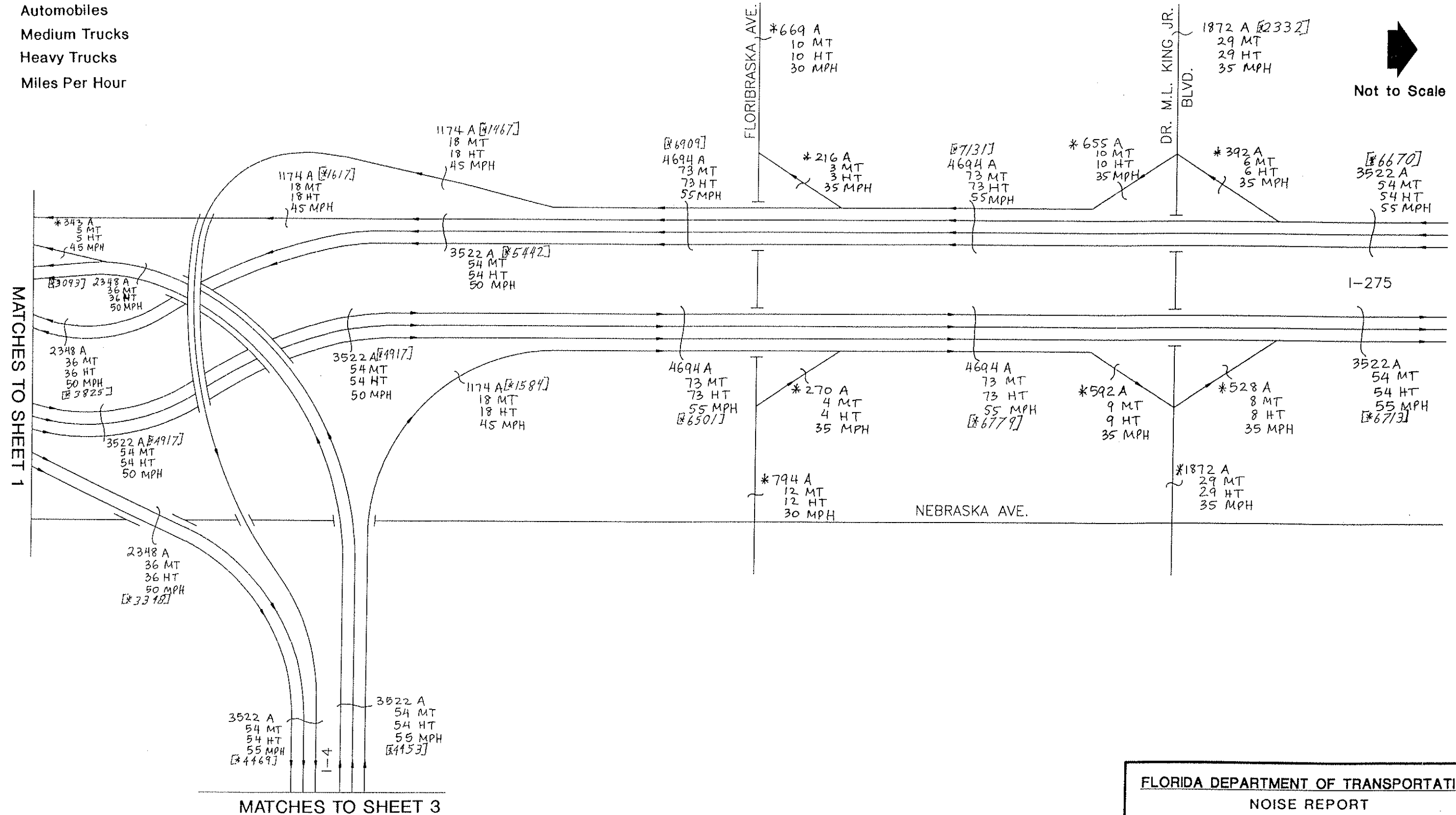
SHEET 1 OF 3

EXHIBIT 17

LEGEND

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

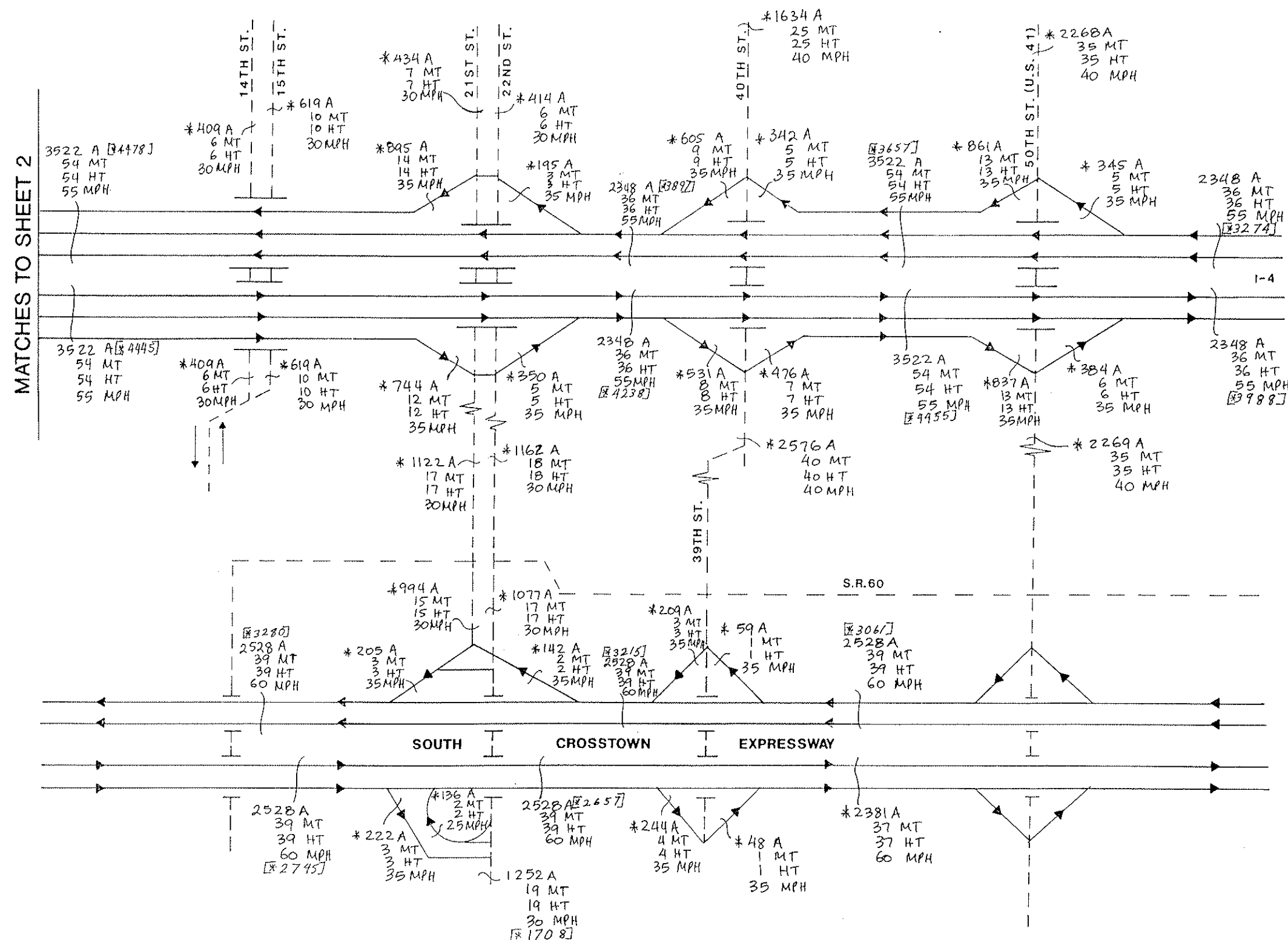
Not to Scale



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

FLORIDA DEPARTMENT OF TRANSPORTATION
NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida
EXISTING (1990) TRAFFIC DATA

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



* Indicates peak hour "Demand" traffic volumes

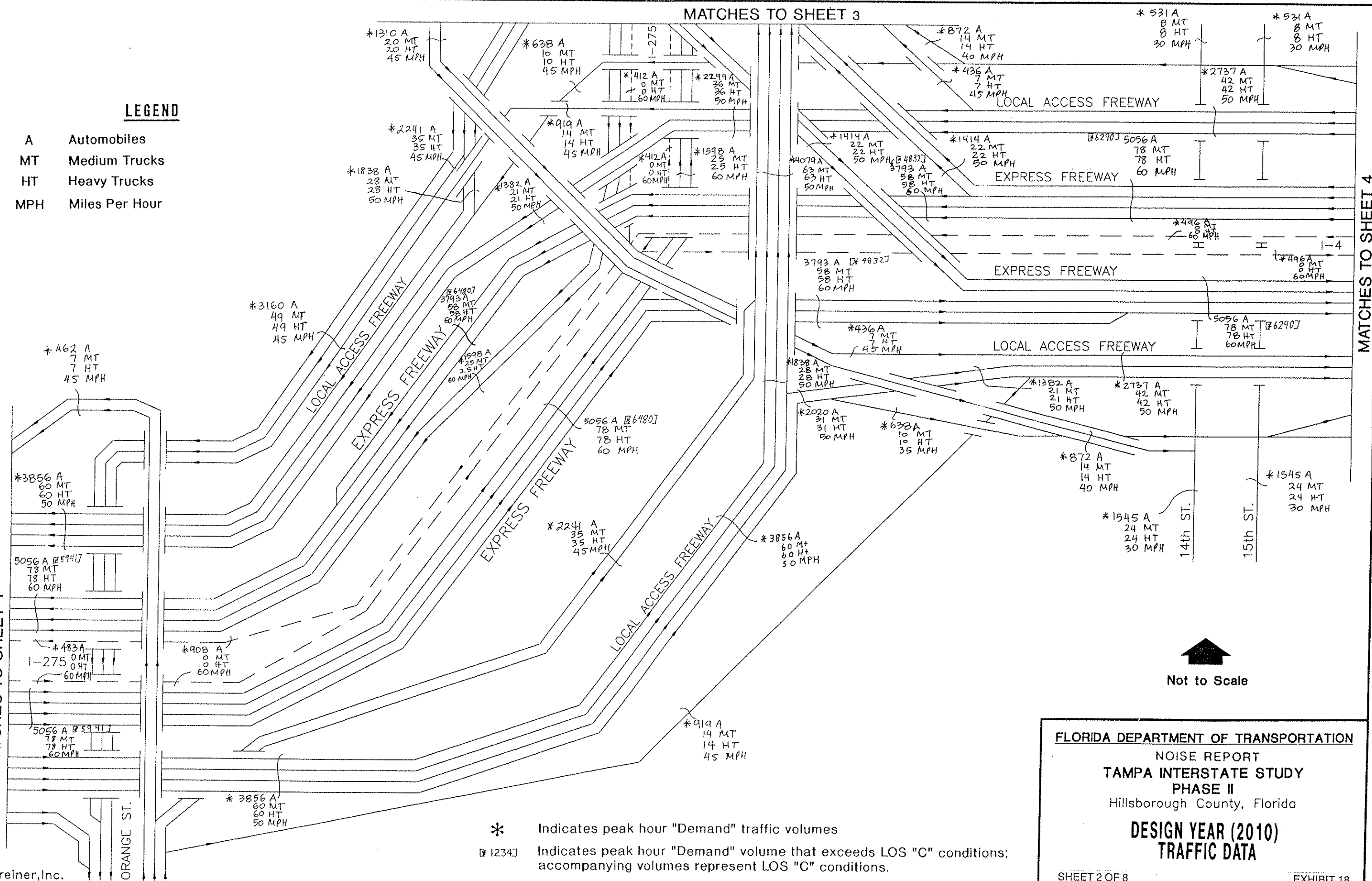
1234J Indicates peak hour "Demand" volume that exceeds LOS "C" conditions; accompanying volumes represent LOS "C" conditions.

MATCHES TO SHEET 1

Greiner, Inc.

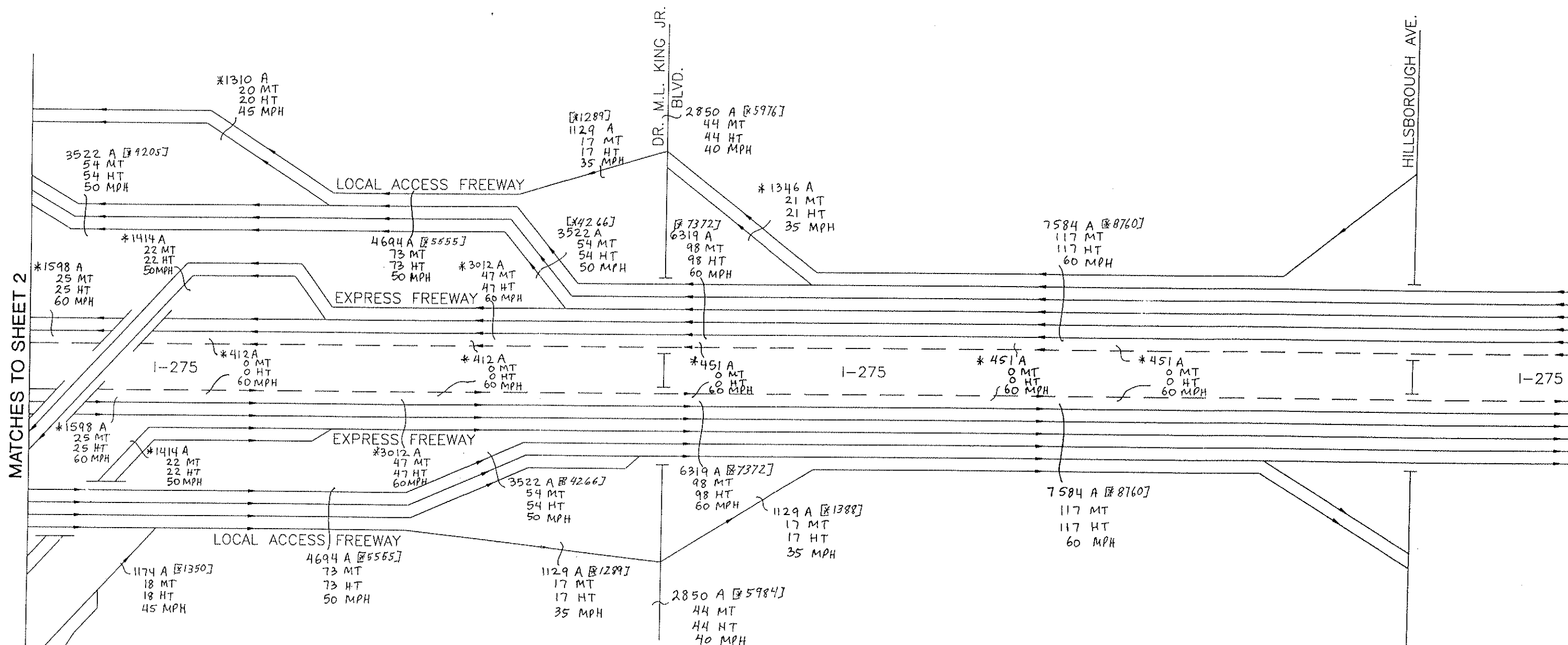
LEGEND

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.

Not to Scale



LEGEND

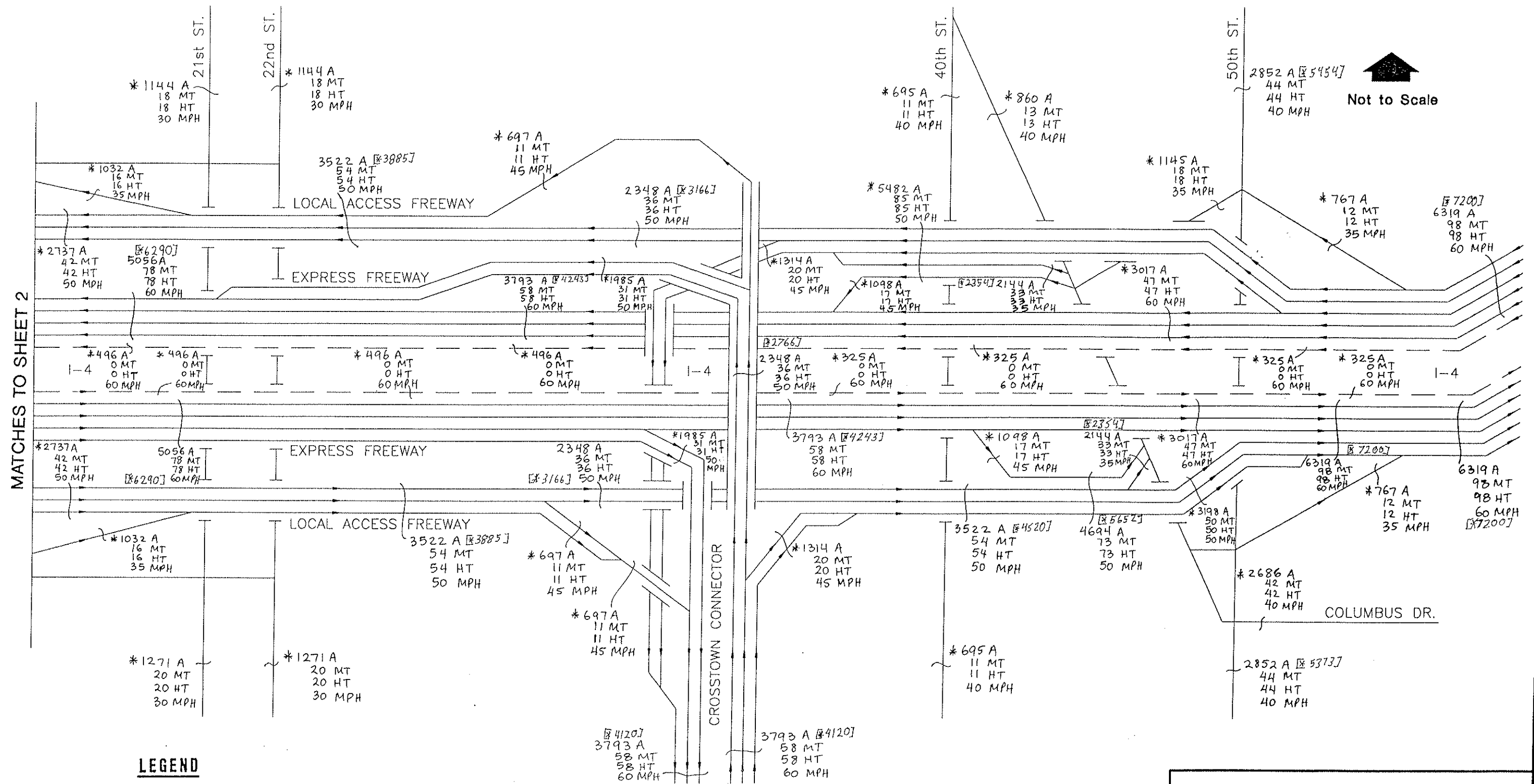
A Automobiles
MT Medium Trucks
HT Heavy Trucks
MPH Miles Per Hour

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

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT
TAMPA INTERSTATE STUDY
PHASE II
Hillsborough County, Florida

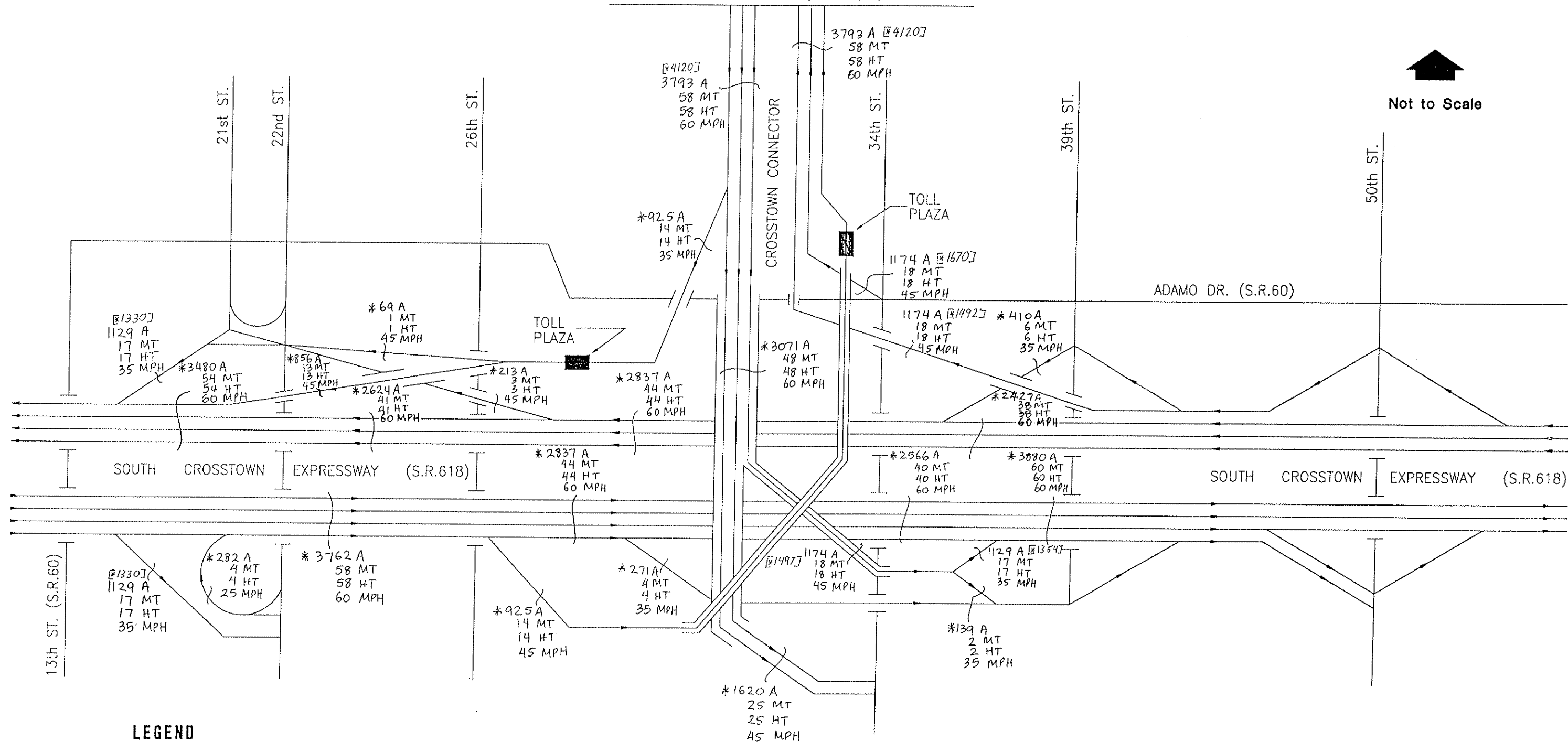
DESIGN YEAR (2010)
TRAFFIC DATA



* Indicates peak hour "Demand" traffic volumes

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

MATCHES TO SHEET 4



LEGEND

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

FLORIDA DEPARTMENT OF TRANSPORTATION

NOISE REPORT

TAMPA INTERSTATE STUDY

PHASE II

Hillsborough County, Florida

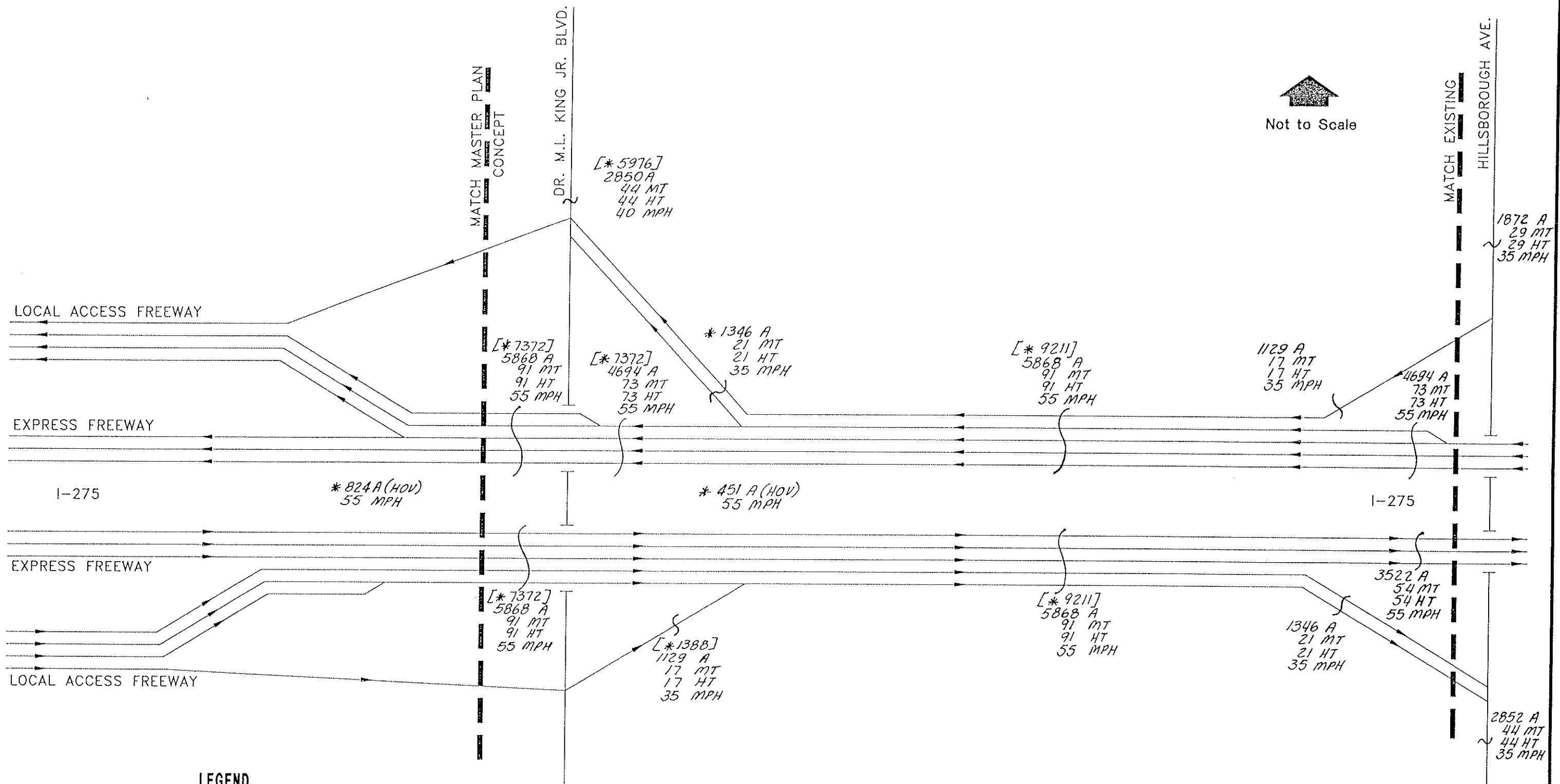
DESIGN YEAR (2010)

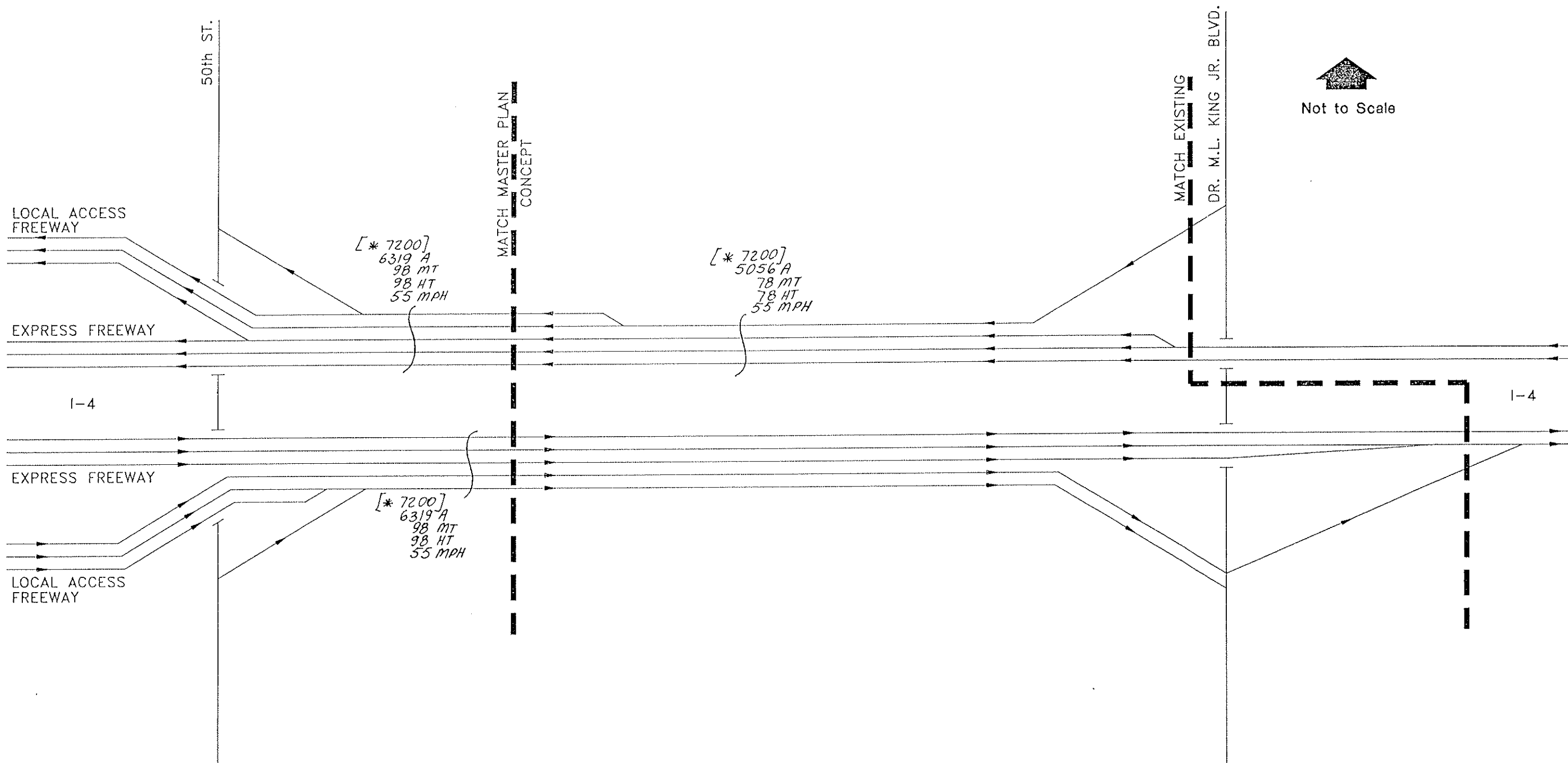
TRAFFIC DATA

SHEET 5 OF 8

EXHIBIT 18

C86/C238015/TGD28.DWG/08.09.91

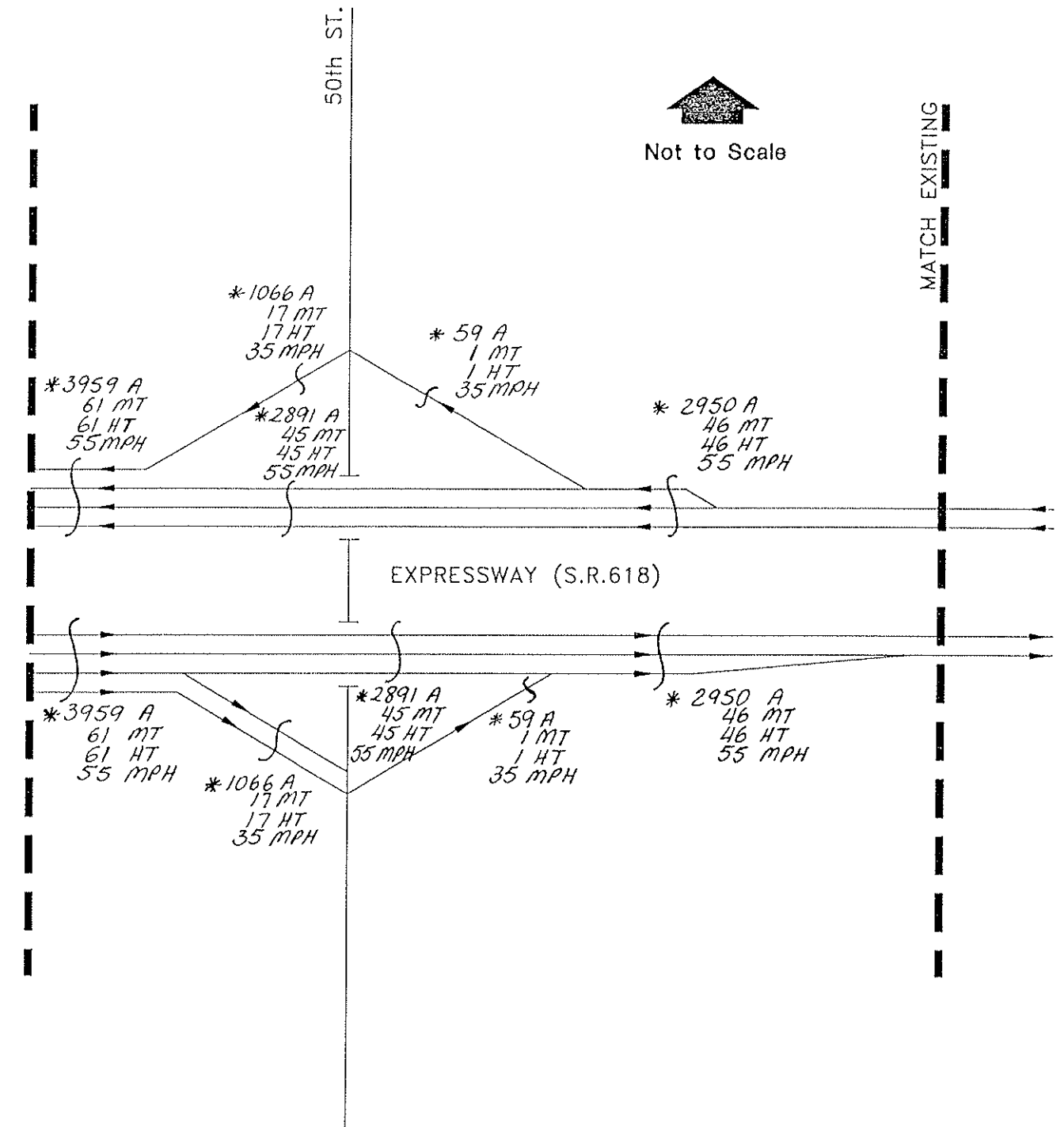
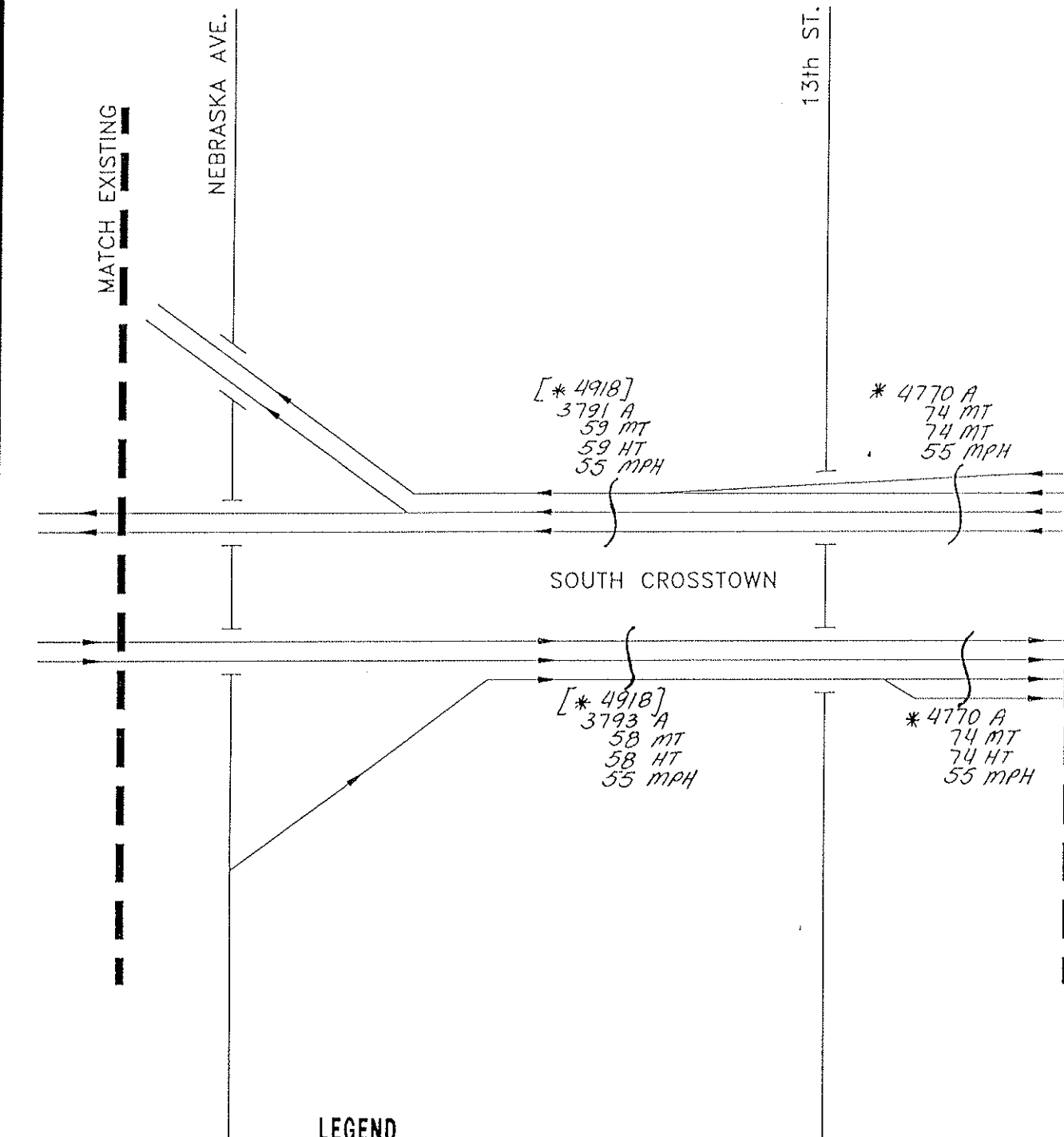




LEGEND

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

FLORIDA DEPARTMENT OF TRANSPORTATION
 NOISE REPORT
 TAMPA INTERSTATE STUDY
 PHASE II
 Hillsborough County, Florida
 TRANSITION SEGMENT-DESIGN SEGMENT 3B
 DESIGN YEAR (2010)
 TRAFFIC DATA



APPENDIX C

MODELED RECEPTORS

MODELED RECEPTORS
NSA 2A-A

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
13A	B	600	470	58	64	+6	N
14A	B	510	360	63	69	+6	Y
15A	B	970	850	53	58	+5	N
19A	B	570	485	59	63	+6	N
22A	B	580	490	61	66	+5	Y
39A	B	430	340	64	70	+6	Y
42A	B	570	465	59	65	+6	Y
43A	B	960	865	53	58	+5	N
46A	B	575	480	63	67	+4	Y
50A	B	450	350	69	73	+4	Y

**MODELED RECEPTORS
NSA 2A-B**

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
11B	B	170	290	71	71	0	Y
13B	B	185	209	70	71	+1	Y
14B	B	340	440	66	68	+2	Y
15B	B	840	960	59	63	+4	N
17B	B	430	575	64	67	+3	Y
25B	B	200	300	69	71	+2	Y
26B	B	310	460	63	65	+2	Y
28B	B	450	550	59	63	+4	N
33B	B	310	420	63	66	+3	Y
37B	B	180	285	71	71	+0	Y

MODELED RECEPTORS
NSA 2A-C

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
6C	B	340	290	66	68	+2	Y
11C	B	755	700	57	60	+3	N
13C	B	310	250	68	66	-2	Y
15C	B	950	860	54	58	+4	N
25C	B	700	715	57	60	+3	N
27C	B	285	325	68	67	-1	Y
28C	B	445	520	64	66	+2	Y

**MODELED RECEPTORS
NSA 2A-D**

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
9D	B	590	685	59	62	+3	N
13D	B	290	320	68	66	-2	Y
14D	B	560	600	60	62	+2	N
19D	B	290	285	67	69	+2	Y
21D	B	835	840	54	59	+4	N
22D	B	470	450	64	67	+3	Y
26D	B	460	390	68	69	+1	Y

MODELED RECEPTORS
NSA 2B-E

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
3E	B	595	600	62	66	+4	N
4E	B	540	540	67	67	0	Y

MODELED RECEPTORS
NSA 2B-J

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
2J	B	450	530	65	68	+3	Y
3J	B	375	500	66	68	+2	Y
4J	B	500	555	64	66	+2	Y

**MODELED RECEPTORS
NSA 2B-K**

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
5K	B	800	800	60	61	+1	N
6K	B	500	330	65	66	+1	Y
8K	B	700	610	62	62	0	N
9K	B	350	350	68	67	-1	Y

MODELED RECEPTORS
NSA 2B-L

Receiver Number	Land Use Category	Distance in Ft. to Centerline ¹		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
10L	B	560	560	64	64	0	N
11L	B	590	590	62	64	+2	N
14L	B	625	580	57	64	+7	N

¹ Distances to middle of interchange.

MODELED RECEPTORS
NSA 2B-N

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
1N	B	520	420	61	62	+1	N
2N	B	780	680	58	60	+2	N
3N	B	655	560	58	61	+3	N
4N	B	540	455	60	63	+3	N
14N	B	285	280	69	70	+1	Y
15N	B	525	520	60	63	+3	N
17N	B	560	560	61	63	+2	N
20N ¹	B	600	600	64	67	+3	Y

¹ Influenced by Dr. Martin Luther King Jr. Boulevard.

MODELED RECEPTORS
NSA 3A-A

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
19A	B	360	430	64	67	+3	Y
34A	B	370	400	62	64	+2	N
35A	B	600	630	58	64	+6	N

MODELED RECEPTORS
NSA 3A-B

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
23B	B	480	410	63	68	+5	Y
24B	B	660	590	60	63	+3	N
39B	B	370	340	61	63	+2	Y
38B	B	760	730	56	62	+6	N

MODELED RECEPTORS
NSA 3B-A

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
1A	B	260	260	65	66	+1	Y
4A	B	635	630	59	64	+5	N
12A	B	575	570	65	65	0	Y
13A	B	335	330	67	66	-1	Y

MODELED RECEPTORS
NSA 3B-B

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
10B	B	730	735	60	63	+3	N
11B	B	540	545	63	65	+2	Y
12B	B	300	305	67	66	-1	Y

MODELED RECEPTORS
NSA 3B-C

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
5C	B	790	790	60	63	+3	N
7C	B	570	560	62	63	+1	N
10C	B	670	640	61	64	+3	N
13C	B	275	235	67	67	0	Y
14C	B	570	530	62	65	+3	Y
19C	B	360	310	66	67	+1	Y
22C	B	540	495	63	66	+3	Y
24C	B	370	325	65	67	+2	Y

MODELED RECEPTORS
NSA 3B-E

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
4E	B	445	440	64	67	+3	Y
6E	B	650	650	62	66	+4	Y
8E	B	320	320	66	69	+3	Y
11E	B	650	650	59	62	+3	N
13E	B	400	400	63	68	+5	Y
18E	B	530	530	60	66	+6	Y

MODELED RECEPTORS
NSA 3B-F

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
5F	B	775	775	67	69	+2	Y
7F	B	1,070	1,070	61	64	+3	N

**MODELED RECEPTORS
NSA CTE-A**

Receiver Number	Land Use Category	Distance in Ft. to Centerline		Leq(h) dBA		Change	Abatement Required
		1990 Existing	2010 Preferred Alt.	1990 Existing	2010 Preferred Alt.		
16A	B	620	620	61	61	0	N
9A	B	260	260	67	67	0	Y
13A	B	370	370	64	65	+1	Y

APPENDIX D

ADDENDUM: HISTORIC RESOURCES NOISE IMPACT ANALYSIS

APPENDIX D

ADDENDUM: HISTORIC RESOURCES NOISE IMPACT ANALYSIS

A historic resources noise impact analysis was completed as part of the "Determination of Effect" to fulfill the requirements of the Section 106 process. All of the historic structures included in the analysis are located within the previously established noise study areas. More detailed information including the location and historic significance of the structures discussed below can be found in the Effects Analysis Report (November 1994), published separately. The identification numbers of the structures correspond to assigned numbers found in the Effects Analysis Report.

Noise Study Area 2A-A - includes structures that are part of the West Tampa National Register Historic District. One structure (B4d) is predicted to experience noise levels which approach or exceed the FHWA noise abatement criteria (NAC). Noise barriers were found to be economically reasonable in Noise Study Area 2A-A. The noise barriers would attenuate traffic noise impacts at this location, reducing project-related noise levels below an approach of the FHWA NAC.

Noise Study Area 2A-B - includes structures that are part of the West Tampa National Register Historic District. Thirty structures (B1a through B1n and B2a through B2p) are predicted to experience noise levels which approach or exceed the FHWA noise abatement criteria (NAC). Noise barriers were found to be economically reasonable in Noise Study Area 2A-B. The noise barriers would attenuate traffic noise impacts at 28 of the locations, reducing project-related noise levels below an approach of the FHWA NAC. Two structures (B2o and B2p) are located in close proximity to Armenia Avenue and would receive less than a 2 dBA reduction from the attenuation of traffic noise generated from I-275.

Noise Study Area 2A-C - includes structures that are part of the West Tampa National Register Historic District and an individual property that is eligible/listed on the National Register. Thirty-three structures (B5a through B5q, B8a, B8e through B8d, B9b, B9c, B9e through B9h and I-1) are predicted to experience noise levels which approach or exceed the FHWA NAC. Noise barriers were found to be economically reasonable in Noise Study Area 2A-C. The noise barriers would attenuate traffic noise impacts at 29 locations, reducing project-related noise levels below an approach of the FHWA NAC. Four structures (B5a, B5j, B5k and B5q) are located in close proximity to Armenia Avenue and would receive less than a 2 dBA reduction from the attenuation of traffic noise generated from I-275.

Noise Study Areas 2A-D - includes structures that are part of the West Tampa National Register Historic District. Twenty-one structures (B3a through B3i, B6a, B6b, B6c, B6f, B6g, B7a, B7b and B7d through B7h) are predicted to experience noise levels which approach or exceed the FHWA NAC. Noise barriers were found to be economically reasonable in Noise Study Area 2A-D. The noise barriers would attenuate traffic noise impacts at 11 locations, reducing project-related noise

levels below the FHWA NAC. One structure (B3e) is located in close proximity to Armenia Avenue and 9 structures (B3a through B3d, B6a, B6b, B6c, B6f and B6g) front the merge area of Ramp N and Green Street. These 10 structures would only receive an approximate 2 dBA reduction from the attenuation of traffic noise generated from I-275.

Noise Study Area 2B-G - includes individual structures that are eligible/listed on the National Register. Noise levels at the Oaklawn Cemetery (I9) are predicted to increase 3 dBA above existing noise levels and approach the FHWA NAC. Considering that a 3 dBA increase is barely audible, the predicted build noise levels are not expected to have an adverse effect or interfere with outdoor activities in the cemetery. Noise levels at the Greater Bethel Baptist Church (I22) are predicted to increase 3 dBA above existing noise levels and exceed the FHWA NAC. Considering that the church faces Jefferson Street away from the major noise source and a 3 dBA increase is barely audible to the human ear, traffic noise is not expected to interfere with any church activities.

Noise Study Area 2B-I - includes structures that are part of the proposed Tampa Heights Multiple Property Listing. Three structures (PAa, PAb and MPL3) are predicted to experience noise levels which approach or exceed the FHWA NAC. Structures PAa and PAb would benefit from a noise barrier. However, only a small number of noise sensitive sites benefit and a noise barrier was not found to be economically reasonable. The W.B. Henderson School (MPL3) is predicted to experience noise levels which exceed the FHWA NAC. Because of the numerous proposed elevated ramps at various heights, noise barriers are not considered feasible. Notably, the structure is vacant with no plans for rehabilitation and there are no exterior activities that would be impacted by noise.

Noise Study Area 2B-K - includes structures that are part of the Proposed Tampa Heights Multiple Property Listing. Seven structures (PAg, PAi, PAj, PAk, MPL1, MPL2, and MPL4) are predicted to experience noise levels which approach or exceed the FHWA NAC. Structures PAj and PAk would benefit from a noise barrier. However, only a small number of noise sensitive sites benefit and a noise barrier was not found to be economically reasonable. Structures PAg and PAi front Palm Avenue and would receive a 3 dBA or less reduction from the attenuation of traffic noise from I-275. Structures MPL1 and MPL2 are churches and exterior noise levels which approach the FHWA NAC will not interfere with any outdoor activities. Interior noise levels at the churches are predicted to be below the FHWA NAC. Structure MPL4 is predicted to experience a slight decrease compared to existing noise levels with the proposed alignment shifting traffic further from the structure.

Noise Study Area 2B-J - includes structures that are part of the Ybor City National Historic Landmark District. Sixteen structures (B4a through B4g, B4j, B4k, B4l, B5a, B5b, B8a, B8b, B8m, and B8n) are predicted to experience noise levels which approach or exceed the FHWA NAC. None of the structures would benefit from a noise barrier. Structures B4a through B4g, B4j, B4k, B4l, B5a and B5b are in the immediate vicinity of the I-275/I-4 interchange where noise barriers are not feasible due to numerous elevated ramps on structures at various heights. Structures B8a, B8b, B8m and B8n are impacted by the Nick Nuccio Parkway and would not benefit from noise barriers attenuating I-4 traffic noise.

Noise Study Area 2B-L - includes structures that are part of the Ybor City National Historic Landmark District. Forty-two structures (B2a through B2g, B2i through B2o, B2p, B2q, B2s, B3a through B3e, B9a through B9f, B9h, and B10a through B10m) are predicted to experience noise levels which approach or exceed the FHWA NAC. Noise barriers were found to be economically reasonable in Noise Study Area 2B-L. The noise barriers would attenuate traffic noise impacts at the 41 locations, reducing project-related noise levels below an approach of the FHWA NAC. One structure, B10f, is located in close proximity to 14th Street and would receive less than a 4 dBA reduction from the attenuation of traffic noise generated from I-4.

Noise Study Area 3A-A - includes structures that are part of the Ybor City National Historic Landmark District. Seven structures (B16a and B20a through B20f) are predicted to experience noise levels which approach or exceed the FHWA NAC. Noise barriers were found to be economically reasonable in Noise Study Area 3A-A. The noise barriers would attenuate traffic noise impacts at 5 structures. Two structures (B20a and B20b) are in close proximity to 22nd Street and would receive less than a 3 dBA reduction from the attenuation of traffic noise generated from I-4.

Noise Study Area 3A-B - includes structures that are part of the Ybor City National Historic Landmark District. Twenty-four structures (B10ba, B11a through B11i, B12a through B12e, B13b, B14a through B14e, B18a, B18b and B18c) are predicted to experience noise levels which approach or exceed the FHWA NAC. Noise barriers were found to be economically reasonable in Noise Study Area 3A-B. The noise barriers would attenuate traffic noise impacts at the 24 locations reducing project-related noise levels below an approach of the FHWA NAC.

Additional noise attenuation analyses were completed for those areas where a barrier was found to be not economically reasonable but contained structures identified as within the Area of Potential Effect (APE) and listed or eligible for listing on the *National Register of Historic Places*.

In most cases, National Register historic structures would benefit from the proposed economically reasonable noise barriers. However, six historic structures (PAa, PAb, PAg, Pai, PAj, Pak) in the Tampa Heights area (Noise Study Areas 2B-I and 2B-K) are located where barriers were determined to be not economically reasonable. This area is adjacent to the complex downtown interchange which has varying ramp elevations. A barrier in the Tampa Heights area would cost \$628,800 to attenuate noise at these six historic structures (an additional seven non-historic structures in the area would be benefited). At a cost of \$104,800 per historic structure, this mitigation was determined in an agency coordination meeting with SHPO to be not a reasonable expenditure. Consequently, structures PAa, PAb, PAg, Pai, PAj, Pak are adversely affected as a consequence of this project. For more detail, see the Effects Analysis Report.