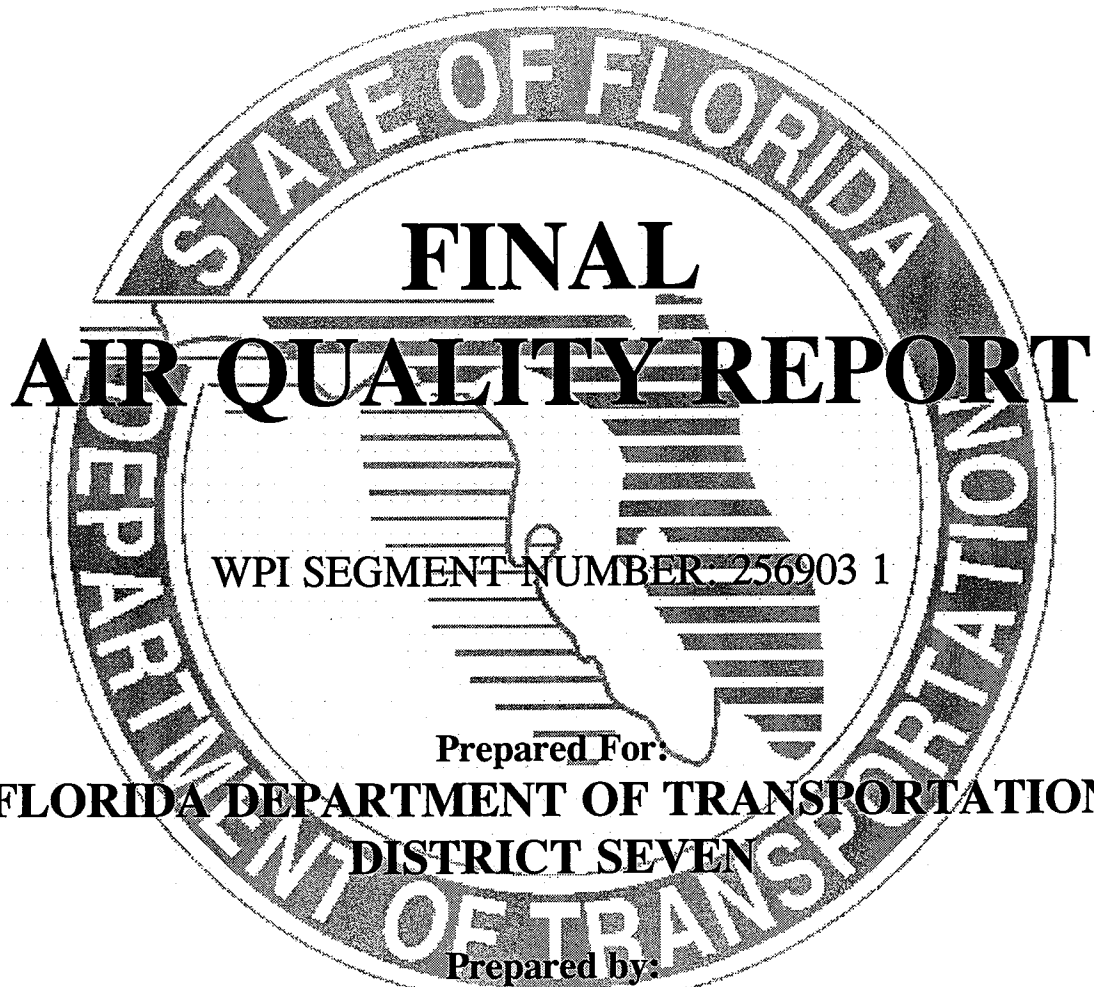


**SR 682 (Pinellas Bayway)
From the West Toll Booth to West of SR 679
PINELLAS COUNTY, FLORIDA**



**Prepared For:
FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT SEVEN**

**Prepared by:
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1715 N. Westshore Blvd., Suite 500
Tampa, FL 33607**

December 1999

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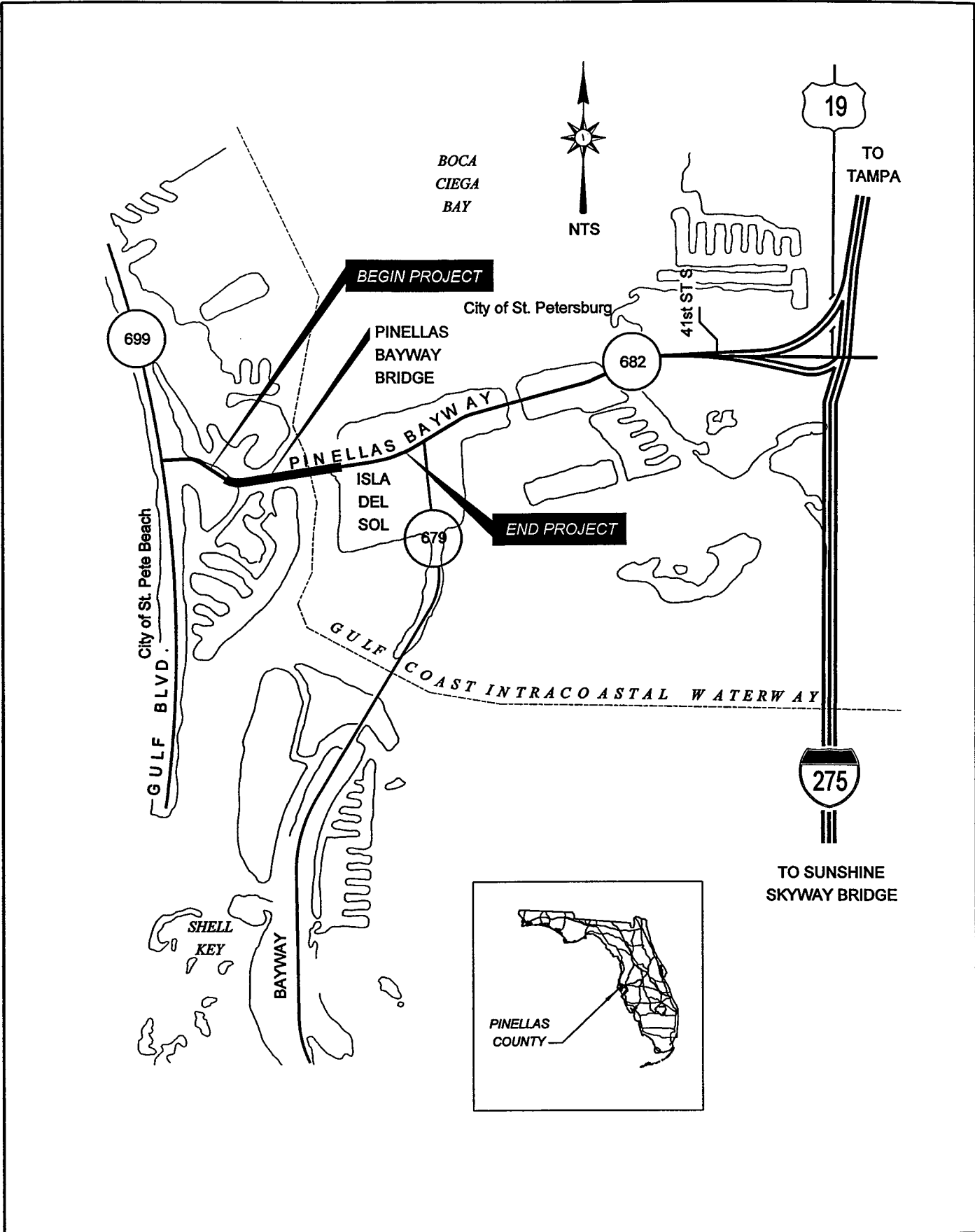
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1.0 INTRODUCTION

This study was prepared by the Florida Department of Transportation (FDOT) to reevaluate the findings of a previously prepared Environmental Assessment/Finding of No Significant Impact (EA/FONSI) which was approved by the United States Coast Guard (USCG) in 1983 for SR 682 from the West Toll Booth to 41st Street South in Pinellas County, Florida. Figure 1-1 is a project location map. The improvements recommended in the EA/FONSI were to multilane SR 682 within the project limits and improve three bridges. The recommended improvements have been completed between SR 679 and 41st Street South. This Air Quality Report for WPI Segment No. 256903 1 evaluates improvements to SR 682 from the West Toll Booth to west of SR 679 including an existing drawbridge which spans the Gulf Coast Intracoastal Waterway (GCIW). The EA/FONSI recommended that a four lane divided roadway be constructed. Additionally, it was recommended that when the design plans for the second stage are to begin, the bridge type (high level fixed span or low level drawbridge) at the GCIW should be analyzed to determine which type of structure best serves the area.

Six Build Alternatives were developed and analyzed in the last reevaluation which was started in 1992. The Build Alternatives included two low level drawbridges, two mid level drawbridges, and two high level fixed bridges. The low, mid, and high level configurations considered alternatives north and south of the existing structure. Following analysis and evaluation of social, economic, and environmental concerns, the high level fixed bridge alternative on the south alignment was recommended in the reevaluation which was approved by the USCG on October 24, 1994. After USCG approval of the selected alternative contained in the Reevaluation, the FDOT committed to conducting additional public involvement prior to beginning the project's design phase. This additional public involvement phase began in 1997. Alternatives presented during this public involvement phase were the low level drawbridge and the high level fixed bridge alternatives located to the south side of the existing bridge.

Based on this further reevaluation of the bridge alternatives, Alternative 5 remains the Recommended Alternative. The recommended improvements for Alternative 5 include the construction of a four lane fixed bridge with 19.8 meters (m) [65 feet (ft)] of vertical clearance. Widening the bridge approaches to a four lane divided roadway from the West Toll Booth to west of SR 679 is also to be undertaken.



WPI SEG. NO.
256903 1

SR 682 (PINELLAS BAYWAY)
WEST TOLL BOOTH TO WEST OF SR 679



PROJECT LOCATION MAP
FIGURE 1-1

An air quality study was performed to evaluate the potential effects of the proposed improvements. The study was based on Part 2, Chapter 16 "Air Quality Analysis" of the FDOT *Project Development and Environment Manual* (PD&E Manual), revised August 8, 1999. The methods and results of the analysis are summarized in the following paragraphs. The purpose of this document is to present the technical analysis supporting the findings reported in the project's Preliminary Engineering Report (PER) and Project Reevaluation Form.

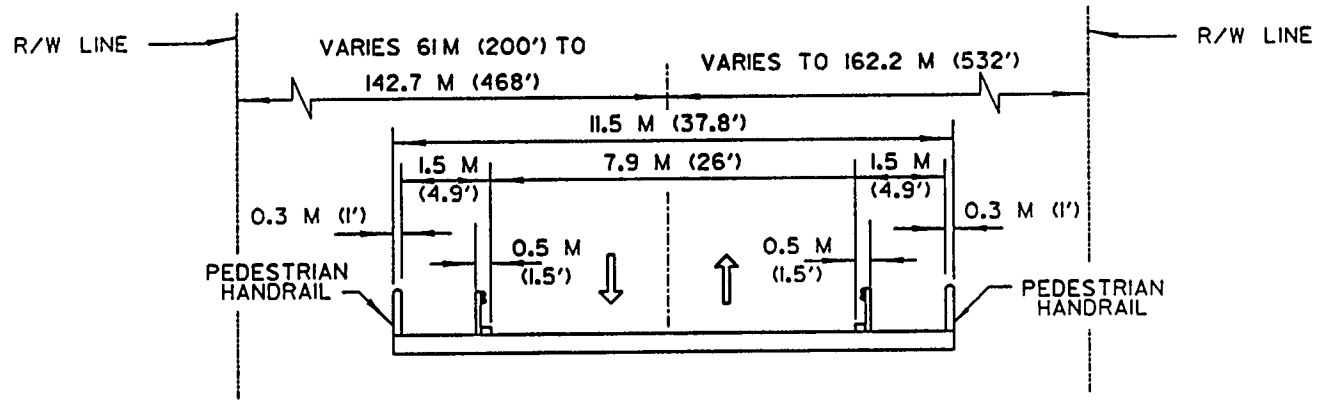
1.1 EXISTING FACILITY

SR 682 is operated as a toll facility between the West Toll Booth which is located approximately 0.4 kilometers (km) [0.25 miles (mi)] east of SR 699 and the East Toll Booth located approximately 0.8 km (0.50 mi) west of 41st Street South. SR 682 is currently a two lane roadway from the West Toll Booth to west of SR 679, a four lane divided roadway from west of SR 679 to the East Toll Booth, and a six lane divided roadway from the East Toll Booth to 41st Street South. A two lane drawbridge carries SR 682 over the GCIW. The typical sections for the existing drawbridge and two lane roadway are depicted in Figure 1-2. The typical sections for the existing four and six lane roadways are depicted in Figure 1-3. The posted speed limit is currently 45 miles per hour (mph) [70 kilometers per hour (kph)] within the study area.

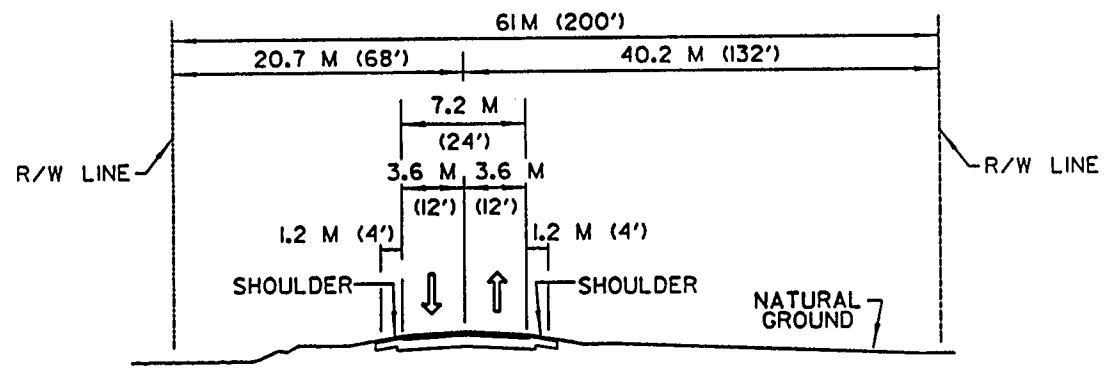
The existing drawbridge is approximately 778 m (2,552 ft) long with a 3% grade and is approximately 7.6 m (25 ft) above mean sea level (msl) at the highest point. The fixed portion of the bridge is approximately 4.6 m (15 ft) above msl or 3 m (10 ft) above the surrounding land.

1.2 PROPOSED IMPROVEMENTS

The proposed improvements would occur within the existing right of way between the West Toll Booth and west of SR 679. The Recommended Alternative includes the construction of a four lane high level fixed bridge with 19.8 m (65 ft) of vertical clearance and widening the bridge approaches to a four lane divided roadway from the West Toll Booth to west of SR 679. The proposed typical sections for the high level bridge and four lane roadway are depicted in Figure 1-4. The recommended bridge typical section in the 1983 EA/FONSI is depicted in Figure 1-5. The proposed posted speed limit will be 70 kph (45 mph) within the study area.



EXISTING BRIDGE



EXISTING 2-LANE ROADWAY
FROM THE EAST END OF THE BRIDGE
TO WEST OF SR 679

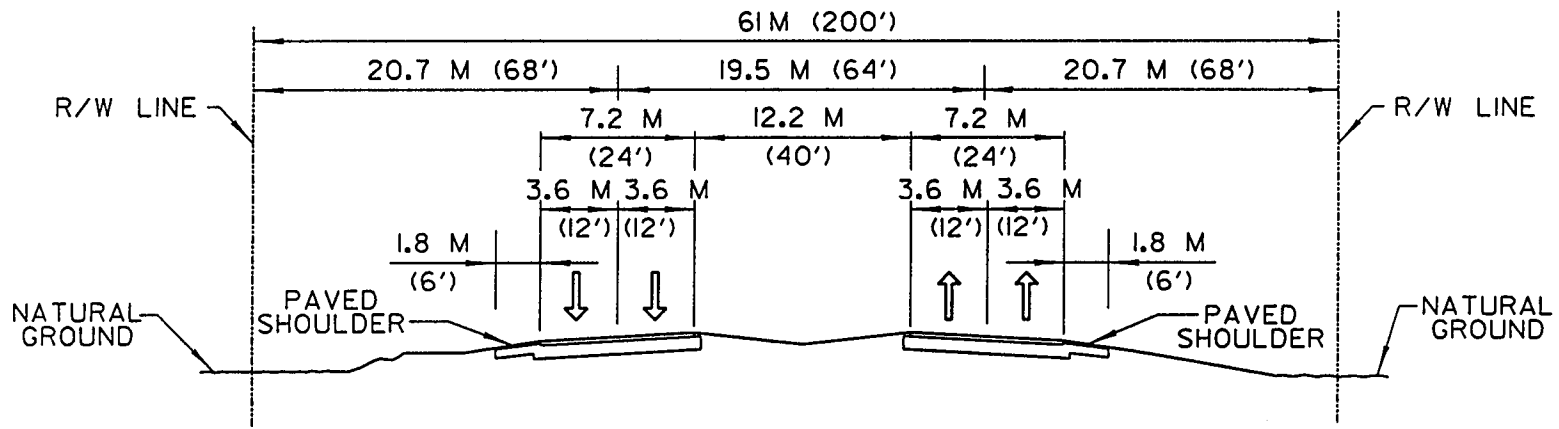
SR 682 (PINELLAS BAYWAY)
WEST TOLL BOOTH TO WEST OF SR 679



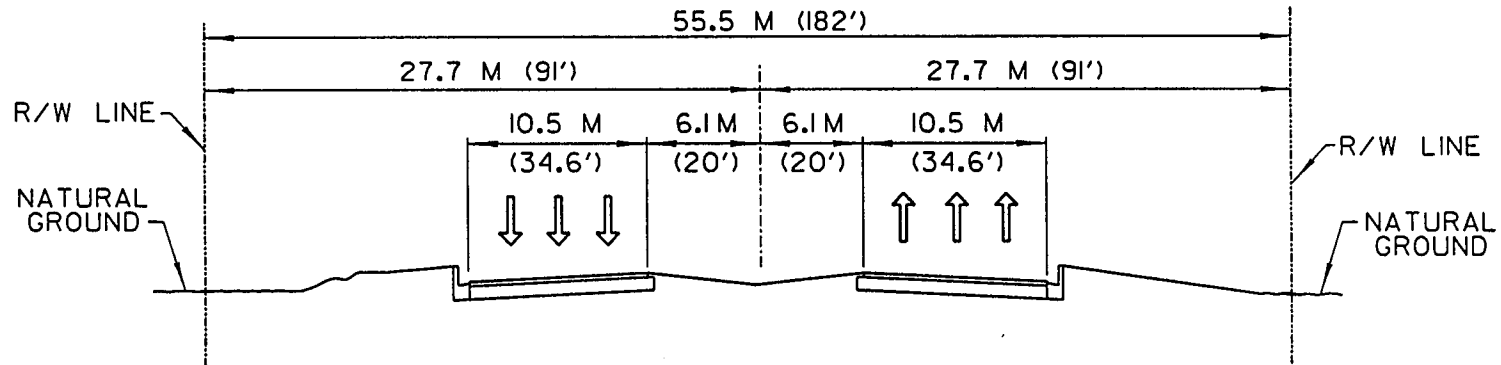
EXISTING BRIDGE & 2-LANE
ROADWAY TYPICAL SECTIONS

FIGURE 1-2

2104874.00293900EXISTROADTY-4m



EXISTING 4-LANE ROADWAY
FROM WEST OF SR 679 TO THE EAST TOLL BOOTH



EXISTING 6-LANE ROADWAY
FROM THE EAST TOLL BOOTH
TO 41st STREET SOUTH

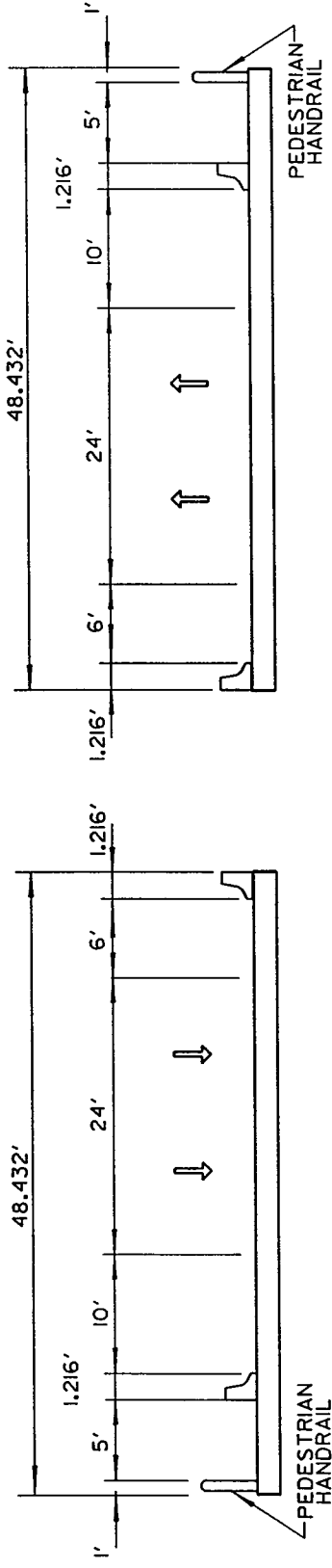
SR 682 (PINELLAS BAYWAY)
WEST TOLL BOOTH TO WEST OF SR 679



EXISTING 4-LANE & 6-LANE
ROADWAY TYPICAL SECTIONS

FIGURE 1-3

I-5



LOW LEVEL OR HIGH LEVEL BRIDGE
NTS

1983 EAFONSI RECOMMENDED
BRIDGE TYPICAL SECTION

FIGURE 1-5

FLORIDA DEPARTMENT OF
TRANSPORTATION
DISTRICT VI



SR 682 (PINELLAS BAYWAY)
WEST TOLL BOOTH TO WEST OF SR 679

1.3 LAND USE

The project traverses property within the Cities of St. Pete Beach and St. Petersburg. The study area encompasses residential, recreational, commercial, and utility land uses. The existing land uses for the study area are depicted in Figure 1-6. The land use surrounding SR 682 from the West Toll Booth to the east end of the existing Bayway Bridge, consists of low density (single family) residential development and Boca Ciega Bay. East of the bridge, SR 682 crosses two man-made islands called Isla Del Sol and Point Brittany. Isla Del Sol occupies the portion of the project area from the east end of the existing Bayway Bridge to a point 91.5 m (300 ft) east of the intersection of SR 682 and SR 679. Isla Del Sol includes medium-high density residential developments (low and high-rise condominiums), the Isla Del Sol golf course, and a small retail shopping center at the northeast corner of the intersection of SR 682 and SR 679. Isla Del Sol tennis courts are located at the northwest corner of the intersection of SR 682 and SR 679. Point Brittany Island is mainly medium-high density residential development.

No new development is planned in or adjacent to the project limits, according to the future land use element of the Pinellas County Comprehensive Plan and the land use map. The City of St. Petersburg Comprehensive Plan, future land use element shows no future development. The City of St. Pete Beach can be classified as a built-out community, according to the Future Land Use element of the St. Pete Beach Comprehensive Plan. Of the 526.7 hectares (ha) [1,303 acres (ac)] making up the community, only 13.4 ha (33.4 ac) or 2.5% is vacant or undeveloped. In the project vicinity, the only available area suitable for development consists of the single family residential lots located in Mangrove Pointe, located approximately 335.4 m (1,100 ft) north of the west end of the existing Bayway Bridge. Because the study area has essentially reached buildout, future land use is expected to continue in the same pattern as existing land uses.

1.4 AMBIENT AIR QUALITY

The project is located in Pinellas County which is included in the Tampa Bay airshed. Pinellas County is in attainment for all state and federal air quality standards. Therefore, the project is located within an area where the National Ambient Air Quality Standards (NAAQS) for the six primary pollutants:



A = 21,000
B = 22,600
C = 25,800

SR 699

A = 17,000
B = 18,900
C = 22,600

PINELLAS BAYWAY (SR 682)

A = 24,500
B = 27,100
C = 32,000

A = 10,000
B = 10,800
C = 12,300

GULF BOULEVARD

BAYWAY (SR 679)

A = 12,700
B = 18,750
C = 30,000

LEGEND

- A = 1997 COUNT
- B = 2005
- C = 2020
- K₉₅ = 9.6%
- D = 56.6%
- T = 3% PEAK HOUR
6% DAILY

NOTE:
K₉₅, D, T FACTORS FROM
TECHNICAL MEMORANDUM PROJECT
TRAFFIC REPORT, OCTOBER 1992.

WPI SEG NO.
258903 01

SR 682 (PINELLAS BAYWAY)
WEST TOLL BOOTH TO WEST OF SR 679



EXISTING AND PROJECTED DAILY
TRAFFIC VOLUMES

FIGURE 2-1

Table 2-1 Input Data for the Air Quality Screening Test and the Resultant Critical Distance for SR 682 (Pinellas Bayway) Project

| Intersection/ Alternative/ Year | Average Speed kph (mph) | Peak-Hour Volume | Closest Receptor m (ft) | Critical Distance m (ft) |
|--|------------------------------------|-----------------------------|--|---|
| SR 682 and SR 679 | | | | |
| No - Build Alternative | | | | |
| 2005 (First Year Open) | 67.6 (42) | 2,505 | 9.1 (30) | <3 (<10) |
| 2020 (Design Year) | 67.6 (42) | 3,072 | 9.1 (30) | <3 (<10) |
| Recommended Alternative | | | | |
| 2005 (First Year Open) | 66 (41) | 2,505 | 9.1 (30) | <3 (<10) |
| 2020 (Design Year) | 67.6 (42) | 3,072 | 9.1 (30) | <3 (<10) |

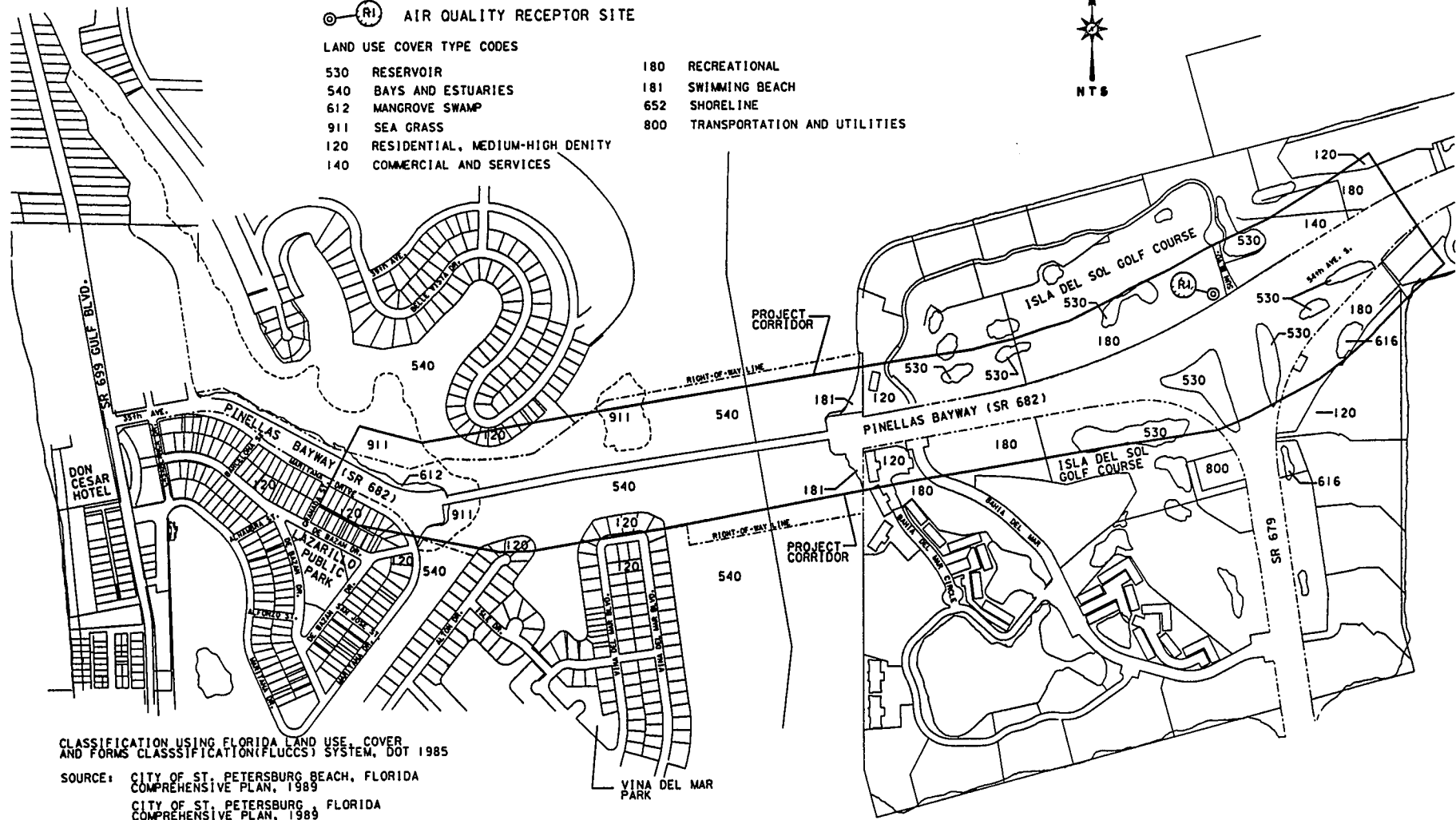
2-4

LEGEND

⊙ (R1) AIR QUALITY RECEPTOR SITE

LAND USE COVER TYPE CODES

- | | |
|--------------------------------------|----------------------------------|
| 530 RESERVOIR | 180 RECREATIONAL |
| 540 BAYS AND ESTUARIES | 181 SWIMMING BEACH |
| 612 MANGROVE SWAMP | 652 SHORELINE |
| 911 SEA GRASS | 800 TRANSPORTATION AND UTILITIES |
| 120 RESIDENTIAL, MEDIUM-HIGH DENSITY | |
| 140 COMMERCIAL AND SERVICES | |



CLASSIFICATION USING FLORIDA LAND USE COVER AND FORMS CLASSIFICATION (FLUCCS) SYSTEM, DOT 1985

SOURCE: CITY OF ST. PETERSBURG BEACH, FLORIDA COMPREHENSIVE PLAN, 1989
CITY OF ST. PETERSBURG, FLORIDA COMPREHENSIVE PLAN, 1989

WPI SEG NO.
258903 01

SR 682 (PINELLAS BAYWAY)
WEST TOLL BOOTH TO WEST OF SR 679



AIR QUALITY RECEPTOR SITE MAP

FIGURE 2-2

The cost analysis and air emissions estimates are based on an average annual daily traffic (AADT) of 21,470 in the 2020 Design Year, an average hourly traffic volume of 1,353 vehicles, an average of 18 bridge openings per day (7,083 per year) lasting an average of 3 minutes and 40 seconds, and an average free flow (i.e., non delayed speed of 48 kph [30 mph]). This data was used to define the number of vehicle miles traveled, the average travel speed, and the stopped delay for each of the bridge alternatives. The traffic data used in the calculation of air emissions are summarized in Table 2-2.

Air emission estimates for each of the bridge alternatives were calculated using the same roadway segment. The roadway segment selected corresponds to the anticipated length of the high level bridge including the bridge approaches. For the high level fixed span bridge the travel distance for this segment is approximately 1,555.6 m (5,102.37 ft). Because the low level bridge is lower than the high level fixed span bridge, the travel distance for this segment is slightly less (i.e., approximately 1,555.14 m [5,100.86 ft]).

For the low level bridge, the number and the length of time vehicles are delayed during a bridge opening were based on the average hourly traffic volume. Based on an average of 766 vehicles per hour in the peak direction and 587 vehicles in the off peak direction, 98 vehicles are expected to be delayed per opening. The vehicles delayed include 56 vehicles in the peak direction and 42 vehicles in the off peak direction. The number of cars delayed represent those vehicles in the queue (i.e., delayed) during the bridge opening which was used to define the length of the deceleration and acceleration travel link (i.e., rolling delay segment). Assuming 7.6 m (25 ft) between vehicles, the distance vehicles experience delay was estimated to be approximately 426.8 m (1,400 ft) peak direction (i.e., approximately 213.4 m [700 ft] on either side of the drawbridge) and 320 m (1,050 ft) for the off peak direction. The total stopped delay per vehicle for the peak direction is estimated to be 114.3 seconds and 112.7 seconds for the off peak direction. An estimate of travel delay for deceleration and acceleration link was based on 30% of the total stopped delay. Based on this stopped delay, average speed along this segment is estimated to be 23.2 kph (14.4 mph) in the peak direction and 20.0 kph (12.4 mph) in the off peak direction.

Table 2-2 Traffic Data Used to Estimate Vehicle Emissions for the 2020 Design Year for the High Level Fixed Span Bridge and Low Level Drawbridge Alternatives

| BRIDGE ALTERNATIVE | | TRAVEL DISTANCE | | ANNUAL TRAFFIC VOLUME | VEHICLE MILES TRAVELED | AVERAGE TRAVEL SPEED |
|-----------------------|---|-----------------------------|-----------|-----------------------|----------------------------|----------------------|
| High Level Fixed Span | | 1,555.6 m (5,102.37 ft) | | 7,836,550 | 7,572,912 | 48.3 kph (30 mph) |
| Low Level Drawbridge | | 1,555.14 m (5,100.86 ft) | | 7,836,550 | 7,570,891 | ----- |
| Non-Delayed Segment | Peak Direction (Non Delayed Vehicles) | 1,555.14 m (5,100.86 ft) | 4,038,839 | 4,179,972 | 48.3 kph (30 mph) | |
| | Peak Direction (Free Flow Segment for Delayed Vehicles) | 1,128.3 m (3,700.86 ft) | 396,648 | | | |
| | Off Peak Direction (Non Delayed Vehicles) | 1,235.0 m (4,050.86 ft) | 3,103,577 | 3,226,657 | 48.3 kph (30 mph) | |
| | Off Peak Direction (Free Flow Segment for Delayed Vehicles) | 1,235.0 m (4,050.86 ft) | 297,486 | | | |
| Rolling Delay Segment | Peak Direction | 426.8 m (1,400 ft) | 396,648 | 105,151 | 23.2 kph (14.4 mph) | |
| | Off Peak Direction | 320.1 m (1,050 ft) | 297,486 | 59,111 | 20.0 kph (12.4 mph) | |
| Vehicles Stopped | Peak Direction | ----- | 396,648 | ----- | Idling (114.3 sec/vehicle) | |
| | Off Peak Direction | ----- | 297,486 | ----- | Idling (112.7 sec/vehicle) | |

EPA’s MOBILE5a Emission Factor Model was used to estimate the emission rates associated with various speeds and operation modes of vehicles. FDOT standard Tampa Bay input data was used to generate the emission factors for the future conditions (2020). A summary of the input parameters used in MOBILE5a is listed in Table 2-3. In accordance with EPA recommendations, the idle emission rate (grams per hour) was estimated based on a running speed of 4 kph (2.5 mph). The emission rate (grams per mile) for 4.0 kph (2.5 mph) was multiplied by this speed to obtain grams per hour of idling. The operating mode emission rates for HC, CO, and NOx for 2020 are listed in Table 2-4. The MOBILE5a output file is included in Appendix D.

Table 2-3 Input Parameters Used in MOBILE5a

| INPUT PARAMETER | VALUE |
|--|-------------------------|
| Region | Low Altitude |
| Ambient Temperature | 15.5° C (59° F) |
| Vehicle Mix | MOBILE5a Default Values |
| Cold Start Percentage (Operating Mode) | 20.6% |
| Hot Re-Start Percentage (Operating Mode) | 27.3% |
| Evaluation Year | 2020 |
| Traffic Volume and Speeds | See Table 2-2 |

Table 2-4 MOBILE5a Emission Factors

| OPERATING MODE | HYDROCARBONS | CARBON MONOXIDE | NITROGEN OXIDES |
|---------------------|--------------|-----------------|-----------------|
| Idle | 22.725 g/hr | 212.6 g/hr | 7.55 g/hr |
| 20 kph (12.4 mph) | 2.55 g/mi | 26.61 g/mi | 2.13 g/mi |
| 23.2 kph (14.4 mph) | 2.33 g/mi | 24.34 g/mi | 2.07 g/mi |
| 48.3 kph (30 mph) | 1.38 g/mi | 12.32 g/mi | 1.95 g/mi |

Emission estimates for free flow conditions were calculated by multiplying the number of miles traveled by the MOBILE5a emission factors for the various operating speed. Emissions associated with the stopped delay (i.e., idling vehicles) were determined by multiplying the average delay times by the idle emission rate.

2.2 AIR QUALITY ANALYSIS AND EVALUATION

The Air Quality Screening Test results and the estimates of annual air emissions for the high level fixed span bridge and low level drawbridge are presented in the following sections.

Air Quality Screening Test

The results of the Air Quality Screening Test are included in Table 2-1 and depicted graphically in Appendix E. The critical distance for all alternatives and years was less than 3 m (10 ft), which is attributed to the low traffic volumes and high travel speeds. Since the closest receptor site is 9.1 m (30 ft) from the roadway, the project passes the Air Quality Screening Test (i.e., all air quality receptor sites were farther away than the critical distance for all alternatives and years analyzed). Therefore, none of the project alternatives will have a significant adverse impact on air quality.

The proposed improvements, a high level fixed span bridge, would improve traffic flow on SR 682 across Boca Ceiga Bay and reduce congestion compared to the No Build Alternative. In addition, the increased capacity is also expected to reduced traffic delays associated with bridge openings. Traffic is stopped periodically by the opening of the bascule bridge for boat traffic. The bridge opens on the hour, and every 20 minutes thereafter as required. According to the bridge opening logs from 1996 to 1998, the annual number of openings average 6,814 per year or approximately 19 openings per day. The additional capacity associated with a four lane high level facility would also minimize traffic congestion associated with existing bridge openings. Furthermore, improved traffic flow would result in lower excess emissions caused by acceleration and deceleration (i.e., would lower CO concentrations from automobile exhaust).

Vehicle Emissions

The air emission estimates from traffic associated with the high level bridge and low level drawbridge alternatives are listed in Table 2-5. The high level bridge alternative is predicted to result in approximately 24,403.3 kg (26.9 tons) of emissions in the 2020 Design Year. This includes 2,141.0 kg (2.36 tons) of HC, 19,232.2 kg (21.2 tons) of CO, and 3,048.1 kg (3.36 tons) of NOx. The low level bridge alternative is predicted to result in approximately 25,945.5 kg (28.6 tons) of emissions including 2,141 kg (2.36 tons) of HC, 19,232.3 kg (21.2 tons) of CO, and 3,048.1 kg (3.36 tons) of NOx. Total emissions for the low level drawbridge alternative are estimated to be approximately 6% [1,542.2 kg (1.7 tons)] per year higher than the high level bridge alternative. Although the emissions estimates for the low level drawbridge is higher, the difference compared to the high level bridge is not substantial. In addition, the 1,542.2 kg (1.7 tons) associated with the low level bridge would not represent a substantial contribution to the Tampa Bay airshed.

Table 2-5 Estimated Air Emissions for the High Level Fixed Span Bridge and Low Level Drawbridge Alternatives in the Design Year (2020)

| BRIDGE TYPE | TYPE OF EMISSION | HYDROCARBONS | | CARBON MONOXIDE | | NITROGEN OXIDES | | TOTAL EMISSIONS | |
|------------------------------|-------------------------|--------------|-----------|-----------------|-----------|-----------------|-----------|-----------------|-----------|
| | | kg/year | tons/year | kg/year | tons/year | kg/year | tons/year | kg/year | tons/year |
| High Level Fixed Span Bridge | Free Flow (Non Delayed) | 2,141.0 | 2.36 | 19,232.3 | 21.20 | 3,048.1 | 3.36 | 24,408.3 | 26.9 |
| Low Level Drawbridge | Free Flow (Non Delayed) | 2,104.7 | 2.32 | 18,760.6 | 20.68 | 2966.5 | 3.27 | 25,945.5 | 28.6 |
| | Rolling Delay | 81.6 | 0.09 | 852.8 | 0.94 | 72.6 | 0.08 | | |
| | Stopped Delay | 99.8 | 0.11 | 961.6 | 1.06 | 36.3 | 0.04 | | |
| | Total | 2,286.1 | 2.52 | 20,575.0 | 22.67 | 3,075.4 | 3.39 | | |

2.3 CONCLUSIONS

All of the bridge alternatives and the No Build Alternative passed FDOT's Air Quality Screening Test. Therefore, none of the project alternatives will have significant adverse effects on air quality (i.e., have CO levels that exceed the 1 or 8 hour NAAQS of 35 parts per million (ppm) and 9 ppm, respectively). Since all of the sensitive air quality sites are greater than 3 m (10 ft) away from SR 682 and SR 679, no long term exposure to CO pollution is anticipated. The low traffic volumes and high speeds contributed to the critical distance being less than 3 m (10 ft).

Emission estimates for the drawbridge alternatives were higher than the high level fixed bridge. Total emissions for the low level drawbridge alternative are estimated to be approximately 6% (1,542.2 kg [1.7 tons]) per year higher than the high level bridge alternative (i.e., 25,945.5 kg [28.6 tons] per year versus 24,403.3 kg [26.9 tons] per year). The difference in annual emissions between the proposed bridge alternatives [1,542.2 kg (1.7 tons per year)] would not represent a substantial contribution to the Tampa Bay airshed. During the design phase, the project will be reevaluated by FDOT to reconfirm there are no adverse air quality effects associated with the project.

3.0 CONSTRUCTION AIR QUALITY EFFECTS

Construction activities would cause minor short-term air quality effects. These effects would be minimized by adherence to all state and local regulations and to FDOT's *Standard Specifications for Road and Bridge Construction*.

4.0 COORDINATION WITH LOCAL OFFICIALS

All State and local agencies were provided with an opportunity to comment on this project. There were no adverse comments regarding air quality.

The project is in an area which had been designated as nonattainment for the ozone standards under the criteria provided in the Clean Air Act Amendments of 1990. However, effective February 5, 1996, the EPA redesignated Tampa Bay airshed to “maintenance attainment” status. The counties in the air shed are in a maintenance period for conformity purposes. This project is in conformance with the SIP because it will not cause violations of any of the NAAQS.

5.0 BIBLIOGRAPHY

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2. Florida Department of Transportation, 1999 Revised. *Air Quality Analysis*, Part 2, Chapter 16. *Project Development and Environment Manual*, Florida Department of Transportation, Tallahassee, Florida, Revised August 18, 1999.
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APPENDIX A
AIR DATA SHEET

AIR DATA

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT SEVEN
TRAFFIC DATA FOR AIR STUDY SCREENING TEST

Revised: 11-Nov-98
Date: 11-Nov-98
Prepared By: Roy Chapman, PE

Project Description: SR 682 (Pinellas Bayway) from the West Toll Booth to west of SR 679, Pinellas County, Florida

Segment Description: West Toll Booth to SR 679

MOST CONGESTED INTERSECTION (1)

| | <u>BUILD</u> | <u>NO BUILD</u> |
|---|-------------------------|-------------------------|
| Opening Year (Date) | <u>2005</u> | <u>2005</u> |
| Total PHV of the Most Congested Leg (2) | <u>2,601 (east leg)</u> | <u>2,601 (east leg)</u> |
| Average Link Speed For Above Leg | <u>41.4 mph</u> | <u>42.2 mph</u> |

| | <u>BUILD</u> | <u>NO BUILD</u> |
|---|-------------------------|-------------------------|
| Design Year (Date) | <u>2020</u> | <u>2020</u> |
| Total PHV of the Most Congested Leg (2) | <u>3,072 (east leg)</u> | <u>3,072 (east leg)</u> |
| Average Link Speed For Above Leg | <u>41.6 mph</u> | <u>42.3 mph</u> |

Notes:

- (1) Intersection with the highest total volume and the lowest departure speeds (Could be two different intersections based on alternatives).
- (2) Use attached diagram to indicate volumes and speeds.

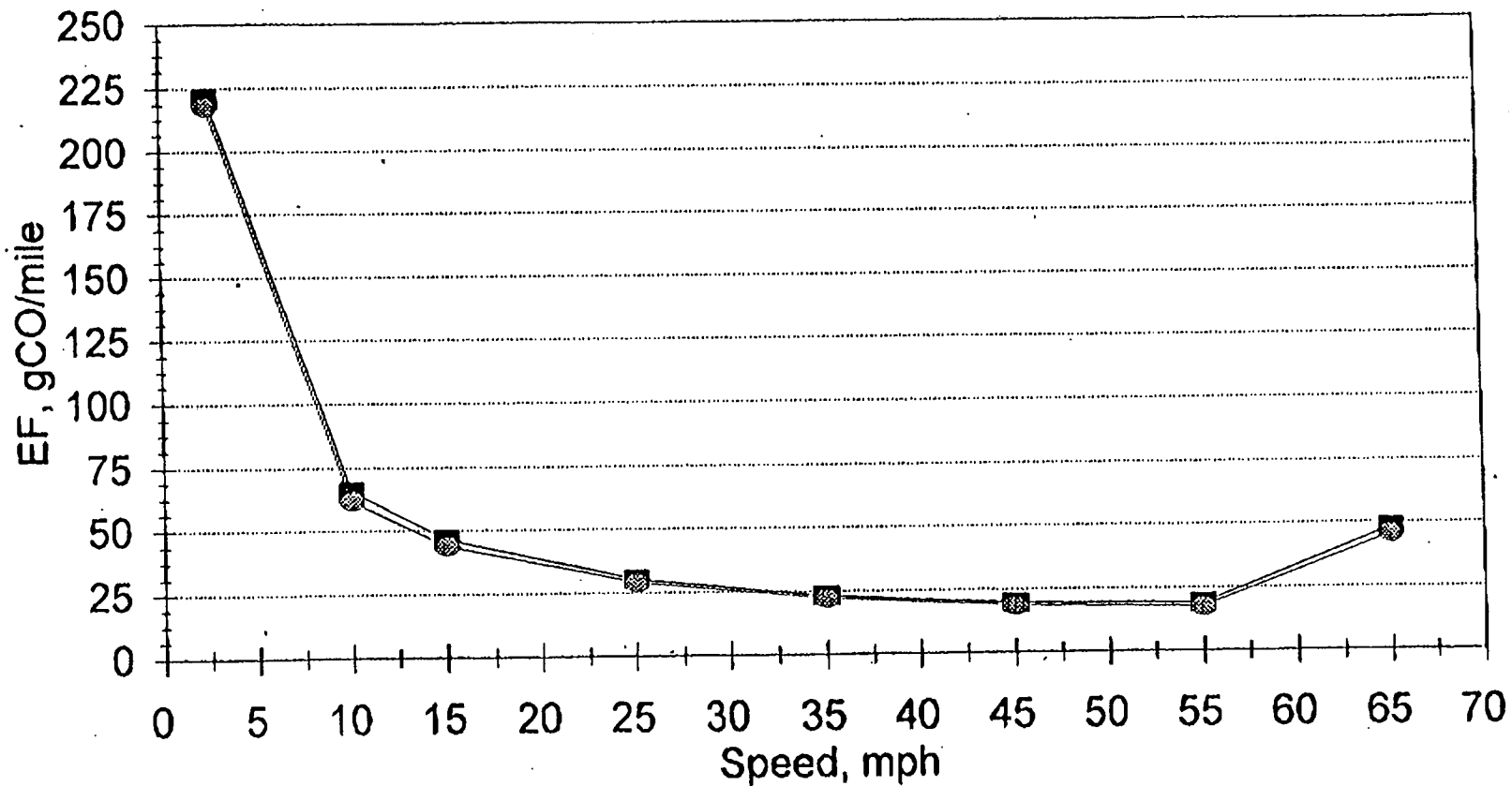
APPENDIX B

MOBILE5a EMISSION FACTORS VERSUS SPEED

Carbon Monoxide, Hydrocarbons, & Nitrogen Oxides

Emission Factor vs. Speed

Florida vs. National Default

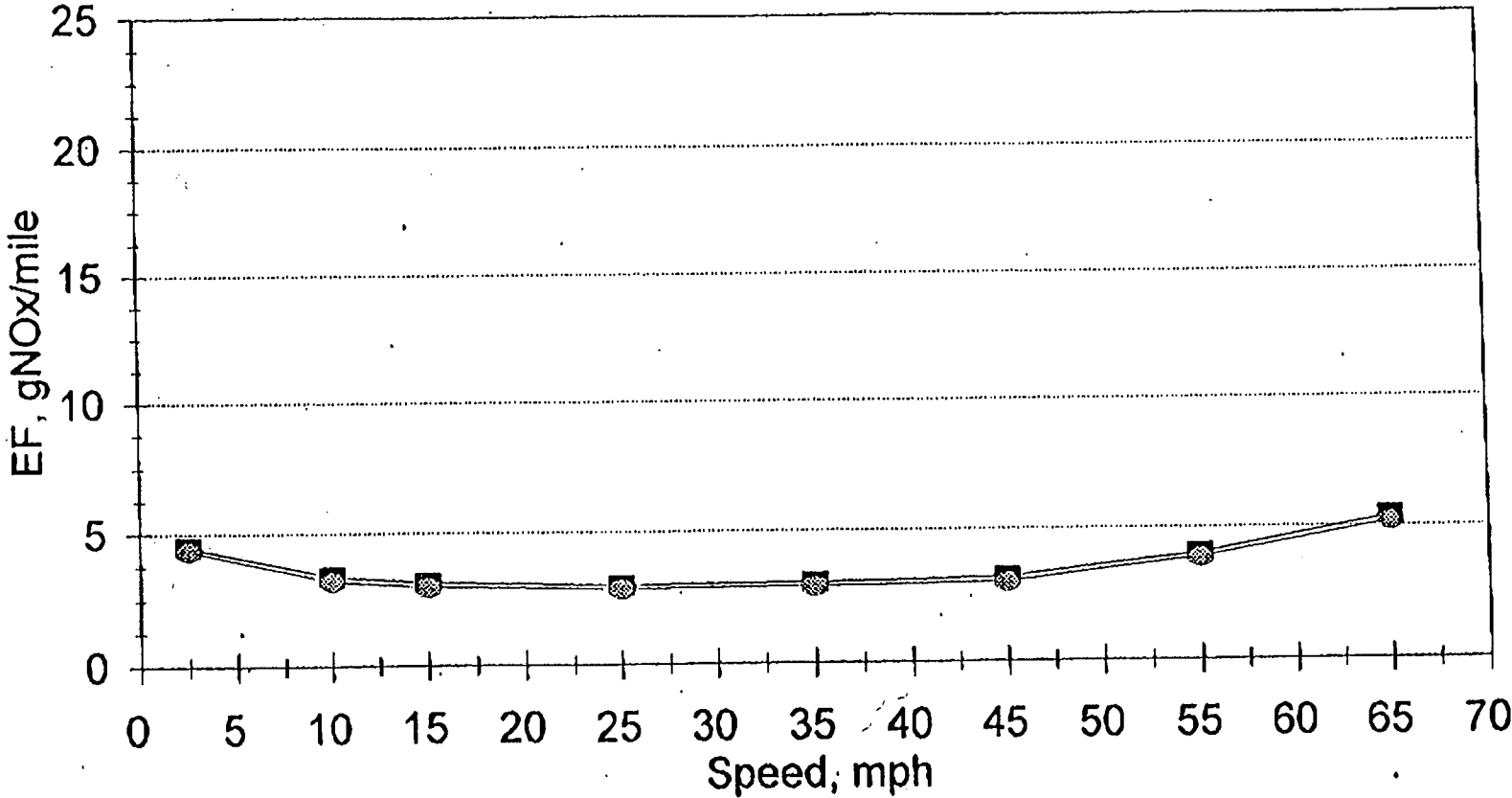


-■- National -●- Florida

B-1

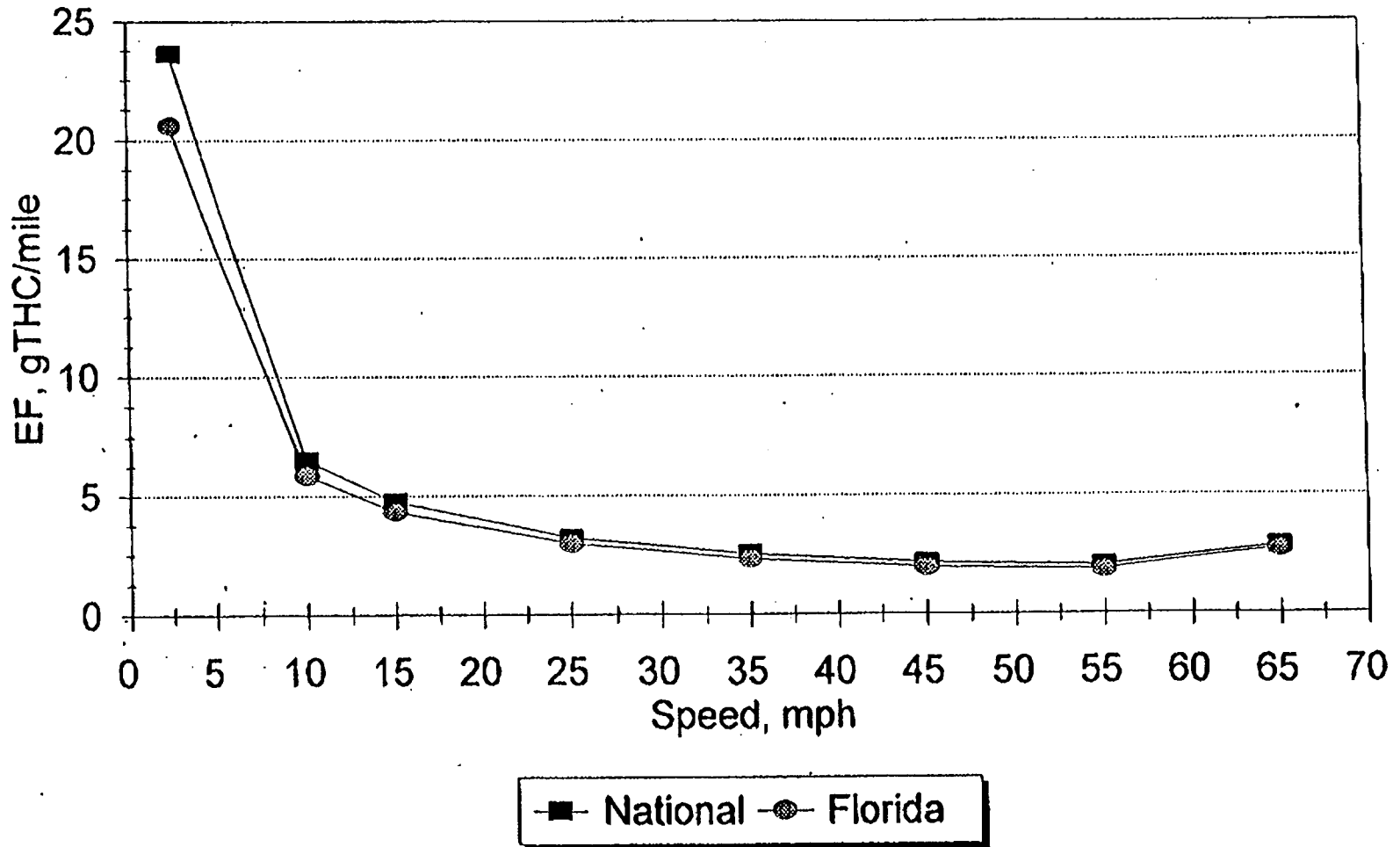
Emission Factor vs. Speed

Florida vs. National Default



■ National ● Florida

THC Emission Factors Florida vs. National Defaults



APPENDIX C
ADDITIONAL USER COSTS
FOR LOW LEVEL DRAWBRIDGE

Table 8-3. Additional Costs (User Delay)

A. Low Level Bridge

Bayway Bridge Project - Analysis of Net Present Worth

| | | | |
|--|----------------|----------------|----------------------------|
| Peak Season Weekday Daily Traffic | | 22,600 | |
| Peak Season Conversion Factor | | 0.95 | |
| Average Annual Daily Traffic | | 21,470 | vehicles per day |
| Average Hour K | | 6.30% | |
| Average Hourly Volume | | 1353 | vehicles per hour |
| | Peak Direction | Off Peak Dir. | |
| Average Directional Traffic | 766 | 587 | |
| Percent Trucks | 6% | 6% | |
| Percent Autos | 94% | 94% | |
| Number of Trucks | 46 | 35 | vehicles per hour |
| Number of Autos | 720 | 552 | vehicles per hour |
| Total Directional Volume | 766 | 587 | |
| Unit Cost of Trucks | \$ | 31.85 | \$/vehicle-hour |
| Unit Cost of Autos | \$ | 15.82 | \$/vehicle-hour |
| Unit Cost of Time | \$ | 16.78 | \$/vehicle-hour |
| Determination of Delay Per Opening | | | |
| Length of Opening (In minutes) | 3.67 | 3.67 | minutes (3 min 40 sec) |
| Length of Opening (In hours) | 0.061 | 0.061 | hours |
| Average Queue Discharge Rate | 1800 | 1800 | vehicles per lane per hour |
| Number of Lanes (per direction) | 2 | 2 | lanes |
| Average Flow Rate per Lane | 383 | 293.5 | vehicle per hour |
| Number of Vehicle in Queue 1 per Lane (Qm) | 23 | 18 | vehicles per lane |
| Arrival Delay (Queue 1 Formation) | 1.406 | 1.100 | vehicle-hours of delay |
| Duration of Queue 1 Discharge | 0.013 | 0.01 | hours |
| Queue 1 Departure Delay | 0.294 | 0.180 | vehicle-hours of delay |
| Number of Vehicles in Queue 2 | 5 | 3 | vehicles |
| Arrival Delay (Queue 2 Formation) | 0.064 | 0.030 | vehicle-hours of delay |
| Duration of Queue 1 Discharge | 0.003 | 0.002 | hours |
| Queue 2 Departure Delay | 0.014 | 0.005 | vehicle-hours of delay |
| Directional Delay Per Opening | 1.78 | 1.32 | vehicle-hours of delay |
| TOTAL DELAY PER OPENING | | 3.09 | |
| Unit Cost Per Opening | \$ | 51.91 | \$ per opening |
| Openings Per Year | | 7083 | |
| Annual User Cost of Openings | \$ | 367,657.56 | annulized costs |
| Life-Cycle Period | | 50 | years |
| Discount Factor | | 7% | |
| Present Worth of User Costs | | \$5,073,948.74 | |

Table 8-3. Additional Costs (User Delay) (Continued)

B. Mid Level Drawbridge (1/2 the Openings of the Low-Level Drawbridge)

Annual Cost - $\$367,658 \div \text{Year} \div 2 =$ \$ 183,829.00

Present Worth - $\$183,829/\text{Year} \times 13.801 =$ \$ 2,536,975.00

C. High Level Fixed Bridge

Annual Cost - $5,512 \text{ Hours} \times \$16.78/\text{hr.} =$ \$ 92,491.00

Present Worth - $\$92,491/\text{Year} \times 13.801 =$ \$ 1,276,473.00

APPENDIX D
MOBILE5a OUTPUT FILES

1 Bayway Bridge PD&E Study 9/22/99 Bay2026.in Design Year 2000

MOBILE5a (26-Mar-93)

0I/M program selected:

0 Start year (January 1): 1991
 Pre-1981 MYR stringency rate: 23%
 First model year covered: 1975
 Last model year covered: 2020
 Waiver rate (pre-1981): 0%
 Waiver rate (1981 and newer): 0%
 Compliance Rate: 100.%
 Inspection type: Test Only
 Inspection frequency: Annual
 Vehicle types covered: LDGV - Yes
 LDGT1 - Yes
 LDGT2 - Yes
 HDGV - No

1981 & later MYR test type: Idle
 Cutpoints, HC: 220.000 CO: 1.200 NOx: 999.000

0Functional Check Program Description:

| 0Check Start (Jan1) | Model Yrs Covered | Vehicle Classes | LDGV | LDGT1 | LDGT2 | HDGV | Inspection Type | Comp Freq | Rate |
|---------------------|-------------------|-----------------|------|-------|-------|------|-----------------|-----------|------|
|---------------------|-------------------|-----------------|------|-------|-------|------|-----------------|-----------|------|

| | | | | | | | | | |
|-----|------|-----------|-----|-----|-----|----|-----------|--------|--------|
| ATP | 1991 | 1975-2020 | Yes | Yes | Yes | No | Test Only | Annual | 100.0% |
|-----|------|-----------|-----|-----|-----|----|-----------|--------|--------|

0Air pump system disablements: No Catalyst removals: Yes

Fuel inlet restrictor disablements: No Tailpipe lead deposit test: No

EGR disablement: No Evaporative system disablements: No

PCV system disablements: No Missing gas caps: Yes

0Scenario title.

Minimum Temp: 50. (F) Maximum Temp: 70. (F)

Period 1 RVP: 9.2 Period 2 RVP: 7.8 Period 2 Yr: 1992

0Total HC emission factors include evaporative HC emission factors.

0

0Emission factors are as of Jan. 1st of the indicated calendar year.

0Cal. Year: 2020 Region: Low Altitude: 500. Ft.

I/M Program: Yes Ambient Temp: 59.9 / 59.9 / 59.9 F

Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6

Reformulated Gas: No

0Veh. Type: LDGV LDGT1 LDGT2 LDGT HDGV LDDV LDDT HDDV MC All Veh

+

| Veh. Spd.: | 12.4 | 12.4 | 12.4 | 12.4 | 12.4 | 12.4 | 12.4 | 12.4 |
|------------|------|------|------|------|------|------|------|------|
|------------|------|------|------|------|------|------|------|------|

| | | | | | | | | |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| VMT Mix: | 0.575 | 0.207 | 0.089 | 0.034 | 0.002 | 0.005 | 0.084 | 0.004 |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|

0Composite Emission Factors (Gm/Mile)

Total HC: 2.21 2.59 3.50 2.86 4.89 0.68 0.95 2.86 3.97 2.55
Exhst CO: 25.02 28.90 38.42 31.76 35.94 2.20 2.46 17.07 37.48 26.61
Exhst NOX: 1.41 1.57 2.24 1.77 3.52 1.31 1.49 7.87 0.82 2.13

0Emission factors are as of Jan. 1st of the indicated calendar year.

0Cal. Year: 2020 Region: Low Altitude: 500. Ft.
 I/M Program: Yes Ambient Temp: 59.9 / 59.9 / 59.9 F
 Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
 Reformulated Gas: No

0Veh. Type: LDGV LDGT1 LDGT2 LDGT HDGV LDDV LDDT HDDV MC All
Veh

+

Veh. Spd.: 14.4 14.4 14.4 14.4 14.4 14.4 14.4 14.4
VMT Mix: 0.575 0.207 0.089 0.034 0.002 0.005 0.084 0.004

0Composite Emission Factors (Gm/Mile)

Total HC: 2.03 2.37 3.19 2.61 4.28 0.63 0.88 2.63 3.60 2.33
Exhst CO: 22.95 26.67 35.45 29.30 31.34 1.94 2.17 15.03 32.05 24.34
Exhst NOX: 1.39 1.55 2.21 1.75 3.59 1.23 1.40 7.42 0.84 2.07

0Emission factors are as of Jan. 1st of the indicated calendar year.

0Cal. Year: 2020 Region: Low Altitude: 500. Ft.
 I/M Program: Yes Ambient Temp: 59.9 / 59.9 / 59.9 F
 Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
 Reformulated Gas: No

0Veh. Type: LDGV LDGT1 LDGT2 LDGT HDGV LDDV LDDT HDDV MC All
Veh

+

Veh. Spd.: 30.0 30.0 30.0 30.0 30.0 30.0 30.0 30.0
VMT Mix: 0.575 0.207 0.089 0.034 0.002 0.005 0.084 0.004

0Composite Emission Factors (Gm/Mile)

Total HC: 1.22 1.46 1.94 1.60 2.04 0.36 0.50 1.51 2.41 1.38
Exhst CO: 11.43 14.11 18.76 15.50 14.55 0.92 1.03 7.15 15.04 12.32
Exhst NOX: 1.42 1.52 2.16 1.71 4.11 0.95 1.09 5.74 1.10 1.95

0Emission factors are as of Jan. 1st of the indicated calendar year.

0Cal. Year: 2020 Region: Low Altitude: 500. Ft.
 I/M Program: Yes Ambient Temp: 59.9 / 59.9 / 59.9 F
 Anti-tam. Program: Yes Operating Mode: 20.6 / 27.3 / 20.6
 Reformulated Gas: No

0Veh. Type: LDGV LDGT1 LDGT2 LDGT HDGV LDDV LDDT HDDV MC All

Veh

+

Veh. Spd.: 2.5 2.5 2.5 2.5 2.5 2.5 2.5 2.5

VMT Mix: 0.575 0.207 0.089 0.034 0.002 0.005 0.084 0.004

0Composite Emission Factors (Gm/Mile)

Total HC: 8.47 10.10 13.86 11.23 13.18 1.10 1.54 4.62 12.44 9.09

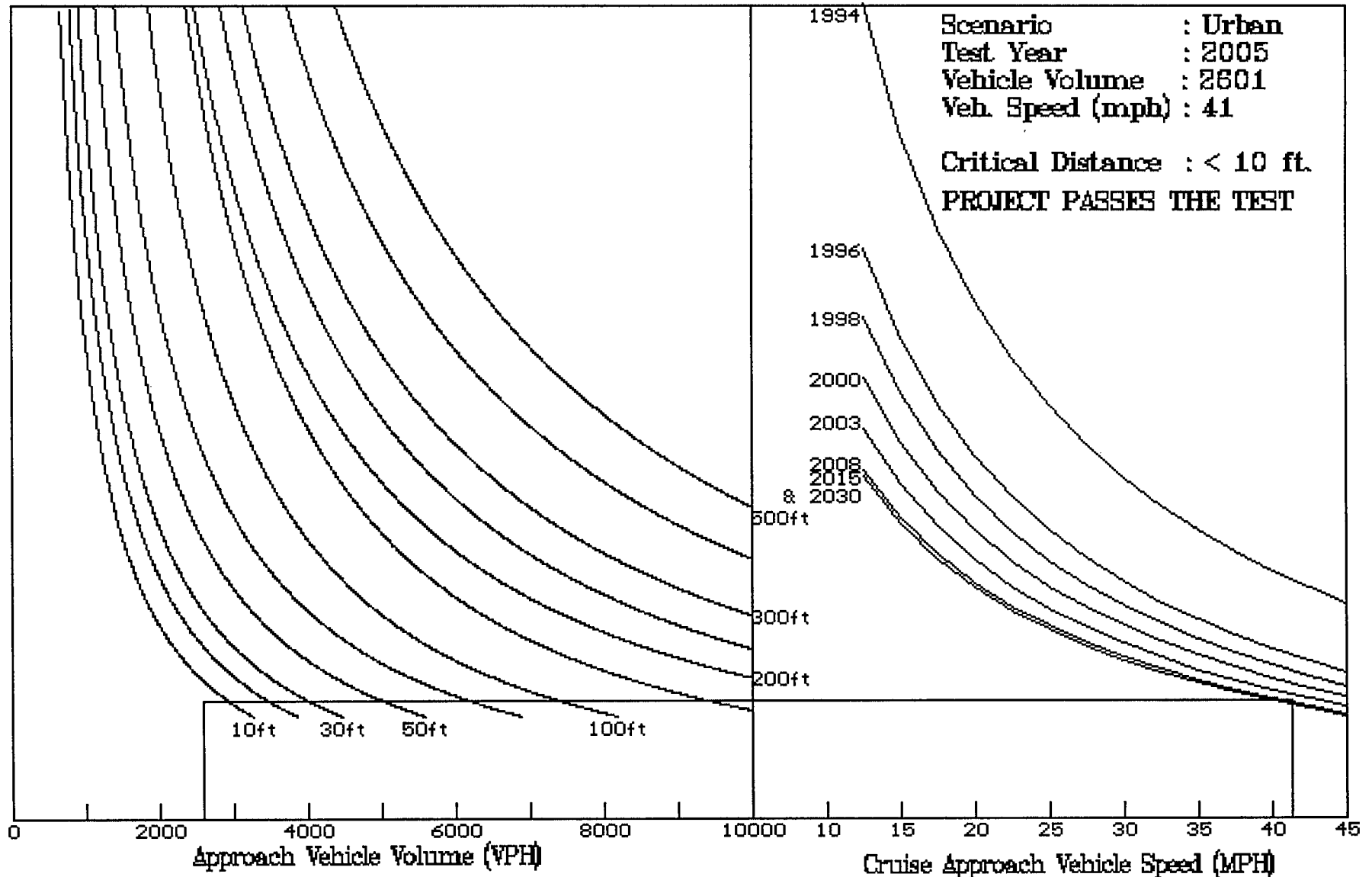
Exhst CO: 84.20 92.63 123.15 101.77 80.62 4.60 5.14 35.66 171.01 85.04

Exhst NOX: 2.04 2.28 3.24 2.56 3.19 1.89 2.16 11.39 1.02 3.02

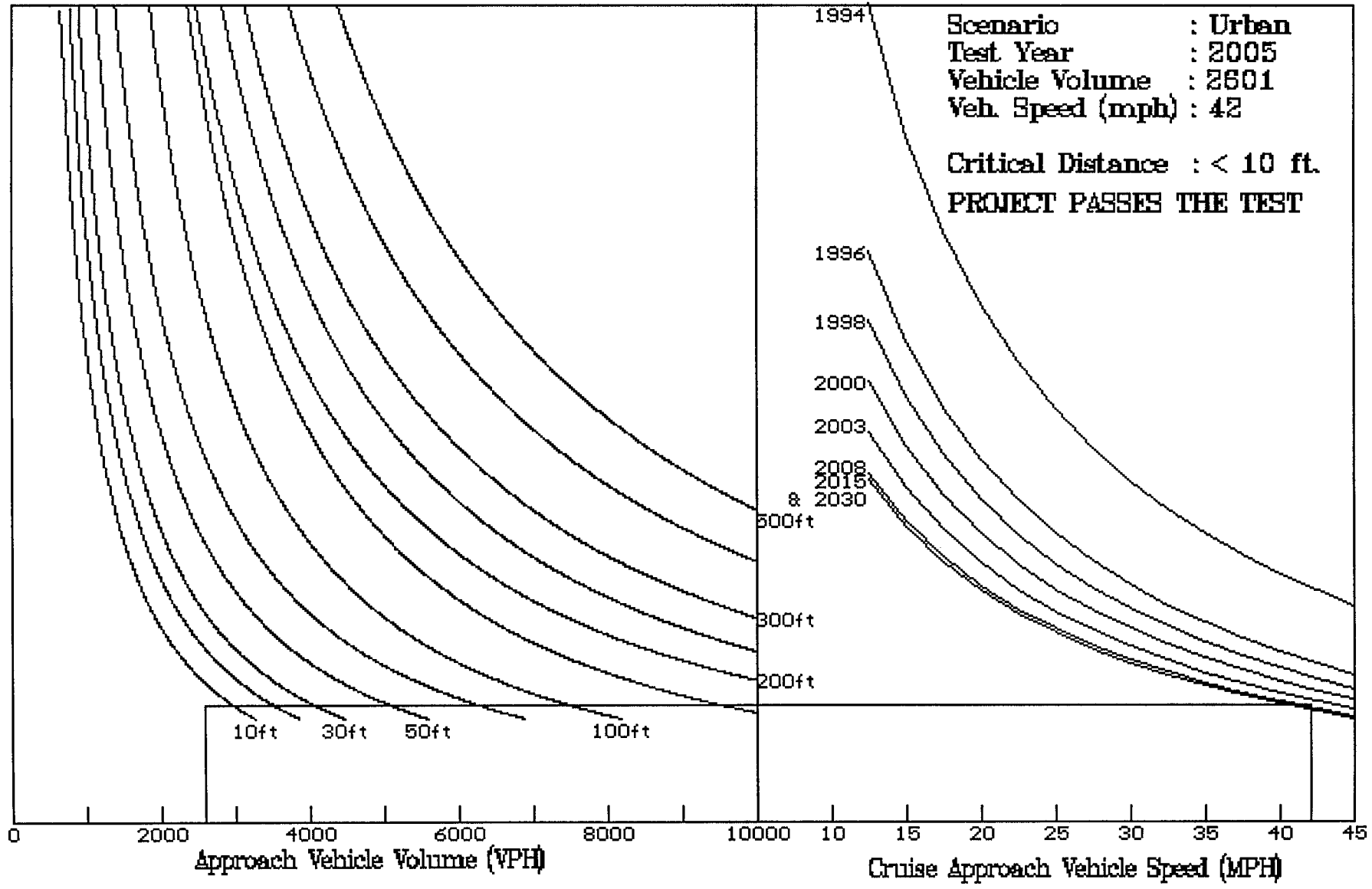
APPENDIX E
SCREENING TEST WORKSHEETS

FDOT Screening Test * Bayway Bridge *** Alternative : No build**

B-1



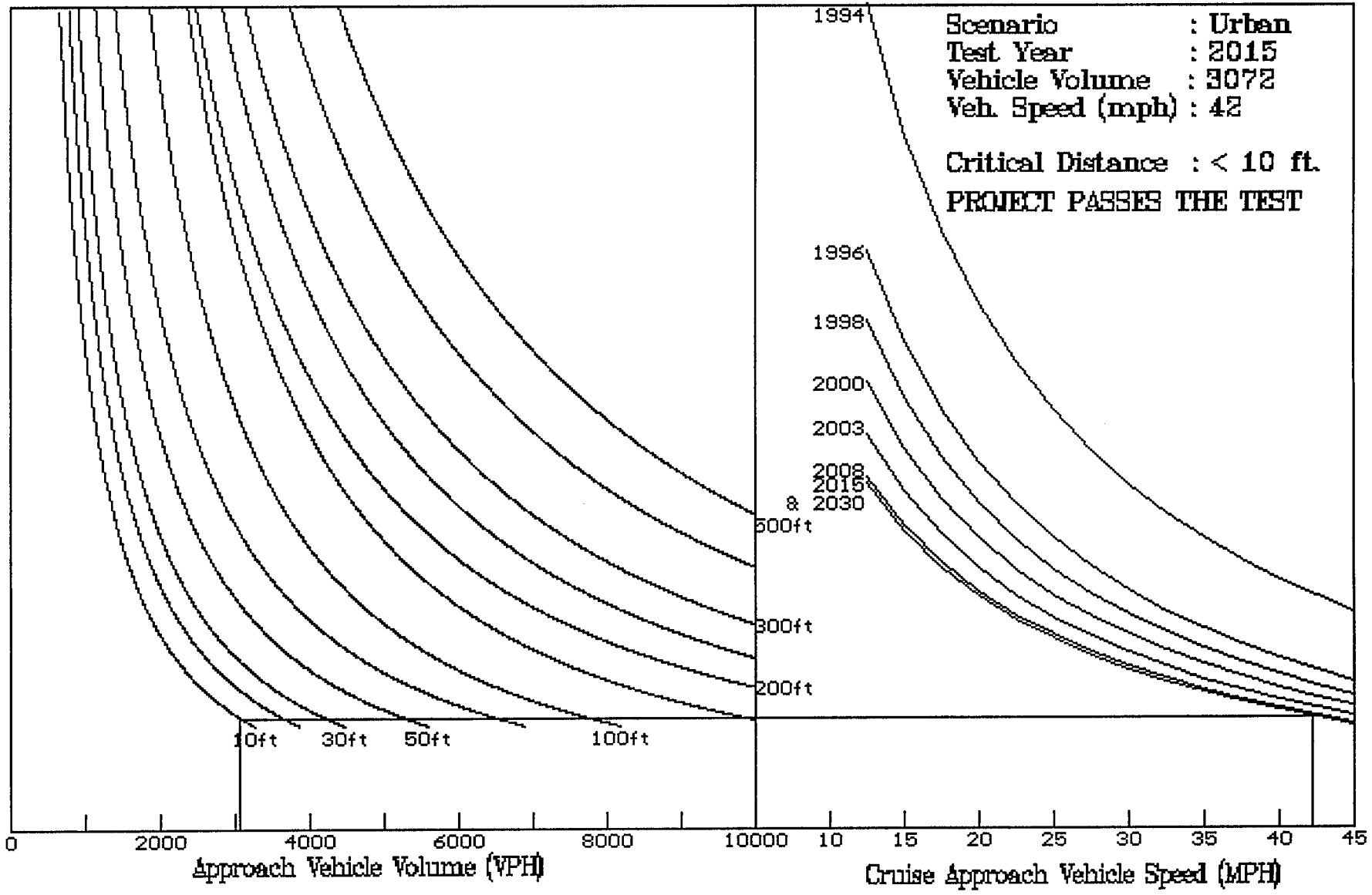
FDOT Screening Test * Bayway Bridge *** Alternative : Build**



E-2

FDOT Screening Test * Bayway Bridge *** Alternative : No build**

E-3



FDOT Screening Test * Bayway Bridge *** Alternative : Build**

E-4

