FINAL
PRELIMINARY ENGINEERING REPORT

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Project Development and Environment Study
Pinellas County, Florida

Work Program Item Segment No: 410755 1

Prepared for:

Florida Department of Transportation
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P.E. Number

July 2007
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Section 1.0
SUMMARY

1.1 COMMITMENTS

The Florida Department of Transportation (FDOT) is committed to the following measures:

1. During the design phase, FDOT will evaluate traffic signal warrants at the realigned Madonna Boulevard/Pinellas Bayway intersection to determine if a traffic signal is warranted.

2. The replacement bridge and roadway improvements on the northern causeway will not preclude capacity improvements in the future, if needed.

3. FDOT will implement the "Manatee and Sea Turtle Watch Program Guidelines" and "Sea Turtle and Smalltooth Sawfish Construction Conditions" for protection of the five species of marine turtles (green turtle, leatherback turtle, hawksbill turtle, Kemp's Ridley turtle, and loggerhead turtle) potentially occurring in the area. Note that no suitable nesting beaches are found in the project area and protective measures are for turtles in open water only.

1.2 RECOMMENDATIONS

This section summarizes the design recommendations for the recommended construction alternative. A more detailed analysis of the engineering and environmental issues associated with the recommended alternative is presented in Section 9.0 of this report.

The Recommended Alternative is Alternative 5A, replacing the existing two-lane double-leaf bascule bridge (Pinellas Bayway Structure E) with a two-lane high-level fixed bridge structure providing 65-feet (ft) vertical navigational clearance over the existing channel. The Village Driveway will be relocated to align with Madonna Boulevard, as shown in Appendix A. Based on the data provided by the bridge tender at Structure E and allowing for tidal fluctuations, this height would allow over 99 percent of the waterway users that currently use the channel to safely navigate under the proposed structure.

The proposed bridge replacement typical section includes one 12-ft lane and a 10-ft shoulder in each direction. The shoulders can accommodate bicyclists and disabled vehicles. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate Pinellas County's planned multi-use path. The overall width of the fixed-span is 65 ft.

South of the bridge, the typical section transitions between a four-lane divided urban roadway with turn lanes and the undivided two-lane bridge. Lane, shoulder, and sidewalk widths will be consistent with the proposed bridge. The proposed roadway typical section approaching the north end of the bridge is similar to the proposed bridge except it is elevated on embankment with a retaining wall on

each side. The retaining wall will minimize the amount of fill needed to be placed on the causeway and into Boca Ciega Bay and prevent the type of erosion evident in the existing sloped embankment. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate a planned multi-use path. A 4.5-ft high pedestrian/bicycle railing will be provided on the outside. Pedestrian hand railings are required on the sidewalks when the grades exceed 5 percent. The proposed roadway at-grade north of the bridge is consistent with the bridge typical section except that the eastern sidewalk is increased in width to 12 ft. The proposed design speed for all proposed typical sections is 45 miles per hour (mph).

The northern and southern roadway approaches to the bridge structure would be placed on an earthen fill section with a retaining wall. All superstructure components would be located above the splash zone. Access from S.R. 679 to the causeway beaches north of the bridge could continue via the existing northern set of turnouts. Vehicles could then travel along the causeway on either side to reach the beach area at the southern end of the causeway. Unlike the existing condition, the proposed bridge could accommodate vehicular traffic under the bridge (north side only) from one side of the causeway to the other.

The proposed bridge structure is anticipated to accommodate a stormwater management facility (SMF) under both the north and south end of the bridge to meet treatment requirements for the Recommended Alternative. These proposed pond configurations will also accommodate the potential future four-lane widening of S.R. 679 without modification, if warranted.

Wetland impacts resulting from the construction of this project are anticipated to be mitigated pursuant to Section 373.4137 Florida Statutes (F.S.) to satisfy all mitigation requirements of Part IV, Chapter 373 F.S. and 33 United States Code 1344. Under Section 373.4137 F.S., mitigation of FDOT wetland impacts will be implemented by the Southwest Florida Water Management District (SWFWMD). The project is currently listed on the FDOT's wetland mitigation inventory, which is provided to SWFWMD on an annual basis. It is anticipated that FDOT will provide funding to SWFWMD for implementation of wetland mitigation required for this project.

Section 2.0
INTRODUCTION

The Florida Department of Transportation (FDOT) conducted a Project Development and Environment (PD&E) Study for bridge and roadway improvement alternatives along S.R. 679 (Pinellas Bayway Structure E) over the Gulf Intracoastal Waterway, hereafter referred to as the Intracoastal Waterway. The project location map (Figure 2-1) illustrates the location and limits of the PD&E Study.

2.1 PURPOSE

The purpose of the PD&E Study was to provide documented environmental and engineering analyses to assist FDOT and the United States Coast Guard (USCG), the lead federal agency, in reaching a decision as to the type, location, and conceptual design of roadway and bridge improvements to the S.R. 679 (Pinellas Bayway Structure E) crossing of the Intracoastal Waterway. The PD&E Study also satisfies the requirements of the National Environmental Policy Act (NEPA) and other state and federal regulations.

The PD&E Study documents the need for the improvements, and presents the procedures that FDOT utilized to develop and evaluate various improvement alternatives including rehabilitation and replacement of the existing double-leaf bascule bridge (Bridge Number 150049) known locally as the Tierra Verde Bridge. FDOT collected information relating to the engineering and environmental characteristics essential for alternatives and analytical decisions. FDOT then established design criteria and developed preliminary alternatives. The comparison of alternatives is based on a variety of parameters utilizing a matrix format. This process identified the alternative which would have the least impact, while providing the necessary improvements. The study also solicited input from the community and users of the facility. The design year for the analysis is 2030.

2.2 PROJECT DESCRIPTION

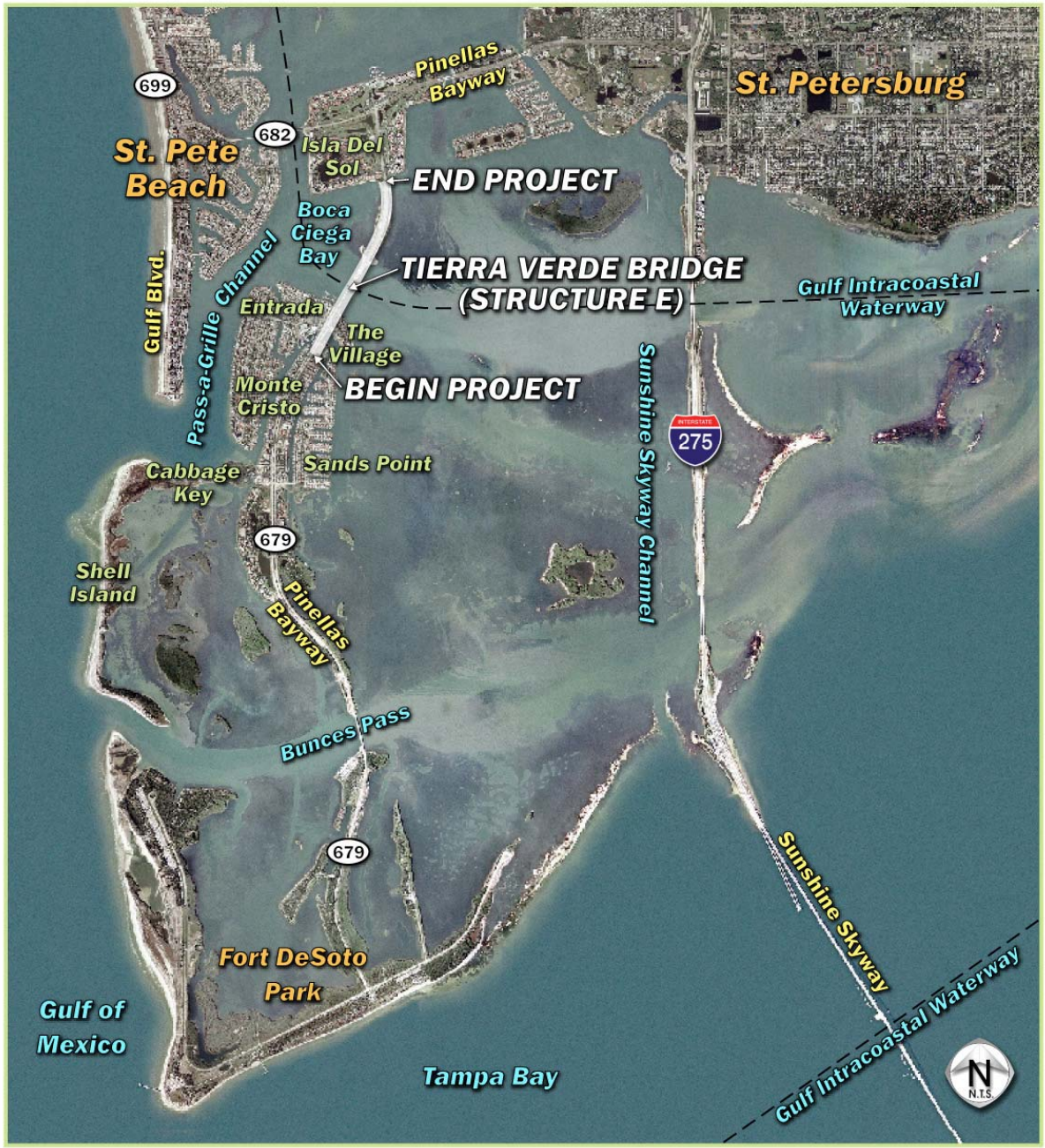
The PD&E Study limits encompass the portion of S.R. 679 from south of Madonna Boulevard (milepost 8.366) in Tierra Verde to south of S.R. 682 (milepost 9.454) in St. Petersburg, Florida, a distance of 1.088 miles (mi). The project is located within Sections 8, 17, and 20, Township 32 South, Range 16 East, and within the Pass-A-Grille Beach United States Geological Survey (USGS) quad map (quad Number 3022). Structure E is a low-level bascule structure that spans the Intracoastal Waterway, a marked federal navigational channel which generally runs between the mainland and the nearly contiguous barrier islands along the Gulf of Mexico. S.R. 679 is not part of the National Highway System, the Florida Intrastate Highway System, or the Strategic Intermodal System (SIS); however, the Intracoastal Waterway within the PD&E Study area is on the SIS. In addition, both S.R. 682 and S.R. 679 are designated hurricane evacuation routes by the Florida State Emergency Response Team (SERT).

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

WPI Segment No : 410755-1

PROJECT LOCATION MAP

Figure 2-1



S.R. 679 was originally constructed in 1961 to join the man-made islands of Tierra Verde with Isla Del Sol in St. Petersburg in Pinellas County. S.R. 679 is a north-south urban minor arterial that provides the only vehicular access to the islands of Tierra Verde and Mullet Key, where Fort De Soto Park is located. S.R. 679 is part of the Pinellas Bayway toll system, which also includes S.R. 682.

Routine bridge inspections have identified safety and structural problems associated with the age of the existing bridge, including concrete delaminations, spalls, cracks, and other deficiencies. Structure E is functionally obsolete and is rated "scour critical." It also contains fracture critical elements, meaning that members are subject to tension such that failure could result in collapse of the bridge. The remaining service life under normal maintenance conditions is estimated to be six years, meaning that under the current normal maintenance program, the bridge will need to be rehabilitated or replaced by year 2011. Improvement alternatives considered for this facility include rehabilitation, rehabilitation (with widening), and replacement with a low-level bascule bridge, a mid-level bascule bridge, or a high-level fixed-bridge.

Section 3.0
NEED FOR IMPROVEMENT

3.1 REGIONAL CONNECTIVITY

S.R. 679 (Pinellas Bayway Structure E) (Bridge Number 150049) over the Intracoastal Waterway is the only bridge and roadway that provides vehicular access between the mainland and the islands of Tierra Verde and Mullet Key (Fort De Soto Park). S.R. 679 connects to S.R. 682, which runs east-west between Interstate 275 and S.R. 699 (Gulf Boulevard).

3.2 TRANSPORTATION DEMAND

Less than 7 percent of the land area in Pinellas County is currently vacant property suitable for development. This indicates that future growth in the county is expected to be redevelopment and infill development activities. On that basis, the forecasted growth for the barrier islands of Tierra Verde and Mullet Key is expected to be minimal since the community is currently approaching the build-out condition. However, overall county population increases may result in increased usage of the Fort De Soto Park and its recreational facilities, such as the campground and boat ramps. The weekend average daily traffic (WADT) volume was used for the purpose of performing the traffic analyses due to the recreational nature of the traffic environment. WADT volumes are expected to increase from the existing 2005 WADT volume of 19,300 to the 2030 WADT volume of 23,600. As the islands of Tierra Verde are substantially built-out, this increase in WADT represents a minimal traffic growth rate. Therefore, the need for bridge improvements is not based on capacity needs. The need for improvements is based on the structural deficiencies associated with the age of the existing bridge, the functional obsolescence of the bridge, and its scour critical rating.

3.3 STRUCTURAL DEFICIENCIES

The Florida Department of Transportation (FDOT), through routine bridge inspections, identified safety and structural problems associated with the age of the existing bridge. The structure has numerous cracks and spalls. Severe spalling is located in the deck overhangs and concrete pedestrian railing. Many pile jackets installed during the life of the bridge also show signs of failure. The seawall bulkheads have many spalls and there has been some backfill leakage. The sidewalks and shoulder widths are sub-standard. The guardrails separating the roadway from pedestrians, the concrete post and beam barriers on the fixed spans, and the traffic barriers on the bascule spans are all not considered crash-tested barriers and do not meet current structural design standards. The rehabilitation and replacement alternatives for improvements should address these safety and structural issues.

The condition of Structure E has been formally documented in annual bridge inspection reports. The bridge inspection reports prepared by FDOT include a Sufficiency Rating for each bridge. Since the early 1970s, the Federal Highway Administration (FHWA) has used this rating to classify bridges according to their safety, serviceability, and essentiality for public use. As referenced in the

Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges[1], the Sufficiency Rating rates each bridge on a scale of 0 (worst) to 100 (best); considering structural adequacy and safety, serviceability, functional obsolescence, detour length, and essentiality for public use. The Sufficiency Rating is a method of evaluating highway bridge data to obtain a numeric value that is indicative of bridge sufficiency to remain in service. The result of this method is a percentage in which 100 percent would represent an entirely sufficient bridge and 0 percent would represent an entirely insufficient or deficient bridge. Although used by FHWA primarily to establish funding eligibility for bridge rehabilitation or replacement, it also provides a comparative basis for similar bridge structures throughout the United States. The 2003, 2004, 2005, 2006 and 2007 Structure E *Bridge Inspection Reports*[2] indicate Sufficiency Ratings of 51.0, 49.3, and 50.0, 48.3, and 49.3, respectively. These ratings reflect, in part, the sub-standard geometric conditions, bridge width, lack of shoulders, etc., as well as the structural condition of the substructure, superstructure, and deck. More information on the condition of the bridge is included in Section 4.0 of this report.

Scour was also identified as a significant concern for this structure. A *Phase 1 Scour Evaluation Report*[3], which was completed for FDOT in 1998, rated Structure E as "Scour Susceptible, High Priority, Known Foundation Rating" and recommended a Phase 2 evaluation. An interim plan of action was recommended, which included the following actions:

- Inspections of increased frequency and following severe storm events.
- Bridge and channel inspections every 3 to 6 months. Indications of recurring scour may require temporary countermeasures.
- Preparation of contingency plans should the bridge require closure during storm events until countermeasures can be installed.
- Prepare a schedule for bridge replacement or installation of permanent countermeasures.

The *Phase 2 Scour Evaluation Report*[4], which was completed in 2002, also rated the structure "Scour Susceptible, High Priority, Known Foundation Rating." A Phase 3 analysis was recommended based on the predicted undermining at trunnion pier 12 and piers 13, 14, and 15 and the minimal predicted embedment at pier 11 and bents 4, 16, and 17. A geotechnical investigation was recommended to determine the depth to the underlying erosion-resistant strata and to assess the stability of the structure based on the predicted remaining foundation embedment.

The *Phase 3 Scour Evaluation Report*[5] , which was completed in 2004, resulted in a rating of "Scour Critical." The Phase 3 evaluation consisted of geotechnical and structural load analyses to determine the vertical and lateral load capacities and the critical scour depth for the critical bent under the 100-year storm scour conditions. A new revised critical scour elevation was established at -24.3 feet (ft) North American Vertical Datum (NAVD), which is 7.2 ft above the average pile tip elevation at pier 6. Scour beyond the critical scour elevation will result in bridge foundation instability. A Phase 4 analysis was recommended based on the scour vulnerability rating of "Scour Critical" and the

instability of the bridge foundation resulting from the calculated scoured bed conditions. The Phase 3 report includes additional recommendations consisting of the following:

- Increased frequency of inspections, not exceeding a 12-month interval, including after all severe storm events and tidal surges, with a report filed after each inspection.

- Conduct a detailed inspection to determine scour depths at each bent and pier. Compare channel depth to the critical scour elevation for each inspection and report results to the structures engineer.

- Prepare contingency plans should the bridge require closure during severe storm events until countermeasures are installed.

- Prepare a schedule for bridge replacement or installation of permanent countermeasures.

The *Phase 4 Scour Evaluation Report*[6] was completed on December 7, 2004. The structure was evaluated for two alternative permanent solutions to correct the scour problem. Evaluation factors included cost, constructability, and traffic impacts. Alternative 1 consisted of adding channel armoring with an articulated concrete block system or grout filled mat at trunnion pier 12 and piers 13, 14, and 15. This alternative also proposed fixed-instrument and portable sonar scour monitoring systems. Alternative 2 consisted of the complete replacement of the bridge. The recommended plan of action included performing increased inspections (annual and post storm), preparing contingency plans should the bridge require closure during severe storm events until countermeasures are installed, and scheduling the design and construction of the permanent scour countermeasures or bridge replacement.

3.4 SAFETY

3.4.1 VEHICLE CRASHES

Review of the vehicle crash data presented in Section 4.0 of this report reveals that the Madonna Boulevard intersection and the bridge itself are high crash locations. An area of high crash location is recognized for roadway segments or intersections where a Safety Ratio is greater than 1.0 for one or more of the last six years. A Safety Ratio above 1.0 indicates that a roadway segment or an intersection experiences higher than average vehicle collisions compared to the statewide average of roadway segment or an intersection or with similar characteristics.

3.4.2 NAVIGATIONAL SAFETY

Types of vessels that pass frequently under Structure E include towboats, recreational pleasure and fishing boats, commercial boats, power boats, and sailboats. In addition, the Starlight Princess paddle wheeler and Starlight Majesty make frequent passes carrying passengers for lunch and dinner cruises. Occasionally, United States Coast Guard (USCG) cutters and tug boats with barges also pass through the channel. A review of data logs provided by the bridge tenders did not indicate a history of boats impacting the bridge or frequent navigational accidents near the bridge.

The USCG guide clearances have been established for the Intracoastal Waterway. They are 21-ft vertical clearance at mean high water (MHW) for drawbridges and 65-ft vertical clearance at MHW for fixed bridges. The horizontal guide clearance is 100 ft between fenders. In comments on the Efficient Transportation Decision Making (ETDM) Programming Screen Summary Report effects to navigation resources, the USCG has established that these clearances will apply to this reach of waterway. The existing horizontal clearance between fenders is 90 ft and the existing vertical clearance when the bridge is closed is 21.5 ft.

3.5 CONSISTENCY WITH TRANSPORTATION PLAN

There are no capacity improvements identified for S.R. 679, including Structure E, in the Pinellas County Metropolitan Planning Organization (MPO) *2025 Long Range Transportation Plan*[7] (*2025 LRTP*) completed in December 2004 or the *Pinellas County Comprehensive Plan*[8], which was adopted February 17, 1998, and last amended on December 21, 2004. This Project Development and Environment (PD&E) Study is being conducted due to the structural deterioration of the bridge and potential safety problems.

The *2025 LRTP* shows a future designation for S.R. 679 as part of the Pinellas Trail Extension linking the existing Pinellas Trail to the Fort De Soto Park Trail.

3.6 MODAL INTERRELATIONSHIPS

S.R. 679 is not designated as a truck route in the *2025 LRTP* and does not provide access to any intermodal facilities or freight activity centers; however, the Intracoastal Waterway within the PD&E Study area is on the Strategic Intermodal System (SIS).

As explained above, Pinellas County is planning a multi-use path along S.R. 679, which would accommodate pedestrians and bicyclists. There is currently no bus or fixed-route transit service along S.R. 679. The closest existing bus route is Route 90 which travels along 54th Avenue South/ S.R. 682 from east St. Petersburg to St. Pete Beach. The Pinellas County MPO *2025 LRTP* indicates that there are no plans to implement transit (bus, rail, trolley, etc.) along S.R. 679.

Coordination with Port Manatee, the Port of Tampa and the Port of St. Petersburg indicated that commercial vessel traffic bound to or from these ports does not use the Intracoastal Waterway at this location.

3.7 HURRICANE EVACUATION

S.R. 679 is designated as a hurricane evacuation route for the residential, commercial, and recreation area south of the project. Structure E is the only bridge linking the Tierra Verde and Mullet Key area to the mainland. These areas lie within Evacuation Level A, which is evacuated in the event of a Category 1 hurricane. According to the *Pinellas County Public Works Preparedness and Recovery Plans and Procedures Hurricane Manual*[9], "S.R. 679 is considered a priority to maintain uninterrupted flow of traffic upon notice of an evacuation. Emergency repairs to the roadway and

bridge will be made in conjunction with removal of debris causing any restrictions in the flow of evacuating traffic."

While Structure E currently accommodates hurricane evacuation and recovery activities, the evacuation time, reliability, and efficiency of the evacuation activities can be improved with rehabilitation or replacement of the bridge. Furthermore, the addition of shoulders on a replacement structure provides an area for inoperable vehicles to be removed from the traffic an emergency.

3.8 TRANSIT

Currently, no fixed route service exists within the PD&E Study area and no transit improvements are proposed as a part of this project.

3.9 SOCIAL AND ECONOMIC DEMANDS

Pinellas County, with 279.9 square miles (sq mi) of land area, is the second smallest and the most densely populated county in Florida. Population and socio-economic information for Pinellas County is included in Table 3-1. As Pinellas County moves toward build-out, conflicts between land uses have the potential to increase as development activity shifts to redevelopment and infill urban development.

According to the Census 2000 Demographic Profile for Tierra Verde (Census Tract 201.03, Block Groups 2 and 3) listed in the *2000 Census Demographic Profile*[10], Tierra Verde's population was 3,574, which represents a 63.5 percent increase over the 1990 population of 2,186. As with Pinellas County, Tierra Verde is moving toward a build-out capacity. Socio-economic information for Tierra Verde is presented in Table 3-2.

Table 3-1
Pinellas County Socio-Economic Information

Statistic	Value
Population - 1990	851,659
Population - 2000	921,495
Projected population - 2030	1,089,300
% increase in population - 1990-2000	8.2%
% increase in population - 2000-2030	18.2%
Median age (2004 projection)	44.2
% 65 and older	21.9 %
% agricultural	0.008%
Average Persons per household	2.16
Average House purchase price (2005)	$271,313
Per capita income (2003)	$33,316

Source: *2005 Florida Statistical Abstract*[11]
1998 Pinellas County Comprehensive Plan, Amended 2004
1997 Census of Agriculture: State and County Data, Florida[12]

Table 3-2
Tierra Verde Socio-Economic Information

Statistic	Value
Population - 1990	2,186
Population - 2000	3,574
% increase in population - 1990-2000	63.5%
Median age	47.9
% 65 and older	14.4 %
Average Persons per household	2.15
Average House median value (2000)	$256,200
Per capita income (1999)	$48,259

Source: *2000 Census Demographic Profile*

3.10 REFERENCES

1. *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges;* U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division; December 1995.

2. *Bridge Inspection Reports (Bridge Number 150049);* prepared for the Florida Department of Transportation, District Seven; Tampa, Florida; 2003, 2004, 2005, 2006, and 2007.

3. *Phase 1 Scour Evaluation Report*; prepared by Pitman-Hartenstein and Associates, Inc. for the Florida Department of Transportation, District Seven; Tampa, Florida; September 14, 1998.

4. *Phase 2 Scour Evaluation Report*; prepared by Pitman-Hartenstein and Associates, Inc. for the Florida Department of Transportation, District Seven; Tampa, Florida; July 30, 2002.

5. *Phase 3 Scour Evaluation Report*; prepared by Pitman-Hartenstein and Associates, Inc. for the Florida Department of Transportation, District Seven; Tampa, Florida; June 29, 2004.

6. *Phase 4 Scour Evaluation Report (Draft)*; prepared by Pitman-Hartenstein and Associates, Inc. for the Florida Department of Transportation, District Seven; Tampa, Florida; December 7, 2004.

7. *2025 Long Range Transportation Plan*; Pinellas County Metropolitan Planning Organization; Clearwater, Florida; December 2004.

8. *Pinellas County Comprehensive Plan;* Pinellas County Planning Department; Clearwater, Florida; February 1998, Amended December 2004.

9. *Public Works Preparedness and Recovery Plans and Procedures Hurricane Manual;* Pinellas County Public Works Engineering; Clearwater, Florida; September 25, 2002.

10. *2000 Census Demographic Profile*; U.S. Census Bureau; http://factfinder.census.gov; October, 2005.

11. *2005 Florida Statistical Abstract*; Bureau of Economic and Business Research; University of Florida College of Business Administration; Gainesville, Florida; 2005.

12. *1997 Census of Agriculture: State and County Data, Florida;* U.S. Department of Commerce, Bureau of the Census; March 1999.

Section 4.0
EXISTING CONDITIONS

4.1 EXISTING ROADWAY CHARACTERISTICS

4.1.1 FUNCTIONAL CLASSIFICATION

S.R. 679 is functionally classified as an urban minor arterial. In addition, S.R. 679 is a designated hurricane evacuation route.

4.1.2 TYPICAL SECTIONS

As shown in Figure 4-1, the existing roadway south of Structure E features a four-lane divided typical section with 12-foot (ft) travel lanes and a 64-ft landscaped median, which includes unpaved 8-ft inside shoulders. A delineated and signed 4-ft bicycle lane is provided in each direction, separated from the travel lanes by a striped 8-ft paved area. No curb and gutter is provided along the inside edge of pavement and Type F curb and gutter is provided on the outside edge of pavement. Sidewalks, 5-ft wide, are provided within each border. The existing right-of-way (ROW) width is 200 ft. The posted speed limit is 45 miles per hour (mph).

As shown in Figure 4-2, the existing roadway along the causeway north of Structure E features a two-lane undivided rural typical section with lanes varying in width from approximately 11 to 12 ft, 10-ft shoulders with 5 ft paved as a delineated and signed bicycle lane, guardrail and open drainage on both sides. Turnouts are provided at three locations for access to the water along the causeway. The existing ROW width is 1,000 ft. The posted speed limit is 45 mph.

As shown in Figure 4-3, the existing bridge includes two similar typical sections, one for the approach spans, and another for the bascule span. The concrete deck on the approach spans is crowned in the center, while the open steel grid decking of the bascule span deck is level. Stormwater is discharged into the bay through scuppers spaced along the curb line. The bridge typical sections are symmetrical, providing 26 ft between curbs, and the deck is striped to provide one 12-ft wide traffic lane in each direction. There are pedestrian sidewalks along each fascia. The approach span sidewalks are each approximately 3-ft wide, as measured between the reinforced concrete bridge railings at the fascias and the rear faces of the metal guardrail posts that flank the 1-ft-7 inch.(in) wide concrete curbs. The bascule span sidewalks are each nearly 4-ft wide, and they are flanked by metal bridge railings at the fascias and 11.25-in wide metal curbs. The overall width between bridge copings is 37 ft-9 in for the approach spans and 35 ft-10 in for the bascule span. The causeway and bridge are located within a band of existing ROW 1000-ft wide. The posted speed limit is 45 mph.

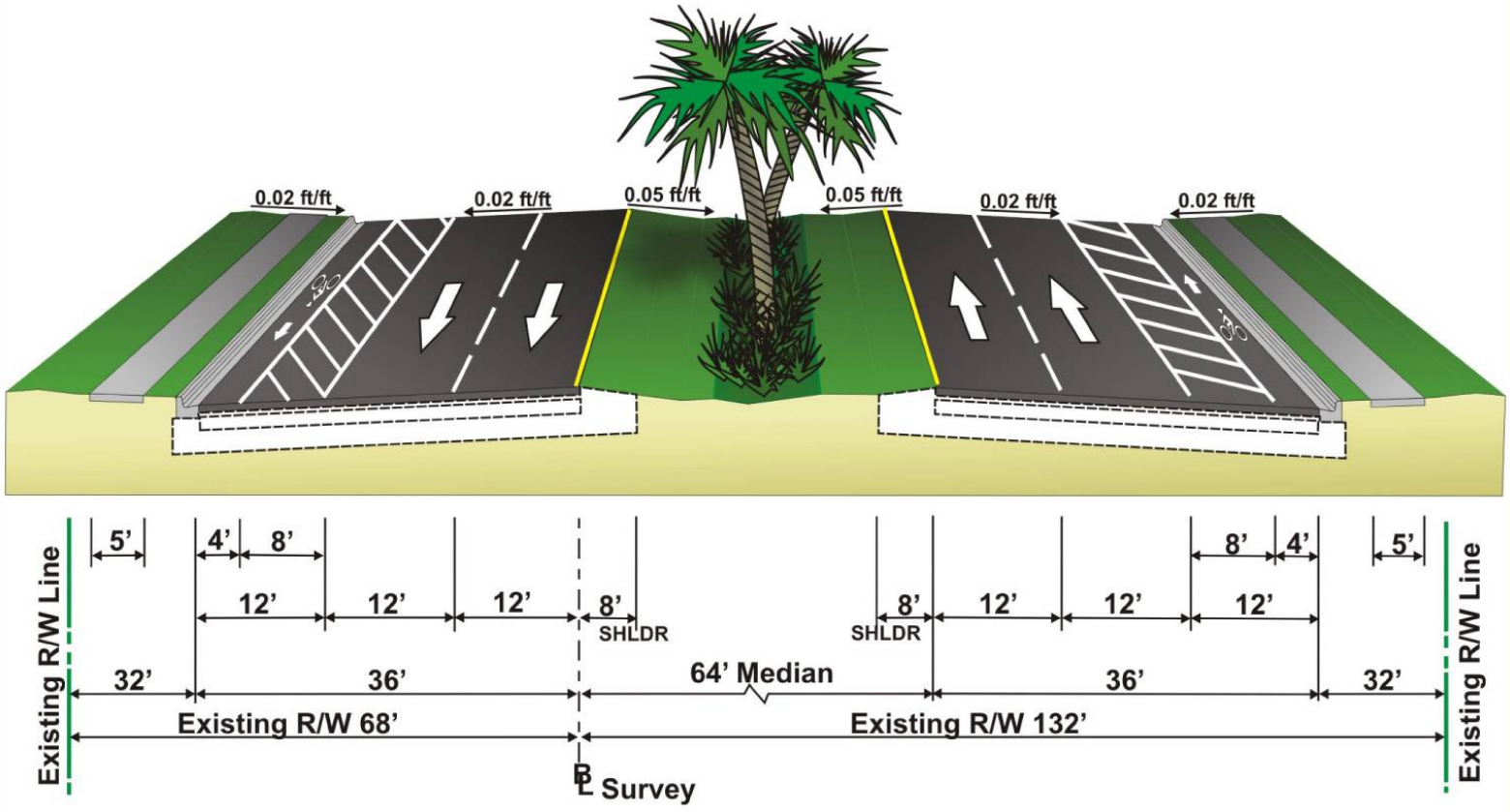
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

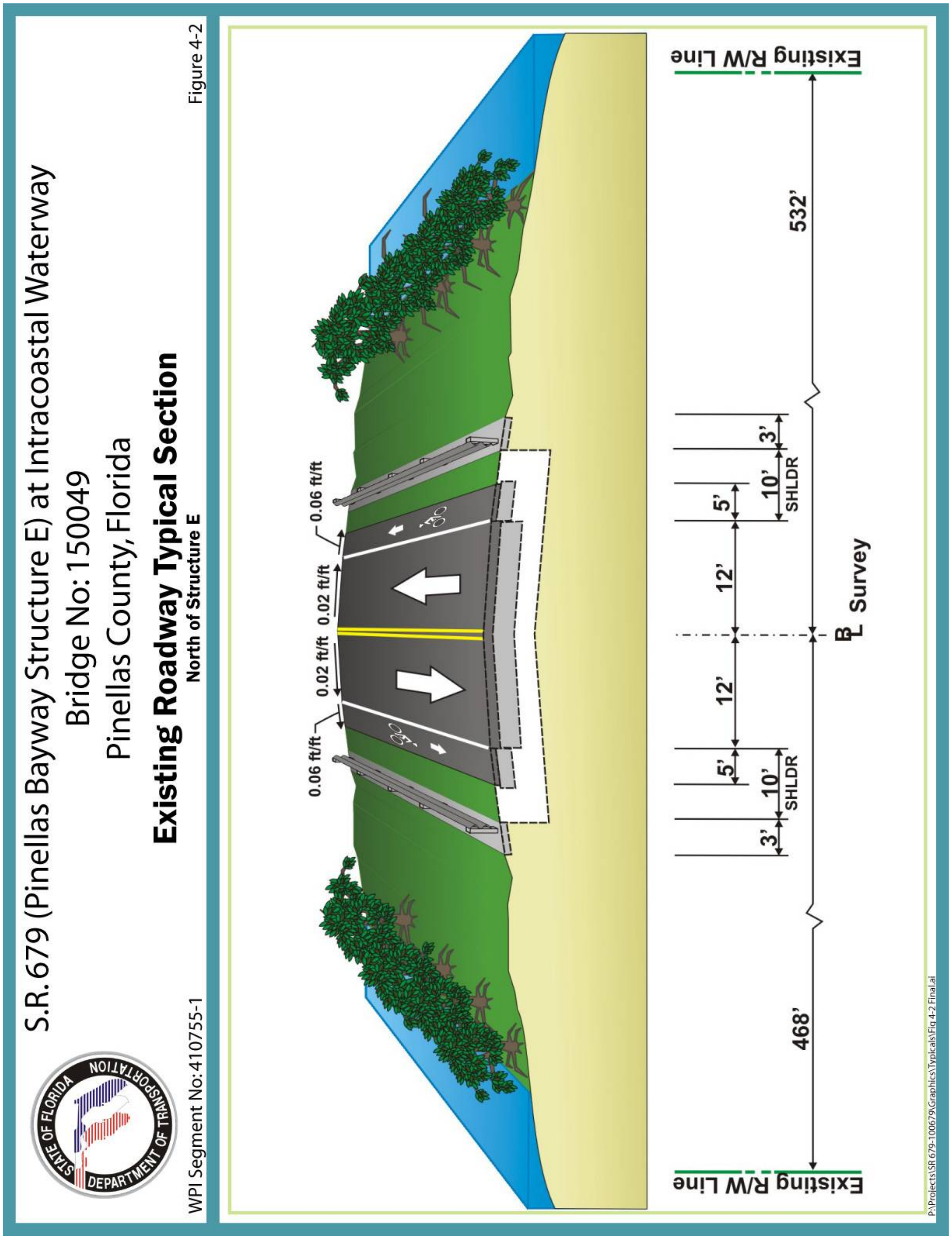
Existing Roadway Typical Section

South of Structure E

WPI Segment No: 410755-1

Figure 4-1



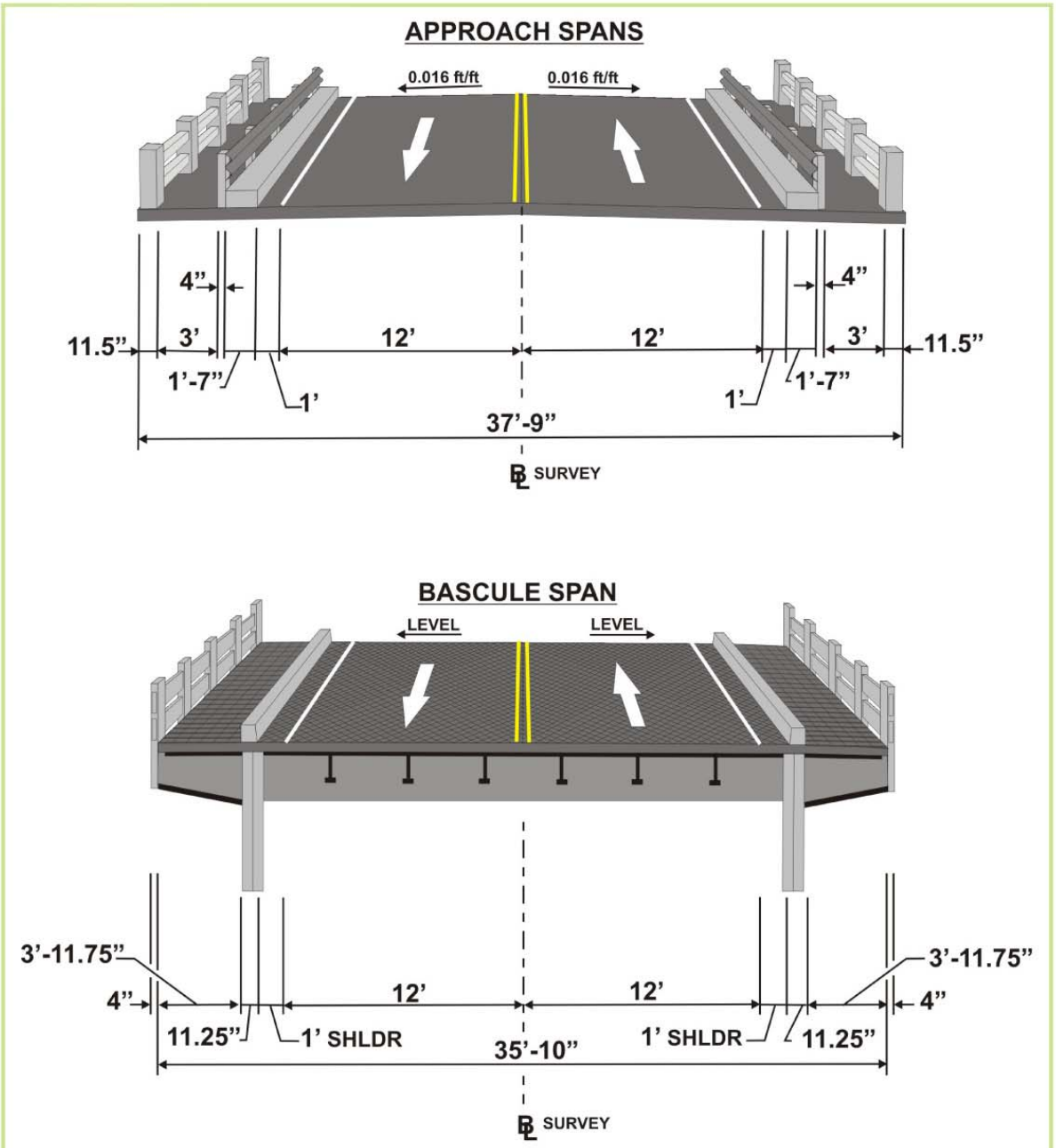

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Existing Roadway Typical Section
North of Structure E
WPI Segment No: 410755-1
Figure 4-2
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
0.06 ft/ft
0.02 ft/ft
0.02 ft/ft
0.06 ft/ft
Existing R/W Line
468'
3'
10'
SHLDR
5'
12'
12'
5'
10'
SHLDR
3'
532'
Existing R/W Line
B L Survey
P:\Projects\SR 679-100679\Graphics\Typicals\Fig 4-2 Final.ai

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Existing Bridge Typical Sections

WPI Segment No : 410755-1

Figure 4-3



4.1.3 PEDESTRIAN AND BICYCLE FACILITIES

Sidewalks are provided in both directions along S.R. 679 south of Structure E and across the bridge. No sidewalks are provided on S.R. 679 north of the bridge. However, pedestrians commonly utilize the causeway for recreational purposes. Anglers fish from the bridge's sidewalk.

Designated bicycle lanes, 4 ft in width, are provided south of Madonna Boulevard and are also designated north of the bridge on 5-ft wide shoulders. However, there are no bike lanes on the bridge itself.

4.1.4 RIGHT-OF-WAY

The existing ROW for S.R. 679 varies from 200 ft south of Structure E on Tierra Verde to a maximum of 1000 ft across the bridge and along the causeway north of the bridge (including submerged lands). The existing corridor ROW width information was obtained from the Florida Department of Transportation (FDOT) ROW maps, as-built plans, and design plans.

4.1.5 HORIZONTAL ALIGNMENT

The centerline survey prepared for this Project Development and Environment (PD&E) Study indicates the existing horizontal alignment of the S.R. 679 centerline is on a tangent bearing of N 30° 53' 13.832" E south of Madonna Boulevard. North of Structure E, the existing alignment curves to the west along a 1° 30' curve (Radius=3819.72 ft). The alignment then continues northbound on a tangent bearing of N 8° 07' 27.432" W to S.R. 682.

4.1.6 VERTICAL ALIGNMENT

The original 1961 as-built plans for S.R. 679 indicate elevations of the roadway vary from 6.17 ft above sea level (United States Coast Guard [USCG] and Geodetic Survey Mean Low Water and Coordinate System) on the approaches, to a highpoint of 29.85 ft atop Structure E. Both bridge touchdowns are at elevation 6.45 ft above sea level.

4.1.7 DRAINAGE

Stormwater runoff along S.R. 679 on Tierra Verde is captured through median or curb inlets and discharged into Boca Ciega Bay, which is an Outstanding Florida Water (OFW) and State Aquatic Preserve. Drainage on the bridges is discharged through scuppers directly into Boca Ciega Bay. Stormwater runoff from the roadway north of Structure E is discharged into Boca Ciega Bay as sheet flow. There are no major drainage structures or retention/detention ponds within the project limits.

The entire project is located within the 100-year storm surge floodplain; however, since the area is tidally influenced, no floodplain mitigation will be required.

4.1.8 GEOTECHNICAL DATA

Soil borings which were performed in support of the FDOT's recent S.R. 682, Bayway Structure C bridge replacement design project were reviewed. The borings were performed from the existing

approach embankments (elevation 12 to 13 ft, National Geodetic Vertical Datum [NGVD]) and water surface (elevation 0 ft, NGVD) to elevations of -80 to -140 ft, NGVD. The borings encountered relative loose to medium dense gray brown fine sand to slightly silty fine sand extending from approximate elevation 13 ft to elevation 0. Very soft to soft dark gray brown to green gray silty sand with clay was generally encountered next and extended from approximate elevation 0 to -12 ft. Loose to medium dense gray brown slightly silty fine sand was generally encountered next and extended from approximate elevation -12 to -30 ft. A dense to hard layer of sand with shell was generally encountered next extending from approximate elevation -30 to elevation -50 ft. The sand with shell strata varied in thickness nonexistent to 10 ft. Loose to very dense gray brown fine sand was generally encountered next and extended from approximate elevations -30 to -50 ft to elevation -100 ft. An indurated (rock like) green silty clay and very hard gray brown silty sand were generally encountered next extending from approximate elevation -100 to -140 ft.

Borings performed for S.R. 679, Structure E, as part of the October 1957 design plans indicate similar soil conditions. The borings performed were recorded to mean sea level (MSL) and did not have Standard Penetration Test, N values. Subsequently, relative density and consistency are unknown. Based on the borings performed, fine sand with shell was generally encountered from the channel bottom to approximate elevations -40 to -80 ft, MSL. Sandy shell, fine marly sand, some shell and fine sand, some marl and organic silt were generally encountered next and extended to elevations ranging from -40 to -100 ft MSL. Minor inclusions consisting of fine marly sand, some shell were encountered at elevations ranging from -21 to -25 ft MSL. Fine sand, some shell was generally encountered between elevations -60 feet MSL to the boring termination depths ranging from. -90 to -115 ft MSL.

Based on the general description of the subsurface soil encountered, the subsurface soils appear to be similar. Descriptions of soils have evolved since 1957. The term "marl" is likely describing high silt and clay contents.

4.1.9 CRASH DATA

A review of FDOT crash data for the years 1999 through 2004 indicated that 89 crashes had occurred within the project limits. An evaluation of the data indicated that the Madonna Boulevard intersection, the segment along the bridge itself, and the segment north of the bridge have safety ratios greater than 1.0 for one or two of the years evaluated. A safety ratio greater than 1.0 indicates that a segment or intersection is experiencing an abnormal amount of crashes compared to the statewide average of an intersection or roadway with similar characteristics. The number of crashes could be attributed to the narrow clear width of the bridge and the number of conflict points (median openings and driveways) surrounding the Madonna Boulevard intersection. Table 4-1 summarizes the number of crashes and the safety ratio for each year for these locations.

Table 4-1
Crash Data

Year	Madonna Boulevard Intersection		Structure E Bridge Segment		North of Structure E Roadway Segment		Total Crashes
	Crashes	Safety Ratio	Crashes	Safety Ratio	Crashes	Safety Ratio	
1999	8	1.259	4	1.535	1	0.410	13
2000	12	1.868	3	0.369	3	1.281	18
2001	3	0.432	1	0.104	5	0.704	9
2002	5	0.699	2	0.233	6	0.878	13
2003	8	0.808	3	0.342	8	1.173	19
2004	8	0.708	6	0.637	3	0.497	17
Total/Average	44	0.962	19	0.537	26	0.824	89

4.1.10 INTERSECTIONS AND SIGNALIZATION

The S.R. 682 intersection with S.R. 679, which is located north of the study area (1.6 miles north of the Madonna Boulevard intersection), is the only signalized intersection near the project study area. Forming a T-intersection with S.R. 679 just south of the bridge, Madonna Boulevard serves a large residential area on the west side of Tiera Verde. A driveway serving The Village at Tierra Verde, a large condominium community on the east side of S.R. 679, is offset approximately 120 ft to the north of the Madonna Boulevard intersection. A commercial driveway is located immediately across from the Village at Tierra Verde driveway on the west side of S.R. 679. In addition to Madonna Boulevard and The Village at Tierra Verde driveway each being served by separate median openings, other commercial driveways are also located in the vicinity.

There are no railroad crossings within or near the project study area.

4.1.11 LIGHTING

Conventional roadway lighting is provided south and north of Structure E. However, no lighting is provided across the bridge.

4.1.12 UTILITIES

In order to evaluate potential aerial, surface, and subsurface utility conflicts associated with the project, information was requested from utility companies pertaining to the type, location, and ownership of the existing utilities within the project area. This information is summarized in Table 4-2. Plan sheets marked-up by each utility provider are located in the project files.

Table 4-2
Existing Utilities Along S.R. 679

Owner	Utility	Aerial (A) Buried (B) Connected to Bridge (C)	Approximate Location		
			Side	From	To
Knology Broadband of Florida	No facilities within Project limits				
Bright House Networks	CATV Fiber Optic Cable	B	West	Madonna Boulevard	S.R. 682
City of St. Petersburg	12 in D.I. Force Main	B	East	South of Madonna Boulevard	S.R. 682
Progress Energy - Distribution	Electric Distribution	A	East and West	South of Madonna Boulevard	South bridge approach
		A	West	North of Structure E	S.R. 682
		B Sub-Aqueous	East	South of Structure E	North of Structure E
Tierra Verde Utilities	Gravity Main	B	East and West	South of Madonna Boulevard	South of Madonna Boulevard
		B	Across S.R. 679	The Village at Tierra Verde Driveway	Madonna Boulevard
	Force Main	B	West	South of Madonna Boulevard	Madonna Boulevard
Pinellas County Utilities	8" PVC Potable Water Main	B	East	South of Madonna Boulevard	Madonna Boulevard
	10" PVC Potable Water Main	B	West	South of Madonna Boulevard	Madonna Boulevard
	4" PVC Potable Water Main	B		At Madonna Boulevard intersection	
	10" PVC Potable Water Main	B		Along south side of Madonna Boulevard	
	6-4” Conduit with 1 FOC	B	East	South of Madonna Boulevard	South bridge approach
	2 - 4" Conduit with 1 FOC	C	East	South bridge approach	North bridge approach
	2 - 4" Conduit with 1 FOC	B	East	North bridge approach	Palma Del Mar Boulevard
	1 – BT	B	East	North bridge approach	Palma Del Mar Boulevard

4.1.13 PAVEMENT CONDITIONS

S.R. 679 was last resurfaced south of Structure E in 1999 and north of Structure E in 2000. FDOT calculates Ride Rating, Rut Rating, and Crack Rating on a scale of 1 (worst) to 10 (best). Based on the Flexible Pavement Condition Survey Forecast prepared by FDOT, the 2006 pavement condition ratings south of the bridge are 10.0 (crack rating), 7.6 (ride rating) and 10.0 (rut rating). The 2006 pavement condition ratings north of the bridge are 10.0 (crack rating), 7.2 (ride rating) and 9.0 (rut rating).

4.2 EXISTING BRIDGES

4.2.1 TYPE OF STRUCTURE

The existing two-lane bridge consists of 22 approach spans flanking a low-level double-leaf trunnion bascule span.

4.2.2 CURRENT CONDITIONS AND YEAR OF CONSTRUCTION

Structure E was originally constructed in 1961. The posted speed limit on Structure E is 45 mph. At present, Structure E is not posted for any weight restrictions. Structure E is functionally obsolete and has a scour vulnerability rating of "scour critical."

Every year and after major storm events, under a FDOT contract, Structure E is inspected by certified bridge inspectors (CBI) to satisfy the federal regulations of the National Bridge Inspection Standards. The information from the *Bridge Inspection Report*[1] is used to calculate the load rating for the bridge. Bridge load rating calculations provide a basis for determining the safe load capacity of a bridge. Load rating requires engineering judgment in determining a rating value that is applicable to maintaining the safe use of the bridge and arriving at posting and permit decisions. However, the bridge is not currently posted for weight restrictions. Based on the latest *Bridge Inspection Report*, no load rating is required.

An element of the *Bridge Inspection Report* is the Sufficiency Rating, which was discussed previously in Section 3.0. *The 2004 Bridge Inspection Report* indicated a Sufficiency Rating of 49.3 while the *2005 Bridge Inspection Report* indicated a Sufficiency Rating of 50.0 for Structure E. Sufficiency Ratings for 2006 and 2007 are 48.3 and 49.3, respectively. As documented in the *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*[2], Sufficiency Ratings are calculated based on 23 factors grouped into four main components. Items such as superstructure, substructure, culverts, and inventory rating (load rating) are considered for a Structural Adequacy and Safety component, which comprises a maximum 55 percent of the overall Rating. Items such as deck geometry and condition, traffic volumes, structural evaluation, structure type, and waterway adequacy are considered for the Serviceability and Functional Obsolescence component, which comprises a maximum 30 percent of the overall Rating. Essentiality for public use comprises a maximum15 percent of the overall Rating. Finally, special reductions are considered for a maximum 13 percent reduction of the Sufficiency Rating.

The Sufficiency Rating of 49.3 reflects, in part, the substandard geometric conditions, bridge width, lack of shoulders, etc. of the structures. As with all bascule bridges, Structure E also contains fracture critical elements, meaning that members are subject to tension such that failure could result in collapse of bridge spans.

Another element reported in the Bridge Inspection Reports is the National Bridge Inventory (NBI) Rating. This rating is used to assess the condition of major components of the structure, including the deck, superstructure, and substructure. The ratings are defined as follows:

NBI Ratings

0	Failed Condition	5	Fair Condition
1	Imminent Failure Condition	6	Satisfactory Condition
2	Critical Condition	7	Good Condition
3	Serious Condition	8	Very Good Condition
4	Poor Condition	9	Excellent Condition

The NBI ratings reported in the *2003, 2004,* and 2005 *Bridge Inspection Reports* are summarized in Table 4-3, which shows deterioration in the deck and superstructure condition for each one year period. The superstructure and substructure components are currently in satisfactory condition, while the deck is in fair condition.

Table 4-3
NBI Ratings

Structural Component	2003	2004	2005
Deck	7	6	5
Superstructure	7	6	6
Substructure	6	6	6

Bridges in saltwater environments are subject to corrosion of the reinforcing steel caused by saltwater intrusion through the concrete, causing the reinforcing steel to rust. This process creates cracks in the concrete. The cracks lead to delaminating and spalling, causing the concrete to crumble and fall away. This results in reduced structural integrity. The bridge inspection reports document several specific areas of corrosion stains, concrete delaminations, spalls, cracks, and other deficiencies. In addition, a number of piles had previously been fitted with pile jackets which are now showing signs of deterioration as well.

According the Final Bridge Rehabilitation Alternatives Report, the rehabilitation is to be completed by 2011. Therefore, the remaining service life of Structure E under normal maintenance conditions

is estimated to continue until 2011. This means that under the current normal maintenance program, the bridge will need to be rehabilitated or replaced by 2011.

4.2.3 HORIZONTAL AND VERTICAL ALIGNMENT

The alignment of Structure E consists of a tangent along bearing N 30° 53' 13.832" E. The profile consists of a 900-ft crest curve with grades of 3 percent on both approaches. The centerline of the Intracoastal Waterway channel and the fender system are perpendicular to the bridge. Structure E provides a 90-ft horizontal clearance between fenders and a 21.5-ft vertical navigational clearance (when closed) over the Intracoastal Waterway.

4.2.4 SPAN ARRANGEMENT - NUMBER AND LENGTH OF SPANS

The 1382 ft-5½ in long bridge consists of 22 approach spans flanking a double leaf, trunnion bascule span. The south and north approach spans are comprised of 9 and 11 prestressed concrete beam spans respectively, and two steel spans that are adjacent to the bascule span. Approach spans 1-3 and 15-23 are each 48-ft long simple spans comprised of the American Association of State Highway Transportation Officials (AASHTO) Type II beams, and spans 4-9, 13 and 14 are each 72-ft long and they are comprised of simple span AASHTO Type III beams. Spans 10 and 12 are each 48 ft-8.5 in long simple spans comprised of rolled steel wide flange beams. The bascule span is 133 ft-0.5 in long as measured between the open deck joints at the rear of each bascule pier. Figure 4-4 presents the existing bridge plan and elevation.

4.2.5 CHANNEL DATA

Structure E spans a marked navigable channel, the Gulf Intracoastal Waterway, providing a horizontal clearance between fenders of 90 ft. The maximum water depth in the channel under Structure E is approximately 20 ft. The channel and fenders are perpendicular to the bridge.

4.2.6 BRIDGE OPENINGS

Structure E is manned 24 hours a day, 7 days a week. The bridge opens on demand except from 9 a.m. to 7 p.m. when the bridge opens every 20 minutes if boats requesting an opening are present. Figure 4-5 summarizes all of the bridge openings from January 2003 through April 2005.

Average statistics over the time period include:

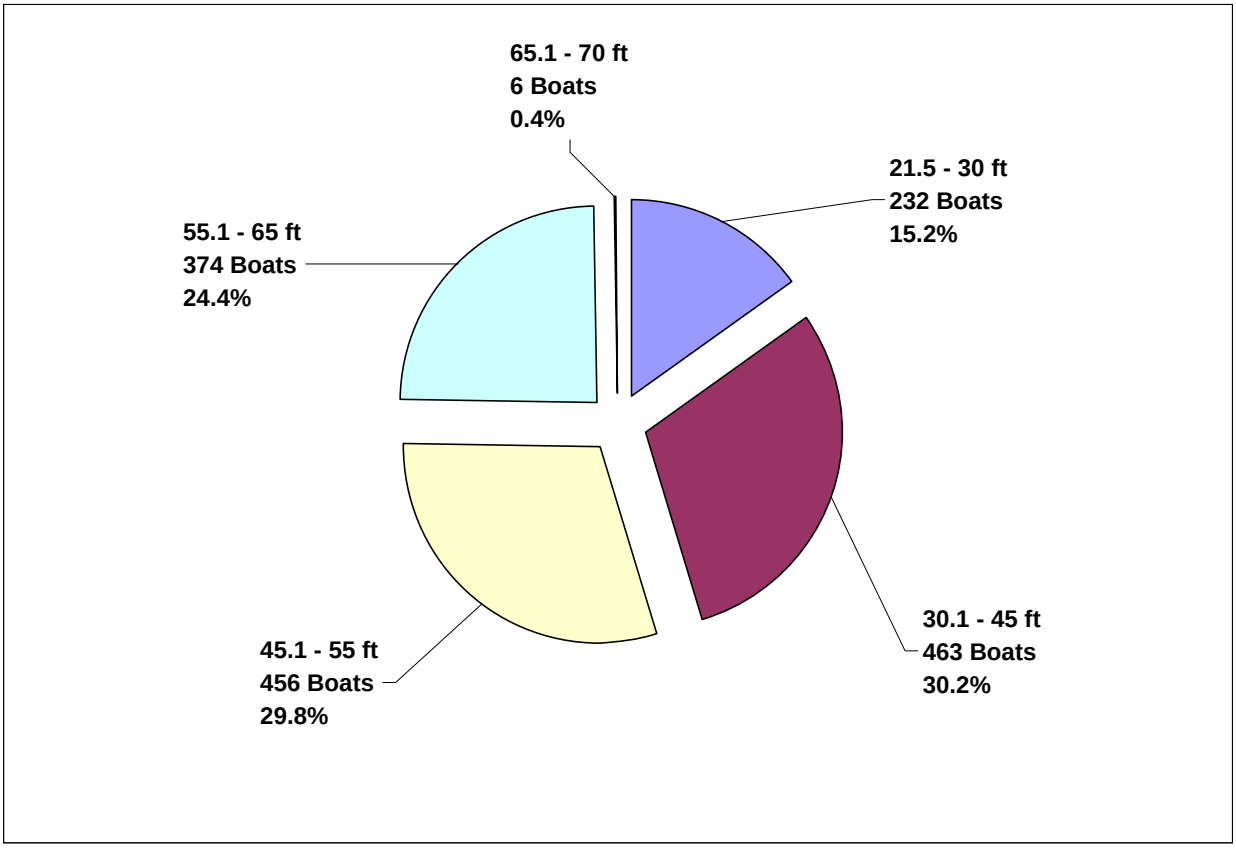
- Peak month is April
- Peak day is Sunday
- 12.8 boats per day
- 9.9 openings per day
- 4.66-minute average duration of bridge openings

These statistics were considered when developing future traffic projections in Section 6.0 of this report.

4.2.7 VESSEL HEIGHT DATA

Vessel (mast) heights were collected by the bridge tender as the vessels which required the bridge to open passed through the channel during the period from June 2005 through March 2006. The bridge tender contacted each boat Captain by radio to ascertain the vessel height. If no radio were available on a vessel, the bridge tender estimated the heights. A total of 1531 vessels were logged during this period. Chart 4-1 summarizes the data by height, number of boats in each height range, and percentage of boats in each height range. The data indicates that approximately 15 percent of the boats which currently require the bridge to open are 30 ft or under. Similarly, approximately 45.4 percent of the boats which currently require the bridge to open are 45 ft or under. Approximately 99.6 percent of the boats which currently require the bridge to open are 65 ft tall or less. This data can be used to estimate the percentage of boats which will fit under alternative bridges with differing vertical navigational clearances.

Chart 4-1
Vessel Heights

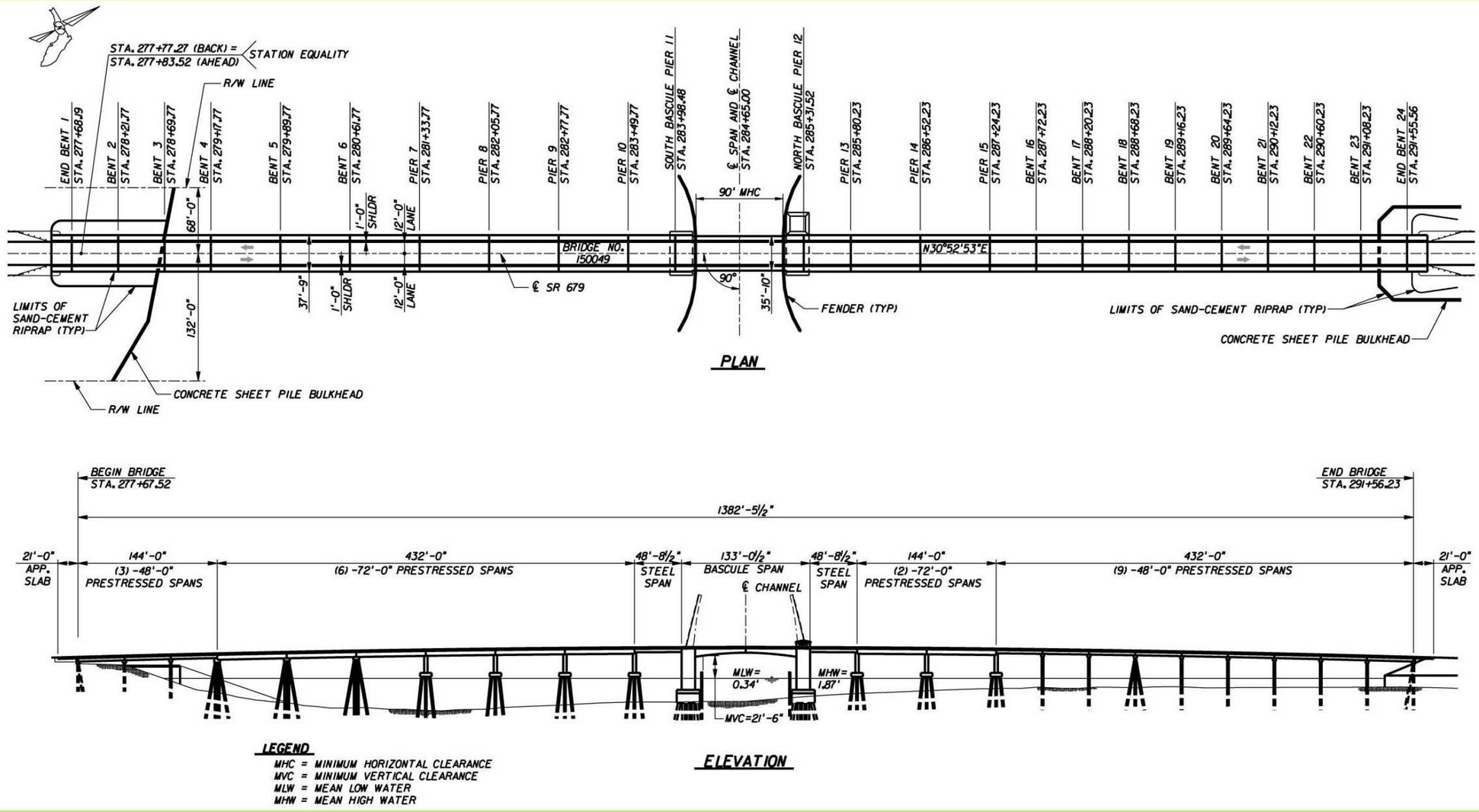


S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Existing Bridge Plan & Elevation

WPI Segment No : 410755-1

Figure 4-4

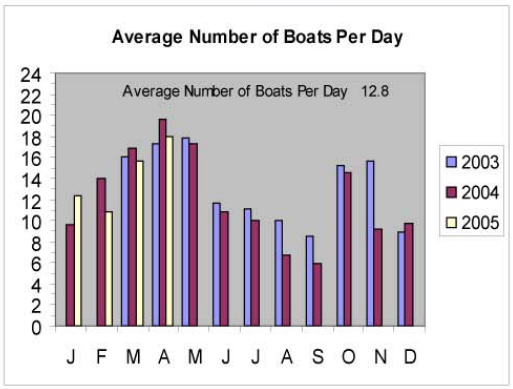


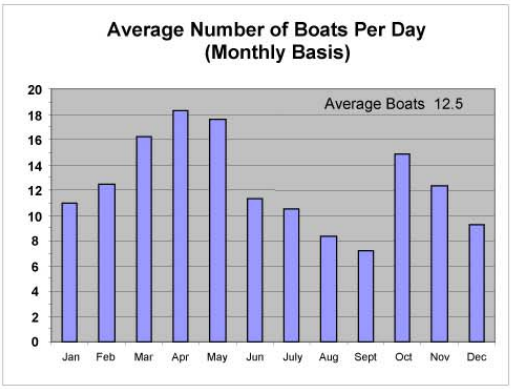
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

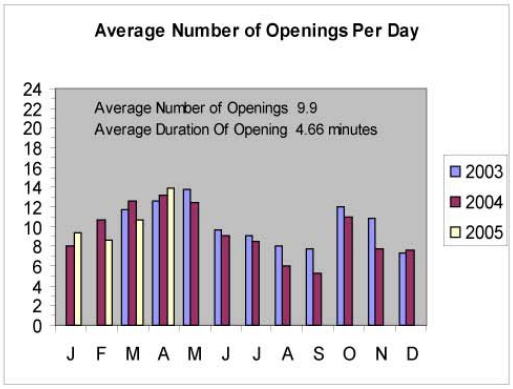
Boat Log Summaries

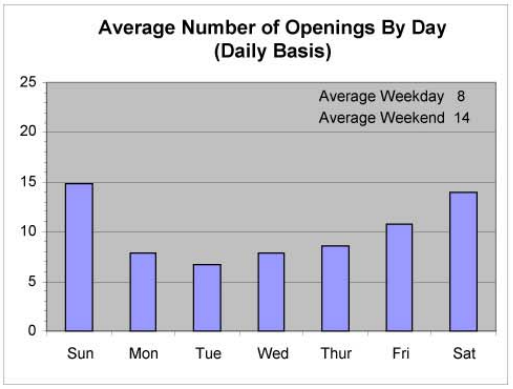
WPI Segment No : 410755-1

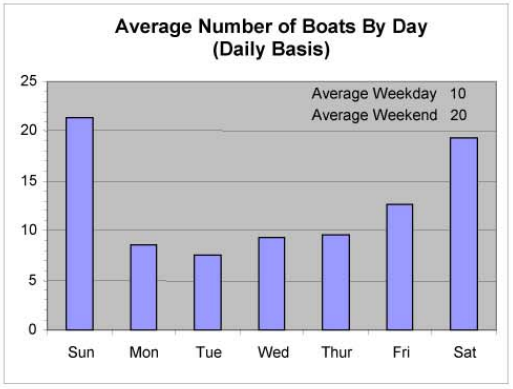
Figure 4-5

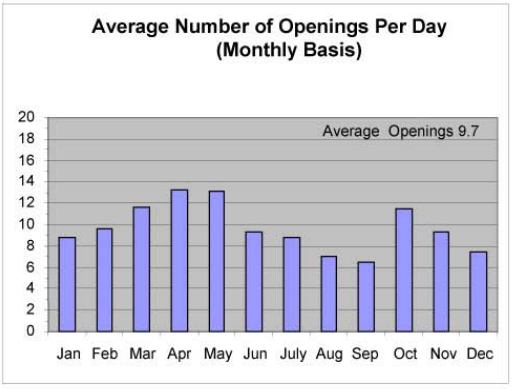












4.2.8 SHIP IMPACT DATA

The existing bridge substructure contract plans did not address vessel collision requirements, and the existing fender system is a sacrificial structure and not intended to accommodate vessel impact. The current edition of the FDOT *Structures Design Guidelines (SDG)*[3] states that the design of all new bridges over navigable waters must include consideration for possible vessel collision Based on coordination with FDOT and the USCG, and a review of the 2003 through 2005 bridge tender logs for Structure E, there is no evidence to suggest that vessels impacting the bridge or having navigational difficulties is a significant problem at this location.

4.3 EXISTING ENVIRONMENTAL CHARACTERISTICS

4.3.1 LAND USE DATA

4.3.1.1 Existing Land Use

The existing land uses adjacent to S.R. 679 consist of residential, commercial, marinas/docks, recreational, and preservation. An overview of the existing land use is shown in Figure 4-6.

Residential developments adjacent to S.R. 679 are The Village at Tierra Verde, The Yacht Club, and Anchor Cove to the south of the bridge and Bahia Del Mar and Palma Del Mar located north of the causeway. Commercial uses south of the bridge on the west side of the S.R. 679/Madonna Boulevard intersection include Tierra Verde Marina Shopping Plaza, 7-Eleven, and other small businesses. The Tierra Verde Hi and Dry and Tierra Verde Resort Marina are southwest of the bridge. Fort De Soto Park is located 5 mi south of the project area, south of Bunces Pass.

The bridge spans over the Intracoastal Waterway, a navigable waterway that is within Boca Ciega Bay, which is an OFW and State Aquatic Preserve.

4.3.1.2 Future Land Use

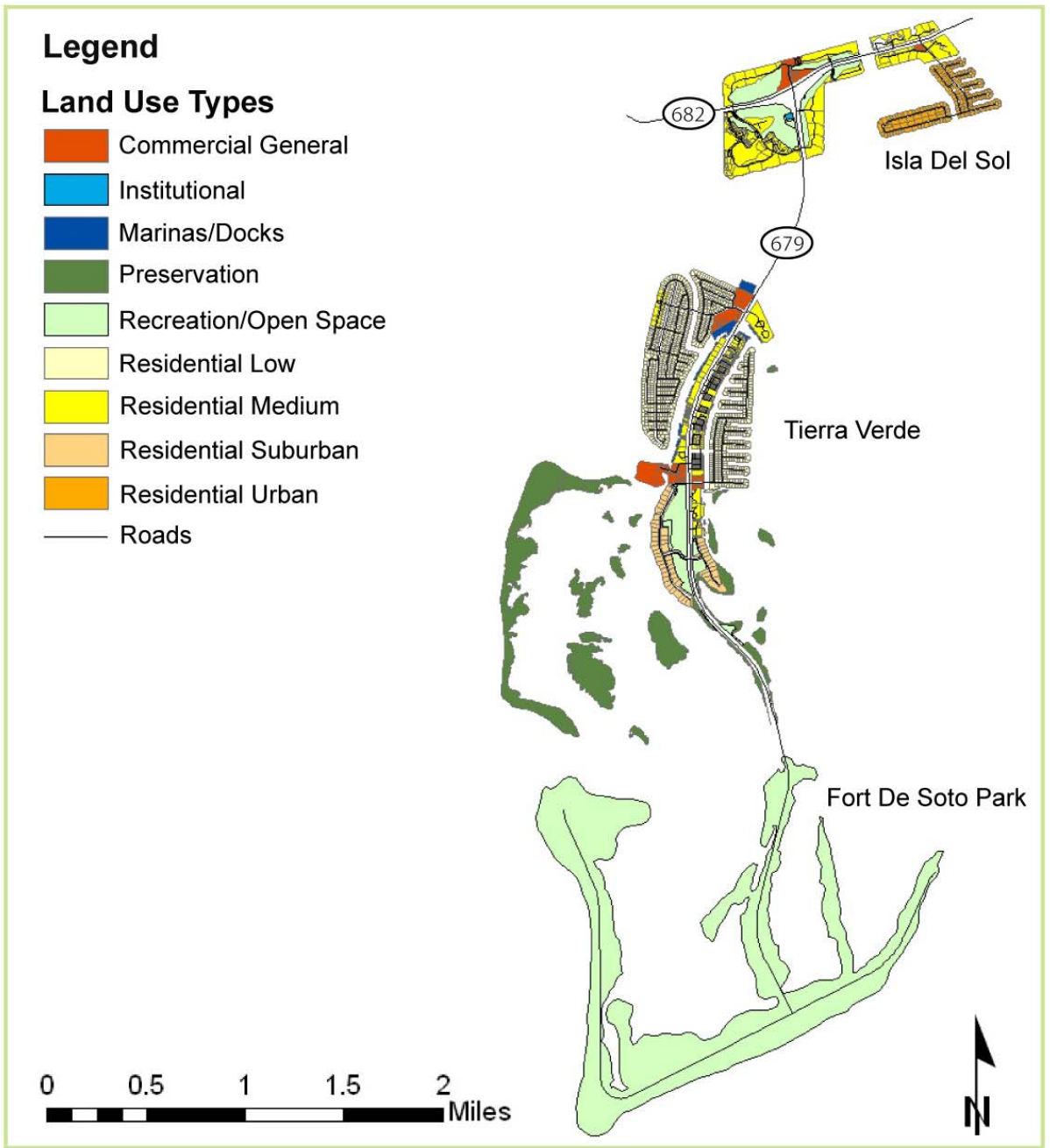
The designated land uses on *The Updated Countywide Plan for Pinellas County*[4] Future Land Use Map (FLUM) indicates that future land uses conform to the existing land uses. Future land use designations include residential low, residential medium, residential suburban, and commercial general as shown in Figure 4-7. Future recreational uses include Fort De Soto Park located south of the project area and the proposed Bayway Trail South, a recreational trail that would be located adjacent to S.R. 679 and link the mainland to Fort De Soto Park.

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Existing Land Use Map

WPI Segment No : 410755-1

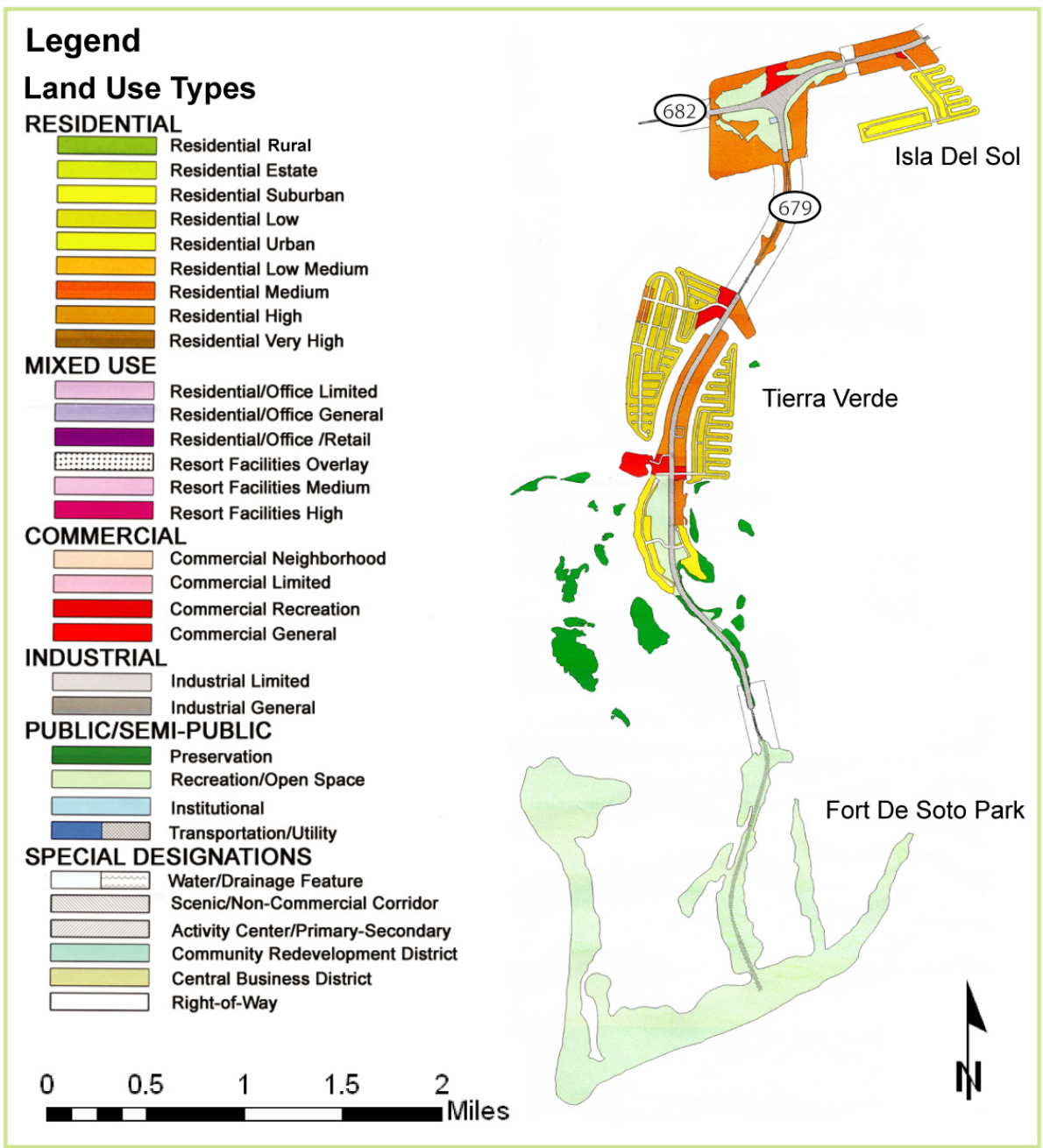
Figure 4-6



S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Future Land Use Map

WPI Segment No : 410755-1

Figure 4-7



Per the socio-economic data used in the development of the Pinellas County Metropolitan Planning Organization (MPO) *2025 Long Range Transportation Plan*[5], the population growth for Pinellas County from 1999 to 2025 is expected to grow from 893,415 to 962,095 (an increase of 7.7 percent). Employment is also expected to increase from 497,887 to 584,900 (an increase of 17.5 percent). With less than seven percent of the land area in the county consisting of vacant property suitable for development, future growth in the county is expected to revolve around redevelopment and infill development activity.

4.3.2 CULTURAL FEATURES AND COMMUNITY SERVICES

4.3.2.1 Cultural Features

Literature reviews and field surveys were performed as part of the PD&E Study's cultural resource assessment survey. The purpose of the *Final Cultural Resource Assessment Survey Report (CRAS)*[6] was to locate, identify, and bound any prehistoric and historic period archaeological sites and historic structures within the project area of potential effects (APE) and to assess the significance of these resources in terms of eligibility for listing in the *National Register of Historic Places* (*NRHP*)[7] according to the criteria set forth in Chapter 36 Code of Federal Regulations (CFR) Part 60.4. The historical/architectural and archaeological surveys were conducted by Archaeological Consultants, Inc. (ACI) in September 2005. Field surveys were preceded by background research. Such work served to provide an informed set of expectations concerning the kinds of cultural resources that might be anticipated to occur within the project APE, as well as a basis for evaluating any new sites discovered.

This survey was initiated in order to comply with Section 106 of the National Historic Preservation Act of 1966 (Public Law 89-665), as amended, and the implementing regulations 36 CFR 800 (revised May 1999), as well as the provisions contained within the revised Chapter 267, Florida Statutes. All work was carried out in conformity with Part 2, Chapter 12 ("Archaeological and Historical Resources") of the FDOT's *Project Development and Environment Manual*[8], and the standards contained in the *Cultural Resource Management Standards and Operational Manual*[9].

Background research, including a review of the *Florida Master Site File (FMSF)*[10] and the *NRHP*, indicated an absence of previously recorded archaeological sites and historic resources. As a result of field survey, no new archaeological sites or historic structures were identified within the project APE. Thus, no significant cultural resources, including archaeological sites and historic resources that are listed, determined eligible, or considered potentially eligible for listing in the *NRHP* will be affected by this project. No further work is recommended. The State Historic Preservation Office (SHPO) coordination letter, dated March 17, 2006, is included as Appendix C.

4.3.2.2 Community Services

Community services provide a focal point for adjacent neighborhoods and communities, as well as serving the needs of surrounding areas. For the purpose of this study, community facilities include churches and other religious institutions, cemeteries, parks and recreation areas, other neighborhood gathering places, fire stations, police stations, public and private schools, medical and emergency treatment facilities, and public buildings and facilities. Community service facilities located along or near the project study area are discussed below and shown on Figure 4-8.

Recreation Areas

S.R. 679 serves as the only roadway connection between the mainland of Pinellas County and islands of Tierra Verde and Mullet Key (Fort De Soto Park). Fort De Soto Park, located south of the project area and Bunces Pass, offers many amenities including camping, canoeing, swimming, fishing, boating, Fort De Soto Park Trail, a paw playground (dog park), and a historic fort. Fort De Soto Park is the largest and most active park in the county, hosting more than 2.7 million visitors each year, many of which access the park via automobile.

The Bayway Trail South is a proposed recreational trail for this portion of the Pinellas Bayway that would be located adjacent to S.R. 679 and link the mainland to Fort De Soto Park. The proposed trail would also connect the Fort De Soto Trail with the South Beaches Trail and the proposed Bayway Trail North that connects with the Pinellas Trail to the north and the Sunshine Skyway Trail to the south. Each of these trails is depicted on Figure 4-8. The proposed Bayway Trail South is being considered in the evaluation and development of bridge alternatives.

Emergency Services and Access

Emergency management services are provided to this community by Sun Star Emergency Medical Services which has a contract with Pinellas County. Fire Department services are provided by the City of St. Petersburg. One fire station is located in Tierra Verde at 1420 Pinellas Bay Way South.

Hospitals providing medical services to this area include Palms of Pasadena Hospital (7 mi away), Bayfront Medical Center (10 mi away), and All Children's Hospital (10 mi away).

Sheriff's Deputies regularly patrol Tierra Verde, although a facility (with public access) dedicated to administration and management is not located within the Tierra Verde community. Sheriff's deputies do have access to facilities not available to the public to facilitate continual service 24 hours a day.

Schools

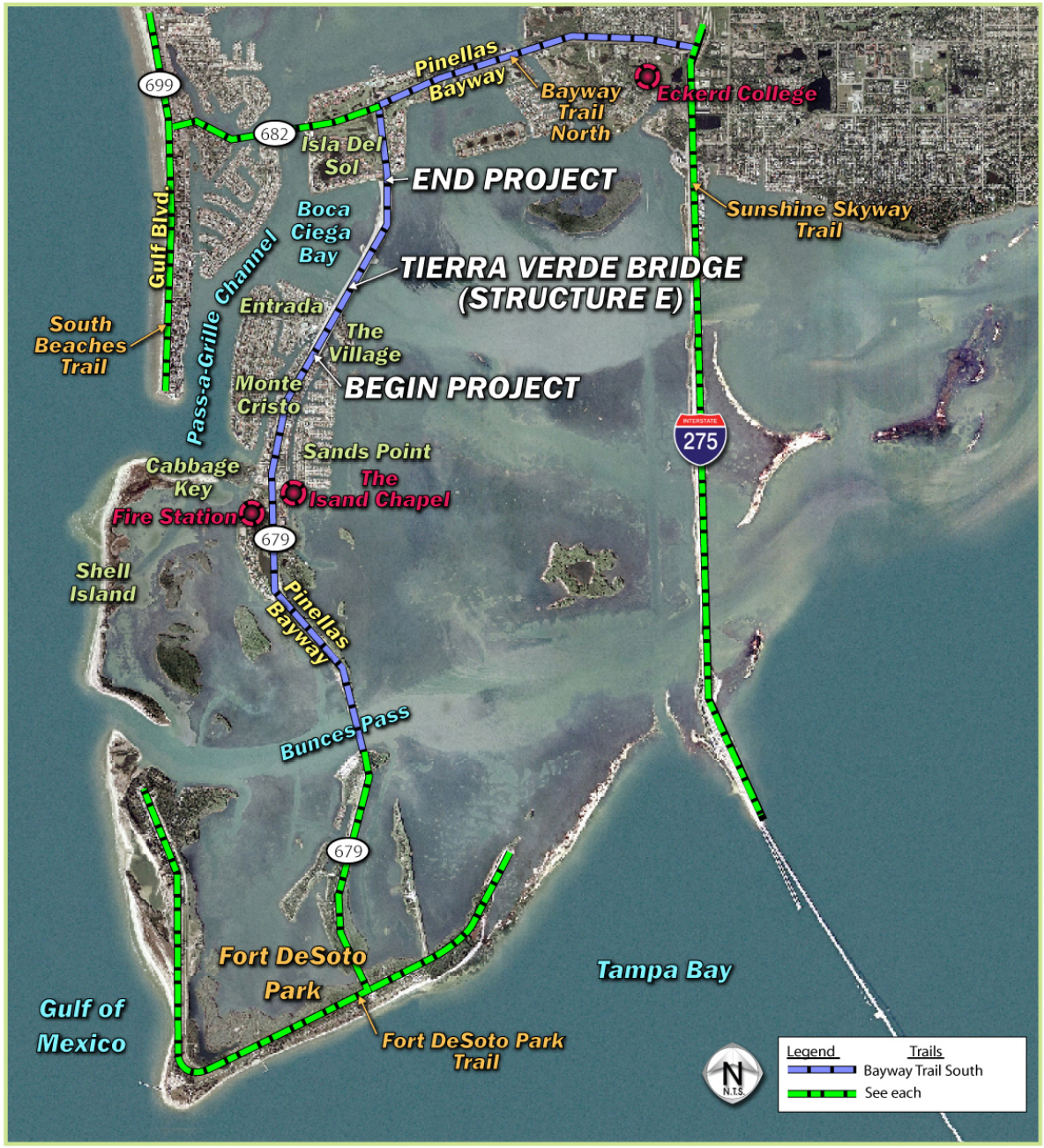
No schools are located within the study area.

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

WPI Segment No : 410755-1

COMMUNITY SERVICES MAP

Figure 4-8



Churches

The Island Chapel is located at 1271 Pinellas Bayway South. The church is at the south end of the project corridor on the east side of the roadway. This facility will not be impacted from the proposed improvements.

There are no government buildings or cemeteries located within the study area.

4.3.3 NATURAL AND BIOLOGICAL FEATURES

4.3.3.1 Threatened and Endangered Species

The following federally protected species were identified as potentially occurring within the project area: Gulf sturgeon, smalltooth sawfish, loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, Kemp's Ridley turtle, piping plover, bald eagle, wood stork and the West Indian manatee.

In addition to the federally protected species, state-only protected species were also identified. These included state-protected wading birds, such as the roseate spoonbill, little blue heron, reddish egret, snowy egret, tricolored heron, and white ibis. The state protected brown pelican, least tern, American oystercatcher, snowy plover, and black skimmer were also identified as potentially occurring in the project area. For more information, refer to the *Final Wetland Evaluation and Biological Assessment Report (WEBAR)*[11] prepared for this PD&E Study.

4.3.3.2 Outstanding Florida Waters

Boca Ciega Bay is classified as an OFW and State Aquatic Preserve.

4.3.3.3 Coastal Barrier Resources

In 1982, the Coastal Barrier Resources Act was signed into public law (P.L. 97-348), prohibiting Federal expenditures for development of designated undeveloped coastal barriers and their associated aquatic habitat, including wetlands, estuaries, and inlets. This law was reauthorized as the Federal Coastal Barrier Resources Reauthorization Act of 1999. This Act designated various undeveloped coastal barrier islands for inclusion in the Coastal Barrier Resources System. Areas so designated were made ineligible for direct or indirect Federal financial assistance that might support development. This project is not located in the vicinity of or within a coastal barrier resource unit as defined by the Governor's Executive Order 8 1-105 and the Federal Coastal Barrier Resources Reauthorization Act of 1999.

4.3.3.4 Essential Fish Habitat

Inter-agency coordination between FDOT and the National Marine Fisheries Service (NMFS) has resulted in a list of Major Essential Fish Habitat (EFH) categories for managed species in the Gulf of Mexico. For more information, refer to the *WEBAR* prepared for this PD&E Study. Table 4-4 summarizes the species which are considered to potentially utilize the area.

Table 4-4
Managed Fisheries Species Anticipated to Occur in Pinellas County and Potentially Occurring within the Study Area

Management Plan	Scientific Name	Common Name
Shrimp Fishery Management Plan	*Penaeus aztecus*	brown shrimp
	Pandalus jordani	pink shrimp
	Pleoticus robustus	royal red shrimp
	Penaeus setiferus	white shrimp
Red Drum Fishery Management Plan	*Sciaenops ocellatus*	red drum
Reef Fish Fishery Management Plan	*Mycteroperca bonaci*	black grouper
	Mycteroperca microlepis	gag grouper
	Lutjanus griseus	gray snapper
	Balistes capriscus	gray triggerfish
Stone Crab Fishery Management Plan	*Menippe mercenaria*	stone crab
Spiny Lobster Fishery Management Plan	*Panulirus spp.*	spiny lobster

4.3.4 WETLANDS

The Structure E Bridge spans the Intracoastal Waterway main channel between Tampa Bay and Pass-A-Grille Channel. The roadway connects Tierra Verde to the south with Isla Del Sol to the north. The southern bridge terminus has a concrete seawall with sand and scattered rip-rap seaward of the bulkhead. South of the seawall is man-made upland fill which comprises the island. The northern structure terminus has a similar concrete seawall connecting to Isla Del Sol via a man-made causeway. A seawall borders both sides of the causeway for a short distance terminating into sloped embankment which interfaces with the water. The shoreline vegetation is limited to a narrow band because of the fairly steep gradient. The upland areas are comprised of fan palms, cabbage palms, Brazilian peppers, castorbeans, crowsfoot grasses, and Bahiagrasses. Typical wetland floral observed along the causeway include white mangroves, black mangroves, red mangroves, buttonwoods, sea myrtles, marsh elders, seaside goldenrods, and seaside oxeyes. For more information, refer to the *WEBAR* prepared for this PD&E Study.

4.3.5 SUBMERGED AQUATIC VEGETATION (SAV)

Waterward of the wetland communities on the northern terminus of the bridge are beds of SAV consisting primarily of seagrass species such as shoalweed and turtle grass. For more information, refer to the *WEBAR* prepared for this PD&E Study. Seagrass beds are shown on the concept plans in Appendix A.

4.3.6 POTENTIAL HAZARDOUS MATERIALS AND PETROLEUM PRODUCTS CONTAMINATED SITES

A *Final Contamination Screening Evaluation Report*[12] (*CSER*) was prepared for this study and is summarized below. Each property within and/or adjacent to the project corridor must have a conscious determination of the contamination potential. All properties are assigned a rating of No, Low, Medium, or High and are explained as follows:

- No − After a review of all available information, there is nothing to indicate contamination would be a problem. It is possible that contaminants could have been handled on the property; however, all information (Florida Department of Environmental Protection (FDEP) reports, monitoring wells, water and soil samples, etc.) indicate problems should not be expected.

- Low − The former or current operation has a hazardous waste generator identification (ID) number or deals with hazardous materials; however, based on all available information, there is no reason to believe there would be any involvement with contamination. This is the lowest possible rating a gasoline station operating within current regulations could receive. This could also be applied to a retail hardware store that blends paint.

- Medium − After a review of all available information, indications are found (reports, Notice of Violations, consent orders, etc.) that identify known soil and/or water contamination and that the problem does not need remediation, is being remediated (i.e., air stripping of the ground water, etc.), or that continued monitoring is required. The complete details of remediation requirements are important to determine what action must be performed if the property were to be acquired. A recommendation should be made on each property falling into this category to its acceptability for use within the proposed project, what actions might be required if the property is acquired, and the possible alternatives if there is a need to avoid the property.

- High − After a review of all available information, there is a potential for contamination problems. Further assessment will be required after alignment selection to determine the actual presence and/or levels of contamination and the need for remedial action. A recommendation must be included for what further assessment is required. Conducting the actual contamination assessment is not expected to begin until alignment is defined; however, circumstances may require additional screening assessments (i.e., collecting soil or water samples for laboratory analysis that may be necessary to determine the presence and/or levels of contaminants) to begin earlier. Properties that were previously used as gasoline stations and have not been evaluated or assessed would receive this rating.

Five sites identified through the database search and field review are shown in Table 4-5. These sites were evaluated for potential contamination involvement for each of the alternatives. The risk ratings are reported in Table 4-5.

Table 4-5
Potential Contamination Sites

Site No.	Facility Name	Risk Rating
1	Tierra Verde Resort & Marina	Medium
2	7-Eleven Food Store #29301	High
3	Deltona Corporation	Medium
4	Texaco – Tierra Verde Marina and BP Station	Medium
5	Tierra Verde Bridge (Structure E)	High

4.3.7 NOISE

A noise sensitive site is any property (owner occupied, rented, or leased) where frequent exterior human use occurs and where a lowered noise level would be of benefit. Noise sensitive land uses along S.R. 679 within the project limits include The Village at Tierra Verde condominiums and the associated recreational land uses (i.e., tennis courts).

A noise sensitive site is considered affected when predicted noise levels approach or exceed the Noise Abatement Criteria (NAC) established by FDOT. The NAC, summarized in Table 4-6, vary by activity category with primary consideration given to exterior areas. All of the noise sensitive sites within the project limits are in Activity Category B. FDOT defines approaching the NAC as meaning within one A-weighted decibel (1 dBA). Therefore, noise sensitive sites are considered affected when predicted noise levels are 66.0 dBA or greater.

Table 4-6
Noise Abatement Criteria

Activity Category	Leq (h)*	Description of Activity Category
A	57 (Exterior)	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.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties, or activities not included in Categories A or B above.
D	--	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: Florida Statutes Chapter 335.17 (F.S. 335.17)[13]

** Note: Leq is the level equivalent steady-state sound level which in a stated period of time contains the same acoustic energy as the time-varying sound level during the same time period. Leq(h) is the hourly value of Leq.*

The existing 66 dBA contour was established for a two-lane, undivided roadway. Modeled traffic volumes reflect 2005 site conditions. The 66 dBA contour was established using the traffic noise model (TNM) and is estimated to extend approximately 85 ft from the near travel lane. Traffic data used to establish the existing 66 dBA contour is documented in a *Final Noise Study Report*[14] prepared for this project.

4.3.8 AIR QUALITY

In accordance with the Clean Air Act Amendments of 1990 and Part 2, Chapter 16 of the FDOT's *Project Development and Environment Manual*, an air quality analysis was conducted for this project utilizing the FDOT carbon monoxide (CO) screening model, CO Florida 2004 (released September 7, 2004). This computer program makes a number of conservative assumptions about the project and indicates whether the project needs a more detailed computer analysis. The roadway intersection with the highest total volume was S.R. 679 at Madonna Boulevard. The Build and No-Build scenarios for both the opening year (2010) and the design year (2030) were modeled.

Estimates of CO were predicted for the default receptors which are located 10 ft to 150 ft from the edge of the roadway. The results of the screening model indicate that the worst-case CO one- and eight-hour levels are not predicted to meet or exceed the one- or eight-hour National Ambient Air Quality Standard (NAAQS) for the pollutant with either the No-Build or Build Alternatives. As such, the project "passes" the screening model.

The project is located in an area that has been designated as Attainment for the eight-hour NAAQS for ozone under the criteria provided in the Clean Air Act and therefore, conformity does not apply.

4.4 REFERENCES

1. *Bridge Inspection Reports [Structure 150049 (Structure E)]*; prepared for the Florida Department of Transportation; 2003, 2004, 2005, 2006, and 2007.
2. *Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges*; U.S. Department of Transportation, Federal Highway Administration, Office of Engineering, Bridge Division; December 1995.
3. *Structures Design Guidelines,* Florida Department of Transportation; Tallahassee, Florida; current edition.
4. *The Updated Countywide Plan for Pinellas County*; Pinellas Planning Council; Clearwater, Florida; May 3, 2005.
5. *2025 Long Range Transportation Plan;* Pinellas County Metropolitan Planning Organization; Clearwater, Florida; December 2004.
6. *Final Cultural Resource Assessment Survey Report*; Archaeological Consultants, Inc.; Sarasota, Florida; February 2006, Revised June 2008.
7. *National Register of Historic Places*; U.S. Department of the Interior, National Park Service; Washington, D.C.

8. *Project Development and Environment Manual;* Florida Department of Transportation; Tallahassee, Florida; current edition.

9. *Cultural Resource Management Standards and Operational Manual*; Florida Department of State, Division of Historical Resources; Tallahassee, Florida; 2002.

10. *Florida Master Site File (database)*; Florida Department of State, Division of Historical Resources; Tallahassee, Florida.

11. *Final Wetland Evaluation and Biological Assessment Report*; Florida Department of Transportation, District Seven; Tampa, Florida; June 2007, revised June 2008.

12. *Final Contamination Screening Evaluation Report*; PBS&J; June 2007, revised June 2008.

13. Florida Statute 335.17, *State Highway Construction; Means of Noise Abatement*; 1989.

14. *Final Noise Study Report*; Florida Department of Transportation, District Seven; Tampa, Florida; July 2007, revised June 2008.

Section 5.0
DESIGN CONTROLS AND STANDARDS

In order for the proposed roadway improvements to fulfill the objective of accommodating motorized vehicles, pedestrians and bicyclists in a safe and efficient manner, the proposed typical sections and alignment geometry must adhere to specific design standards. The Florida Department of Transportation (FDOT) *Plans Preparation Manual (PPM)*[1], the American Association of State Highway and Transportation Officials (AASHTO) publication, *A Policy on Geometric Design of Highways and Streets*[2], and the FDOT District Seven *Straight Line Diagram*[3] was used as the reference for development of proposed project geometric design criteria for this project. Tables 5-1 and 5-2 present the pertinent geometric and structural design criteria used for both the roadway and the bridge structures and their respective values or designations. Some of the fundamental project design criteria are also described in more detail in the following sections.

Table 5-1
Roadway Design Criteria

Roadway Design Feature	Value/Designation	Documentation
Functional Classification	Urban Minor Arterial	FDOT Straight Line Diagram
Level of Service (LOS)	LOS D	FDOT Quality/LOS Manual[4]
Design Speed: Miles Per Hour (mph) With Curb and Gutter With Flush Shoulders	 45 mph 50 mph	FDOT PPM, Table 1.9.1
Maximum Superelevation Rate With Curb and Gutter (Urban) With Flush Shoulders (Rural)	 0.05 feet (ft)/ft 0.10 ft/ft	 FDOT PPM, Table 2.9.2 FDOT PPM, Table 2.9.1
Travel Lane Width	12 ft	FDOT PPM, Table 2.1.1
Shoulder Width Undivided Roadway Bridge (two-lane undivided)	 10 ft, with 5 ft paved 10 ft	 FDOT PPM, Table 2.3.3 FDOT PPM, Fig. 2.0.2
Bicycle Lane Width With Curb and Gutter On Flush Shoulders	 4 ft 5 ft	FDOT PPM, Table 2.1.2
Border Width Urban (Curb and Gutter) Rural (Flush Shoulders)	 12 ft 40 ft	 FDOT PPM, Table 2.5.2 FDOT PPM, Table 2.5.1
Clear Zone (Flush Shoulders)		

Table 5-1 (Cont.)
Roadway Design Criteria

Roadway Design Feature	Value/Designation	Documentation
Recoverable Terrain	24 ft	FDOT PPM, Table 2.11.11
Maximum Grade (flat terrain, urban area)	6%	FDOT PPM, Table 2.6.1
Stopping Sight Distance Grades ≤ 2% 45 mph Design Speed 50 mph Design Speed	 360 ft 425 ft	FDOT PPM, Table 2.7.1
Passing Sight Distance 45 mph Design Speed 50 mph Design Speed	 1,625 ft 1,835 ft	FDOT PPM, Table 2.7.2
Maximum Deflection without Curve Without Curb and Gutter With Curb and Gutter Two-lane to Four-lane Transition	 0° 45’ 00” 1° 00’ 00” 5° 00’ 00”	 FDOT PPM, Table 2.8.1a FDOT PPM, Table 2.8.1a FDOT Standard Index 526, 5 of 8
Maximum Degree of Curvature 45 mph Design Speed 50 mph Design Speed	 8° 15’ 00” 6° 30’ 00”	 FDOT PPM, Table 2.8.3
Maximum Curvature with Normal Crown 45 mph Design Speed (e max = 0.05) 50 mph Design Speed (e max = 0.10)	 2° 45’ 00” 0° 30’ 00”	 FDOT PPM, Table 2.8.4
Minimum Sag Vertical “K” Value 45 mph Design Speed 50 mph Design Speed	 79 96	 FDOT PPM, Table 2.8.6
Minimum Crest Vertical “K” Value 45 mph Design Speed 50 mph Design Speed	 98 136	 FDOT PPM, Table 2.8.5
Sidewalk Width Minimum Shared-Use Path	 5 ft 12 ft	 FDOT PPM, Chapter 8
Vertical Navigational Clearance for Bridge Fixed Span Bascule	 65 ft 21 ft	 United States Coast Guard (USCG) Guide Clearances

Table 5-2
Structural Design Criteria

Structural design shall be in accordance with FDOT standard practices and procedures. The design will comply with: 1. *AASHTO* Standard Specifications for Highway Bridges, Seventeenth Edition 2. *AASHTO* Load and Resistance Factored Design (LRFD) Bridge Design Specifications – U.S. Customary Units, Third Edition, 2004 3. FDOT Structural Design Guidelines for Load Factored Design, Topic No. 625-020-152-a, effective January 2000 4. FDOT Structural Design Guidelines for Load and Resistance Factored Design, Topic No. 625-020-154-b, effective 2006 5. *AASHTO*/AWS Bridge Welding Code 1.5, most current edition 6. *AASHTO* LRFD for Movable Bridges	
Dead Loads:	
Unit weight of reinforced concrete:	150 lb/cf (pounds per cubic ft)
Unit weight of structural steel:	490 lb/cf
Future wearing surface:	15 lb/sf (pounds per square ft)
Barrier, Traffic Railing:	418 lb/ft (pounds per linear ft)
Pedestrian/Bicycle Railing:	390 lb/ft
Barrier, Median Traffic:	490 lb/ft
Live Loads:	
Wind Load:	HS 20-44
Based on LRFD Design Code:	HL 93

5.1 DESIGN SPEED

Since the existing roadway south of Structure E includes curb and gutter and the existing roadway typical section north of Structure E includes flush shoulders, proposed bridge replacement design criteria needs to accommodate both types of roadway facility.

The design speed affects design elements such as horizontal and vertical alignments, superelevation, and typical section dimensions (clear zone, border width, etc.). The assumed design speed should be a logical one with respect to factors such as topography, adjacent land use, and the functional classification of the highway. As indicated in *A Policy on Geometric Design of Highways and Streets*, the design speed control applies to a lesser degree on arterial streets than on other type of facilities such as rural highways since the top speeds for several hours a day on arterial streets are limited or regulated by the recurring peak volumes which can be handled. Speeds along these types of roadways are governed by the presence of other vehicles traveling in groups both in and across the through lanes. The speeds are also governed by traffic devices rather than by the physical characteristics of the street. During periods of low to moderate traffic volumes, speeds are governed by such factors as speed limits, intersectional frictions, and midblock frictions such as a high density of driveways.

A design speed should not be less than the posted speed. The existing posted speed limit is 45 mph throughout the entire study area. A design speed of 5 to 10 mph greater than the posted speed limit will generally compensate for off-peak and overrunning speeds that can be expected. The south approach to Structure E is an urban roadway with curb and gutter. Since the PPM states that curb and gutter should not be used on high-speed facilities (design speeds ≥ 50 mph), the design speed will transition between 45 mph and 50 mph at the southern approach to the bridge as the clear roadway opens up to include shoulders. The majority of the remaining study area (i.e., the bridge itself and the causeway to the north) is undeveloped with only a few driveway connections for beach access. Therefore, 50 mph is a logical design speed selection for a majority of the project.

5.2 ACCESS CLASSIFICATION

The objective of the Access Classification system is to protect the public safety, enhance the mobility of people and goods, and preserve the functional integrity of the highway system. The current access management classification for S.R. 679 is Class 3. This classification is distinguished by restrictive medians and maximum distance between traffic signals and median openings. Access Class 3 is used where existing land use and roadway sections have not completely built out to the maximum land use or roadway capacity, or where the probability of significant land use change in the future is high. The access class standards for a Class 3 roadway are shown in Table 5-3. Although Structure E is proposed to be replaced as a two-lane undivided bridge, a future four-lane divided facility is possible by widening the replacement bridge or adding a second two-lane bridge in the future if warranted.

Table 5-3
Access Classification Standards

Standard	Access Class 3
Facility Design Features (Median Treatment & Access Roads)	Restrictive
Minimum Connection Spacing - With posted speed over 45 mph - - With posted speed at or less than 45 mph	 660 ft 440 ft
Minimum Directional Median Opening Spacing	1,320 ft (1/4 mi)
Minimum Full Median Opening Spacing	2,640 ft (1/2 mi)
Minimum Signal Spacing	2,640 ft (1/2 mi)

A proposed traffic signal (if warranted) at the Madonna Boulevard intersection will meet the signal spacing standards since the nearest existing signal is located at S.R. 682, over one-half mile to the north. However, existing driveways and median openings (two within 100 ft) along S.R. 679 near Madonna Boulevard (see concept plans in Appendix A) do not meet these standards and are a contributing factor to the high safety ratio identified in Section 4.1.9 of this report. Proposed design alternatives evaluated in Section 8.0 of this report consider a reduction in the number of median openings and driveways.

5.3 REFERENCES

1. *Plans Preparation Manual;* Florida Department of Transportation; Tallahassee, Florida; January 2006, Revised January 1, 2008.

2. *A Policy on Geometric Design of Highways and Streets;* American Association of State Highway and Transportation Officials; 2004.

3. *Straight Line Diagram*, Florida Department of Transportation, District Seven; Tampa, Florida; April 2007, Revised May, 2007.

4. *Quality/LOS Manual*, Florida Department of Transportation; Tallahassee, Florida; 2002, Revised 2007.

Section 6.0
TRAFFIC

The *Final Traffic Technical Memorandum*[1] prepared for this project documents the analyses of existing and future traffic conditions for the Structure E study area. The study area focused on S.R. 679, Madonna Boulevard, The Village at Tierra Verde (The Village) driveway, and other driveways immediately adjacent to the intersection of S.R. 679 and Madonna Boulevard. Existing traffic analyses were performed with the existing intersection and bridge conditions. Future traffic analyses were based on the consideration of either retaining the existing intersection conditions or realigning Madonna Boulevard and The Village driveway in combination with different bridge height and bridge opening alternatives. In addition, signalizing the intersection of Madonna Boulevard and S.R. 679 was also analyzed. As described in Section 3.2 of this report, the need for this project is based on the structural deficiencies associated with the age of the existing bridge, the functional obsolescence of the bridge, and its scour critical rating. No capacity improvements are being considered; however, study alternatives do not preclude capacity improvements, if needed in the future.

Once the parameters of the study area were defined, the first step was evaluating the existing conditions. This required a data collection effort that included conducting and summarizing traffic count data and conducting field reviews of the study area. The existing data collected were used to evaluate existing traffic conditions for the study area. Once existing conditions were evaluated, the next stage in the study methodology was to evaluate future traffic conditions. The development of traffic projections was required to evaluate the future conditions within the study corridor, which was then used to perform future operational analyses of the study area. The final step of the methodology includes summarizing and presenting these results.

6.1 EXISTING TRAFFIC CONDITIONS

6.1.1 TRAFFIC COUNT DATA

Seventy-two-hour and 48-hour vehicle classification counts were conducted on weekday and weekend conditions respectively at different locations within the study area. Four-hour turning movement counts were also conducted at different locations within the study area to appropriately capture the existing traffic patterns.

The counts were conducted in May 2005. The traffic count locations are shown in Figure 2-1 of the *Final Traffic Technical Memorandum*.

6.1.2 EXISTING DAILY VOLUMES AND TRAFFIC CHARACTERISTICS

The weekend average daily traffic (WADT) volume was used for the purpose of performing the traffic analyses due to the recreational nature of the traffic related to weekend visitors to the beaches and Fort De Soto Park. The existing (2005) WADT volume for the study area was developed from raw 48-hour count data conducted during the weekend. Axle correlation factors developed from the

48-hour vehicle classification counts were applied to the raw count data, to obtain the WADT volumes. A WADT of 20,500 was recorded south of Madonna Boulevard on S.R. 679 while a WADT of 19,300 was recorded north of Structure E on S.R. 679. The peak hour distribution factor (K), the directional distribution factor (D), and the design hour truck factor (T) for S.R. 679 were also calculated based on the 48-hour vehicle class count data. The calculated D value was modified to comply with the Florida Department of Transportation (FDOT) *Design Traffic Handbook*[2].

The peak direction was found to be southbound on S.R. 679 and eastbound on Madonna Boulevard during the Noon peak hour and northbound and westbound respectively during the PM peak hour.

For the purpose of simulation, the bridge openings were assumed to be pre-timed and scheduled to open at regular intervals irrespective of the magnitude of boat traffic.

Please refer to Figure 2-2 and Table 2-1 of the *Final Traffic Technical Memorandum* for WADT volumes and for existing applied K, D, & T values, respectively.

6.1.3 PEAK HOUR VOLUMES AND DESIGN HOUR VOLUMES (DHV)

The existing (2005) peak hour turning movement volumes for the Structure E study area were developed from raw 15-minute turning movement counts taken between the hours of 11:00 AM - 1:00 PM and 4:00 PM - 6:00 PM. Fifteen-minute intervals were summed to determine the peak hour for each intersection. FDOT seasonal adjustment factors were applied to the raw counts, to obtain the peak hour turning movement volumes. The peak hour turning movement counts were then converted to the design hour volume by applying the methodology explained in the *Final Traffic Technical Memorandum.* The existing design hour volumes are shown in Figure 6-1.

6.1.4 EXISTING ROADWAY CHARACTERISTICS

As per the FDOT *Quality/Level of Service Handbook*[3] and *Pinellas County Comprehensive Plan Transportation Element*[4], the Level of Service (LOS) standard for S.R. 679 is LOS D for the peak hour. The only signal control within the study area is in the form of the bascule bridge on Structure E. All other intersections under consideration for this study are stop controlled with a free movement for traffic on S.R. 679 and stop controls for the minor roadways/driveways.

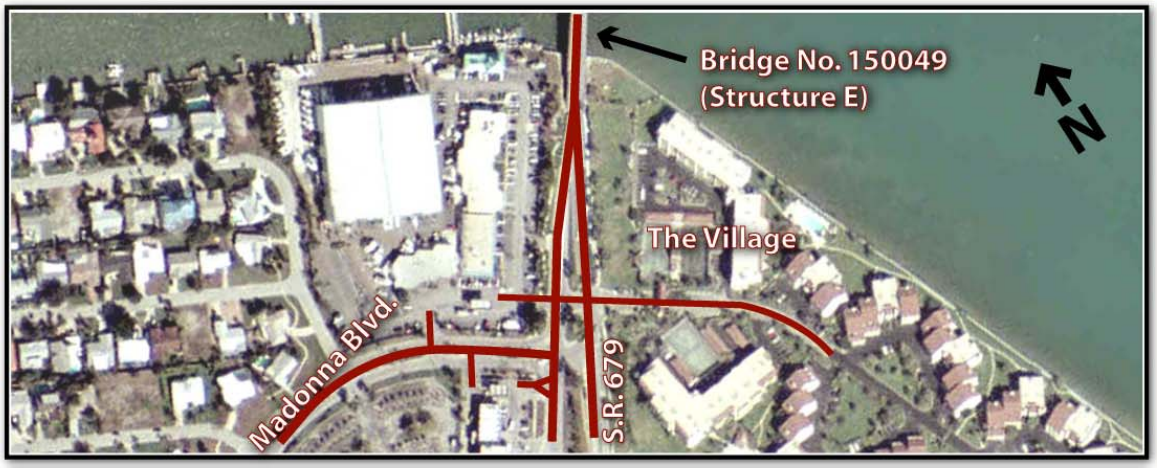
From south to north, S.R. 679 transitions from a four-lane divided roadway to a two-lane undivided roadway just north of Madonna Boulevard. Southbound S.R. 679 opens up from one lane to two lanes, however; a bottleneck is created on northbound S.R. 679 when the lanes are constricted from two lanes to one lane. Also, the intersections of S.R. 679 with Madonna Boulevard and The Village driveway are staggered with numerous driveways in the immediate vicinity. The existing intersection lane geometries are displayed in Figure 6-2.

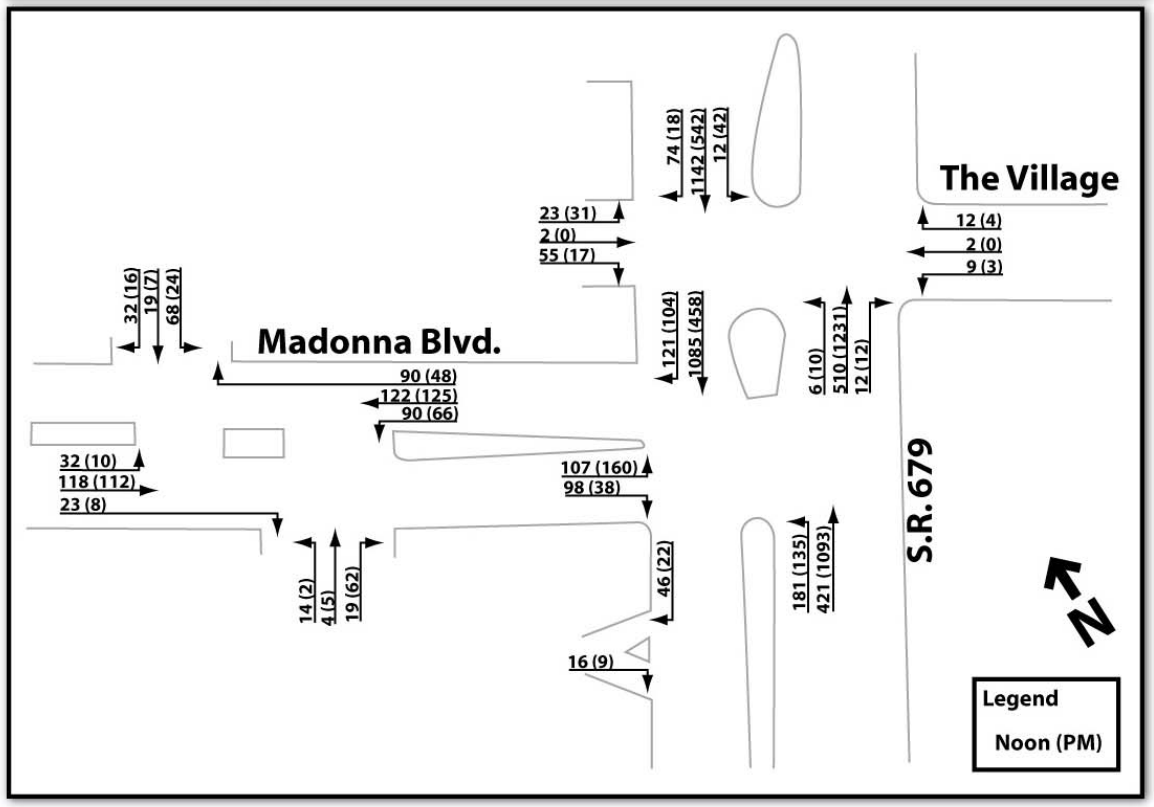
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Existing
Design Hour Volume

WPI Segment No : 410755-1

Figure 6-1



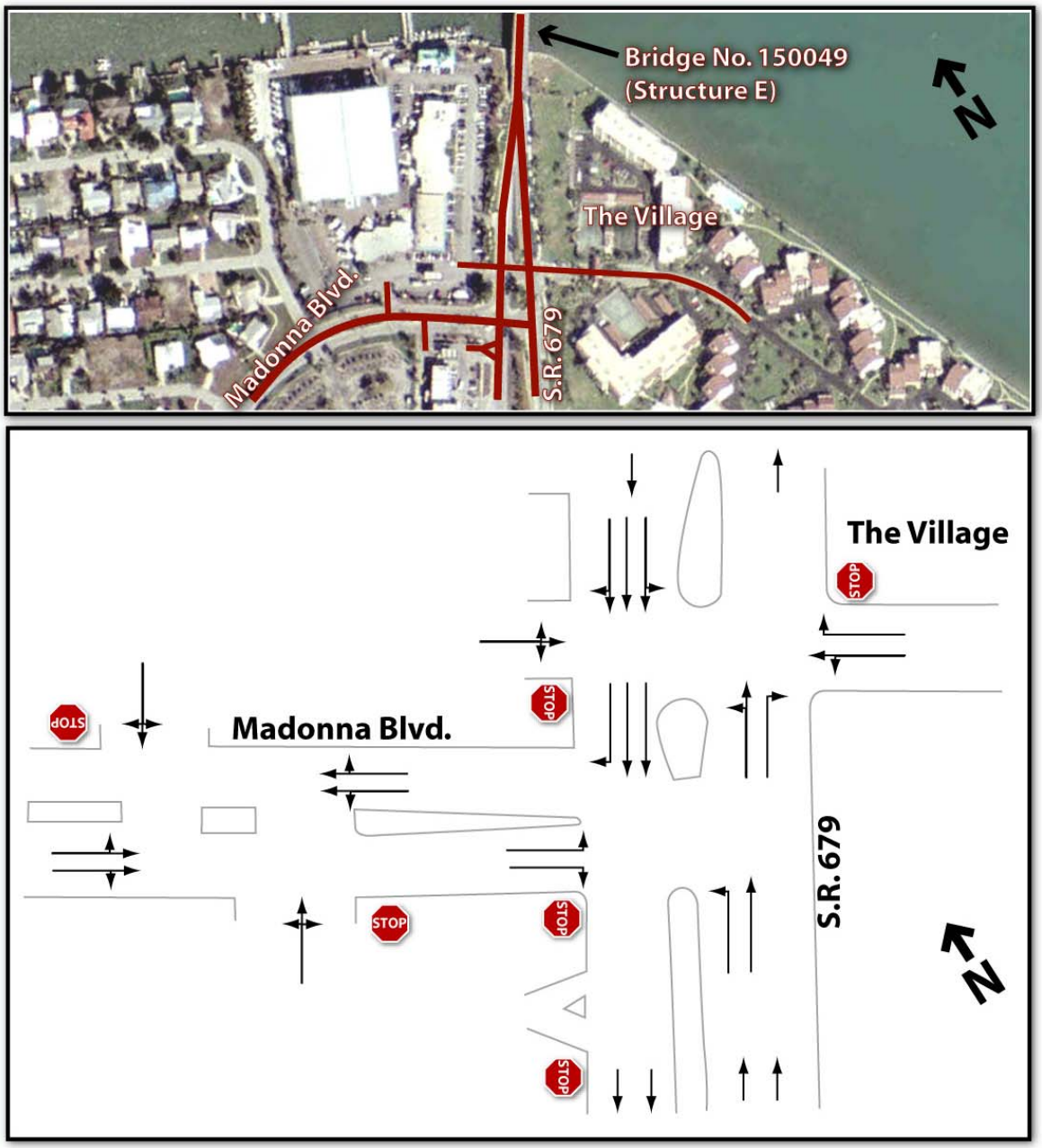


S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

WPI Segment No : 410755-1

Existing Lane Geometry

Figure 6-2



6.1.5 EXISTING SCENARIOS FOR OPERATIONAL ANALYSES

The existing operational analyses included evaluation of the whole study area as described in previous sections. The analyses were conducted using the traffic simulation software, *VISSIM, version 4.1*[5]. The simulation was performed for the peak vehicular hour (Noon and PM) with bridge opening three times an hour for the Low-level bascule bridge condition and two times for the Mid-level bascule bridge condition. The study area was observed several times before and after the simulation runs to verify the existing conditions model. Observations were made and incorporated in the model to reflect the existing field conditions as best as possible.

The existing low-level bascule bridge is on a timed opening schedule set by the United States Coast Guard (USCG), opening three times per hour or every 20 minutes if boats are present. In an effort to evaluate an alternative that opens less frequently, a mid-level bascule bridge was evaluated. It was assume for the purposes of this evaluation that any bridge would have to open on a set schedule, either two or three times per hour. Therefore, the opening schedule for the mid-level bascule was set at three times per hour, or every half hour. The average duration of each bridge opening, based on bridge tender logs as summarized in Section 4.2.6, is 4.66 minutes.

The following scenarios were analyzed for both Noon and PM peak hours in order to provide an understanding of how each of these would have worked under existing conditions:

- Low-level bascule bridge opening every 20 minutes
- Mid-level bascule bridge opening every 30 minutes
- High-level fixed-bridge

6.1.6 ROADWAY SEGMENT OPERATIONAL ANALYSES

Since the project will not increase segment capacities, a LOS analysis was not performed for the segments.

6.1.7 RESULTS OF EXISTING OPERATIONAL ANALYSES

The results of the operational analyses were evaluated from a simulated network in terms of measures of effectiveness (MOE) such as travel times, queue lengths, and delays. Travel times were recorded for north to south, south to north, west to north, north to west, and network-wide for all vehicles. Queue counters were set up to determine the average and maximum queue lengths on S.R. 679 and the eastbound approach on Madonna Boulevard at the intersection with S.R. 679. Average travel and stopped delays per vehicle were recorded for the whole network, at the bascule bridge, and for the eastbound approach on Madonna Boulevard at the intersection with S.R. 679. Approximate locations of the travel time segments, queue counters, and locations for recording travel delays are shown in Figure 6-3.

The LOS* and delay in seconds per vehicle for different alternatives have been reported in Figures 6-4 and 6-5 and the detailed results of the Noon and PM peak hour analyses are reported in Table 6-1.

* The delays are based on VISSIM simulation outputs but the LOS has been assigned for comparison purposes based on the delay classification provided by the *Highway Capacity Manual*..

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Travel Time Segments, Queue Counters, and Travel Delay Recordings

WPI Segment No : 410755-1

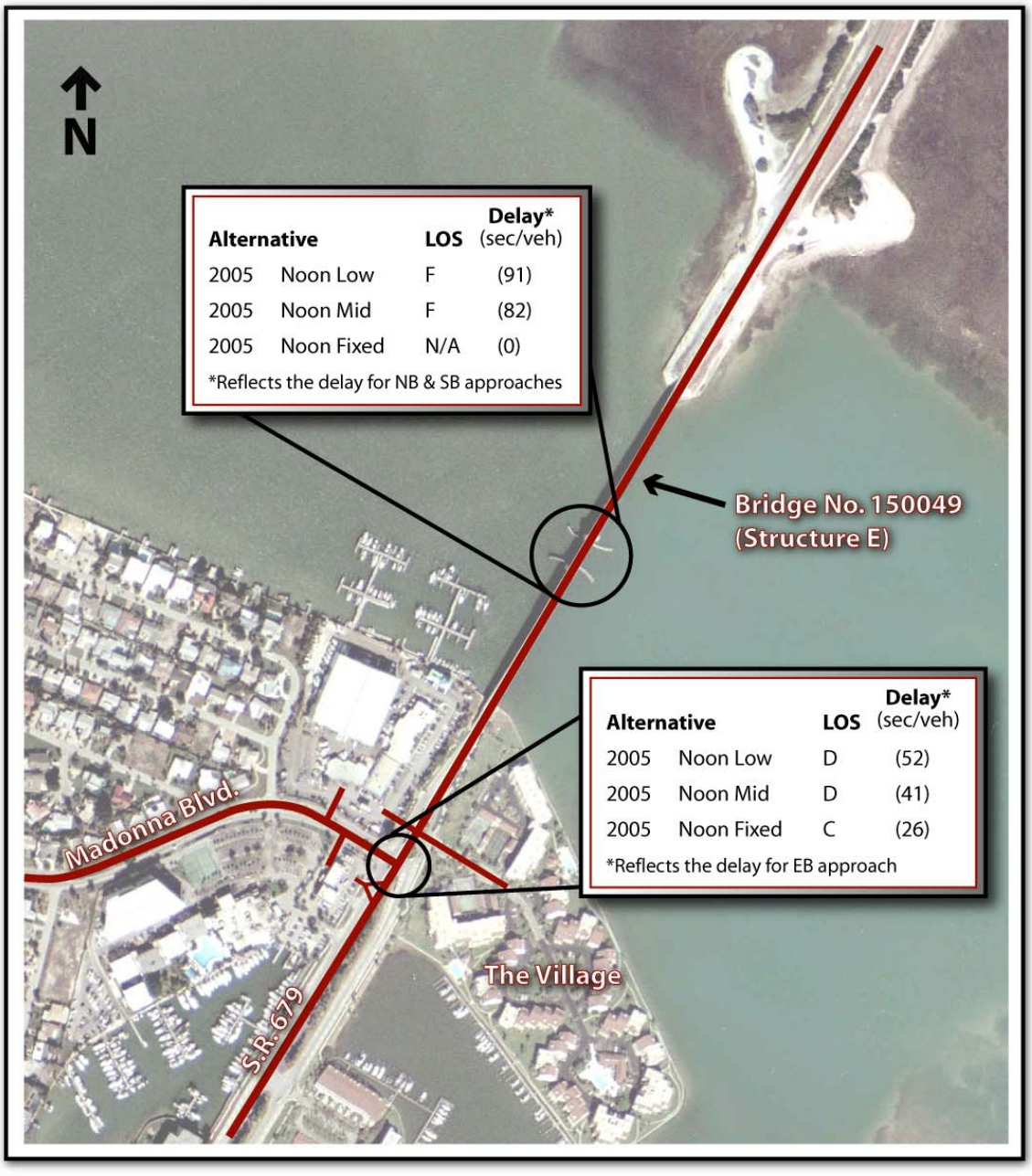
Figure 6-3

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Existing Weekend
Noon Level of Service (LOS) and Delay

WPI Segment No : 410755-1

Figure 6-4



S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Existing Weekend
PM Level of Service (LOS) and Delay

WPI Segment No : 410755-1

Figure 6-5

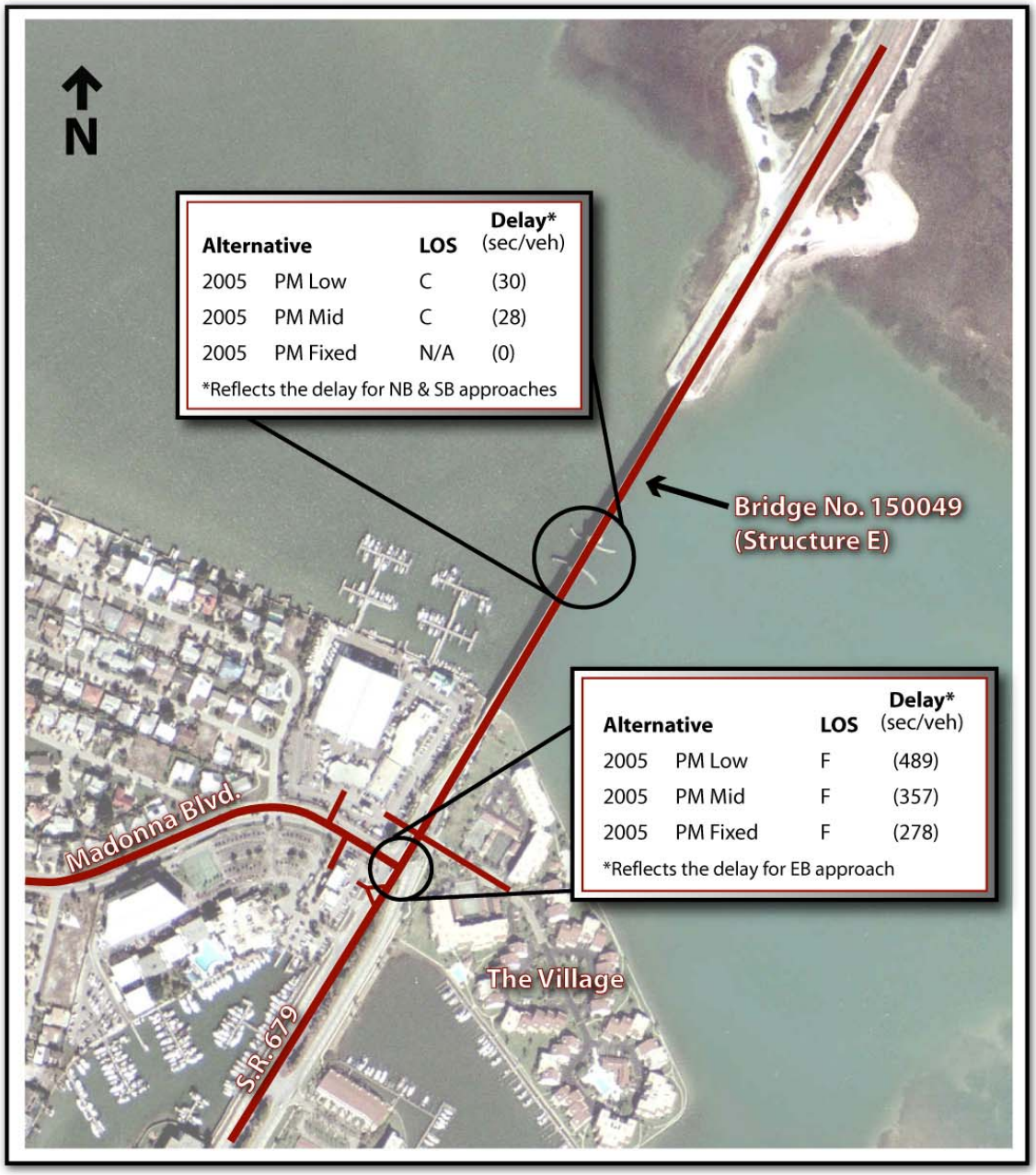


Table 6-1
Travel Times, Queue Lengths, Delays, and LOS for Existing Analyses

	Results of Operational Analyses using VISSIM 4.1 (Weekend Noon Peak 11:00 AM - 1:00 PM and PM Peak 4:00PM - 6:00 PM)																
	Travel Times (minutes)					Queue Lengths (feet)						Delay (seconds per vehicle)					
Alternatives	TT[1] N to S	TT[1] S to N	TT[1] W to N	TT[1] N to W	TT[1] Network-wide	NB[2] Avg. Queue	NB[2] Max. Queue	SB[2] Avg. Queue	SB[2] Max. Queue	EB[3] Avg. Queue	EB[3] Max. Queue	N-S Avg. Travel Delay @ Bridge	Madonna/SR 679 Avg. Travel Delay[4]	Network-wide Travel Avg. Delay	Network-wide Stopped Avg. Delay	LOS at Bridge[5]	LOS at Madonna[6]	Alternatives
2005 Noon Low	5.26	2.28	3.11	1.18	2.96	302	1975	2038	6035	52	318	91	52	96	60	F	D	2005 Noon Low
2005 Noon Mid	4.76	1.82	2.59	1.45	2.72	222	1924	1631	6035	26	307	82	41	78	46	F	D	2005 Noon Mid
2005 Noon Fixed	3.31	1.12	1.56	1.15	2.06	0	0	0	0	11	156	N/A	26	18	2	N/A	C	2005 Noon Fixed
2005 PM Low	3.91	12.25	13.18	1.47	11.05	5451	6067	219	1938	842	1414	30	489	549	288	C	F	2005 PM Low
2005 PM Mid	3.72	10.82	11.65	1.28	9.21	4759	6067	191	2102	516	625	28	357	396	186	C	F	2005 PM Mid
2005 PM Fixed	3.20	7.71	9.28	1.12	7.74	0	0	0	0	437	630	N/A	278	254	89	N/A	F	2005 PM Fixed

Notes:

1. TT stands for travel time.
2. NB and SB queue lengths refer to queuing at the bridge in the case of bascule bridge and at the intersection of SR 679 and Madonna Boulevard in the case of fixed bridge.
3. EB queuing refers to queuing at the eastbound approach of the intersection of SR 679 and Madonna Boulevard
4. This being an unsignalized intersection under existing conditions, the delay refers to the delay for the EB movement on Madonna Bouelvard.
5. LOS at the bridge has been calculated based on N-S Average Travel Delay at the bridge
6. LOS at Modonna has been calculated based on the Average Travel Delay at the intersection of Madonna Boulevard and SR 679.

N/A refers to free flow conditions on the bridge in case of fixed bridge

Travel time segment markers, queue counters, and travel delay recording locations have been shown in PER Figure 6-3.

Unsignalized Intersection LOS Criteria

LOS	Delay(sec/veh)
A	≤ 10
B	> 10 ≤ 15
C	> 15 ≤ 25
D	> 25 ≤ 35
E	> 35 ≤ 50
F	> 50

6.2 FUTURE TRAFFIC CONDITIONS

This section summarizes the analysis of future traffic conditions for the Structure E study area. In order to complete the analyses, the development of future traffic characteristics and projections were completed for the study area. Opening year (2010), interim year (2020), and design year (2030) traffic projections were developed for the three bridge alternatives: (1) Low-level bascule; (2) Mid-level bascule; and, (3) Fixed structure. Operational analyses were performed for the Noon and PM peak hours.

6.2.1 DAILY VOLUME PROJECTIONS

The future WADT volumes were developed for the opening year (2010), interim year (2020), and design year (2030) roadway system located in the Structure E study area. The future weekend traffic volumes were used to determine the design hour traffic volumes for this study.

The 2025 Cost Feasible Tampa Bay Regional Planning Model provided the basis to develop future WADT volumes for the study area. Some refinements were made to the model at the suggestion of FDOT District Seven staff. Additionally, the model derived annual average daily traffic (AADT) volumes were adjusted using the National Cooperative Highway Research Program (NCHRP) 255 average adjustment method to reflect a more realistic volume projection for 2025. Based on existing WADT and AADT, the 2025 WADT was obtained from the NCHRP 255 adjusted model AADT.

2010 and 2020 WADT volumes were developed by interpolating between the existing WADT and 2025 WADT volumes. 2030 WADT volume was developed by extrapolating from existing WADT and 2025 WADT volumes.

Table 6-2 summarizes the projected WADT values located north of Structure E on S.R. 679 that were used for deriving future design hour volumes. The WADT values north of the bridge were used instead of the values south of the bridge since they better represent the traffic volume crossing the bridge itself.

Table 6-2
Summary of Projected WADT Values

Year	2010	2020	2030
WADT	20,200	21,900	23,600

6.2.2 FUTURE GEOMETRIC AND OPERATIONAL ASSUMPTIONS

Existing operational analyses illustrated that the PM peak hour was the more critical and limiting time period for the intersection of S.R. 679 and Madonna Boulevard as far as the operational performance was concerned. The LOS for the PM peak hour was found to be LOS F for all the three alternatives (2005 PM Low, 2005 PM Mid, and 2005 PM Fixed) analyzed for the existing analyses. With growth in traffic, the level of service for future years would be expected to degrade further and also considering safety concerns, the intersection of Madonna Boulevard, S.R. 679, and The Village driveway was assumed to be realigned and signalized for future analyses. However, no signal

warrant study was performed. The driveways accessing S.R. 679 north of Madonna Boulevard were assumed to be closed for future operational analyses. Also, the right-in/right-out driveway accessing S.R. 679 south of Madonna Boulevard has been assumed to be closed for future operational analyses. The proposed realigned lane geometry is shown in Figure 6-6.

6.2.3 DESIGN HOUR VOLUME PROJECTIONS

The 2005 DHVs under existing geometric conditions were first used to calculate the DHVs for 2010, 2020, and 2030 under existing geometric conditions. The methodology used to develop future DHVs, under the existing geometric conditions was similar to what was discussed in Section 2.1.4 of the *Final Traffic Technical Memorandum*, except that the corresponding future WADT volumes were used for 2010, 2020, and 2030. The DHVs developed for 2010, 2020, and 2030 under existing geometric conditions were then redistributed, in order to reflect the resultant traffic distribution and travel pattern due to the proposed realigned intersection and closure of driveways. DHVs for 2010, 2020, and 2030 are shown in Figures 6-7, 6-8, and 6-9, respectively.

6.2.4 FUTURE SCENARIOS FOR OPERATIONAL ANALYSES

The future operational analyses included evaluation of the whole study area under proposed conditions as mentioned and shown in previous sections. The analyses were conducted using *VISSIM 4.1* and the simulation was performed for the peak vehicular hour (Noon and PM) combined with bridge opening three times an hour for Low-level bascule bridge condition and two times for Mid-level bascule bridge condition. The signal-operating plan of S.R. 679 and Madonna Boulevard intersection used for simulation was optimized using *SYNCHRO 6*[7].

The following scenarios were analyzed for both Noon and PM peak hours for 2010, 2020, and 2030 in order to provide an understanding of how each of these would work under future conditions:

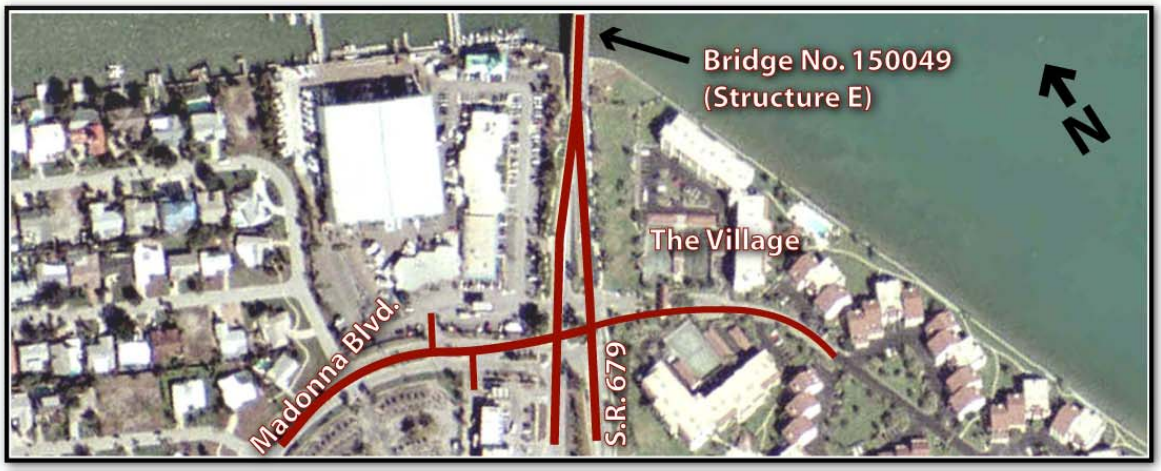
- Low-level bascule bridge opening every 20 minutes.
- Mid-level bascule bridge opening every 30 minutes.
- High-level fixed-bridge.

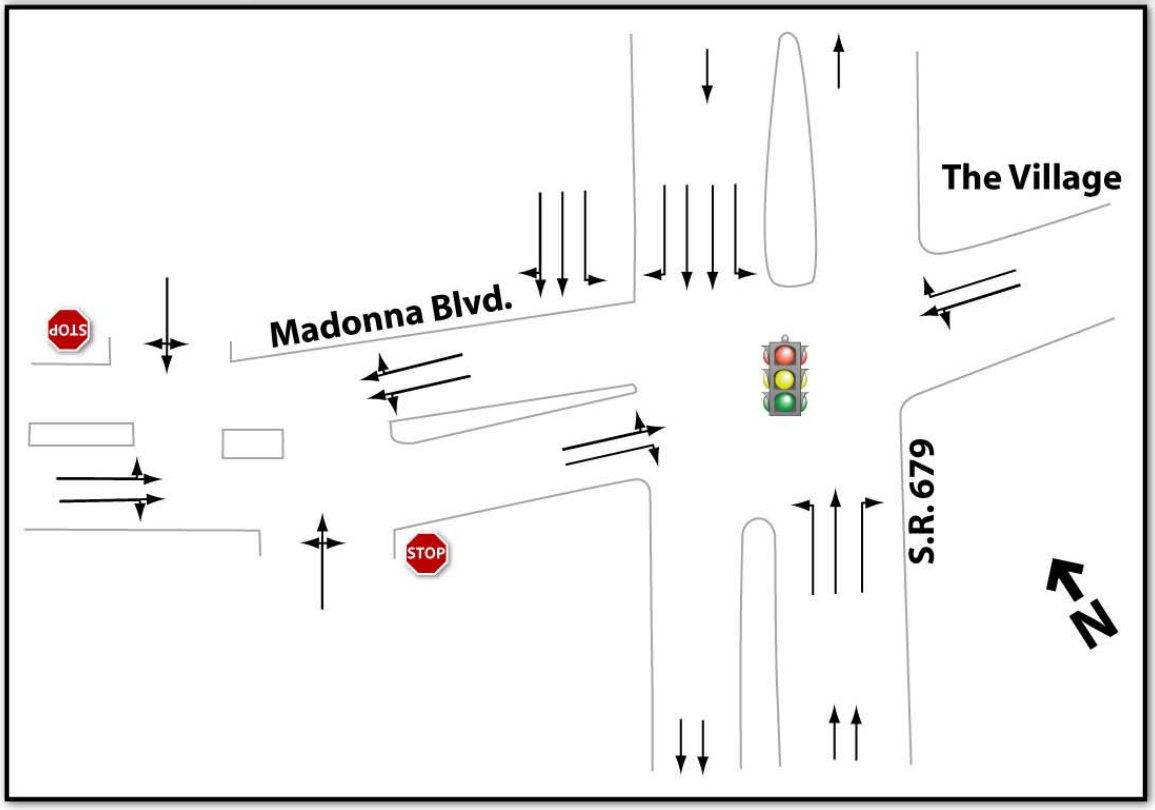
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Realigned Lane Geometry

WPI Segment No : 410755-1

Figure 6-6



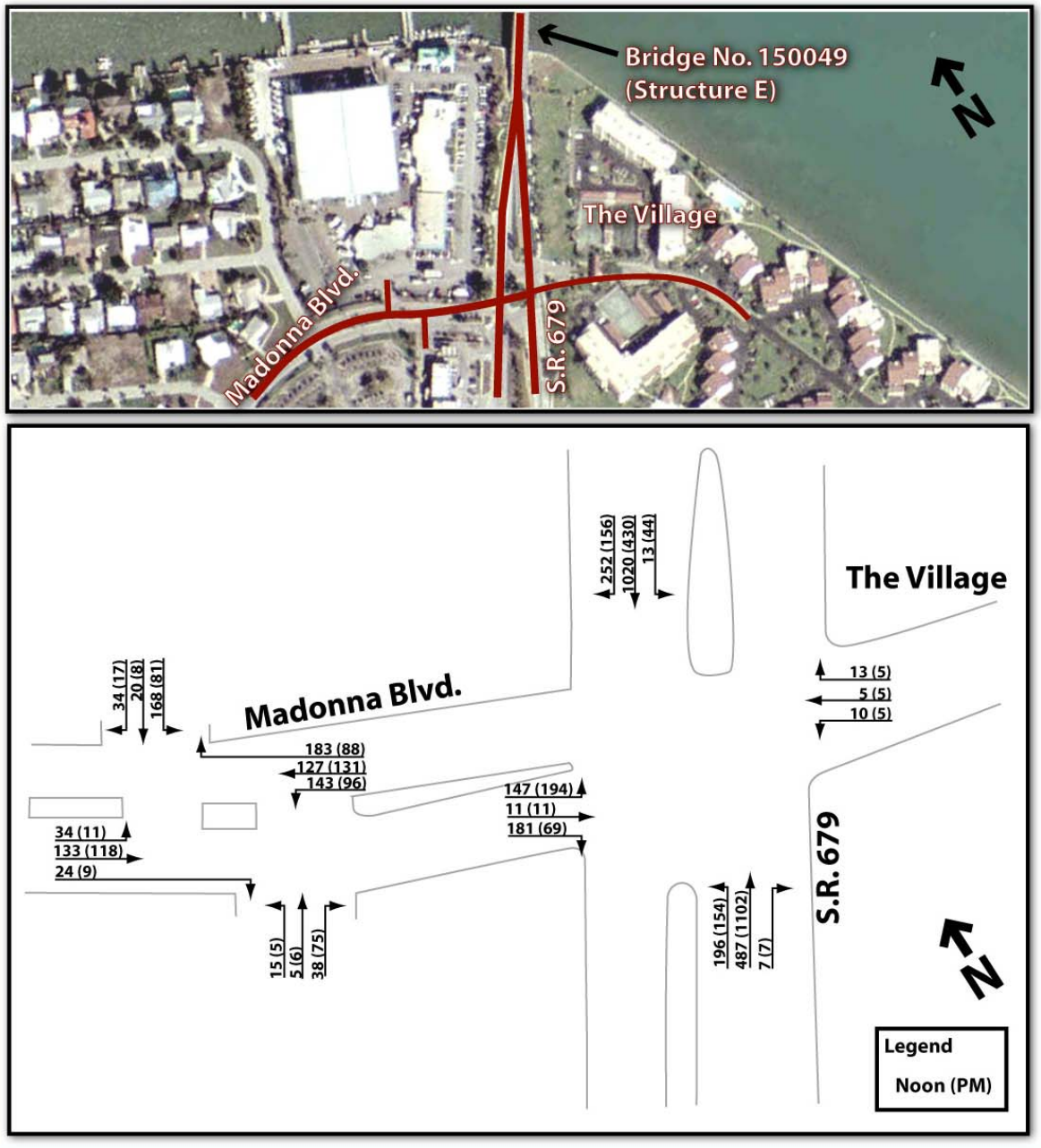


S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Opening Year 2010
Design Hour Volume

WPI Segment No : 410755-1

Figure 6-7

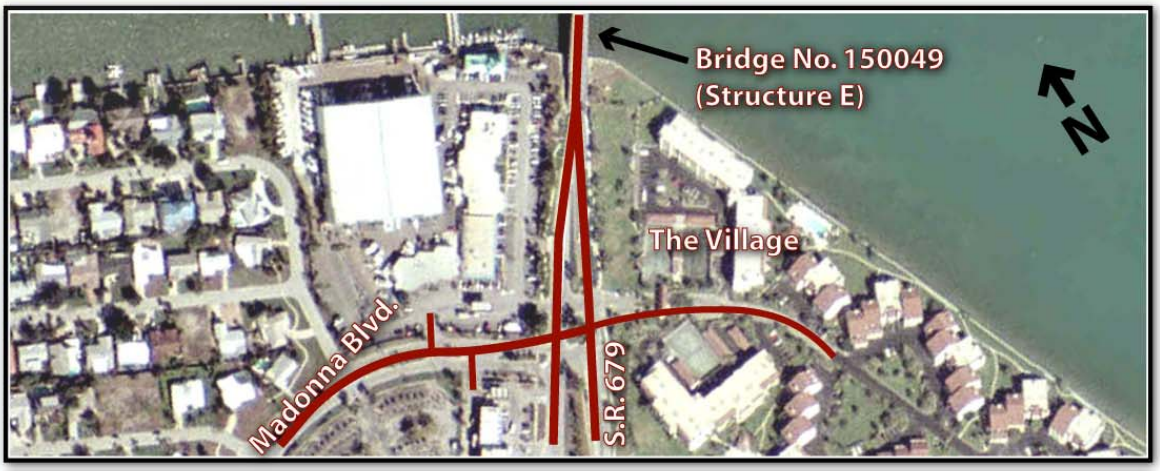


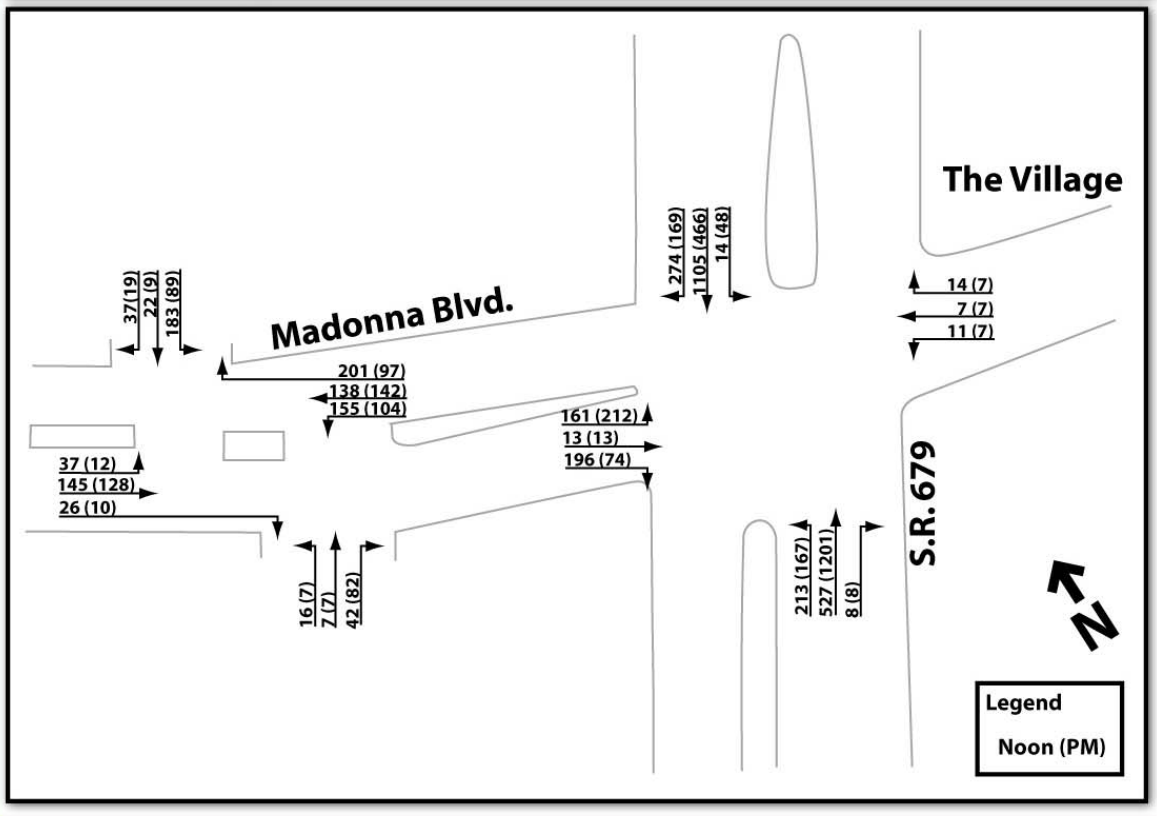
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Interim Year 2020
Design Hour Volume

WPI Segment No : 410755-1

Figure 6-8



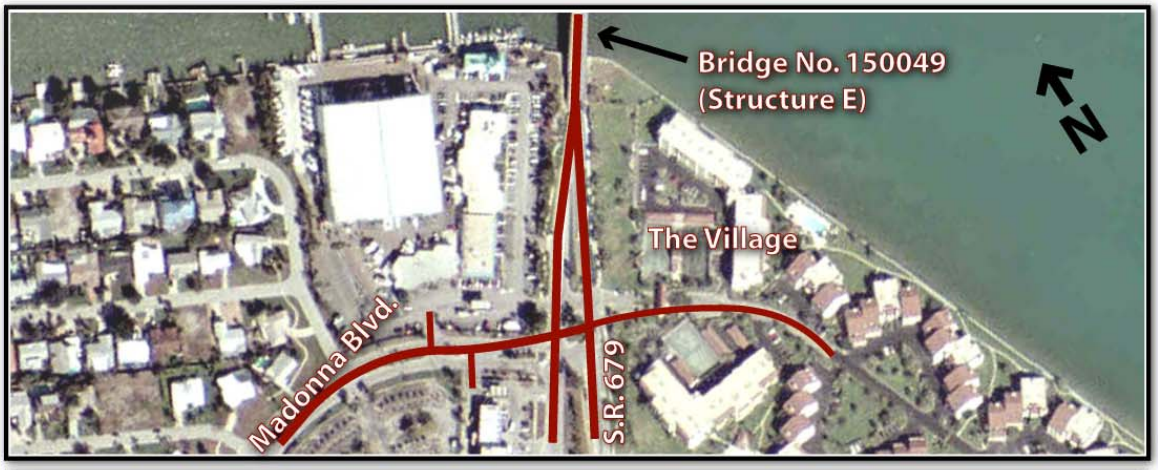


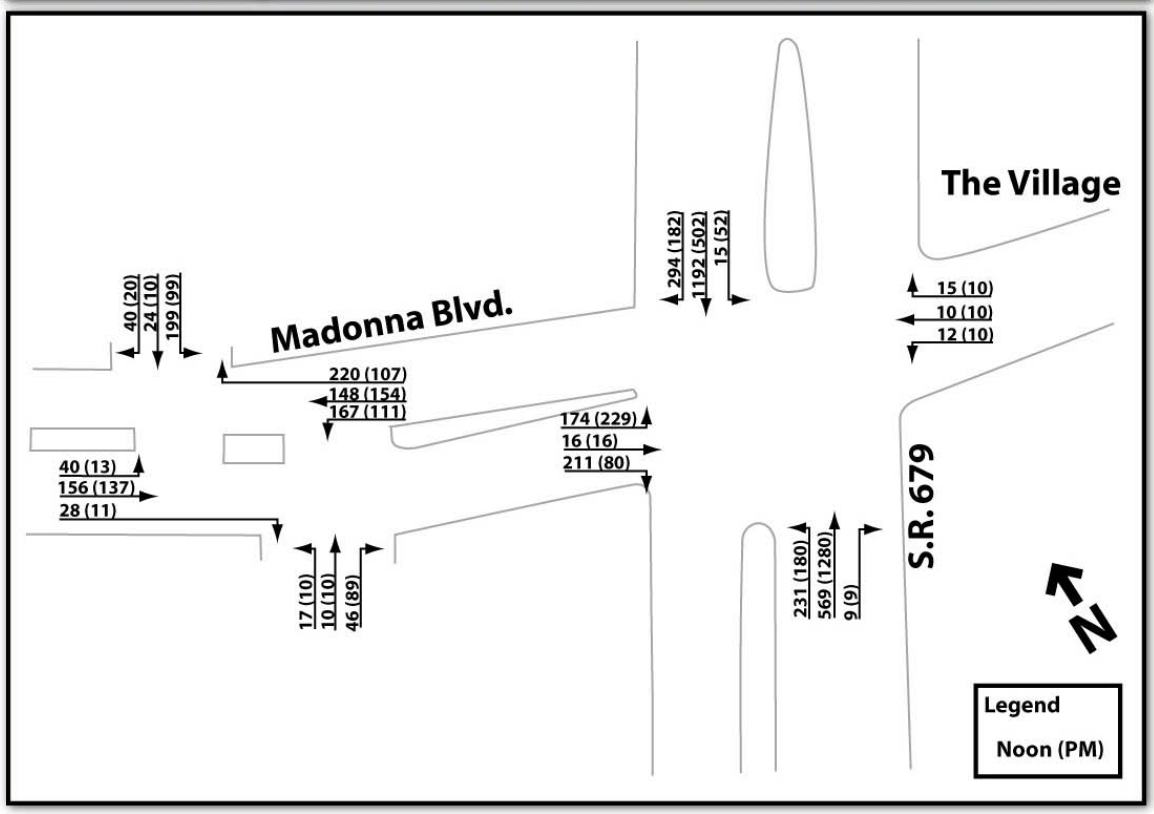
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Design Year 2030
Design Hour Volume

WPI Segment No : 410755-1

Figure 6-9





6.2.5 RESULTS OF FUTURE OPERATIONAL ANALYSES

As in case of the existing analyses, the results of the operational analyses were evaluated in terms of MOE such as travel times, queue lengths, and delays. Travel times were recorded for north to south, south to north, west to north, north to west, and for network-wide for all vehicles. Model output from VISSIM was used to estimate average and maximum queue lengths on S.R. 679 and Madonna Boulevard. Average travel and stopped delays per vehicle were recorded for the whole network, at the bascule bridge, and for the eastbound approach on Madonna Boulevard at its intersection with S.R. 679. Approximate locations of the travel time segments, queue counters, and locations for recording travel delays are shown in Figure 6-3.

The LOS* and delay in seconds per vehicle for different years and alternatives have been reported in Figures 6-10 and 6-11 and the detailed results of the Noon and PM peak hour analyses are reported in Table 6-3.

6.3 SUMMARY AND CONCLUSIONS

The purpose of this study was to analyze the existing and future operational performance of the Structure E study area and to provide information on how different bridge alternatives compare against one another. As per the *Florida Department of Transportation Quality/Level of Service Handbook* and *Pinellas County Comprehensive Plan Transportation Element*, the LOS standard for S.R. 679 is LOS D for the peak hour. The following sections summarize the findings and the results for the existing and future traffic conditions.

6.3.1 SUMMARY OF EXISTING CONDITIONS

Existing conditions analyses were performed under existing geometric and bridge conditions for the existing Noon and PM peak hour DHV. In addition, existing analyses were also performed for the Mid and Fixed-bridge alternatives in order to understand how each of them would have worked, under stop controlled conditions at the intersection of S.R. 679 and Madonna Boulevard. The evaluation of existing operating conditions reveals that low and mid-level bascule bridge alternatives would have LOS F operations at the bridge during the Noon peak hour and LOS C operations during the PM peak hour. All three alternatives would operate above the LOS standard for the intersection of S.R. 679 and Madonna Boulevard during the Noon peak hour but would operate at LOS F with extremely high delays for the PM peak hour.

It can be concluded from the existing analyses that the fixed-bridge alternative would work the best under existing conditions because of free flow conditions at the bridge but even this option would experience very high delay at the stop controlled eastbound approach of Madonna Boulevard at its intersection with S.R. 679. Also, the fixed-bridge alternative performs better in terms of travel times on various segments, average and maximum queue lengths, and network-wide average delays.

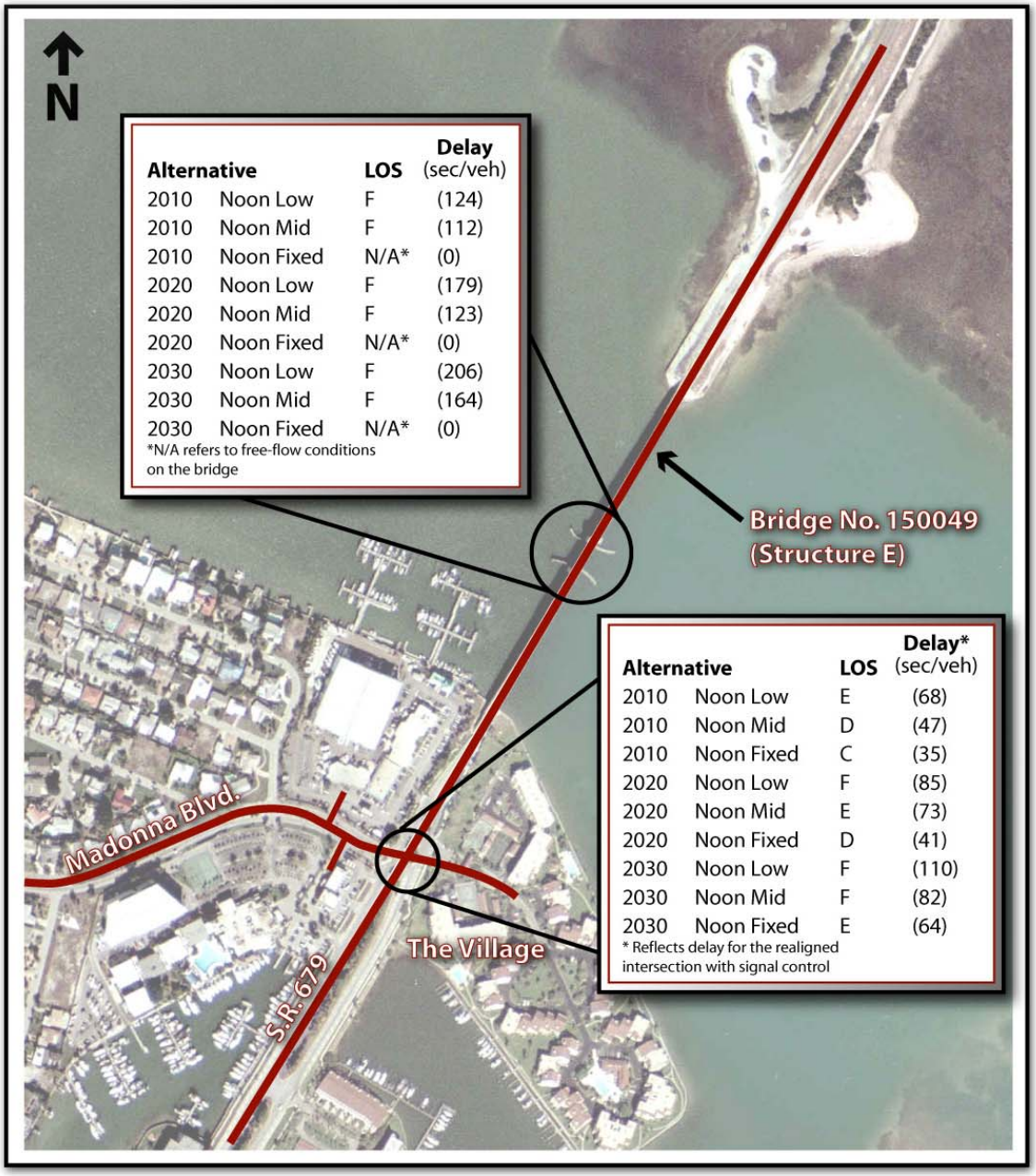
* The delays are based on VISSIM simulation outputs but the LOS has been assigned for comparison purposes based on the delay classification provided by the *Highway Capacity Manual*.

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

2010, 2020, and 2030
Noon Level of Service (LOS) and Delay

WPI Segment No : 410755-1

Figure 6-10



S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
2010, 2020, and 2030
PM Level of Service (LOS) and Delay

WPI Segment No : 410755-1

Figure 6-11

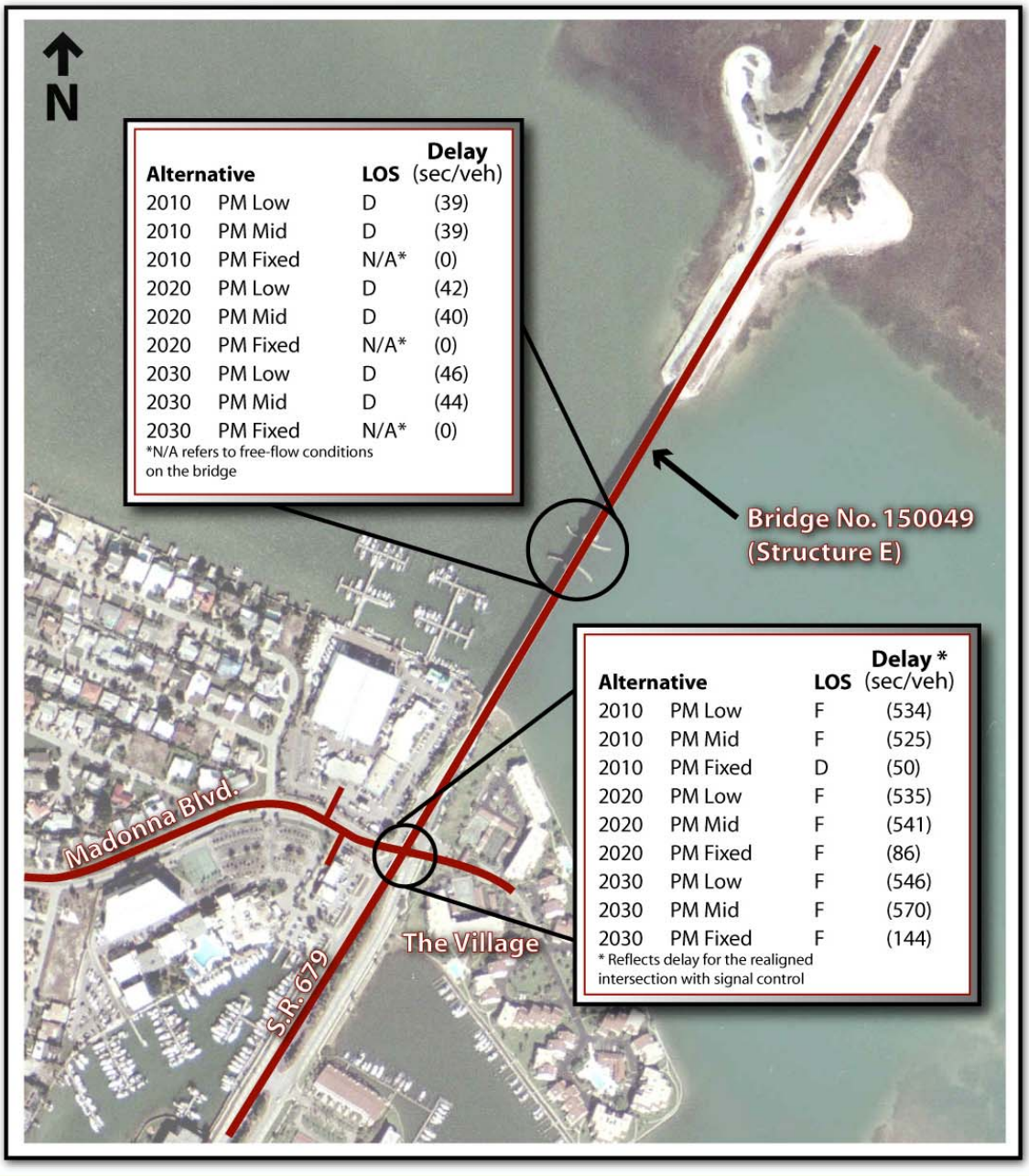


Table 6-3
Travel Times, Queue Lengths, Delays, and LOS for Future Analyses

Results of Operational Analyses using VISSIM 4.1 (Weekend Noon Peak 11:00 AM - 1:00 PM)

	Travel Times (minutes)					Queue Lengths (feet)						Delay (seconds per vehicle)						
Alternatives	TT[1] N to S	TT[1] S to N	TT[1] W to N	TT[1] N to W	TT[1] Network-wide	NB[2] Avg. Queue	NB[2] Max. Queue	SB[2] Avg. Queue	SB[2] Max. Queue	EB[3] Avg. Queue	EB[3] Max. Queue	N-S Avg. Travel Delay @ Bridge	Madonna/SR 679 Avg. Travel Delay	Network-wide Travel Avg. Delay	Network-wide Stopped Avg. Delay	LOS at Bridge[4]	LOS at Madonna[5]	Alternatives
2010# Noon Low	6.42	2.79	6.41	1.38	8.31	551	2257	3603	6628	354	696	124	68	195	91	F	E	2010# Noon Low
2010# Noon Mid	5.76	2.08	4.78	1.28	7.69	241	1991	2719	6627	230	649	112	47	145	61	F	D	2010# Noon Mid
2010# Noon Fixed	3.56	1.25	2.28	1.03	6.61	21	450	48	316	78	493	N/A	35	56	12	N/A	C	2010# Noon Fixed
2020# Noon Low	7.35	2.85	8.31	1.21	9.37	601	2388	5736	6630	495	876	179	85	246	118	F	F	2020# Noon Low
2020# Noon Mid	5.90	2.14	6.38	1.25	8.77	185	1961	3709	6629	349	786	123	73	187	84	F	E	2020# Noon Mid
2020# Noon Fixed	3.72	1.23	2.52	1.05	7.35	18	302	70	1406	103	584	N/A	41	66	13	N/A	D	2020# Noon Fixed
2030# Noon Low	7.62	3.41	10.57	1.37	10.13	1164	2570	6392	6639	726	982	206	110	286	135	F	F	2030# Noon Low
2030# Noon Mid	6.52	2.14	9.33	1.23	9.68	219	2043	5505	6635	580	907	164	82	228	101	F	F	2030# Noon Mid
2030# Noon Fixed	4.06	1.28	3.45	1.16	8.32	32	512	599	5851	188	721	N/A	64	92	22	N/A	E	2030# Noon Fixed

Results of Operational Analyses using VISSIM 4.1 (Weekend PM Peak 4:00 PM - 6:00 PM)

	Travel Times (minutes)					Queue Lengths (feet)						Delay (seconds per vehicle)						
Alternatives	TT[1] N to S	TT[1] S to N	TT[1] W to N	TT[1] N to W	TT[1] Network-wide	NB[2] Avg. Queue	NB[2] Max. Queue	SB[2] Avg. Queue	SB[2] Max. Queue	EB[3] Avg. Queue	EB[3] Max. Queue	N-S Avg. Travel Delay @ Bridge	Madonna/SR 679 Avg. Travel Delay[4]	Network-wide Travel Avg. Delay	Network-wide Stopped Avg. Delay	LOS at Bridge[5]	LOS at Madonna[6]	Alternatives
2010# PM Low	4.28	4.21	17.71	1.16	14.26	8430	10048	344	2502	1369	1512	39	534	796	426	D	F	2010 PM Low
2010# PM Mid	4.00	3.80	18.04	1.23	13.59	7732	10048	283	2537	1365	1497	39	525	722	373	D	F	2010 PM Mid
2010# PM Fixed	3.37	1.48	3.96	0.99	6.49	462	1754	19	189	195	637	N/A	50	61	17	N/A	D	2010 PM Fixed
2020# PM Low	4.35	4.20	16.42	1.29	15.74	8806	10048	398	2944	1487	1608	42	535	874	473	D	F	2020 PM Low
2020# PM Mid	4.09	3.70	17.06	1.14	15.36	8073	10048	331	2981	1460	1585	40	541	831	434	D	F	2020 PM Mid
2020# PM Fixed	3.42	1.56	9.76	0.99	7.50	927	2239	25	255	604	855	N/A	86	95	37	N/A	F	2020 PM Fixed
2030# PM Low	4.49	4.33	15.04	1.51	16.85	9143	10048	461	3074	1487	1600	46	546	929	501	D	F	2030 PM Low
2030# PM Mid	4.29	3.78	16.30	1.17	16.44	8286	10048	397	3114	1470	1605	44	570	879	457	D	F	2030 PM Mid
2030# PM Fixed	4.29	3.78	16.30	1.17	8.68	2058	3456	26	285	714	939	N/A	144	149	55	N/A	F	2030 PM Fixed

Notes:

1. TT stands for travel time.
2. NB and SB queue lengths refer to queuing at the bridge in the case of bascule bridge and at the intersection of SR 679 and Madonna Boulevard in the case of fixed bridge.
3. EB queuing refers to queuing at the eastbound approach of the intersection of SR 679 and Madonna Boulevard.
4. LOS at the bridge has been calculated based on N-S Average Travel Delay at the bridge.
5. LOS at Modonna has been calculated based on the Average Travel Delay at the intersection of Madonna Boulevard and SR 679.

#. 2010 onwards, the intersection of SR 679, Madonna Boulevard, and The Village drivewayhas been treated as realigned and signalized for operational analyses. A signal warrant study has not been evaluated.

N/A refers to free flow conditions on the bridge in case of fixed bridge.

LOS Criteria

LOS	Delay(sec/veh)
A	≤ 10
B	> 10 ≤ 20
C	> 20 ≤ 35
D	> 35 ≤ 55
E	> 55 ≤ 80
F	> 80

6.3.2 SUMMARY OF FUTURE CONDITIONS

All the bridge alternatives that were analyzed for existing conditions were also carried into the analyses for future years. It was observed from the existing analyses that the stop controlled intersection of S.R. 679 and Madonna Boulevard was experiencing extremely high delays in case of all the three alternatives for the PM peak hour. With growth in traffic, the LOS for future years would be expected to degrade further and also considering safety concerns, the intersection of Madonna Boulevard, S.R. 679, and The Village driveway was assumed to be realigned with a signal control for future analyses. The driveways accessing S.R. 679 to the north and immediate south of Madonna Boulevard were assumed to be closed for future operational analyses.

The low-level bascule bridge operates below the LOS standard at the bridge and at the intersection of S.R. 679 and Madonna Boulevard for the Noon peak hour in 2010, 2020, and 2030. It operates at the standard LOS D at the bridge in the PM peak hour for 2010, 2020, and 2030 but operates at LOS F with extremely high delays for the PM peak hour at the intersection of S.R. 679 and Madonna Boulevard.

For 2010 Noon peak hour, the mid-level bascule bridge operates at LOS F at the bridge and at LOS D at the intersection of S.R. 679 and Madonna Boulevard. However, it operates below the standard LOS at both the locations in 2020 and 2030. It performs better than the low-level bascule in the Noon peak hour for all three years but the performance of the two bascule bridge alternatives are comparable in the PM peak hour for all three years. Similar to the low-level bridge alternative, the mid-level bridge alternative operates at the standard LOS at the bridge for 2010, 2020, and 2030 and at LOS F with extremely high delays at the intersection of S.R. 679 and Madonna Boulevard for the PM peak hour.

The fixed-bridge would experience free-flow conditions on the bridge. It operates at LOS C, LOS D, and LOS E at the intersection of S.R. 679 and Madonna Boulevard for 2010, 2020, and 2030 Noon, respectively. For the PM peak hour at the intersection of S.R. 679 and Madonna Boulevard, it operates at the standard LOS for 2010 but degrades to LOS F for 2020 and 2030.

Even though the fixed-bridge operates below the standard LOS at the intersection of S.R. 679 and Madonna Boulevard for 2030 Noon, and 2030 PM, it performs much better than the bascule bridge alternatives. The fixed-bridge alternative experiences significantly reduced travel times, queue lengths, and delays. Also, signal controlling the realigned intersection of S.R. 679, Madonna Boulevard, and The Village driveway seems to significantly reduce the PM peak hour delay with the fixed-bridge alternative.

Detailed results of the operational analyses for all the alternatives and all the years have been documented in Table 6-4. Average travel delays for the signal control at the bascule bridge, for the intersection at S.R. 679 and Madonna Boulevard, and for the whole network have been summarized in Charts 6-1 and 6-2.

Table 6-4
Travel Times, Queue Lengths, Delays, and LOS for Existing and Future Analyses

Results of Operational Analyses using VISSIM 4.1 (Weekend Noon Peak 11:00 AM - 1:00 PM)

Alternatives	Travel Times (minutes)					Queue Lengths (feet)						Delay (seconds per vehicle)				LOS at Bridge[5]	LOS at Madonna[6]	Alternatives
	TT[1] N to S	TT[1] S to N	TT[1] W to N	TT[1] N to W	TT[1] Network-wide	NB[2] Avg. Queue	NB[2] Max. Queue	SB[2] Avg. Queue	SB[2] Max. Queue	EB[3] Avg. Queue	EB[3] Max. Queue	N-S Avg. Travel Delay @ Bridge	Madonna/SR 679 Avg. Travel Delay[4]	Network-wide Travel Avg. Delay	Network-wide Stopped Avg. Delay			
2005 Noon Low	5.26	2.28	3.11	1.18	2.96	302	1975	2038	6035	52	318	91	52	96	60	F	D	2005 Noon Low
2005 Noon Mid	4.76	1.82	2.59	1.45	2.72	222	1924	1631	6035	26	307	82	41	78	46	F	D	2005 Noon Mid
2005 Noon Fixed	3.31	1.12	1.56	1.15	2.06	0	0	0	0	11	156	N/A	26	18	2	N/A	C	2005 Noon Fixed
2010# Noon Low	6.42	2.79	6.41	1.38	8.31	551	2257	3603	6628	354	696	124	68	195	91	F	E	2010# Noon Low
2010# Noon Mid	5.76	2.08	4.78	1.28	7.69	241	1991	2719	6627	230	649	112	47	145	61	F	D	2010# Noon Mid
2010# Noon Fixed	3.56	1.25	2.28	1.03	6.61	21	450	48	316	78	493	N/A	35	56	12	N/A	C	2010# Noon Fixed
2020# Noon Low	7.35	2.85	8.31	1.21	9.37	601	2388	5736	6630	495	876	179	85	246	118	F	F	2020# Noon Low
2020# Noon Mid	5.90	2.14	6.38	1.25	8.77	185	1961	3709	6629	349	786	123	73	187	84	F	E	2020# Noon Mid
2020# Noon Fixed	3.72	1.23	2.52	1.05	7.35	18	302	70	1406	103	584	N/A	41	66	13	N/A	D	2020# Noon Fixed
2030# Noon Low	7.62	3.41	10.57	1.37	10.13	1164	2570	6392	6639	726	982	206	110	286	135	F	F	2030# Noon Low
2030# Noon Mid	6.52	2.14	9.33	1.23	9.68	219	2043	5505	6635	580	907	164	82	228	101	F	F	2030# Noon Mid
2030# Noon Fixed	4.06	1.28	3.45	1.16	8.32	32	512	599	5851	188	721	N/A	64	92	22	N/A	E	2030# Noon Fixed

Results of Operational Analyses using VISSIM 4.1 (Weekend PM Peak 4:00 PM - 6:00 PM)

Alternatives	Travel Times (minutes)					Queue Lengths (feet)						Delay (seconds per vehicle)				LOS at Bridge[5]	LOS at Madonna[6]	Alternatives
	TT[1] N to S	TT[1] S to N	TT[1] W to N	TT[1] N to W	TT[1] Network-wide	NB[2] Avg. Queue	NB[2] Max. Queue	SB[2] Avg. Queue	SB[2] Max. Queue	EB[3] Avg. Queue	EB[3] Max. Queue	N-S Avg. Travel Delay @ Bridge	Madonna/SR 679 Avg. Travel Delay[4]	Network-wide Travel Avg. Delay	Network-wide Stopped Avg. Delay			
2005 PM Low	3.91	12.25	13.18	1.47	11.05	5451	6067	219	1938	842	1414	30	489	549	288	C	F	2005 PM Low
2005 PM Mid	3.72	10.82	11.65	1.28	9.21	4759	6067	191	2102	516	625	28	357	396	186	C	F	2005 PM Mid
2005 PM Fixed	3.20	7.71	9.28	1.12	7.74	0	0	0	0	437	630	N/A	278	254	89	N/A	F	2005 PM Fixed
2010# PM Low	4.28	4.21	17.71	1.16	14.26	8430	10048	344	2502	1369	1512	39	534	796	426	D	F	2010 PM Low
2010# PM Mid	4.00	3.80	18.04	1.23	13.59	7732	10048	283	2537	1365	1497	39	525	722	373	D	F	2010 PM Mid
2010# PM Fixed	3.37	1.48	3.96	0.99	6.49	462	1754	19	189	195	637	N/A	50	61	17	N/A	D	2010 PM Fixed
2020# PM Low	4.35	4.20	16.42	1.29	15.74	8806	10048	398	2944	1487	1608	42	535	874	473	D	F	2020 PM Low
2020# PM Mid	4.09	3.70	17.06	1.14	15.36	8073	10048	331	2981	1460	1585	40	541	831	434	D	F	2020 PM Mid
2020# PM Fixed	3.42	1.56	9.76	0.99	7.50	927	2239	25	255	604	855	N/A	86	95	37	N/A	F	2020 PM Fixed
2030# PM Low	4.49	4.33	15.04	1.51	16.85	9143	10048	461	3074	1487	1600	46	546	929	501	D	F	2030 PM Low
2030# PM Mid	4.29	3.78	16.30	1.17	16.44	8286	10048	397	3114	1470	1605	44	570	879	457	D	F	2030 PM Mid
2030# PM Fixed	4.29	3.78	16.30	1.17	8.68	2058	3456	26	285	714	939	N/A	144	149	55	N/A	F	2030 PM Fixed

Notes:

1. TT stands for travel time.
2. NB and SB queue lengths refer to queuing at the bridge in the case of bascule bridge and at the intersection of SR 679 and Madonna Boulevard in the case of fixed bridge.
3. EB queuing refers to queuing at the eastbound approach of the intersection of SR 679 and Madonna Boulevard.
4. This being an unsignalized intersection under existing conditions, the delay refers to the delay for the EB movement on Madonna Bouelvard.
5. LOS at the bridge has been calculated based on N-S Average Travel Delay at the bridge.
6. LOS at Modonna has been calculated based on the Average Travel Delay at the intersection of Madonna Boulevard and SR 679.

#. 2010 onwards, the intersection of SR 679, Madonna Boulevard, and The Village driveway has been treated as realigned and signalized for operational analyses. A signal warrant study has not been evaluated.

N/A refers to free flow conditions on the bridge in the case of fixed a bridge.

LOS Criteria

LOS	Delay(sec/veh)
A	≤ 10
B	> 10 ≤ 20
C	> 20 ≤ 35
D	> 35 ≤ 55
E	> 55 ≤ 80
F	> 80

Chart 6-1 Summary of Average Travel Delays for Weekend Noon Peak Hour

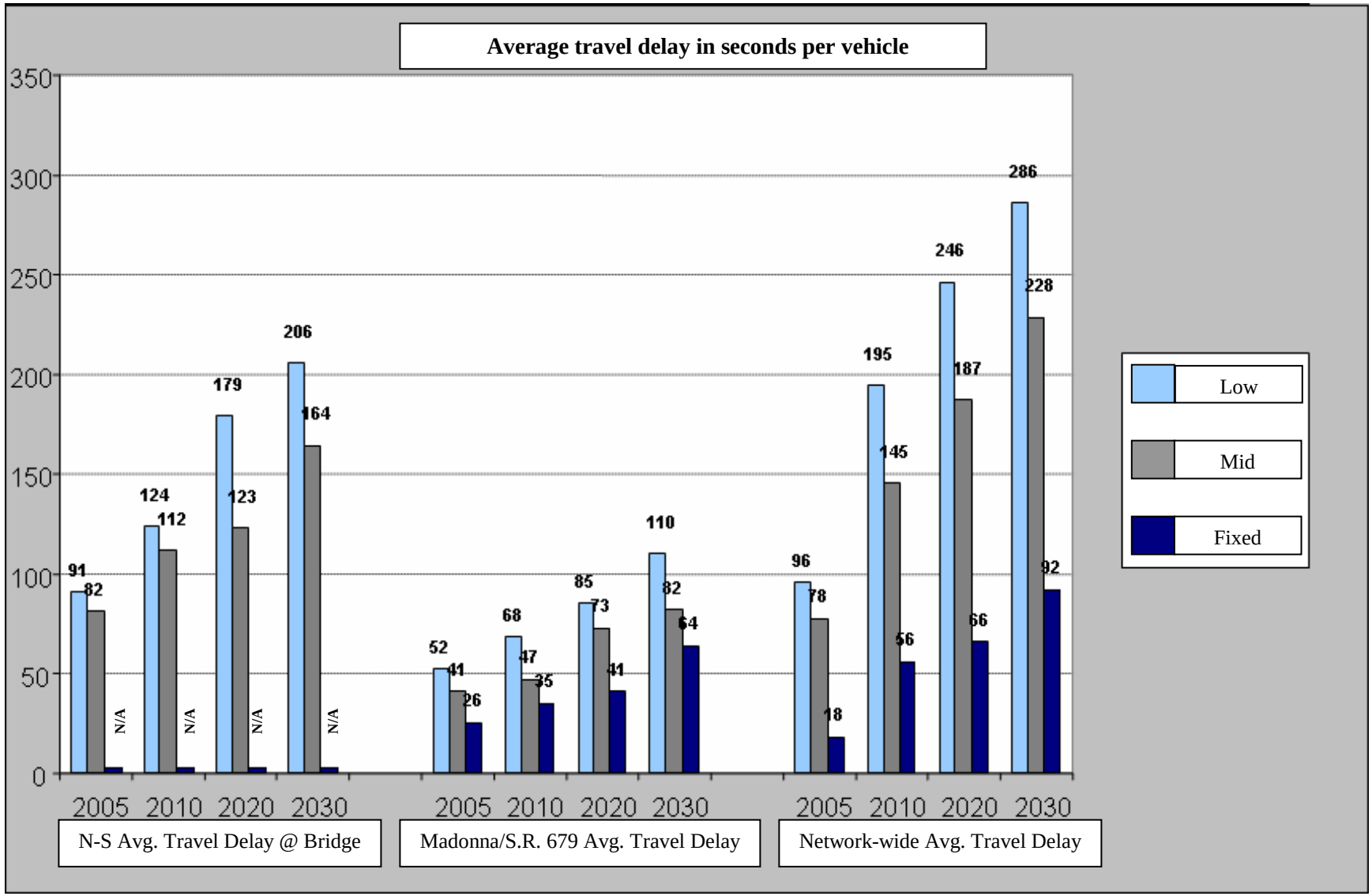
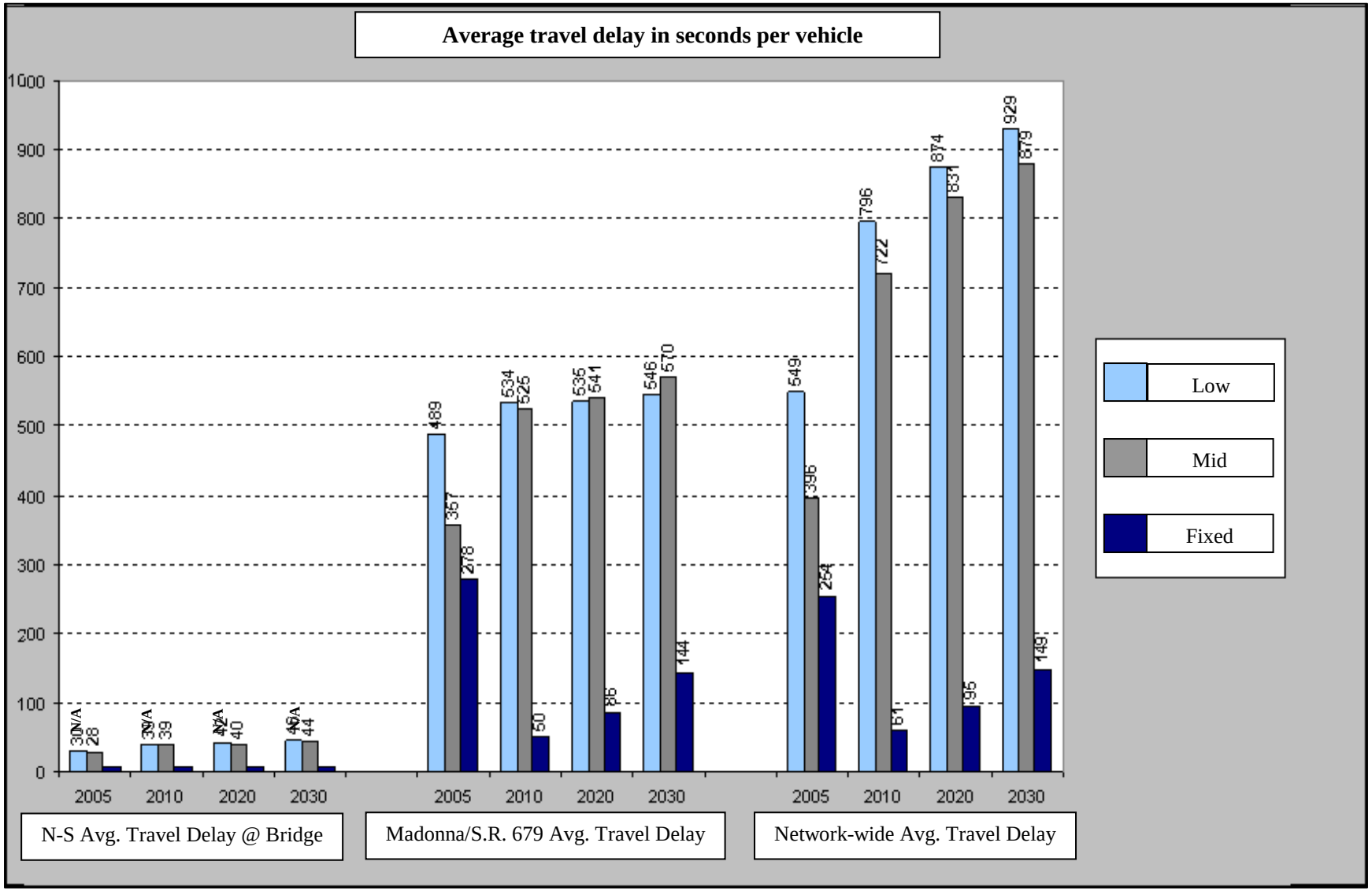


Chart 6-2 Summary of Average Travel Delays for Weekend PM Peak Hour



6.4 REFERENCES

1. *Final Traffic Technical Memorandum;* prepared for Florida Department of Transportation by PBS&J; June, 2007.

2. *Design Traffic Handbook*; Florida Department of Transportation; Tallahassee, Florida; 1996.

3. *Quality/Level of Service Handbook*; Florida Department of Transportation; Tallahassee, Florida; 2002.

4. *Pinellas County Comprehensive Plan Transportation Element*; http://www.pinellascounty.org/Plan/compendium/Transportation.pdf.

5. *VISSIM 4.1 – 09*; PTV AG; Karlsruhe, Germany.

6. *Highway Capacity Manual, 2000*; Transportation Research Board; Washington, D.C.; 2000.

7. *Synchro 6, Trafficware*; Albany, California; 2003.

Section 7.0
CORRIDOR ANALYSIS

7.1 EVALUATION OF ALTERNATIVE CORRIDORS

S.R. 679 provides the only vehicular access to and from Tierra Verde and Mullet Key; therefore, improvements to parallel roadways are not an option for this project.

7.2 CORRIDOR SELECTION

Rehabilitation or replacement of the current bridge within the existing corridor provides for the most feasible corridor. Alternatives to the right and left (east and west) of the existing bridge will be evaluated to identify a preferred alignment for the bridge Build Alternatives within the existing corridor.

Section 8.0
ALTERNATIVE ANALYSIS

To develop an improved roadway facility for S.R. 679 that is in the best overall public interest, engineering, environmental, and economic factors as well as urban development conditions must be taken into consideration. The improved facility should be designed to safely and efficiently accommodate the projected design year vehicular traffic as well as multi-modal traffic. The design and alignment of the improved facility must consider environmental conditions, public recreation areas, as well as sites potentially contaminated with hazardous and/or petroleum materials. The preferred alternative should optimize the possibility for construction staging and traffic control. Access control techniques to promote safe and efficient operations should be used. All of these criteria have a direct bearing on the selection of the preferred design concept.

Bridge improvement alternatives considered for this facility include:

- Alternative 1 – Rehabilitation
- Alternative 2 – Rehabilitation with Widening
- Alternative 3 – Low-Level Bascule Bridge Replacement
- Alternative 4 – Mid-Level Bascule Bridge Replacement
- Alternative 5 – High-Level Fixed-Bridge Replacement over Existing Channel
- Alternative 6 – High-Level Fixed-Bridge Replacement over a Relocated Channel

Included in the following sections are descriptions of each alternative and the evaluation methods used to compare the alternatives. These descriptions are followed by a presentation of the advantages and disadvantages of each alternative.

8.1 ALTERNATIVE 1 – REHABILITATION

The Rehabilitation Alternative is the repair and rehabilitation of the existing bridge in its existing design configuration to keep the bridge operating in a safe condition, maintaining the existing typical section as shown in Figure 8-1. This alternative includes two full rehabilitation programs of the existing fixed and moveable structure components; the first completed by 2011, the second by 2061, in order to extend the service life of the bridge for 75 years until 2086, the same service life of a replacement bridge. In order for vehicular traffic to be maintained at all times during construction activities, a temporary bridge is required on the east side of the existing bridge for both the 2011 and 2061 rehabilitation operations, to be removed upon completion of the rehabilitation activities. Temporary roadway approaches would also be constructed and removed.

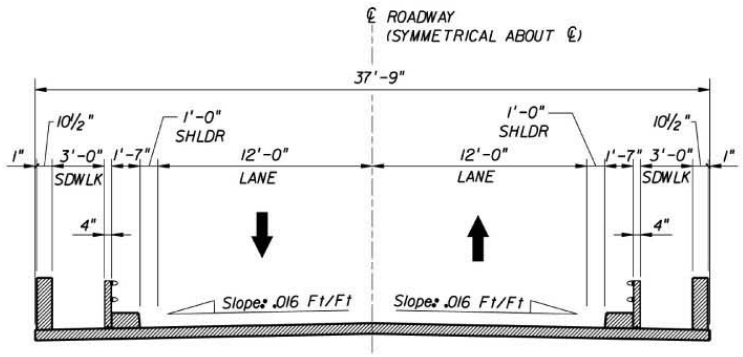
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Bridge Typical Section

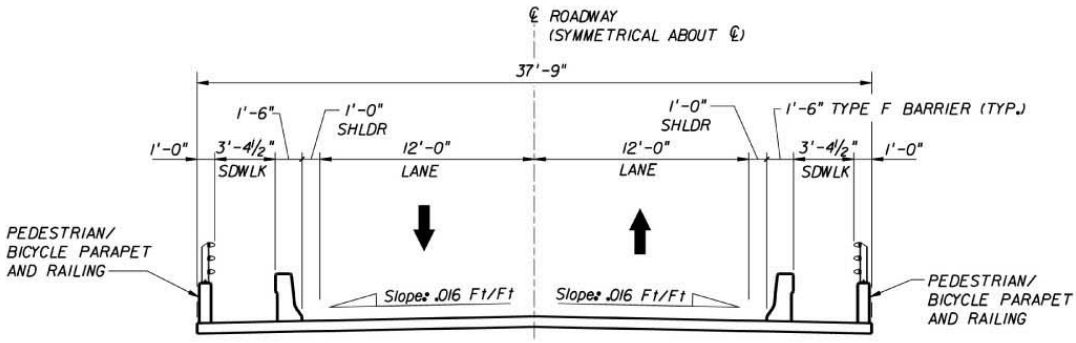
Alternative 1 - Rehabilitation

WPI Segment No : 410755-1

Figure 8-1



EXISTING (REMOVAL CROSS-HATCHED)



NEW CONSTRUCTION

NOTES:

1. APPROACH SPAN SUPERSTRUCTURE VARIES (SUPERSTRUCTURE NOT SHOWN).
2. BASCULE SPAN SECTION REMAINS THE SAME, EXCEPT OPEN STEEL AND CONCRETE FILLED GRID DECKS ARE REPLACED.

The *Bridge Rehabilitation Alternatives Report*[1] explains the repairs in detail. Table 8-1 details the repair measures, their timing, and their costs in 2006 dollars. Bridge railings, traffic curbs and guardrails, concrete deck, and steel grid decking would be replaced by 2011 to provide improved safety features. Permanent scour countermeasures in the form of crutch bents and a grout-filled mat system will be installed. Concrete spalls would be repaired in the prestressed concrete girders, piles, pier columns and struts, bascule piers, pier footings, bents, and end caps. Portions of the bulkheads will be reconstructed. Steel components will be cleaned and painted. All of the moveable bridge mechanical and hydraulic items will be cleaned, lubricated, repaired, replaced, and/or rehabilitated. In addition, the entire electrical system will be replaced. A temporary bridge and extended navigational fenders would be constructed to maintain vehicular and boat traffic during the deck replacement. By 2061, the structural, mechanical, and electrical components and systems will again be 50 years old and need to be replaced or rehabilitated, so the entire rehabilitation program will be essentially repeated. A temporary bridge will again be constructed to maintain traffic during the construction work. An economic analysis was conducted for this rehabilitation program. The discussion of the economic analysis occurs in the later sections of this report.

Table 8-1
Alternative 1 - Rehabilitation Construction Cost Summary

Year	Rehabilitation Element	Cost
2007	Replace bridge rails with exposed reinforcement for safety considerations	$3,125
	Repair spalls in associated concrete posts	$15,000
	Clean and paint the utility pull box and meter head. Clean and pain the junction boxes and conduits throughout the bridge structure	$18,000
	Adjust the digital ammeters to read the proper operating motor currents, and repair the alphanumeric display to communicate with the PLC	$6,000
	Repair/replace gong on the far side oncoming warning gate; clean corrosion at flasher terminals of far side oncoming gate and coat with rust inhibitor	$2,400
	Clean and paint generator; replace housing with fiberglass enclosure	$30,000
	Loosen packing glands on input shafts of all speed reducers	$3,600
	Replace fluid in opposite side center lock hydraulic power unit	$1,200
	Repair all leaks in hydraulic piping system	$1,200
	Tighten loose fastener at adjacent side center lock forward guide	$3,600
	Replace timing belts between trunnions and position transmitters	$1,200
	Check tightness of all machinery fasteners. Check and adjust the balance of the movable spans	$12,000
2008	Grout filled mat system for Bascule Pier 12	$120,000
	Crutch bents on 25% Bents ➔ $200L x 5 bents	$1,000,000

Table 8-1 (Cont.)
Alternative 1 - Rehabilitation Construction Cost Summary

Year	Rehabilitation Element	Cost
2011	Temporary bridge for maintenance of traffic during construction	$9,900,000
	Replace deck slabs on the approach spans and Bascule Piers 11 & 12	$2,100,000
	Replace the bridge railings along the approach spans and bascule piers	$260,000
	Replace the guardrails and the curbs on the approach spans	$218,750
	Repair spalls in the prestressed concrete girders	$7,500
	Repair spalls in the prestressed concrete piles	$7,500
	Repair spalls in the reinforced concrete pier columns and struts	$40,625
	Repair spalls in the reinforced concrete bascule piers	$15,000
	Repair spalls in the reinforced concrete pier footings	$56,250
	Repair spalls in the reinforced concrete bent and pier caps	$22,500
	Reconstruct portion of the north bulkhead cap	$85,000
	Replace the 5”deep open steel grid decking	$322,000
	Replace the 3” deep concrete-filled grid decking	$136,850
	Clean and paint all structural steel	$396,000
	Complete mechanical system rehabilitation and minor hydraulic rehab	$600,000
2018	Replace the entire prestressed concrete pile/timber fender system	$312,500
2026	Minor mechanical system rehabilitation and minor hydraulic rehabilitation	$240,000
	Complete electrical system replacement (no changes in current operation)	$4,200,000
2032	Repair spalls in the reinforced and prestressed concrete elements	$187,500
	Repair/replace a portion of the scour protection grout-filled mat system	$120,000
	Crutch bents on 50% bents ➔ $200K x 10	$2,000,000
2037	Reconstruct or remediate portions of the bulkheads	$87,500
	Clean and paint steel, and perform repairs or replacements	$675,000
2038	Minor hydraulic rehabilitation	$36,000
2051	Complete mechanical system rehabilitation and minor hydraulic rehabilitation	$600,000
2052	Repair spalls in reinforced and prestressed concrete elements	$281,250
2056	Complete electrical system replacement (no changes in current operation)	$4,200,000
2058	Replace the entire prestressed concrete pile/timber fender system	$312,500
	Repair/replace bascule pier 12 of the scour protection grout-filled mat system	$120,000
	Crutch bents on 100% bents ➔ $200K x 20	$4,000,000
2062	Temporary bridge for maintenance of traffic	$9,900,000
	Replace the deck slabs on the approach spans and Bascule Piers 11 & 12	$2,100,000
	Replace bridge railings along the approach spans and bascule piers	$260,000
	Replace the Type F traffic railing barriers on the approach spans	$218,750

Table 8-1 (Cont.)
Alternative 1 - Rehabilitation Construction Cost Summary

Year	Rehabilitation Element	Cost
	Replace the 5" deep open steel grid decking	$322,000
	Replace the 3" deep concrete-filled grid decking	$136,850
	Reconstruct or remediate portions of the bulkheads	$87,500
	Clean and paint the steel, and perform repairs or replacements	$594,000
2066	Minor mechanical system rehabilitation and minor hydraulic rehabilitation	$240,000
2072	Repair spalls in the reinforced and prestressed concrete elements	$500,000
2081	Minor hydraulic rehabilitation, to extend reliable operation until 2086	$360,000
2083	Repair/replace Bascule Pier 12 of the scour protection grout-filled mat system	$120,000
TOTAL		**$47,596,650**

Alternative 1 does not require stormwater management facilities (SMF) since it involves an alteration of the existing roadway without adding additional capacity (the existing bridge will remain while no additional travel lanes are proposed).

Certain advantages would be associated with the implementation of Alternative 1 – Rehabilitation, including:

- No acquisition of residential, business, or recreational property

The potential disadvantages of the Rehabilitation Alternative include:

- Potential effects on the natural environment resulting from the temporary bridge
- An undesirable functional deficiency for the 75-year life of the structure
- Continued and increasing operation, maintenance and repair costs
- Continued safety concerns associated with the absence of shoulders
- Continued safety concerns associated with vessels impacting the structure
- Continued concern for effective and reliable hurricane evacuation and recovery
- No improvement in water quality in Boca Ciega Bay since stormwater will not be treated
- Continued vehicular delay caused by the bascule bridge openings
- Disruption to vehicular and vessel traffic during both rehabilitation programs

- Three-foot (ft) sidewalks in each direction do not accommodate a planned multi-use path
- American's with Disabilities Act (ADA) geometric design standards are not met
- Continued operating costs due to the need for a bridge tender

Alternative 1 is considered the no-build alternative and will remain under consideration throughout the alternatives analysis and evaluation process.

8.2 ALTERNATIVE 2 – REHABILITATION WITH WIDENING

The Rehabilitation with Widening Alternative includes repair, rehabilitation and widening of the existing bridge to the east to accommodate a cross section that meets current Florida Department of Transportation (FDOT) geometric design requirements and standards. The proposed typical sections are shown in Figures 8-2, 8-3, and 8-4 for the approach spans, bascule span, and bascule pier, respectively. The widened structure features two 12-ft lanes separated by a 4-ft striped median, two 10-ft shoulders, and two 5-ft (minimum) sidewalks separated from the shoulder by a barrier wall. In essence, the widening consists of construction of a separate new bascule bridge, with its own separate mechanical and electrical systems, immediately adjacent to the existing bridge. The striped median would be incorporated into the cross section to move the northbound vehicular outboard wheel line off the longitudinal joint associated with the tail of each new leaf.

Complete rehabilitation of all the same components and systems of the existing bridge is also included. Vehicular traffic can be maintained at all times during construction activities without a temporary bridge by using the extra width of the widened bridge. As with Alternative 1, the initial concrete repairs, mechanical and electrical system replacement, scour countermeasures and all new construction would be completed by 2011.

In addition to widening of the initial bridge, this alternative includes two full rehabilitation programs of the existing fixed and moveable structure components, the first completed by 2011, the second completed by 2061, in order to extend the service life of the bridge for 75 years until 2086, the same service life of a replacement bridge. The *Bridge Rehabilitation Alternatives Report* explains the repairs in detail. Table 8-2 summarizes the bridge widening and repair measures, their timing, and their costs in 2006 dollars.

As with Alternative 1, Alternative 2 does not require SMFs since the existing bridge will remain and be widened, but no additional travel lanes are proposed.

Certain advantages would be associated with the implementation of Alternative 2 - Rehabilitation with Widening, including:

- No acquisition of residential, business, or recreational property

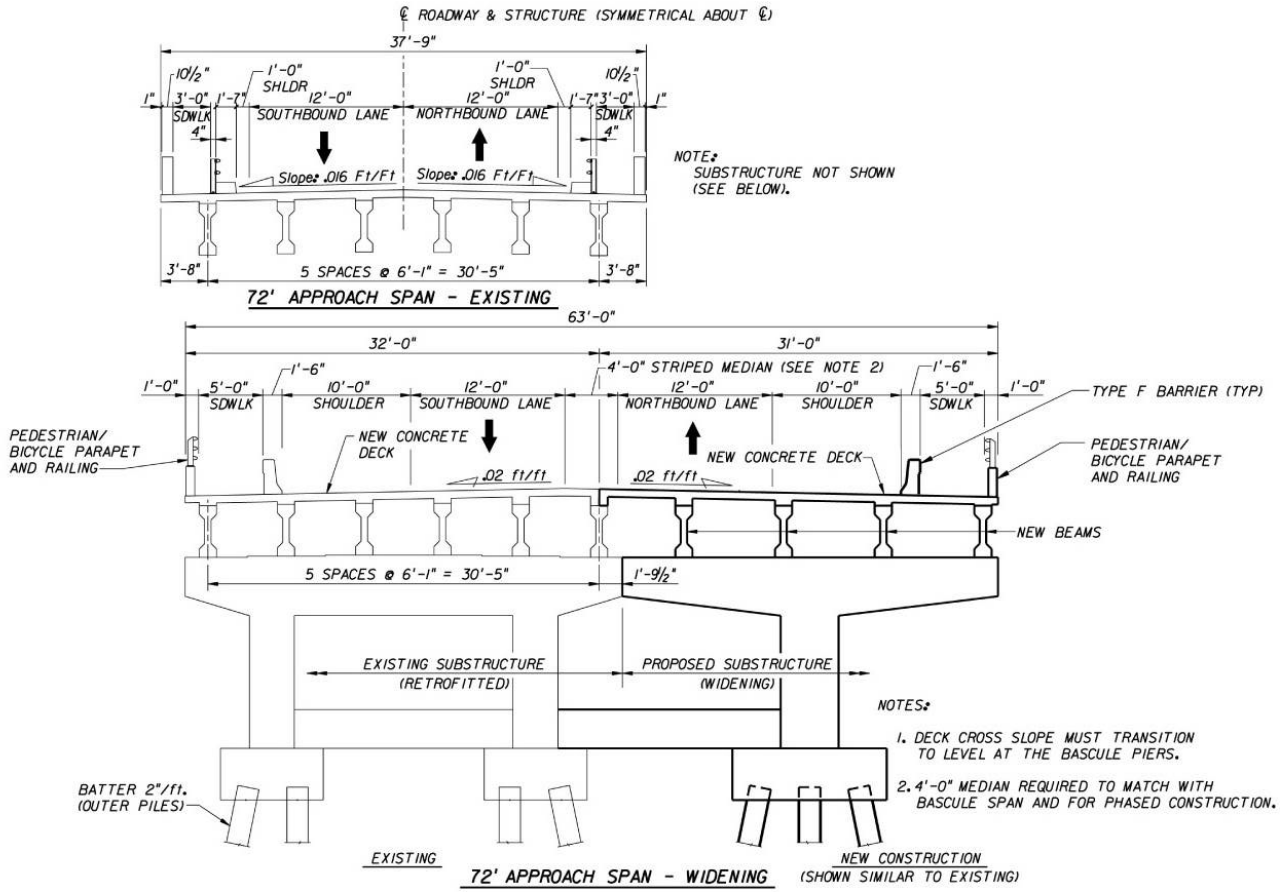
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Approach Span Typical Section

Alternative 2 - Rehabilitation with Widening

WPI Segment No: 410755-1

Figure 8-2



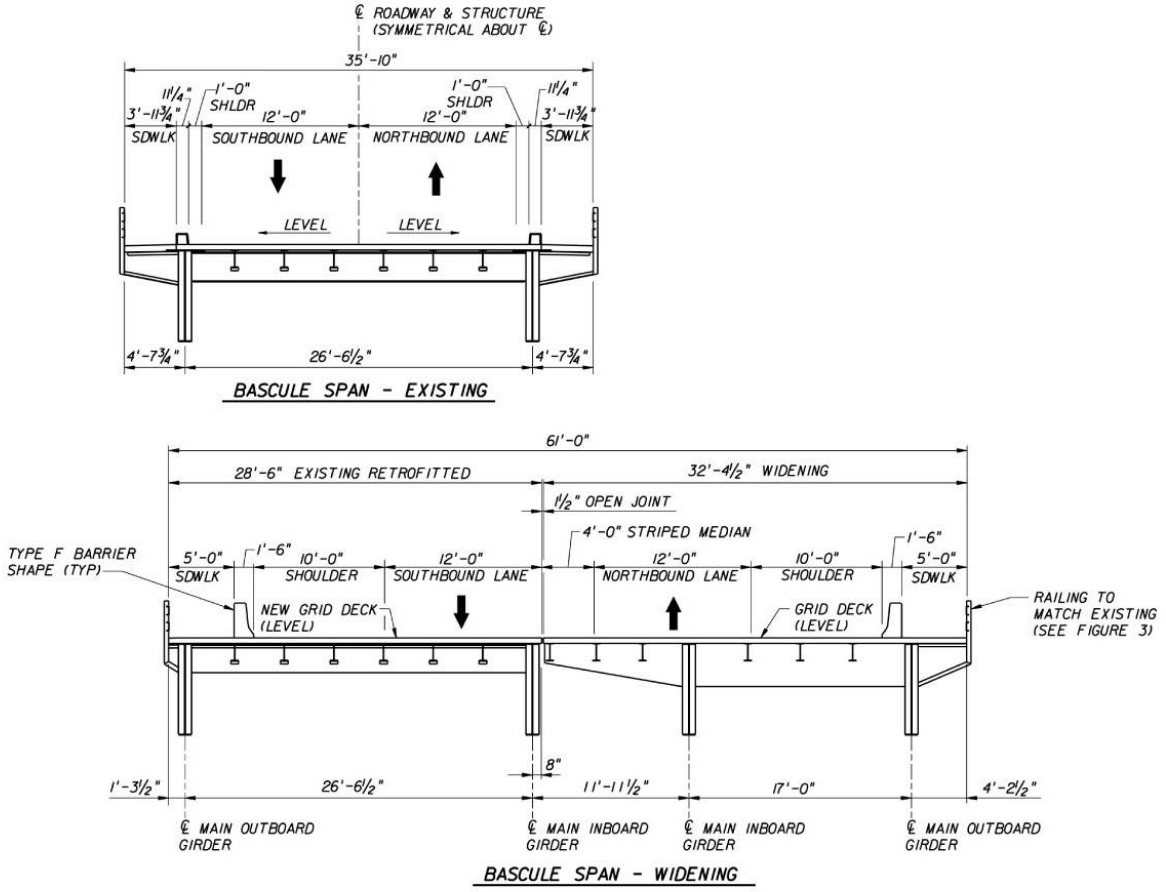
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Bascule Span Typical Section

Alternative 2 - Rehabilitation with Widening

WPI Segment No: 410755-1

Figure 8-3



S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Bascule Pier Typical Section

Alternative 2 - Rehabilitation with Widening

WPI Segment No: 410755-1

Figure 8-4

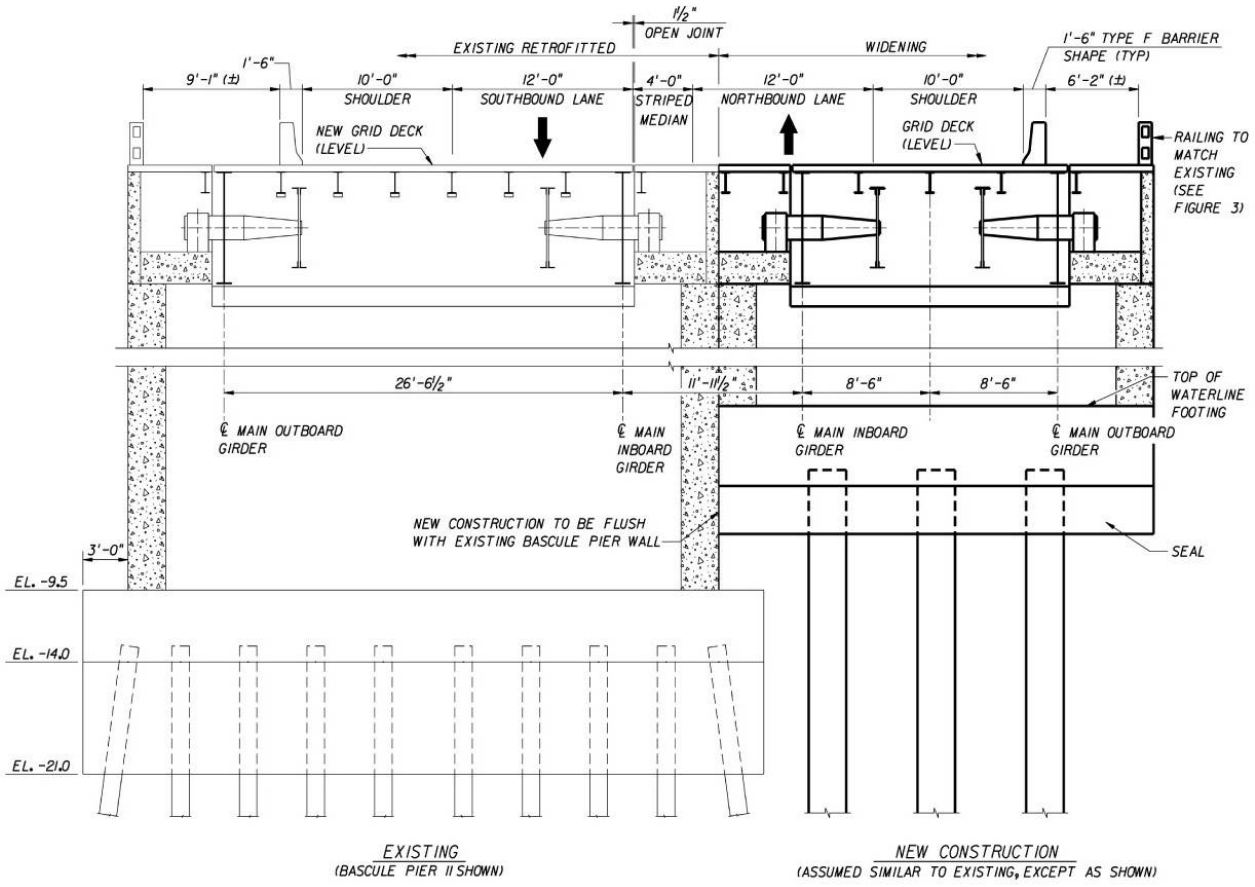


Table 8-2
Alternative 2 - Rehabilitation with Widening Construction Cost Summary

Year	Rehabilitation Element	Cost
2007	Replace bridge rails with exposed reinforcement for safety considerations	$3,125
	Repair spalls in associated concrete posts	$15,000
	Loosen packing glands on input shafts of all speed reducers	$3,600
	Replace fluid in opposite side center lock hydraulic power unit	$1,200
	Repair all leaks in hydraulic piping system	$1,200
	Tighten loose fastener at adjacent side center lock forward guide	$3,600
	Replace timing belts between trunnions and position transmitters	$1,200
	Check tightness of all machinery fasteners. Check and adjust the balance of the movable spans	$12,000
2008	Grout-filled mat system for Bascule Pier 12	$120,000
	Crutch bents on 25% Bents ➔ $200K x 5 bents	$1,000,000
2011	Repair spalls in the prestressed concrete girders	$7,500
	Repair spalls in the prestressed concrete piles	$7,500
	Repair spalls in the reinforced concrete pier columns and struts	$40,625
	Repair spalls in the reinforced concrete bascule piers	$15,000
	Repair spalls in the reinforced concrete pier footings	$56,250
	Repair spalls in the reinforced concrete bent and pier caps	$22,500
	Reconstruct portion of the north bulkhead cap	$85,000
	Clean and paint all structural steel for the existing bridge	$414,000
	Replace the deck slabs on approach spans and Bascule Piers 11 & 12	$2,310,000
	Replace the bridge railings along the approach spans and bascule piers	$130,000
	Replace guardrails and curbs on approach spans	$109,375
	Replace the 5” deep open steel grid decking	$322,000
	Replace the 3” deep concrete-filled grid decking	$183,425
	Replace the entire prestressed concrete pile/timber fender system	$375,000
	Strengthen the P/S Beams in the 72-ft long approach spans	$300,000
	Strengthen the Bascule Span Main Girders	$575,000
	Widening of the Bascule span	$12,190,000
	Widening of the approach spans	$6,000,000
	Reconstruct approach roadways to meet widened bridge	$975,000
	Construct permanent retaining wall for north approach roadway	$312,500
	Total electrical system including replacement of existing systems	$5,400,000
	Install complete new machinery system on new movable span	$3,000,000

Table 8-2 (Cont.)
Alternative 2 - Rehabilitation with Widening Construction Cost Summary

Year	Rehabilitation Element	Cost
2011	Complete mechanical system rehabilitation and minor hydraulic rehabilitation of the existing machinery	$600,000
2026	Minor mechanical system rehabilitation and minor hydraulic rehabilitation	$480,000
2032	Repair spalls in the reinforced and prestressed concrete elements	$187,500
	Repair/replace Bascule Pier 12 of the scour protection grout-filled mat system	$120,000
	Crutch bents on 50% bents ➔ $200K x10	$2,000,000
2037	Reconstruct/ remediate portions of the bulkheads and permanent wall	$131,250
	Clean and paint the steel, and perform repairs or replacements	$828,000
2038	Minor hydraulic rehabilitations	$72,000
2042	Complete electrical system replacement	$5,400,000
2051	Complete mechanical system rehabilitation and minor hydraulic rehabilitation	$1,200,000
2052	Repair spalls in reinforced and prestressed concrete elements	$281,250
	Replace the entire prestressed concrete pile/timber fender system	$375,000
2058	Repair/replace bascule pier 12 of the scour protection grout filled mat system	$120,000
	Crutch Bents on 100% Bents ➔ $200K x 20	$4,000,000
2062	Replace the deck slabs on approach spans and Bascule Piers 11 & 12	$3,500,000
	Replace the bridge railings along approach spans and bascule piers	$260,000
	Replace type F traffic railing barriers on approach spans	$218,750
	Replace the 5” deep open steel grid decking	$561,200
	Replace the 3” deep concrete-filled grid decking	$225,400
	Repair spalls in new concrete elements associated with widening	$150,000
	Reconstruct/remediate portions of the bulkhead and permanent wall	$131,250
	Clean and paint the steel, and perform repairs or replacements	$1,035,000
2066	Minor mechanical system rehabilitation and minor hydraulic rehabilitation	$480,000
2072	Repair spalls in the reinforced and prestressed concrete elements	$500,000
	Complete electrical system replacement #3	$5,400,000
2081	Minor mechanical system rehabilitation (with possible major items), minor hydraulic rehabilitation to extend reliable operation until 2086	$720,000
2083	Repair/replace Bascule Pier 12 of the scour protection grout-filled mat system	$120,000
TOTAL		**$63,088,200**

The potential disadvantages of Alternative 2 include:

- Bridge widening requires a United States Coast Guard (USCG) permit
- Continued and increasing operation, maintenance and repair costs
- Continued safety concerns associated with vessels impacting the structure
- Continued vehicular delay caused by the bascule bridge openings
- Disruption to vehicular and vessel traffic during both rehabilitation programs
- Potential effects on the natural environment
- Highest construction cost
- Five-ft sidewalks in each direction do not accommodate a planned multi-use path
- Continued operating costs due to the need for a bridge tender
- No improvement in water quality in Boca Ciega Bay since stormwater will not be treated

8.3 BRIDGE REPLACEMENT CONSIDERATIONS

The USCG guide clearances have been established for the Intracoastal Waterway at this location. They are 21-ft vertical clearance at mean high water (MHW) for new drawbridges and 65-ft vertical clearance at MHW for new fixed-bridges. The horizontal guide clearance for all bridge replacement alternatives is 100 ft between fenders, which is a 10-ft increase over the existing condition.

Three general bridge replacement alternatives were evaluated for this Project Development and Environment (PD&E) Study:

- **Alternative 3 − Low-Level Bascule:** This concept proposes building a new bascule bridge with a minimum vertical navigational clearance of 21.5 ft above the fenders when the bridge is closed. This is the same vertical clearance as the existing bridge.

- **Alternative 4 − Mid-Level Bascule:** This concept proposes a replacement bascule bridge with a navigation clearance of 45 ft. Based on data provided by the bridge tender at Structure E and allowing for tidal fluctuations, this height would allow approximately 45 percent of the waterway users that currently require the bridge to open to pass without an opening.

- **Alternative 5 – High-Level Fixed-Span over Existing Channel:** This concept proposes a high-level fixed-span replacement bridge over the existing Intracoastal Waterway navigation channel. The vertical navigational clearance will be 65 ft. Based on data provided by the bridge tender at Structure E and allowing for tidal fluctuations, this height would allow over 99 percent of waterway users that currently use the channel to safely navigate under the proposed structure.

- **Alternative 6 – High-Level Fixed-Span over Relocated Channel:** This concept proposes a high-level fixed-span replacement bridge over the Intracoastal Waterway navigation channel

relocated 400 ft to the north. The vertical navigational clearance will be 65 ft. Based on data provided by the bridge tender at Structure E and allowing for tidal fluctuations, this height would allow over 99 percent of waterway users that currently use the channel to safely navigate under the proposed structure.

More information on specific alternatives is provided in the following sections.

8.3.1 MADONNA BOULEVARD INTERSECTION

Madonna Boulevard is a two-lane divided residential collector roadway that intersects S.R. 679 at a three-leg intersection (T-intersection). The Village at Tierra Verde (The Village) driveway is also a two-lane divided roadway at its connection to S.R. 679 approximately 100 ft north of the Madonna Boulevard intersection. As described previously, the existing combined intersection of Madonna Boulevard and The Village driveway is considered a high crash location since the safety ratio is greater than 1.0 for two of the five years evaluated. This is caused by a number of driveways and median openings that do not meet FDOT Access Class 3 spacing criteria. There are two existing median openings along S.R. 679 near Madonna Boulevard located within 100 ft of each other. The southern median opening serves Madonna Boulevard. The northern median opening serves driveway access to The Village condominium community on the east and the Tierra Verde Marina and shopping center on the west. In addition, there is a second driveway to the north which accommodates right-in/right-out Marina access. There are also two driveways south of Madonna Boulevard serving right-in/right-out access to the businesses. Furthermore, there are additional existing median openings and driveways along Madonna Boulevard.

Conflict points are locations along a roadway where two vehicle's paths can legally cross. Each conflict point is a location where a crash can occur. A basic principal of access management is to limit the number of conflict points along a roadway by limiting the number of driveways and median openings and restricting certain movements. Drivers can be overwhelmed by conflict points in proximity to one another, increasing the potential for crashes. Good access management practice strives to separate conflict points by providing a reasonable distance between driveways and between median openings. Not only does an abundance of conflict points lead to crashes, but it also negatively affects the roadway's capacity to handle traffic. The existing configuration involves 51 conflict points. For these reasons, the replacement bridge alternatives (Alternatives 3 through 6) all result in a reduction in conflict points. This is accomplished by combining the two median openings into a single median opening serving both Madonna Boulevard and the driveway to The Village. In addition, for Alternatives 4, 5, and 6, both driveways north of Madonna Boulevard are closed. There are three options to accomplish the reconfiguration of the intersection:

- Option A includes the realignment of The Village driveway to align with existing Madonna Boulevard. This would effect the guard house and the internal circulation and parking for The Village. The existing northern median opening would be closed.

- Option B includes the realignment of Madonna Boulevard to align with the existing The Village driveway. This would affect the Tierra Verde Marina shopping center parking lot. The existing southern median opening would be closed.

- Option C includes the realignment of both The Village driveway and Madonna Boulevard to meet in the middle. This would affect both properties, but keep effects to each property to a minimum.

The proposed intersection improvements, either Option A, B, or C, including the signalization, will reduce the maximum number of potential concurrent conflict points from 51 to a maximum of 10. This will result in fewer driver decision points, fewer accidents, increased capacity, and therefore improved operations through the intersection.

8.3.2 SPLASH ZONE

One possible reason for the deterioration of the existing structure is its location in vertical proximity to the saltwater. According to the FDOT *Structures Design Guidelines*[2], for concrete superstructures located where a significant corrosion potential exists, the desirable minimum vertical clearance standard is a minimum of 4.0 meters (12 ft) above MHW, which is at elevation 1.87 ft. This is referred to as the splash zone. This will significantly protect the structure from the effects of corrosion since the bridge superstructure will be less susceptible to salt water spray which can be absorbed into the concrete and cause corrosion of the reinforcing steel. All new structure concepts considered for this project would be constructed above the splash zone. After accounting for 8 ft of beam and deck, this would result in the approximate minimum deck elevation at or above elevation 21 ft over the water. In addition, the proposed minimum deck elevation will raise the deck above the 18-ft storm surge elevation estimated for a 100-year storm (Category 1 hurricane).

8.3.3 HORIZONTAL ALIGNMENTS

The evaluation of all bridge replacement alternatives included an evaluation of a west alignment, a center alignment, and an east alignment within the existing right-of-way (ROW).

West Alignment

The existing bridge is offset toward the west within the existing 200-ft ROW such that the centerline is 68 ft from the western ROW line. The existing bridge is generally aligned with the southbound lanes of the divided roadway south of the bridge. A new bridge constructed further to the west would require acquisition of additional ROW from the Tierra Verde Marina and Shopping Plaza resulting in effects on the parking area and thus causing business damages. Effects on the driveway access to the shopping plaza would occur. North of the bridge, minor effects on the mangroves along the causeway would result. Therefore, the west alignment was eliminated from further consideration.

Center Alignment

A centered alignment would conflict with the existing bridge, and therefore, is not desirable. It would require a complicated and more costly construction phasing plan, possibly requiring a temporary bridge (estimated construction cost of $9 million) to maintain traffic. It also limits flexibility for a second two-lane bridge, if one is ever warranted in the future. Therefore, the centered alignment was also eliminated from further consideration.

East Alignment

The east alignment appears to be the best suited for a replacement bridge. There is ample room available within existing ROW to construct a new bridge without conflicting with the existing bridge. The new bridge would be generally aligned with the northbound lanes of the divided roadway south of the bridge. Once the new bridge is constructed, the existing bridge can be removed, leaving space on the west of the new bridge to easily accommodate a second two-lane bridge in the future, if warranted.

Effects on the Tierra Verde Marina and Shopping Plaza and The Village ROW could be avoided. North of the bridge, the new alignment would tie to the existing alignment well south of the Bahia Del Mar Boulevard/Palma Del Mar Boulevard/S.R. 679 intersection at Isla Del Sol. As with the west alignment, minor effects on the mangroves along the causeway would result.

Therefore, the eastern alignment was selected for further evaluation with all of the bridge replacement alternatives.

The proposed eastern alignment allows a 10-ft separation between the old and new bridge structures. This allows room for construction and demolition activities to occur without disrupting traffic. Locations of the beginning and end of the bridge as well as the touchdown points where each concept ties back to the existing roadway will vary based on the alternative profiles and alignments.

8.3.4 STORMWATER MANAGEMENT FACILITIES

All bridge replacement alternatives will require SMFs to treat runoff. Boca Ciega Bay is an Outstanding Florida Water (OFW) and an aquatic preserve, therefore an additional 50 percent of the runoff volume is required to be treated before discharge back to the bay. For each bridge alternative, two alternative SMF sites were evaluated within each basin: one SMF within the existing ROW, one SMF requiring additional ROW acquisition. In any case, the SMF can be accommodated within the existing ROW, wholly or partially under the proposed bridge. Therefore, each alternative described below includes one SMF within the existing ROW on the south bridge approach, and one SMF within the existing ROW on the north bridge approach. Additional details, including pond sizes, are described in the *Final Alternative Stormwater Management Facility Report*[3] prepared for this project. SMFs are shown on the Concept Plans in Appendix A.

8.3.5 REMOVAL OF EXISTING BRIDGE

All bridge replacement alternatives include the removal of the existing bridge once traffic has been shifted to the new bridge. There are currently no plans to leave any portions of the existing bridge intact for use as a fishing pier.

8.4 PROPOSED BRIDGE REPLACEMENT ALTERNATIVES

As stated previously, four bridge replacement concepts were evaluated for Structure E:

- Alternative 3 – Low-Level Bascule over the Existing Channel
- Alternative 4 – Mid-Level Bascule over the Existing Channel
- Alternative 5 – High-Level Fixed-Span over the Existing Channel
- Alternative 6 – High-Level Fixed-Span over a Relocated Channel

The proposed design features for each alternative are described in the following sections.

8.4.1 ALTERNATIVE 3 − LOW-LEVEL BASCULE BRIDGE OVER EXISTING CHANNEL

Alternative 3 proposes to replace the existing Structure E with a new low-level bascule structure similar to the existing structure. All of the Build Alternatives would require roadway improvements along the approaches to the new bridge to transition from the new alignment back to the existing alignment. Also, the proposed improvements to roadway sections will transition to match the existing roadway typical sections shown in Figures 4-1 and 4-2.

The proposed typical sections for the bascule bridge and fixed approaches to the replacement bascule bridge, as shown in Figure 8-5, include one 12-ft lane and a 10-ft shoulder in each direction. The shoulders can accommodate bicyclists and disabled vehicles. The fixed-span typical section applies to the fixed approaches to the bascule span. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate a planned multi-use path. A 4.5-ft high pedestrian/bicycle railing will be provided on the outside. The overall width of the fixed-span is 65 ft, while the bascule bridge width is 63 ft 8 inches (in). The proposed design speed, as discussed in Section 5.0 of this report, is 50 miles per hour (mph).

South of the bridge the typical section transitions between a four-lane divided urban roadway with turn lanes and the undivided two-lane bridge. Therefore, a typical section for the southern approach is not provided since the number of lanes and median width will vary. However, lane, shoulder and sidewalk widths will be consistent with the proposed bridge replacement. The proposed roadway typical section approaching the north end of the bridge is shown in Figure 8-6. It is similar to the proposed bridge except it is elevated on embankment with a retaining wall on each side. The retaining wall will minimize the amount of fill needed to be placed on the causeway and into Boca Ciega Bay and prevent the type of erosion evident in the existing sloped embankment. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate a planned multi-use path. Figure 8-7 shows the proposed roadway at grade north of Structure E, which is consistent with the bridge typical

section except that the eastern sidewalk is increased in width to 12 ft. The proposed design for all proposed typical section is 50 mph.

Taking into account the MHW elevation of 1.87 ft, the proposed profile accommodates a minimum 21.5-ft vertical navigational clearance over the existing Intracoastal Waterway, identical to the existing clearance. Maximum grades of 3.25 percent are joined by a 1,100-ft cresting vertical curve through the bascule portion of the structure. The fixed approaches to the bascule bridge accommodate an 8-ft beam depth, while the bascule span beam depth is assumed to be 10 ft.

The bascule portion would consist of two bascule leaves forming a 145-ft span. The northern and southern roadway approaches to the bridge structure would be placed on an earthen fill section with a retaining wall. As previously explained, all superstructure components would be located above the splash zone. Access from S.R. 679 to the causeway beaches north of the bridge could continue similar to existing conditions via two turnout locations. As with the existing condition, the proposed bridge will not accommodate vehicular traffic under the bridge from one side of the causeway to the other.

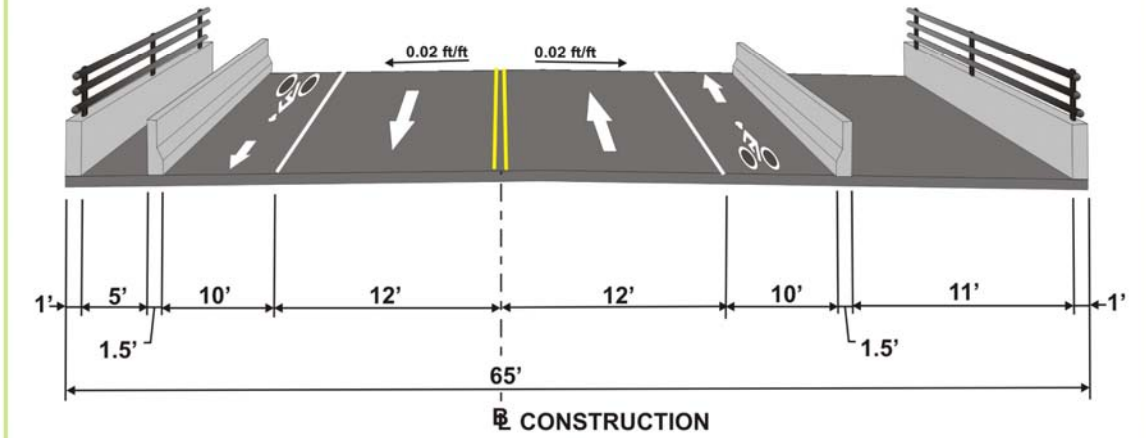
As explained previously, the Madonna Boulevard/The Village Driveway intersections would be combined into one four-leg intersection utilizing a single median opening. All driveways along Madonna Boulevard remain open. However, intersection Options B and C require the closure of the southernmost driveway on S.R. 679 north of Madonna Boulevard. This intersection reconstruction can be accomplished with any one of the three intersection improvement options discussed in Section 8.3.1.

Certain advantages would be associated with the implementation of Alternative 3 – Low-Level Bascule, including:

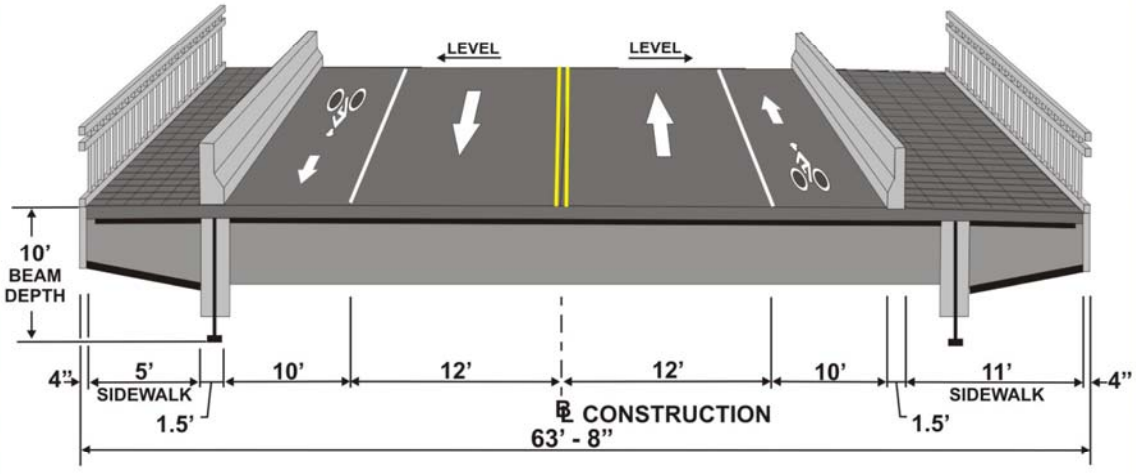
- Vertical navigational height is unlimited when the bridge is open
- Improved operation and safety of the Madonna Boulevard intersection
- Improvement in water quality in Boca Ciega Bay due to treatment of stormwater runoff
- Improved safety and functional adequacy of the facility due to added shoulders and intersection improvements
- Increased horizontal distance between fenders will accommodate safer navigation
- Maximum grades of 3.25 percent do not require flat landings on the sidewalk
- Eleven-ft sidewalk on east side accommodates a planned multi-use path

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Proposed Bridge Typical Sections

WPI Segment No : 410755-1 — Alternative 3 - Low Level Bascule — Figure 8-5



Fixed Spans



Bascule Span

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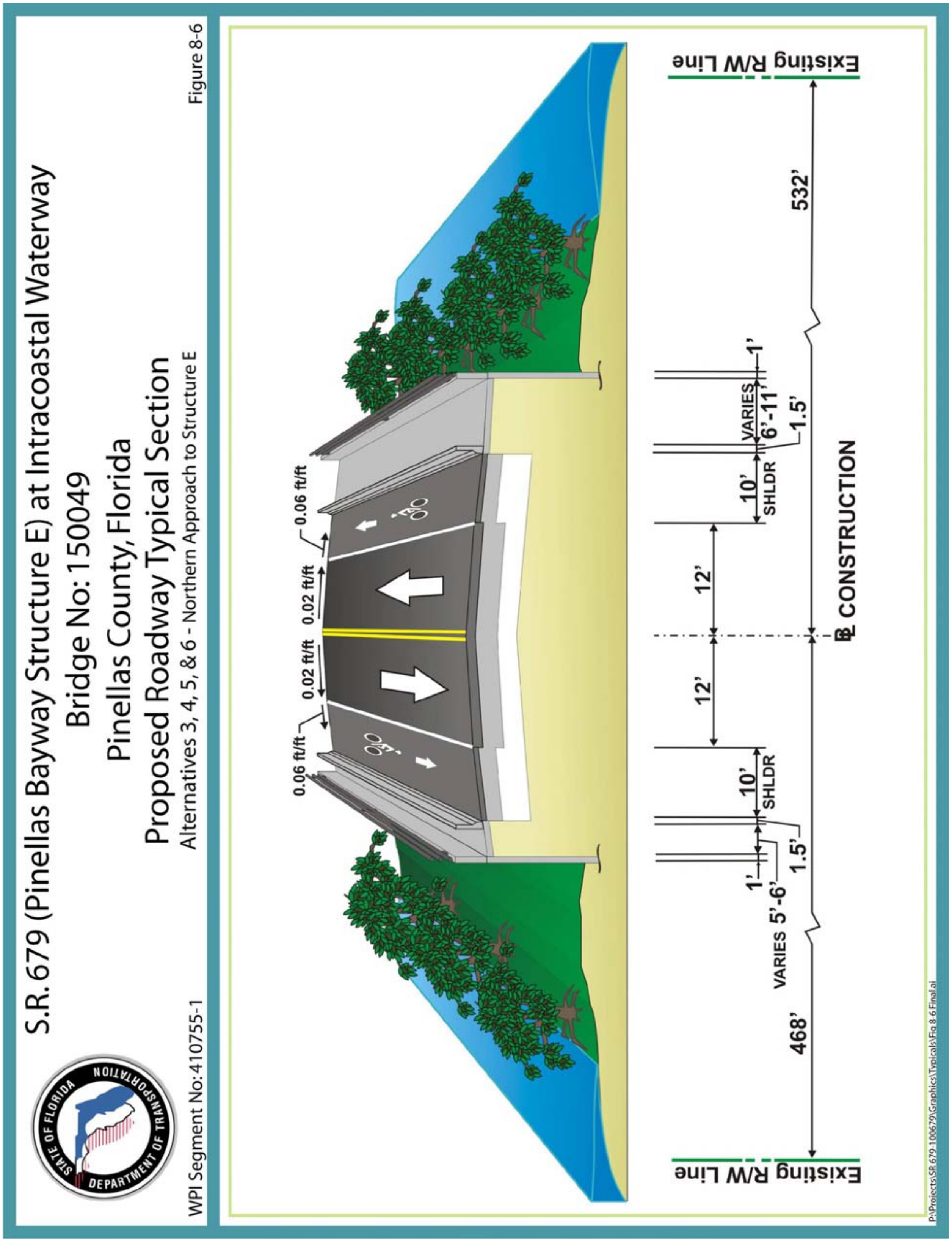

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Proposed Roadway Typical Section
Alternatives 3, 4, 5, & 6 - Northern Approach to Structure E
WPI Segment No: 410755-1
Figure 8-6
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
0.06 ft/ft
0.02 ft/ft
0.02 ft/ft
0.06 ft/ft
Existing R/W Line
468'
VARIES 5'-6'
1'
1.5'
10' SHLDR
12'
12'
10' SHLDR
VARIES 6'-11'
1.5'
1'
532'
Existing R/W Line
℄ CONSTRUCTION

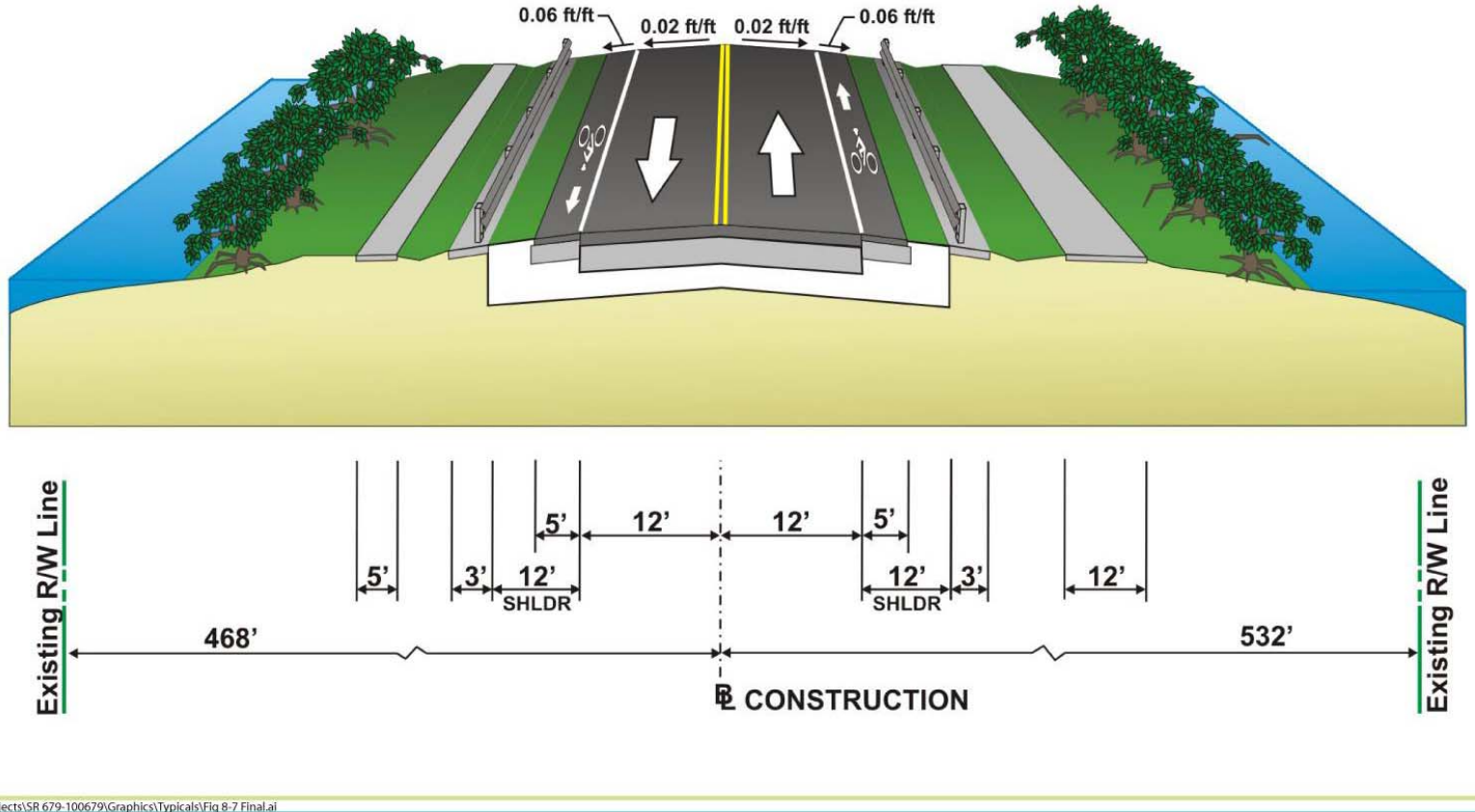
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Roadway Typical Section

WPI Segment No: 410755-1

Alternatives 3, 4, 5, & 6 - North of Structure E

Figure 8-7



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The potential disadvantages of Alternative 3 include:

- Potential effects on The Village and/or the marina and business north of Madonna Boulevard due to the reconfigured intersection
- Reduction of access points to the marina and businesses north of Madonna Boulevard with the closure of one driveway north of Madonna Boulevard (intersection Options B and C only)
- Continued vehicular delay caused by the bascule bridge openings
- Continued operating costs due to the need for a bridge tender
- Potential effects on the natural environment

8.4.2 ALTERNATIVE 4 – MID-LEVEL BASCULE BRIDGE OVER EXISTING CHANNEL

The Mid-Level Bascule Bridge Alternative proposes to replace the existing Structure E with a new mid-level bascule structure similar to the existing structure, but providing more vertical clearance over the Intracoastal Waterway. All of the Build Alternatives would require roadway improvements along the approaches to the new bridge to transition from the new alignment back to the existing alignment. Also, the proposed improvements to roadway sections will transition to match the existing roadway typical sections shown in Figures 4-1 and 4-2.

The proposed bridge replacement typical sections for Alternative 4, shown in Figure 8-8 for fixed-span and bascule bridge alternatives, include one 12-ft lane and a 10-ft shoulder in each direction. The shoulders can accommodate bicyclists and disabled vehicles. In an effort to keep the maximum grades to 6 percent yet still match existing grade at the Madonna Boulevard intersection and provide the desired 45-ft vertical navigational clearance, a concept known as the "through-girder" was evaluated. With this concept, a good portion of the main support beams protrude through and above the deck, covered (or protected) with a metal traffic barrier on the roadway side, thereby reducing the depth between the surface of the deck and the bottom of the beam from 10 ft to 4.5 ft. However, the bascule bridge typical section must be symmetrical, and the sidewalks are both limited in width to 6 ft, which does not accommodate Pinellas County's planned multi-use path. The fixed-span typical section applies to the fixed approaches to the bascule span, and also includes two 6-ft sidewalks. As with Alternative 3, the sidewalks are separated from the shoulder by a concrete barrier wall. The overall width of the fixed-span is 61 ft, while the bascule bridge width is 59 ft-8 in. The proposed design speed, as discussed in Section 5.0 of this report, is 50 mph.

South of the bridge the typical section transitions between a four-lane divided urban roadway with turn lanes and the undivided two-lane bridge. Therefore, the southern approach is not provided as a typical section since the number of lanes and median width will vary. However, lane, shoulder and sidewalk widths will be consistent with the proposed bridge. The proposed roadway typical section

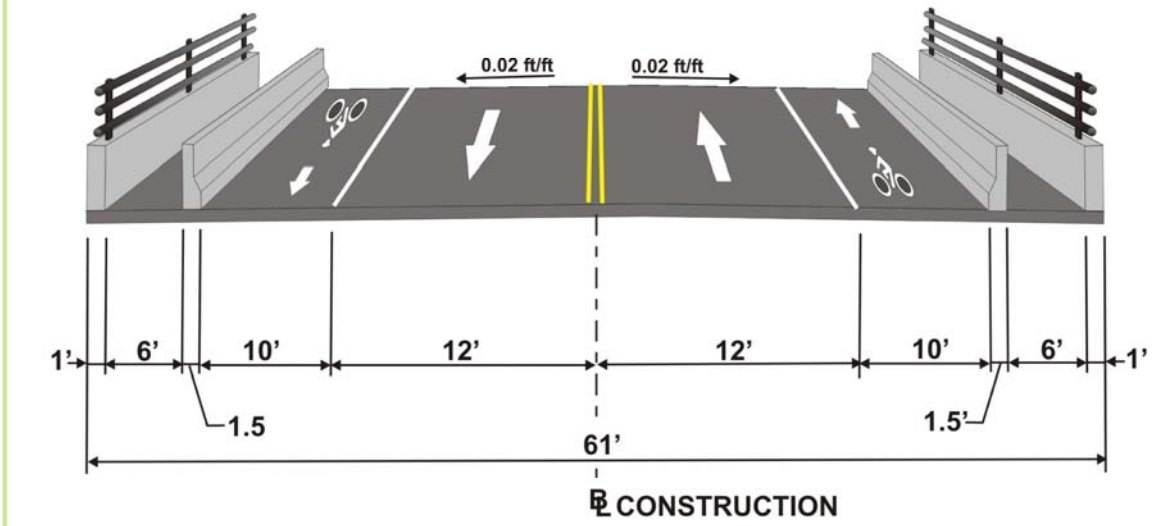
S.R..679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Bridge Typical Sections

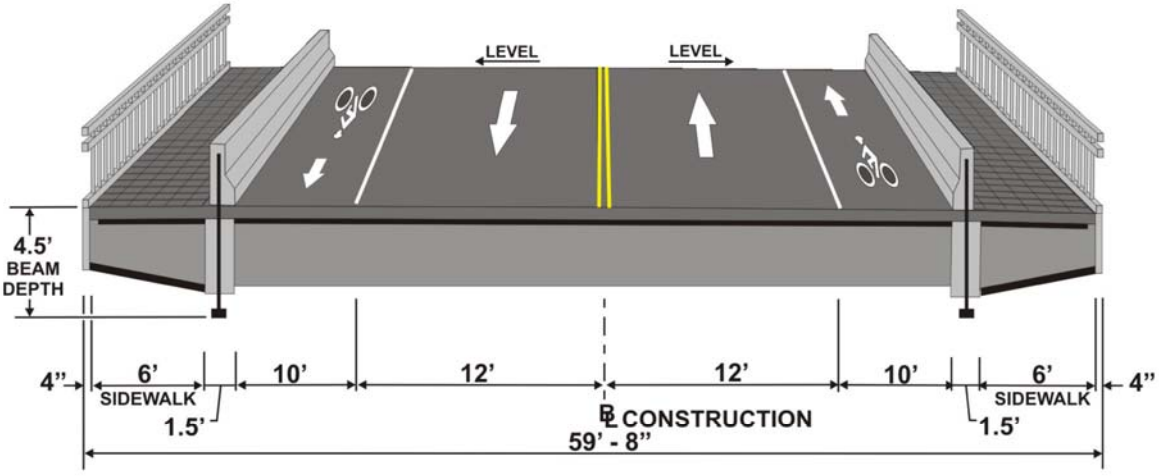
WPI Segment No : 410755-1

Alternative 4 - Mid-Level Bascule Bridge

Figure 8-8



Fixed Spans



Bascule Span (Through-Girder)

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approaching the north end of the bridge is shown in Figure 8-6. It is similar to the proposed bridge except it is elevated on embankment with a retaining wall on each side. The retaining wall will minimize the amount of fill needed to be placed on the causeway and into Boca Ciega Bay and prevent the type of erosion evident in the existing sloped embankment. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall.

An 11-ft sidewalk is provided on the east side to accommodate a planned multi-use path. A 4.5-ft high pedestrian/bicycle railing will be provided on the outside. The American's with Disabilities Act (ADA) requires that sidewalks on grades steeper than 5 percent include a flat landing 5 ft in length for every 30-in rise (every 40 ft for a 6 percent grade). Figure 8-7 shows the proposed roadway at grade, which is consistent with the bridge typical section except that the eastern sidewalk is increased in width to12 ft. The proposed design speed for all proposed typical sections is 50 mph.

The proposed profile accommodates a minimum 45-ft vertical navigational clearance over the existing channel. Based on data provided by the bridge tender at Structure E and allowing for tidal fluctuations, this height would allow approximately 45 percent of the waterway users that currently require the bridge to open to pass without an opening. Maximum grades of 6 percent are joined by a 1,640-ft cresting vertical curve through the bascule portion of the structure.

The bascule portion would consist of two bascule leaves forming a 145-ft span. The fixed approaches to the bascule bridge accommodate an 8-ft beam depth. As explained previously, due to the proximity of the Madonna Boulevard intersection to the navigation channel, a reduced superstructure depth is required to meet a 45-ft navigational clearance. Therefore, this alternative evaluated a "through-girder" concept in the bascule span. As shown in Figure 8-8, this is a method whereby the main support beams for the bascule leaves are incorporated into the deck and traffic barriers in order to reduce the distance the beam extends under the deck. This is required to keep the maximum grade to 6 percent to meet design criteria, and still meet the existing grade at the intersection. The "through-girder" concept reduces the bascule beam depth from 10 ft to 4.5 ft. The northern and southern roadway approaches to the bridge structure would be placed on an earthen fill section with a retaining wall. As previously explained, all superstructure components would be located above the splash zone. Access from S.R. 679 to the causeway beaches north of the bridge could continue similar to existing conditions via two turnout locations. As with the existing condition, the proposed bridge will not accommodate vehicular traffic under the bridge from one side of the causeway to the other.

As with Alternative 3, the Madonna Boulevard/The Village Driveway intersections would be combined into one four-leg intersection utilizing a single median opening. This can be accomplished with any one of the three intersection improvement options. Due to the increased navigational clearance and steeper grade, the profile grade elevation above the existing ground north of Madonna Boulevard is higher than the existing condition. Therefore, both driveways north of Madonna Boulevard would be closed.

Certain advantages would be associated with the implementation of Alternative 4 – Mid-Level Bascule, including:

- Improved safety and functional adequacy of the facility due to added shoulders, wider sidewalks, and intersection improvements
- Potentially reduced travel delay due to possibility of fewer bridge openings.
- Increased horizontal distance between fenders will accommodate safer navigation
- Improved operation and safety of the Madonna Boulevard intersection
- Improvement in water quality in Boca Ciega Bay due to treatment of stormwater runoff

The potential disadvantages of Alternative 4 include:

- Potential effects on the natural environment
- Continued vehicular delay caused by the bascule bridge openings
- Undesirable 6 percent grade approaching the Madonna Boulevard intersection
- Reduction of access points to the marina and businesses north of Madonna Boulevard with the closure of all driveways north of Madonna Boulevard
- Effects on The Village and/or the marina and business north of Madonna Boulevard due to the reconfigured intersection
- Continued operating costs due to the need for a bridge tender
- ADA geometric design standards require flat landings on the sidewalk for 6 percent grades (cost and constructability issues)
- Six-ft sidewalks in each direction do not accommodate a planned multi-use path

8.4.3 ALTERNATIVE 5 – HIGH-LEVEL FIXED-BRIDGE OVER EXISTING CHANNEL

The High-Level Fixed-Bridge (Existing Channel) Alternative proposes to replace the existing Structure E with a new high-level fixed structure. The proposed profile accommodates a minimum 65-ft vertical navigational clearance over the existing channel. Based on data provided by the bridge tender at Structure E and allowing for tidal fluctuations, this height would allow over 99 percent of the waterway users that currently use the channel to safely navigate under the proposed structure. Vessels taller than 65 ft will be required to navigate around Tierra Verde and Fort De Soto via the

Intracoastal Waterway east of the bridge or the Pass-a-Grille channel west of the bridge. Maximum grades of 6.0 percent are joined by a 1,650-ft cresting vertical curve.

The proposed bridge replacement typical section for Alternative 5, shown in Figure 8-9, includes one 12-ft lane and a 10-ft shoulder in each direction. The shoulders can accommodate bicyclists and disabled vehicles. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate Pinellas County's planned multi-use path. The overall width of the fixed-span is 65 ft. The proposed design speed is 50 mph.

South of the bridge the typical section transitions between a four-lane divided urban roadway with turn lanes and the undivided two-lane bridge. Therefore, the southern approach is not provided as a typical section since the number of lanes and median width will vary. However, lane, shoulder and sidewalk widths will be consistent with the proposed bridge. The proposed roadway typical section approaching the north end of the bridge is shown in Figure 8-6. It is similar to the proposed bridge except it is elevated on embankment with a retaining wall on each side. The retaining wall will minimize the amount of fill needed to be placed on the causeway and into Boca Ciega Bay and prevent the type of erosion evident in the existing sloped embankment. A-5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate a planned multi-use path. A 4.5-ft high pedestrian/bicycle railing will be provided on the outside. The ADA requires that sidewalks on grades steeper than 5 percent include a flat landing, 5 ft in length for every 30-in rise (every 40 ft for a 6 percent grade). Figure 8-7 shows the proposed roadway at grade, which is consistent with the bridge typical section except that the eastern sidewalk is increased in width to12 ft. The proposed design speed for all proposed typical sections is 50 mph.

As with the other alternatives, the fixed-spans approaching the navigation channel accommodate an 8-ft beam depth. In an effort to minimize the grades, bridge height and cost, a three-span variable-depth, haunched continuous unit may be utilized over the channel, as illustrated in Figure 8-10. The flanking spans are 150 ft long, and the main span is 200 ft long. The girder depth in the flanking spans varies from 8 ft to approximately 12 ft over the piers. The girder depth in the main span varies from 5 ft directly over the channel to a maximum depth of approximately 12 ft over the main piers. The haunched length is approximately 50 ft long. The superstructure will be made as a three span continuous unit over the channel to comply with *Structures Design Guideline* requirements for deflections and expansion joints.

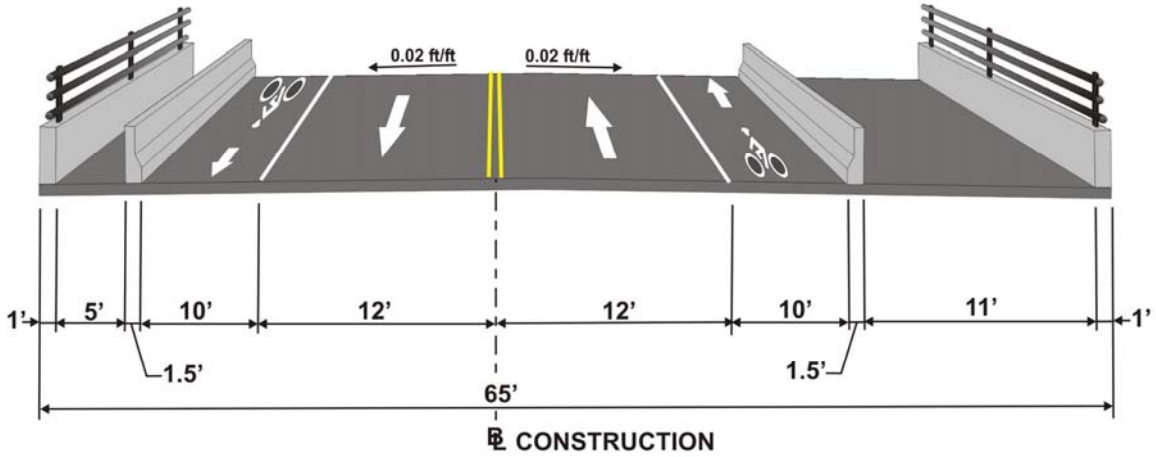
It is important to note that the maximum allowable profile grade for this facility is 6 percent. Even with the reduced depth of the main span, in order for the profile to be near existing grade through the Madonna Boulevard intersection, the profile crest must be located to the north of the channel. Therefore, while the navigational clearance through the channel is 65 ft, the maximum height of the profile crest is 96.5 ft.

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Proposed Bridge Typical Sections

Alternative 5 - High-Level Fixed Bridge Over Existing Channel
and Alternative 6 - High-Level Fixed Bridge Over Relocated Channel

WPI Segment No : 410755-1

Figure 8-9



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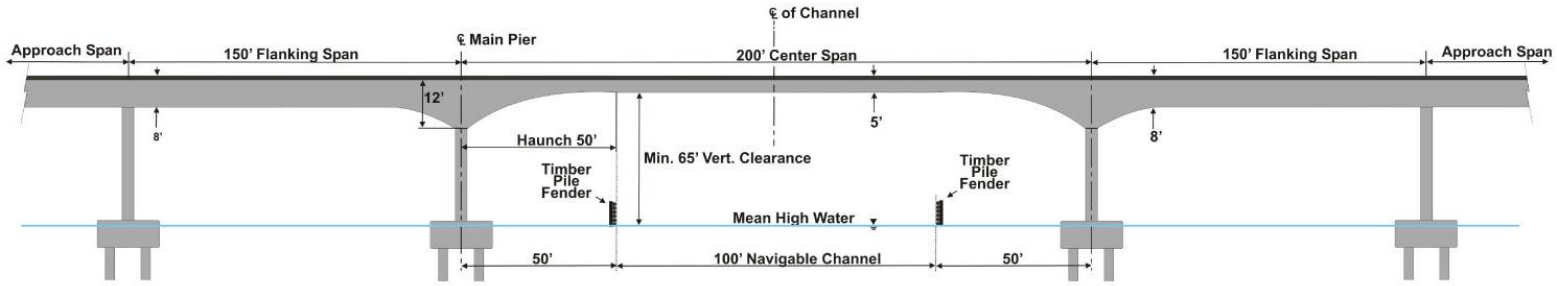
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Main Spans

WPI Segment No: 410755-1

Alternative 5 - High-Level Fixed Bridge Over Existing Channel and Alternative 6 - High-Level Fixed Bridge Over Relocated Channel

Figure 8-10



P:\Projects\SR 679-100679\Graphics\Typicals\Bridge\Fig 8-10.ai

The northern and southern roadway approaches to the bridge structure would be placed on an earthen fill section with a retaining wall. As previously explained, all superstructure components would be located above the splash zone. Access from S.R. 679 to the causeway beaches north of the bridge could continue via the existing northern set of turnouts. Vehicles could then travel along the causeway on either side to reach the beach area at the southern end of the causeway. The height of the proposed bridge could accommodate vehicular traffic under the bridge (north side only) from one side of the causeway to the other.

This alternative also proposes the removal of the existing seawall and the embankment retained within the seawall at the northern bridge approach since it conflicts with the proposed bridge piers. This will increase the overall distance between shorelines by approximately 400 ft.

As with Alternatives 3 and 4, the Madonna Boulevard/The Village driveway intersections would be combined into one four-leg intersection utilizing a single median opening. This can be accomplished with any one of the three intersection improvement options. Due to the increased navigational clearance and steeper grade of the fixed-bridge alternative, the profile grade elevation above the existing ground north of Madonna Boulevard is higher than the existing condition. Therefore, all driveways north of Madonna Boulevard would be closed.

It is recommended that the proposed span arrangement be developed during the design phase to accommodate the existing channel so that the proposed bridge piers do not conflict with vessel traffic. During the construction phase, the existing fender system will need to be extended to protect the replacement bridge piers. The vertical navigational clearance through the existing channel will be limited to approximately 46 ft once the replacement bridge is constructed over the existing channel. Construction can be phased so that the span over the existing channel is constructed last to maintain unlimited vertical clearance for as long as possible. Once the vehicular traffic is routed to the replacement bridge, the existing bridge spans across the relocated channel should be removed first to allow passage of vessels over 46 ft. Channel markers or buoys will need to be relocated to the new channel location. This construction phasing will minimize disruption to the vessel traffic; however, an approximately 10-mile detour route through the Pass-A-Grille Channel, around Fort De Soto is always available.

Certain advantages would be associated with the implementation of Alternative 5 – High-Level Fixed-Bridge over Existing Channel, including:

- Improved operation and safety of the Madonna Boulevard intersection
- Improvement in water quality in Boca Ciega Bay due to treatment of stormwater runoff
- Improved safety and functional adequacy of the facility due to added shoulders and intersection improvements
- Significant operational improvements and reduced vehicular delay due to lack of bridge openings

- Eleven-ft sidewalk on east side accommodates a planned multi-use path
- No operating costs since no bridge tender is required

The potential disadvantages of the Alternative 5 include:

- Potential effects on the natural environment
- Reduction of access points to the marina and businesses north of Madonna Boulevard with the closure of all driveways north of Madonna Boulevard
- Maximum bridge height of 95 ft results in a less efficient design, needing approximately 20 ft of additional bridge height (compared to Alternative 6) to accommodate the required 65-ft vertical navigational clearance
- Undesirable 6 percent grade approaching Madonna Boulevard intersection
- Six percent grades require flat landings on the sidewalk (cost and constructability issues)

8.4.4 ALTERNATIVE 6 – HIGH-LEVEL FIXED-BRIDGE OVER RELOCATED CHANNEL

The High-Level Fixed-Bridge (Relocated Channel) Alternative proposes to replace the existing Structure E with a new high-level fixed structure providing 65-ft vertical navigational clearance over a relocated channel. The proximity of the Madonna Boulevard intersection immediately at the bottom of a 6 percent grade is not a desirable situation, especially in an area with a high number of recreational vehicles in the traffic mix. In an effort to reduce or flatten the grade, the relocation of the channel 400 ft to the north was evaluated, allowing maximum grades of 5 percent joined by a 1,360-ft cresting vertical curve. In this alternative, the profile crest can be located above the relocated channel. Therefore, while the navigational clearance through the channel is 65 ft, the maximum height of the profile crest is 75.55 ft (see profile sheet in Appendix A). Based on data provided by the bridge tender at Structure E and allowing for tidal fluctuations, the proposed 65-ft vertical navigational clearance would allow over 99 percent of the waterway users that currently use the channel to safely navigate underneath the proposed structure.

The proposed bridge replacement typical section for Alternative 6, shown in Figure 8-9, includes one 12-ft lane and a 10-ft shoulder in each direction. The shoulders can accommodate bicyclists and disabled vehicles. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate Pinellas County's planned multi-use path. The overall width of the fixed-span is 65 ft. The proposed design speed is 50 mph.

South of the bridge, the typical section transitions from a four-lane divided urban roadway with turn lanes to the undivided two-lane bridge. Therefore, the southern approach is not provided as a typical section since the number of lanes and median width will vary. However, lane, shoulder and sidewalk widths will be consistent with the proposed bridge. The proposed roadway typical section

approaching the north end of the bridge is shown in Figure 8-6. It is similar to the proposed bridge except it is elevated on embankment with a retaining wall on each side. The retaining wall will minimize the amount of fill needed to be placed on the causeway and into Boca Ciega Bay and prevent the type of erosion evident in the existing sloped embankment. A 5-ft sidewalk is included on the west side, separated from the shoulder by a concrete barrier wall. An 11-ft sidewalk is provided on the east side to accommodate a planned multi-use path. A 4.5-ft high pedestrian/bicycle railing will be provided on the outside. Figure 8-7 shows the proposed roadway at grade, which is consistent with the bridge typical section except that the eastern sidewalk is increased in width to 12 ft. The proposed design speed for all proposed typical sections is 50 mph.

As with the other alternatives, the fixed-spans approaching the navigation channel accommodate an 8-ft beam depth. In an effort to minimize the grades, bridge height and cost, a three-span variable-depth, haunched continuous unit may be utilized over the channel, as illustrated in Figure 8-10. The flanking spans are 150 ft long, and the main span is 200 ft long. The girder depth in the flanking spans varies from eight ft to approximately 12 ft over the piers. The girder depth in the main span varies from 5 ft directly over the channel to a maximum depth of approximately 12 ft over the main piers. The haunched length is approximately 50 ft long. The superstructure will be made as a three-span continuous unit over the channel to comply with Structures Design Guidelines requirement for deflections and expansion joints.

The northern and southern roadway approaches to the bridge structure would be placed on an earthen fill section with a retaining wall. As previously explained, all superstructure components would be located above the splash zone. Access from S.R. 679 to the causeway beaches north of the bridge could continue via the existing northern set of turnouts. Vehicles could then travel along the causeway on either side to reach the beach area at the southern end of the causeway. Unlike the existing condition, the proposed bridge could accommodate vehicular traffic under the bridge from one side of the causeway to the other.

This alternative also proposes the removal of the existing seawall and the embankment retained within the seawall at the northern bridge approach since it conflicts with the proposed bridge piers. This will increase the overall distance between shorelines by approximately 400 ft.

Certain advantages would be associated with the implementation of Alternative 6 – High-Level Fixed-Bridge over Relocated Channel, including:

- Lowest construction cost
- No operating costs since no bridge tender is required
- Improved operation and safety of the Madonna Boulevard intersection
- Improvement in water quality in Boca Ciega Bay due to treatment of stormwater runoff
- Improved safety and functional adequacy of the facility due to added shoulders and intersection improvements

- Significant operational improvements and reduced vehicular delay due to lack of bridge openings
- Grade of 5 percent approaching the Madonna Boulevard intersection
- Five percent grades do not require flat landings on the sidewalk
- Eleven-ft sidewalk on east side accommodates a planned multi-use path. A more efficient design (compared to Alternative 5) with lower overall maximum bridge height of 75.55 ft needed to accommodate the required 65 ft vertical navigational clearance

The potential disadvantages of Alternative 6 include:

- Reduction of access points to the marina and businesses north of Madonna Boulevard with the closure of all driveways north of Madonna Boulevard
- Requires relocation of the Intracoastal Waterway navigational channel
- Vertical navigational height will be limited though the existing channel for a period of time during construction of the replacement bridge
- Potential effects on the natural environment

8.5 LIFE CYCLE COST EVALUATION

An evaluation of life cycle costs was performed to compare the total costs of each alternative over the life of the improvements. Included in the analysis were the initial and future capital costs for construction of the proposed improvements, the annual maintenance costs, and annual operation costs. Appendix B includes spreadsheets illustrating each year from 2006 through 2086, and the respective annual capital, operation, and maintenance costs. None of the costs utilized in this evaluation were inflated; all costs are presented in 2006 dollars.

The annual costs for each alternative include operational and normal maintenance costs. Operational costs are associated with the bridge tender to operate the bascule span so that marine traffic can pass through the channel. Therefore, operational costs are applicable to each alternative that includes a bascule bridge and do not apply to the fixed-bridge alternatives. Normal maintenance costs include minor and periodic work for upkeep of the structural, mechanical, and electrical systems of the bridge. These costs are relatively fixed and will rise incrementally throughout the life of the bridge as the bridge ages. Discussions with the contractor currently managing this work indicate that the yearly operational cost is $125,000. Annual maintenance costs for rehabilitation Alternative 1 is estimated to begin at $25,000 and double every 25 years until year 75. Annual maintenance costs for rehabilitation Alternative 2 is estimated to begin at $50,000 and increase by $25,000 every 25 years.

Each of the new bridge replacement alternatives will have an annual maintenance cost of 25 percent of Alternative 2. The initial annual cost will be approximately $12,500. All alternatives include annual maintenance of $25,000 to maintain the existing bridge from 2007 through 2011 when the

rehabilitation or bridge replacement occurs. Appendix B contains a detailed schedule of construction, operation, and maintenance costs for each alternative.

The Net Present Value (NPV) of the sum of the costs over the life of the improvements was calculated and the results are shown in Table 8-3. For each discount rate, the best economic investment is highlighted for both the rehabilitation and bridge replacement alternatives. As shown, of the two rehabilitation alternatives, Alternative 1 is the best investment. When comparing only the bridge replacement alternatives, Alternative 6 is the best investment.

When making a decision as to the preferred alternative, it is helpful to compare the economics of the six alternatives throughout their service lives by calculating the Net Present Value of each investment. However, it must be realized that each alternative provides different advantages and disadvantages from a safety, structural, aesthetics, functionality, efficiency, reliability, and traffic operations standpoint.

Table 8-3
Net Present Value

Discount Rate	REHABILITATION ALTERNATIVES		BRIDGE REPLACEMENT ALTERNATIVES			
	Alternative 1 Rehabilitation	Alternative 2 Rehabilitation with Widening	Alternative 3 Low-Level Bascule	Alternative 4 Mid-Level Bascule	Alternative 5 Fixed Existing Channel	Alternative 6 Fixed Relocated Channel
0.00%	$62,096,650	$78,838,200	$45,886,569	$51,577,916	$39,864,674	$37,595,642
1.00%	$44,731,876	$61,024,508	$40,557,088	$45,972,209	$37,493,105	$35,334,199
2.00%	$34,084,903	$49,903,754	$36,789,946	$41,944,774	$35,448,075	$33,392,942
3.00%	$27,311,562	$42,609,285	$33,932,718	$38,842,124	$33,622,504	$31,665,217
4.00%	$22,823,949	$37,567,679	$31,634,270	$36,312,143	$31,957,332	$30,092,353
5.00%	$19,719,273	$33,895,667	$29,699,342	$34,158,661	$30,418,214	$28,640,368
6.00%	$17,474,528	$31,085,573	$28,015,346	$32,268,252	$28,983,885	$27,288,333
7.00%	$15,780,696	$28,838,296	$26,514,740	$30,572,592	$27,640,231	$26,022,443
8.00%	$14,451,323	$26,972,991	$25,155,236	$29,028,672	$26,377,203	$24,832,938
9.00%	$13,371,353	$25,377,319	$23,909,150	$27,608,135	$25,187,164	$23,712,449
10.00%	$12,468,046	$23,979,512	$22,757,515	$26,291,394	$24,063,988	$22,655,098

8.6 EVALUATION PROCESS

8.6.1 QUANTIFIABLE CRITERIA

In order to evaluate the study alternatives, the evaluation matrix shown in Table 8-4 was prepared using quantifiable criteria from a multitude of categories including socioeconomic, environmental, cultural, potential hazardous material / petroleum contamination, and costs (engineering, ROW, and construction). The matrix data was developed utilizing raster-based aerial photography and depicts

the proposed ROW needs for each alternative. Note that the matrix data is shown for the Madonna Boulevard Option C (realign both Madonna Boulevard and The Village driveway to meet in the middle). A brief description of the quantifiable evaluation criteria follows.

- **Business Relocations:** The number of businesses estimated to be relocated by each of the Build Alternatives was identified using raster-based aerial photography and field verification. Other business effects expected to be sustained by businesses which will not require relocation, such as parking losses, etc., were considered in the ROW acquisition cost estimates.

- **Residential Relocations:** The number of existing residences estimated to be relocated by the Build Alternatives was assessed by determining the number of residences that exist within the proposed ROW, and which residences will have to be relocated if the non-rehabilitation Build Alternative is implemented.

- **Community Facilities:** The project involvement with existing community facilities such as churches, schools, child care facilities, nursing homes, hospitals, cemeteries, fire stations, etc. were assessed.

- **Cultural/Historic Resources and Public Parks Involvement:** A thorough investigation was undertaken to determine if there are any National Register of Historic Places (NRHP)-listed or eligible historic sites and structures along the project corridor. Project involvement with existing or proposed public parks was also addressed.

- **Natural Environment Involvement:** Effects of the proposed construction and ROW on the natural environment include involvement with bays (open water), mangroves, saltwater marshes, shorelines, and seagrasses.

- **Potential Hazardous Material or Petroleum Pollutant Contaminated Sites:** The number of potentially hazardous material and/or petroleum contaminated sites ranked medium or high along the project.

- **Total Estimated Project Costs:** Preliminary cost estimates were prepared for all Alternatives, including ROW acquisition, maintenance of traffic, mobilization, engineering/final design, construction, Construction Engineering Inspection (CEI) costs and contingencies. These project costs shown in the matrices were generated using 2006 dollars. Maintenance of traffic (MOT) and mobilization costs are each estimated at 10 percent of the construction cost. The Engineering Design and CEI costs are each estimated to be 15 percent based on current per-mile costs for Design and CEI for other similar roadway facilities.

  The ROW acquisition cost, in 2006 dollars, includes the cost of business relocations, private property purchase, and reimbursement cost for miscellaneous business damages. The construction cost includes structures, roadway, drainage system and pond construction, signing and marking, signalization adjustments, and scour protection. Utility adjustments, landscaping, and wetland mitigation are not included in this estimate.

8.6.2 ADDITIONAL QUANTIFIABLE CRITERIA

- **Travel Delay:** Travel delay is reported in Section 6.0 of this report. Delay on the fixed bridge alternatives (Alternatives 5 and 6) is zero seconds per vehicle (sec/veh) compared to 39 to 46 sec/veh for bascule alternatives.

Delay during the 2030 PM peak hour at the Madonna Boulevard intersection is reduced from over 500 sec/veh with the bascule alternatives to 144 sec/veh for the fixed-bridge alternatives, a reduction of over 70 percent. In addition, delay for vessels in the Intracoastal Waterway can be reduced from 15 - 20 minutes with the bascule bridge alternatives to zero with a fixed-bridge alternative. The travel delay evaluation demonstrates that the fixed-bridge alternative handles traffic more efficiently than the bascule bridge alternatives.

8.6.3 NON-QUANTIFIABLE CRITERIA

Another consideration in the evaluation process was factors that are qualitative, non-quantifiable, such as consistency with local transportation plans, user benefits, aesthetics, safety, public sentiment, and access considerations. Non-quantifiable factors consider a variety of factors instead of a numerical count.

- **Consistency with Long Range Transportation Plan:** None of the proposed bridge improvement alternatives are identified in the Pinellas County Metropolitan Planning Organization (MPO) *2025 Long Range Transportation Plan*[4] (*2025 LRTP*) completed in December 2004 or the Pinellas County Comprehensive Plan which was adopted February 17, 1998, and last amended on December 21, 2004. The PD&E study is being conducted due to the structural deterioration of the bridge and potential safety problems.

  The *2025 LRTP* does show a future designation for S.R. 679 as part of the Pinellas Trail Extension linking the existing Pinellas Trail to the Fort De Soto Park Trail, therefore, Alternatives 1, 2, and 4 would be inconsistent with the *2025 LRTP*, since these alternatives do not accommodate a wide sidewalk or multi-use path.

Table 8-4
Alternatives Evaluation Matrix

EVALUATION FACTORS	ALTERNATIVES					
	Alternative 1 **Rehabilitation**	**Alternative 2** **Rehabilitation with Widening**	**Alternative 3** **Low-Level Bascule**	**Alternative 4** **Mid-Level Bascule**	**Alternative 5** **High-Level Fixed Existing Channel**	**Alternative 6** **High-Level Fixed Relocated Channel**
PROJECT LENGTH (miles)	0.262	0.438	0.780	0.780	0.926	0.863
POTENTIAL BUSINESS AND RESIDENTIAL RELOCATIONS						
Number of businesses estimated to be relocated Option A / Option B / Option C	0/0/0	0/0/0	0/3/1	0/3/1	0/3/1	0/3/1
Number of residences estimated to be relocated	0	0	0	0	0	0
COMMUNITY FACILITY EFFECTS (Community effects within ROW)						
Number of churches, schools, child care, nursing homes, hospitals, cemeteries, other services affected	0	0	0	0	0	0
CULTURAL/HISTORIC RESOURCES AND PUBLIC PARKS INVOLVEMENT						
Number of historic sites/structures	0	0	0	0	0	0
Number of public parks adjacent to ROW	0	0	0	0	0	0
NATURAL ENVIRONMENTAL INVOLVEMENT (ac)						
Wetlands	0.000	0.861	3.343	3.343	2.433	2.433
Seagrass	0.000	0.000	0.595	0.595	0.147	0.147
PHYSICAL ENVIRONMENT INVOLVEMENT						
Estimated number of noise sensitive sites approaching or exceeding the NAC	0	0	0	0	0	0
Number of potential petroleum and hazardous materials contaminated sites (medium and high)	1	3	5	5	5	5
ESTIMATED CONSTRUCTION COSTS (Present Value January 2006 Dollars)						
Roadway and Bridge Structure	$72,216,809	$95,647,778	$68,159,360	$78,271,030	$60,697,877	$56,248,958
Madonna Boulevard	$0	$0	$2,892,669	$2,585,547	$2,608,494	$2,839,002
CONSTRUCTION COST TOTAL	**$72,216,809**	**$95,647,778**	**$71,052,029**	**$80,856,577**	**$63,306,371**	**$59,087,961**
ROW Acquisition – Option A	N/A–Intersection not included	N/A–Intersection not included	$5,628,800	$5,628,800	$5,628,800	$5,628,800
ROW Acquisition – Option B	N/A–Intersection not included	N/A–Intersection not included	$15,601,000	$15,601,000	$15,601,000	$15,601,000
ROW Acquisition – Option C	N/A–Intersection not included	N/A–Intersection not included	$12,976,800	$18,419,500	$18,419,500	$18,419,500
Engineering Design (15%)	$10,832,521	$14,347,167	$10,657,804	$12,128,486	$9,495,956	$8,863,194
Construction Engineering & Inspection (15%)	$10,832,521	$14,347,167	$10,657,804	$12,128,486	$9,495,956	$8,863,194
TOTAL ALTERNATIVE COST	**$93,881,851**	**$124,342,111**	**$98.0 - $108.0 Million**	**$110.7 - $123.5 Million**	**$87.9 - $100.7 Million**	**$82.4 - $95.2 Million**

- **Aesthetics:** Aesthetics are an important consideration in any transportation project. The rehabilitation alternatives provide little opportunity to improve aesthetics, other than repair concrete spalls and add fresh paint. Crutch bents are included in the rehabilitation program as a permanent scour countermeasure. Crutch bents consist of supplemental piles driven on each side of the pile cap, with supplemental supports under the pile cap. The short span lengths, crutch bents, and multiple piles supporting the existing bridge clutter the views under the bridge. Any of the bridge replacement alternatives can be designed with longer spans on a single pier instead of a group of piles. The result would provide more open, spacious views from both water and nearby land uses.

- **Evacuation:** Since fixed-bridges do not have bascule leaves and the machinery that operates them, there is no chance for evacuation delays due to machinery malfunctions. Bridge replacement alternatives with an increased vertical navigational clearance also decrease effects on navigation when the bascule spans are locked down during an evacuation.

- **Traffic Operations:** Build Alternatives that increase the vertical navigational clearance on Structure E would be desirable from a traffic operations standpoint. Since fewer or no bridge openings would be required, both vehicular and navigational traffic operations would be improved, resulting in benefits such as improved levels of service, reduced delay, reduced emissions and lower user costs.

- **Safety:** For any of the bridge replacement alternatives and the widening alternative, sufficient shoulders would be provided to accommodate inoperable vehicles, allowing other vehicles to pass. The addition of barrier walls that meet current standards, wider navigational clearance, larger pile dimensions to resist ship impact, and greater pile embedment to resist scour all would contribute to a safer facility.

- **Ship Impact:** All of the replacement bridge alternatives include piers that are designed to better withstand ship impact. The existing bridge was not designed to withstand ship impact, and therefore, the rehabilitation alternatives will not have that extra safety feature.

- **Public Sentiment:** FDOT has received numerous public comments regarding the bridge alternatives, Madonna Boulevard intersection options, and other related items. The majority of public comments favored Alternative 6, the High-Level Fixed-Bridge over a Relocated Channel. In addition, the public comments indicated a preference for Madonna Boulevard intersection Option B, relocating Madonna Boulevard to align with The Village driveway. Numerous comments also requested a traffic signal at the Madonna Boulevard intersection and consideration of a four-lane alternative.

- **Utilities:** The location of existing and planned utilities was considered in the evaluation of utilities. Relocation of aerial or buried utilities may be required. However, utilities can be

connected to a fixed-bridge, whereas, a bascule bridge requires utility lines to be buried under the channel (sub-aqueous).

- **Four-Lane Alternative:** All of the bridge replacement alternatives can accommodate a potential four-lane facility in the future, if warranted. This could be accomplished either by widening the new bridge or by constructing a second bridge to the west of the new bridge. The two-lane roadway north of the bridge, however, would need to be reconstructed as a four-lane roadway.

8.7 SELECTION OF THE INITIAL RECOMMENDED ALTERNATIVE

Initially, the Recommended Alternative was Alternative 6: High-Level Fixed-Bridge over a Relocated Channel with Madonna Boulevard intersection Option B (relocate Madonna Boulevard to align with The Village driveway). The initial selection of a Recommended Alternative was based upon the Alternatives Evaluation matrix, other quantifiable factors such as travel delay, and consideration of non-quantifiable factors such as public sentiment. The following bullets explain the rationale behind the selection of Alternative 6 as the Recommended Alternative:

- There are no operating costs with the fixed-span alternatives
- The total cost of Alternative 6 with Madonna Boulevard intersection Option B is the lowest of all the alternatives
- Compared to Alternative 5, the 5 percent grades for Alternative 6 are desirable to the 6 percent grades for Alternative 5
- There is public support for Alternative 6 with Madonna Boulevard intersection Option B
- Compared to bascule bridge replacement or rehabilitation alternatives, the fixed-span alternatives result in the smallest average travel delay in both the noon and PM peak hours. Compared to bascule bridge replacement or rehabilitation alternatives, the fixed-span alternatives result in improved aesthetics since span lengths can be longer and no crutch bents are required, opening up the views underneath the proposed bridge
- The fixed-span alternatives accommodate pedestrians and bicyclists on the planned multi-use path. The rehabilitation alternatives do not accommodate the planned multi-use path
- The Madonna Boulevard intersection Option B has no effect on The Village property
- Improvement in water quality in Boca Ciega Bay due to treatment of stormwater runoff

8.8 REFINEMENT OF THE INITIAL RECOMMENDED ALTERNATIVE

The following refinements were made to the Recommended Alternative:

- Recommended SMF sites were added to the Recommended Alternative concept plans. The proposed bridge structure is anticipated to accommodate a SMF under both the north and south end of the bridge to meet treatment requirements for the Recommended Alternative. These proposed pond configurations will also accommodate potential future four-lane widening of S.R. 679 without modification, when warranted.

- The median opening along Madonna Boulevard, used to access the 7-Eleven gas station was initially closed due to its proximity to S.R. 679 intersection. However, at the request of 7-Eleven, the median opening was restored since the median opening is needed for fuel tanker trucks to service the fuel tanks.

- Sidewalks at the northern terminus of the project will transition to meet the proposed shoulder, rather than end abruptly. In addition, these sidewalks were moved away from the unimproved dirt access road that runs along each side of the causeway.

The effects on the natural and man-made environment due to the Recommended Alternative are shown in Table 8-5. The ROW and construction costs for the Recommended Alternative were updated in January 2007, as shown in Table 8-5. Concept plans for the Recommended Alternative (Alternative 6) are included in Appendix A. Alternative 6 was displayed as the Recommended Alternative at a Public Hearing on March 28, 2007.

8.9 CHANGE OF THE RECOMMENDED ALTERNATIVE

Subsequent to the Public Hearing, coordination with the United States Army Corps of Engineers (USACE) continued. A meeting was held on January 25, 2008. Meeting minutes are included in Appendix D. Major points determined at this meeting were:

- The FDOT will be responsible in perpetuity for any and all maintenance activities required in the future for the proposed channel or liabilities associated with the relocation.
- Approval from the local sponsor of the navigational channel is required. It was later determined that the local maintenance authority, or sponsor, is Pinellas County. Should Pinellas County oppose the channel relocation, the USACE could not approve the request.
- The design depth was established at -9 feet mean lower low water (mllw) with an additional -2 feet for dredging error. If the substrate being dredged is rock, the USACE will require an additional foot.

Table 8-5
Initial Recommended Alternative Evaluation Matrix

EVALUATION FACTORS	RECOMMENDED ALTERNATIVE Alternative 6 High-Level Fixed Relocated Channel
PROJECT LENGTH (miles)	0.863
POTENTIAL BUSINESS AND RESIDENTIAL RELOCATIONS	
Number of businesses estimated to be relocated – Madonna Boulevard intersection Option B	3
Number of residences estimated to be relocated	0
COMMUNITY FACILITY EFFECTS (Community effects within ROW)	
Number of churches, schools, child care, nursing homes, hospitals, cemeteries, other services affected	0
CULTURAL/HISTORIC RESOURCES AND PUBLIC PARKS INVOLVEMENT	
Number of historic sites/structures	0
Number of public parks adjacent to ROW	0
NATURAL ENVIRONMENTAL INVOLVEMENT (ac)	
Surface Water	2.38
Wetlands	0.05
Seagrass	0.15
PHYSICAL ENVIRONMENT INVOLVEMENT	
Estimated number of noise sensitive sites approaching or exceeding the NAC	0
Number of potential petroleum and hazardous materials contaminated sites (medium and high)	5
ESTIMATED CONSTRUCTION COSTS (Present Value January 2007 Dollars)	
Roadway and Bridge Structure	$72,612,833
Madonna Boulevard Option B	$2,094,814
CONSTRUCTION COST TOTAL	**$74,707,646**
ROW Acquisition – Madonna Boulevard intersection Option B	$15,601,000
Engineering Design (15%)	$11,206,147
Construction Engineering & Inspection (15%)	$11,206,147
TOTAL ALTERNATIVE COST	**$112,720,940**

- A Maintenance Agreement between the FDOT and the local maintaining authority(ies) needs to be executed stating that the FDOT will be responsible for all future costs associated with the channel and establish criteria for future monitoring and maintenance of the channel as well as the disposal of dredge material. This would be subsequently reviewed by the USACE during their approval process for the relocation of the federal channel.
- The potential for effects to cultural resources would have to be coordinated with SHPO for the proposed channel relocation. It was anticipated that a magnetometer survey would be required for the proposed channel to determine potential archeological sites or artifacts.
- Sea grass impacts from sedimentation could be a concern. A sediment transport study had already been initiated by FDOT to address this issue.
- The project would require a USACE regulatory permit, which is dependent on the standard Water Quality Certification and feedback from the commenting agencies (US Fish and Wildlife Service, National Marine Fisheries).

Another meeting was held on March 6, 2008 with the USACE to present the proposed project to Pinellas County Department of Environmental Management (local channel sponsor). Meeting minutes are included in Appendix D. The intent of this meeting was to obtain feedback from the USACE and the County regarding the proposed channel realignment including the design, process for obtaining approval and any required agreements. Several proposed alternative channel alignments were presented. The USACE representative indicated that the USACE would prefer a "straight shot" channel alignment for marine safety and recommended that FDOT look at a single reach alignment (which would not be perpendicular to the bridge).

Through this coordination process, it was determined that the relocation of the Intracoastal Waterway would involve significant agency coordination between FDOT, USACE, USCG, Pinellas County as the local sponsor of the waterway, and the federal reviewing agencies. Issues to be resolved would include funding for the USACE to review the document, initial dredging, if required, maintenance dredging responsibilities, sediment transport, seagrass impacts, navigational markings, a new channel easement, and water quality. While it was determined that although no initial dredging was needed, a dredging disposal site should be identified up front and maintenance dredging costs would be the responsibility of FDOT in perpetuity. This cost could not be calculated with certainty since sediment transport is dependent on many variables including storms and water currents. In addition, potential sediment transport due to the relocated channel posed liability issues for FDOT related to the potential reduction in water depths at the Tierra Verde Marina. Furthermore, any dredging would be highly scrutinized since this is an OFW.

Due to the additional required coordination, additional cost and impacts, potential liabilities, and delay to the schedule estimated at a year or more, the Recommended Alternative was changed to Alternative 5, the high-level fixed-bridge over the existing channel with realignment of The Village driveway.

8.10 REFINEMENT OF THE REVISED RECOMMENDED ALTERNATIVE

Alternative 5 was previously evaluated and presented at the public workshop. Alternative 5 includes a high-level fixed bridge over the existing channel. The proposed horizontal alignment and typical section did not change, except for the addition of handrails on the sidewalks to meet ADA requirements for grades over 5 percent. However, Alternative 5 was refined slightly to become Alternative 5A with the following details:

- It was determined that realigning The Village driveway is preferred over realigning Madonna Boulevard. The Village driveway will be realigned to form a four-leg signalized intersection with S.R. 679 with a single median opening at the existing Madonna Boulevard. This was previously evaluated as intersection Option A. This will result in no business relocations instead of three and save approximately $10 million in estimated ROW costs.

- The design speed on the proposed bridge was reduced from 50 mph to 45 mph. The posted speed will remain at 45 mph. The purpose of this change is to reduce the geometric sight-distance requirements at the crest curve on the bridge. This accommodates a vertical profile which minimizes the bridge length, thereby reducing the length of the proposed bridge.

- The grade from the top of the proposed bridge toward the north was reduced from 6 percent to 5 percent. This is the maximum grade possible without triggering ADA requirements for flat landings on the sidewalks. It will be easier for pedestrians and bicyclists. The grade from Tierra Verde northward up to the crest of the bridge still needs to be 6 percent in order to clear the required 65 ft vertical navigational clearance over the existing channel without increasing the grade significantly at the Madonna Boulevard intersection.

- In addition, the decision to realign Madonna Boulevard was revisited. It was determined that realigning The Village driveway and reconstructing the guard gate would result in substantial cost savings. Internal circulation issues were addressed by including an egress gate from the internal drive, allowing vehicles to exit directly to the driveway, bypassing the guard gate. A presentation is planned to present the revised Recommended Alternative to The Village condominium Board of Directors. The board will need to allow FDOT to construct a new driveway and guard house within a construction easement on The Village common area, and then return the area to The Village for maintenance.

- The median width of S.R. 679 through the Madonna Boulevard intersection was reduced to better accommodate pedestrians utilizing the crosswalks.

The effects on the natural and man-made environment due to the Recommended Alternative 5A were updated and are shown in Table 8-6. The ROW and construction costs for the Refined Recommended Alternative were updated in April 2008, as shown in Table 8-6. Revised concept plan and profile sheets for the Recommended Alternative 5A are provided in Appendix A.

Table 8-6
Refined Recommended Alternative Evaluation Matrix

EVALUATION FACTORS	RECOMMENDED ALTERNATIVE Alternative 5A High-Level Fixed Existing Channel
PROJECT LENGTH (miles)	0.984
POTENTIAL BUSINESS AND RESIDENTIAL RELOCATIONS	
Number of businesses estimated to be relocated – Madonna Boulevard intersection Option A	0
Number of residences estimated to be relocated	0
COMMUNITY FACILITY EFFECTS (Community effects within ROW)	
Number of churches, schools, child care, nursing homes, hospitals, cemeteries, other services affected	0
CULTURAL/HISTORIC RESOURCES AND PUBLIC PARKS INVOLVEMENT	
Number of historic sites/structures	0
Number of public parks adjacent to ROW	0
NATURAL ENVIRONMENTAL INVOLVEMENT (ac)	
Surface Water	2.38
Wetlands	0.06
Seagrass	0.15
PHYSICAL ENVIRONMENT INVOLVEMENT	
Estimated number of noise sensitive sites approaching or exceeding the NAC	0
Number of potential petroleum and hazardous materials contaminated sites (medium and high)	5
ESTIMATED CONSTRUCTION COSTS (Present Value April 2008 Dollars)	
Roadway and Bridge Structure	$66,170,354
The Village Driveway (Option A)	$454,500
CONSTRUCTION COST TOTAL	**$66,624,854**
ROW Acquisition – Madonna Boulevard intersection Option A	$0
Engineering Design (15%)	$9,993,728
Construction Engineering & Inspection (15%)	$9,993,728
TOTAL ALTERNATIVE COST	**$86,612,310**

8.11 REFERENCES

1. *Bridge Rehabilitation Alternatives Report;* Prepared for Florida Department of Transportation, District Seven, by Parsons Brinckerhoff Quade & Douglas; Tampa, Florida; June 2005.

2. *Structures Design Guidelines;* Florida Department of Transportation; Tallahassee, Florida; January 1, 2000.

3. *Final Alternative Stormwater Management Facility Report*; PBS&J; Tampa, Florida; June 2008.

4. *2025 Long Range Transportation Plan;* Pinellas County Metropolitan Planning Organization; Clearwater, Florida.

Section 9.0
PRELIMINARY DESIGN ANALYSIS

The next step in the process was to define/refine the design parameters associated with the Refined Recommended Alternative as described in Section 8.10. The defining of these parameters allowed for a more comprehensive and accurate evaluation of project impact and costs.

9.1 DESIGN TRAFFIC VOLUMES

The weekend average daily traffic (WADT) volumes and PM peak hour traffic volumes were discussed previously in Section 6.0 of this report. The WADT volume for the projected design year (2030) is 23,600 as shown in Table 6-2. Figure 6-9 depicts the 2030 noon and PM design hour traffic volumes. For additional information, see the *Final Traffic Technical Memorandum*[1] prepared for this study.

9.2 TYPICAL SECTIONS

The Recommended Alternative roadway and bridge typical sections were previously described in Sections 8.4.3 and 8.10 (Alternative 5A) and are shown in Figures 9-1 through 9-3.

9.3 INTERSECTION CONCEPTS AND SIGNAL ANALYSIS

The *Final Traffic Technical Memorandum* illustrates the recommended intersection lane geometry and provides detailed information about the operation of the Madonna Boulevard intersection during the design hour as well as the expected average vehicle queue lengths. Figures 6-6 through 6-11 and Table 6-3 in Section 6.0 of this report provide detailed information about the projected operation of the proposed signalized Madonna Boulevard intersection during noon and PM peak hours for the opening year (2010), interim year (2020), and design year (2030).

9.4 ALIGNMENT AND RIGHT-OF-WAY NEEDS

Aerial photos illustrating the Recommended Alternative for the project and the anticipated temporary roadway right-of-way (ROW) needs are shown in Appendix A. The proposed roadway and bridge improvements are accommodated within the existing ROW, with the exception of the realignment of The Village at Tierra Verde (The Village) driveway, which requires a 0.37 ac temporary construction easement. Proposed stormwater management facilities (SMF) are also accommodated within the existing ROW.

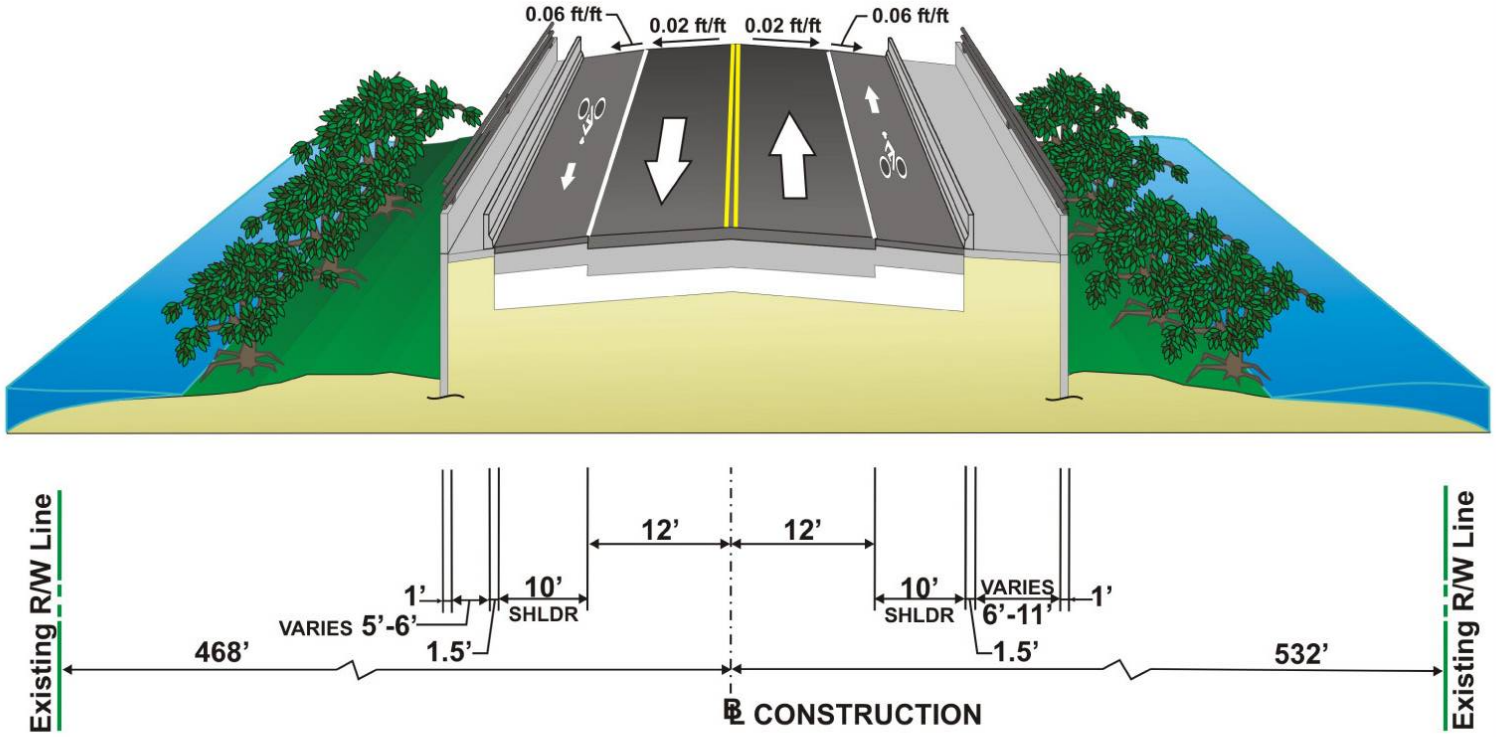
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Roadway Typical Section

Recommended Alternative

WPI Segment No: 410755-1

Figure 9-1



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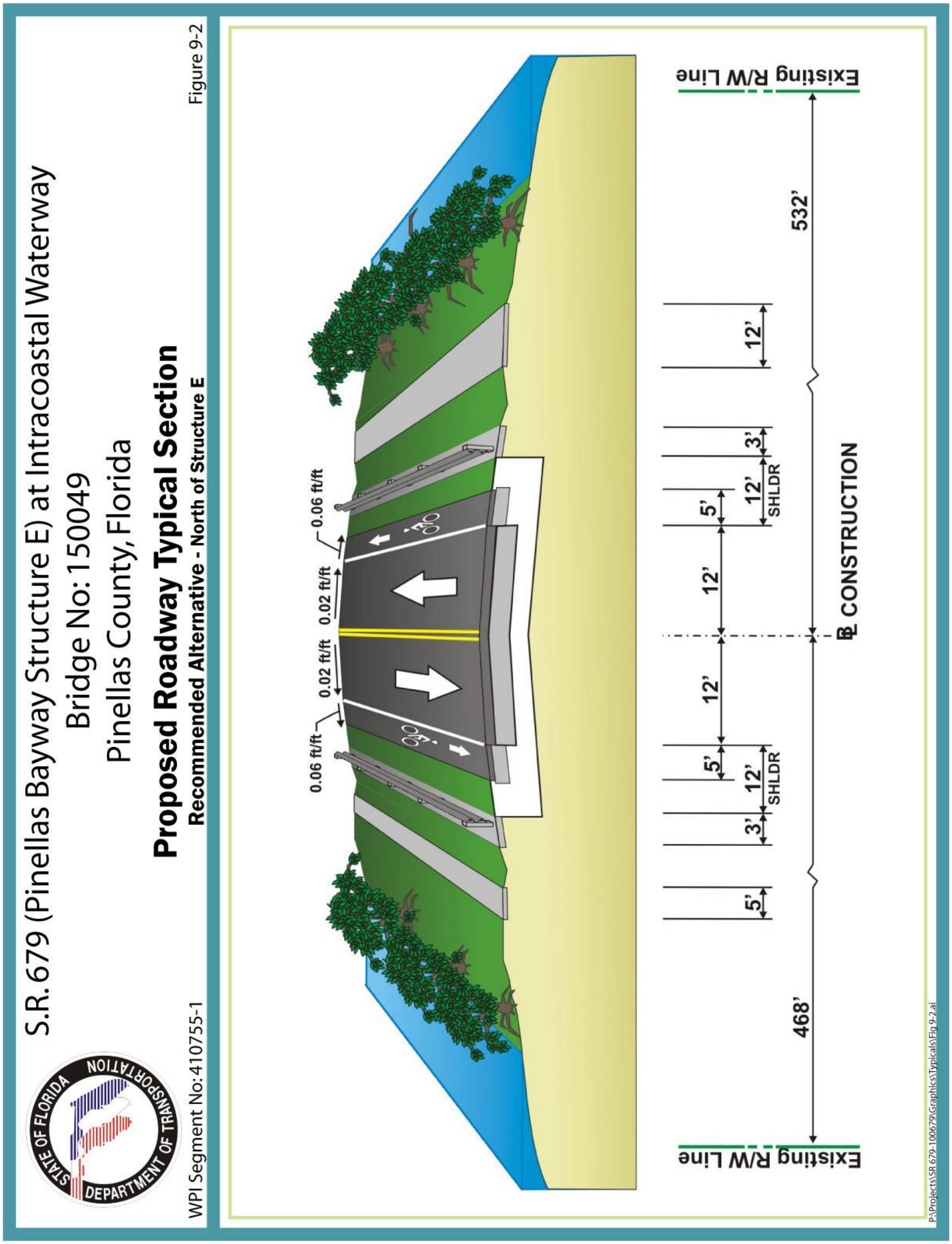

S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida
Proposed Roadway Typical Section
Recommended Alternative - North of Structure E
WPI Segment No: 410755-1
Figure 9-2
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
0.06 ft/ft
0.02 ft/ft
0.02 ft/ft
0.06 ft/ft
Existing R/W Line
Existing R/W Line
468'
532'
5'
3'
12'
SHLDR
5'
12'
12'
5'
12'
SHLDR
3'
12'
℄ CONSTRUCTION
P:\Projects\SR 679-100679\Graphics\Typicals\Fig 9-2.ai

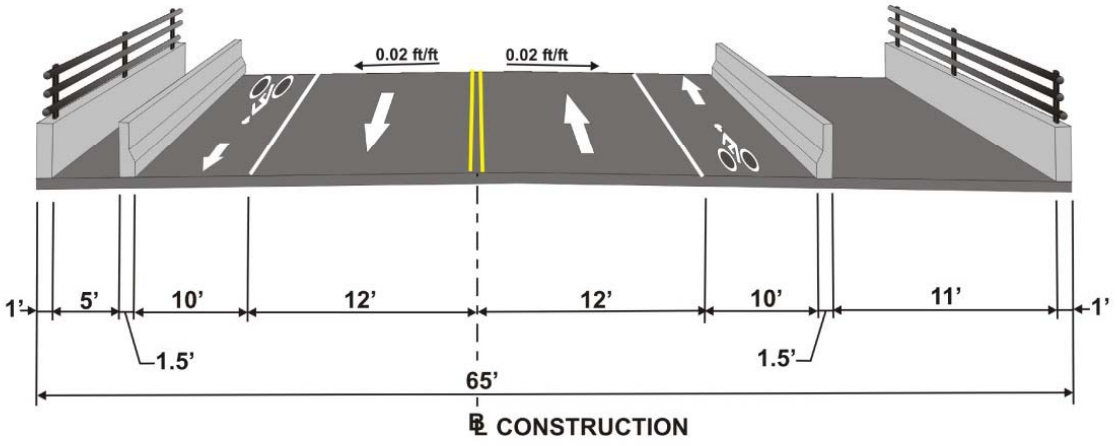
S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
Bridge No: 150049
Pinellas County, Florida

Proposed Bridge Typical Sections

Recommended Alternative

WPI Segment No : 410755-1

Figure 9-3



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9.5 POTENTIAL RELOCATIONS

As shown previously in Table 8-6, the construction of the Recommended Alternative is not expected to cause relocations.

9.6 RIGHT-OF-WAY COSTS

Since construction of a new driveway and guard house for The Village will be accomplished using a temporary construction easement, there is no ROW cost.

9.7 CONSTRUCTION COSTS

The estimated construction cost for the Recommended Alternative is summarized in Table 8-6. The costs were calculated using the Florida Department of Transportation's (FDOT) Long Range Estimates (LRE) method. As shown, the estimated total construction cost for the roadway and bridge improvements is $66.17 million. The construction cost to realign The Village driveway is $0.45 million. Therefore, the total construction cost is $66.62 million. The construction costs were generated using April 2008 dollars.

9.8 PRELIMINARY ENGINEERING AND CONSTRUCTION ENGINEERING COSTS

The cost for engineering (final design) and the cost for Construction Engineering Inspection (CEI) were each estimated at 15 percent of the estimated $66.62 million construction cost for roadway and bridge. Therefore, engineering design and CEI are estimated to cost approximately $9.99 million each.

9.9 RECYCLING OF SALVAGEABLE MATERIAL

During construction of the project, recycling of reusable materials will occur to the greatest extent possible. Where possible, pavement material removed from the existing roadway can be recycled for use in the new pavement. This will help to reduce the volume of the materials that need to be hauled away and disposed of from the project and to reduce the cost of purchasing materials suitable for pavement construction. Other materials such as signs, drainage concrete pipes, etc., will also be salvaged and reused for regular maintenance operations if they are deemed to be in good condition.

9.10 USER BENEFITS

The public will realize numerous benefits after the Recommended Alternative is constructed. Savings in travel time, reduced vehicle operating costs, reduced traffic accident related costs, and reduced emergency response times are the main benefits. Bicyclists and pedestrians will be able to share this facility with motorists and mariners safely and efficiently. Access to schools, public parks and community facilities, as well as the numerous commercial establishments and

residences, will be enhanced. The creation of a motorist-friendly facility will contribute to the economic growth of the area adjacent to the project.

9.11 PEDESTRIAN AND BICYCLE FACILITIES

Pedestrian accommodation is proposed in the form of concrete sidewalks to be replaced or constructed and placement of a pedestrian signal at the proposed signal at the Madonna Boulevard intersection. Also, a 12-foot (ft) wide multi-use path (11 ft on the bridge) located along the east side of S.R. 679 is proposed within the Project Development and Environment (PD&E) Study limits, to accommodate Pinellas County's multi-use path planned from Fort De Soto to S.R. 682. A 5-ft sidewalk is located along the west side of S.R. 679. Pedestrian handrails will be provided on the sidewalks on the bridge.

In addition, bicycle lanes or paved shoulders are provided along both sides of the roadway improvements.

9.12 SAFETY

The proposed improvements will upgrade this portion of S.R. 679 to a safer and more efficient transportation facility. The reduced delay of the proposed fixed-bridge will result in less congestion. A reduction in median openings, by reducing the number of conflict points at the Madonna Boulevard intersection, and the addition of a proposed signal will reduce the probability for crashes. The placement of sidewalks, crosswalks, and the multi-use path will provide safe pedestrian circulation.

The design and alignment of the roadway will meet applicable safety standards. Adherence to design speed as it applies to establishing and setting minimum values on critical roadway design features will be closely followed. Roadway design elements including curvature, sight distance, width, and clearance will meet the applicable minimum roadway design standards.

Navigation will also be safer. Vessels will no longer have to wait in the channel for the bascule bridge to open. In addition, the proposed bridge structure will be designed to better withstand ship impacts.

9.13 ECONOMIC AND COMMUNITY DEVELOPMENT

Pinellas County is the second smallest and the most densely populated county in Florida. With less than 7 percent of the land area in the county consisting of vacant property suitable for development, future growth is expected to revolve around redevelopment and infill urban development. As with Pinellas County, Tierra Verde is moving toward a build-out capacity. The proposed improvements to the S.R. 679 (Pinellas Bayway Structure E) project, which will not add capacity, are not expected to alter development patterns along the project and will not result in any adverse effects to economic and community development.

9.14 ENVIRONMENTAL EFFECTS

9.14.1 LAND USE DATA

9.14.1.1 Existing Land Use

The existing land uses adjacent to S.R. 679 consist of residential, commercial, marinas/docks, recreational, and preservation. An overview of the existing land use is shown in Figure 4-6.

Residential developments adjacent to S.R. 679 are The Village at Tierra Verde, The Yacht Club, and Anchor Cove to the south of the bridge and Bahia Del Mar and Palma Del Mar located north of the causeway at Isla Del Sol. Commercial uses south of the bridge on the west side of S.R. 679 surrounding Madonna Boulevard include Tierra Verde Marina Shopping Plaza, 7-Eleven, and other small businesses. The Tierra Verde Hi and Dry and Tierra Verde Resort Marina are located southwest of the bridge. Fort De Soto Park is located 5 miles (mi) south of the project area, south of Bunces Pass.

The bridge spans over the Intracoastal Waterway, a navigable waterway that is within Boca Ciega Bay, an Outstanding Florida Water (OFW) and a State Aquatic Preserve.

9.14.1.2 Future Land Use

The designated land uses on *The Updated Countywide Plan for Pinellas County*[2] Future Land Use Map (FLUM) indicates that future land uses conform to the existing land uses. Future land use designations include residential low, residential medium, residential suburban, and commercial general as shown in Figure 4-7. Future recreational uses include Fort De Soto Park located south of the project area and Bunces Pass and the proposed Bayway Trail South, a recreational trail that would be located adjacent to S.R. 679 and link Fort De Soto Park to the mainland.

The socio-economic data used in the development of the Pinellas County Metropolitan Planning Organization (MPO) *2025 Long Range Transportation Plan (LRTP)*[3] indicates the population growth for Pinellas County from 1999 to 2025 is expected to grow from 893,415 to 962,095 (an increase of 7.7 percent).

Employment is also expected to increase from 497,887 to 584,900 (an increase of 17.5 percent). With less than 7 percent of the land area in the county consisting of vacant property suitable for development, future growth in the county is expected to revolve around redevelopment and infill development activity.

9.14.2 COMMUNITY COHESION

The proposed project involves the improvement of an existing facility with no ROW acquisition, no splitting or isolation of neighborhoods will occur. The project is not anticipated to harm elderly persons, handicapped individuals, non-drivers and transit-dependent individuals, or minorities. It is anticipated that the project improvements will not affect community cohesiveness and that the quality of life will be improved with the planned multi-use path included in the Recommended Alternative. Therefore, this project is being developed to comply with Executive Order 12898, Environmental Justice, issued on February 11, 1994.

9.14.3 CULTURAL FEATURES

A *Final Cultural Resource Assessment Survey (CRAS) Report*[4] was prepared as part of this PD&E Study. No archaeological or historical sites or properties were identified, nor are any expected to be encountered during the subsequent project development. The State Historic Preservation Officer (SHPO) has determined that no resources listed or eligible for listing in the *National Register of Historic Places* (*NRHP*)[5] would be affected. The SHPO coordination letter, dated March 17, 2006, is included as Appendix C.

9.14.4 WETLAND IMPACT AND MITIGATION

A *Final Wetland Evaluation and Biological Assessment Report (WEBAR)*[6] was prepared for this PD&E Study. The anticipated involvement for the Recommended Alternative with wetland and surface waters is 2.59 ac, with 0.06 ac attributable to wetlands and 0.15 ac attributable to submerged aquatic vegetation (SAV). Wetland involvement resulting from the construction of this project are anticipated to be mitigated pursuant to Section 373.4137 Florida Statutes (F.S.) to satisfy all mitigation requirements of Part IV Chapter 373, F.S. and 33 United States Code 1344. Under Section 373.4137 F.S., mitigation of FDOT wetland impacts will be implemented by the Southwest Florida Water Management District (SWFWMD). The project is currently listed on the FDOT's wetland mitigation inventory, which is provided to the SWFWMD on an annual basis. It is anticipated that FDOT will provide funding to the SWFWMD for implementation of wetland mitigation required for this project.

Based on the above considerations, it is determined that there is no practicable alternative to the proposed construction in wetlands and that the proposed action includes all practicable measures the minimize harm to wetlands which may result from such use. Wetland involvement is considered to be minimal.

9.14.5 THREATENED AND ENDANGERED SPECIES

A *WEBAR* was prepared for this PD&E Study. To determine the occurrence of protected species, the study area was evaluated for suitable habitat for federally protected species by qualified FDOT environmental scientists. Surveys were then conducted in each habitat type for species known to occur or utilize those habitats. The surveys were performed in the winter of 2005/2006 and the spring of 2006. In addition, random surveys were performed along the corridor for the duration of the study to obtain data on resident and transient species. During these surveys, any evidence or direct observation of protected species found was recorded.

The following federally protected species were identified as potentially occurring within the project area: Gulf sturgeon, smalltooth sawfish, loggerhead turtle, green turtle, leatherback turtle, hawksbill turtle, Kemp's Ridley turtle, piping plover, bald eagle, wood stork and the West Indian manatee. In addition to the federally protected species, state-only protected species were also identified. These included state-protected wading birds, such as the roseate spoonbill, little blue heron, reddish egret, snowy egret, tricolored heron, and white ibis. The state protected brown pelican, least tern, American oystercatcher, snowy plover and black skimmer were also identified as potentially occurring in the project area.

The project is anticipated to have "no effect" on the bald eagle and the gulf sturgeon. Bald eagle nests were not identified in the database or observed in the field. The gulf sturgeon rarely occurs in the area and spawning activities, the primary concern for its recovery, are within coastal rivers, not bays and estuaries. Due to the minimal and temporary effect to the foraging areas and the lack of suitable nesting areas for the least tern, black skimmer, brown pelican, and American oystercatcher, the project is also anticipated to have no effect on these species.

The project "may affect, not likely to adversely affect" the following federally protected species: smalltooth sawfish, Atlantic loggerhead turtle, Atlantic green turtle, Atlantic hawksbill turtle, leatherback turtle, Kemp's Ridley turtle, piping plover, wood stork, and the West Indian manatee.

The Department will implement the "Marine Wildlife Safety Plan" and "Manatee and Sea Turtle Watch Program Guidelines" and "Sea Turtle Construction Conditions" for protection of the five species of marine turtles (green turtle, leatherback turtle, hawksbill turtle, Kemp's Ridley turtle, loggerhead turtle) and the West Indian Manatee potentially occurring in the area. Note that no suitable nesting beaches are found in the project area and protective measures are for turtles in open water only. Through implementation of the protection measures affects to these species will be avoided.

The National Marine Fisheries Service (NMFS) [National Oceanic and Atmospheric Administration (NOAA) Fisheries] listed the smalltooth sawfish as an endangered species in 2003. The smalltooth sawfish inhabit shallow coastal waters of tropical seas and estuaries throughout the world. They are typically found in shallow waters close to shore over muddy or sandy bottoms. Historically, the population was common throughout the Gulf of Mexico from Texas to Florida. However, currently, they are found mostly in the Everglades region of south Florida. Although the smalltooth sawfish was not observed in the area and the data as to its occurrence in the area are inconclusive, specific construction guidelines will be followed during the project for this species. With these guidelines in place, the project "may affect, not likely to adversely affect" the smalltooth sawfish.

No colonies or wood stork roosts were identified within the study area during the field evaluations. The Florida Fish and Wildlife Conservation Commission (FFWCC) maintains a colony location database, which identifies two active wood stork colonies within 18.6 mi of the project corridor. The colony identification numbers are 615113 (17.82 mi away) and 615336 (18.5 mi away). Wetlands supporting the proper hydrologic regime for foraging purposes may be affected throughout the study area. It is also noted that impacts to foraging areas are estimated at less than 0.2 ac. If it is concluded that suitable wetlands are impacted, FDOT will coordinate

with the USFWS to propose mitigation to offset effects to the wood stork colonies. It is anticipated that with this effort, the proposed project "may affect, not likely to adversely affect" the wood stork or its habitat.

The FFWCC database was reviewed for potential bald eagle nests in the area. The closest nest was more than four mi away from the project site. No nests were observed in the project area during field reviews. Since nest locations can change over time, FDOT will resurvey the project corridor and review existing databases during all design/permitting phases of this project. These surveys will identify any changes to current nest information, which will then result in modification of construction activities, as necessary, to reduce or eliminate any effects to this species. However, since no eagle nests currently occur within 660 ft of the study area, the bald eagle will receive "no effect" from the proposed project.

State protected wading birds (i.e., snowy egret, little blue heron, roseate spoonbill, reddish egret, tricolored heron and white ibis) will not be adversely affected. Forage areas may be lost due to construction of the bridge approaches. Mitigation will be provided for unavoidable habitat losses resulting from the proposed project.

Additionally, the FFWCC maintains a statewide database of known wading bird colonies. This database was reviewed to determine the proximity and potential effects the project may have on colonies. Several colonies occur within Pinellas County; however, the closest is more than one half mile from the study area. Due to its distance, wading bird colonies will not be affected by the proposed project.

The *WEBAR* was submitted to agencies for review and determination of affect for the proposed improvement. On February 12, 2007, the United States Fish and Wildlife Service (USFWS) concurred that the proposed action is not likely to adversely affect resources protected by the Endangered Species act of 1973, as amended (See Appendix C).

9.14.6 POTENTIAL HAZARDOUS MATERIALS AND PETROLEUM PRODUCTS CONTAMINATED SITES

A *Final Contamination Screening Evaluation Report (CSER)*[7] was prepared as part of this PD&E Study. A total of five potential contamination sites within or adjacent to the project corridor were identified. Of these five sites, three sites were identified as having a "MEDIUM" risk rating, and two sites were identified as having a "HIGH" risk rating.

9.14.7 NOISE IMPACTS

A *Draft Noise Study Report*[8] was prepared as part of this PD&E Study. Twenty noise sensitive sites (including two single family homes, three tennis courts, and 15 condominiums) were evaluated (Activity Category "B"). As a two-lane high-level fixed-bridge over the existing channel, the modeling analysis indicates that traffic noise levels would range from 48.0 to 65.4 dBA. Noise levels are not predicted to approach, meet, or exceed the FDOT's Noise Abatement Criteria (NAC). In addition, noise levels for the 20 sites modeled are predicted to change between 0.0 and 1.2 dBA with the project.

FDOT considers noise abatement measures such as: traffic management, alternative roadway alignment, property acquisition, and noise barriers. Based on the results of the analysis, it is not necessary for FDOT to consider abatement measures because noise levels were not predicted to approach, meet, or exceed the FDOT's NAC, nor are any noise sensitive sites predicted to experience a substantial increase in traffic noise compared to existing conditions.

9.14.8 AIR QUALITY IMPACTS

An *Air Quality Screening Test Memorandum*[9] was prepared as part of this PD&E Study. In accordance with the Clean Air Act Amendments of 1990 and Part 2, Chapter 16 of FDOT's *Project Development and Environment Manual*[10], an Air Quality Screening Test was conducted for this project utilizing the FDOT carbon monoxide (CO) screening model, CO Florida 2004 (released September 7, 2004). This computer program makes a number of conservative worst-case assumptions about the project (site conditions, meteorology and traffic) and indicates whether the project needs a more detailed computer analysis. The roadway intersection forecasted to have the highest total volume was S.R. 679 at Madonna Boulevard. The Build and No-Build scenarios for both the opening year (2010) and the design year (2030) were modeled.

Estimates of CO were predicted for the default receptors which are located 10 ft to 150 ft from the edge of the roadway. Based on the results of the screening model, the highest project-related CO levels are not predicted to meet or exceed the National Ambient Air Quality Standard (NAAQS) for the pollutant with either the No-Build or Build alternatives. As such, the project "passes" the screening model.

The project is located in an area that has been designated as Attainment for the 8-hour NAAQS for ozone under the criteria provided in the Clean Air Act and therefore, the Clean Air Act conformity requirements do not apply to the project.

9.14.9 WATER QUALITY IMPACTS

The proposed storm water facility design will include, at a minimum, the water quality requirements for water quality impacts as required by the SWFWMD in Chapter 40D-40, F.A.C. and the United States Environmental Protection Agency (EPA). Therefore, no further water quality mitigation measures will be needed.

9.14.10 AQUATIC PRESERVES AND OUTSTANDING FLORIDA WATERS

The project is located within the Boca Ciega Bay Aquatic Preserve. Aquatic Preserves are designated as such, in order to maintain an area in an essentially natural or existing condition so that their aesthetic, biological and scientific values may endure for the enjoyment of future generations (Section 258.36, F.S.). Every effort will be made to maximize the treatment of stormwater runoff from the proposed structure. Coordination with the Florida Department of Environmental Protection (FDEP) and SWFWMD was initiated during the Efficient Transportation Decision Making (ETDM) process.

To minimize impacts and effects to local water quality, specific measures will be implemented during construction. Short-term construction related impacts will be minimized by adherence to FDOT's *Standard Specifications for Road and Bridge Construction*[11]. These specifications

include measures known as Best Management Practices (BMP) which include the use of siltation barriers, dewatering structures, and containment devices that will be implemented for controlling turbid water discharges outside of construction limits. Through these efforts there will be minimal effect to the Boca Ciega Bay Aquatic Preserve.

Involvement with wetlands and surface waters due to the construction of the Recommended Alternative are estimated at 2.59 ac. Of those, 0.21 ac is attributable to wetlands and SAV, the remainder being to surface waters. The SWFWMD/FDEP requires an Environmental Resource Permit (ERP) when construction of any project results in the creation of a water management system or in impacts to waters of the state. The ERP required for this project may be elevated to an Individual level by SWFWMD as the project is located within an Aquatic Preserve and an OFW and/or has seagrass impacts.

9.14.11 ESSENTIAL FISH HABITAT

An *Essential Fish Habitat* (*EFH) Assessment* was conducted under the provisions of the Magnuson Fishery Conservation and Management Act of 1976, as amended through 1998 and currently regarded as the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). The *EFH* assessment is included in the *WEBAR*. With the construction of the Recommended Alternative, effects to the unconsolidated bottom portions of the bay are considered to be temporary in nature and not anticipated to have a significant effect to EFH. Further consultation may be necessary to determine the most effective mitigation measures for the proposed effects during the design and permitting phase of the project when more detailed information is available. The proposed project will potentially affect tidal marshes, mangroves communities, shoreline, and SAV With the Recommended Alternative, involvement with the wetland and SAV communities (Florida Land Use, Cover and Forms Classification System [FLUCCS] codes 612, 642, 652, and 911) will be approximately 0.21 ac, with 0.15 attributed to seagrass impacts (FLUCCS code 911). The potential for shellfish harvesting was also evaluated. The project is within a prohibited zone for shellfish harvesting; therefore, there will be no involvement with the shellfish fishery.

Seagrass involvement is looked at carefully by the NMFS, and mitigation will have to fully compensate for the loss of the seagrass areas in the project area. During the development of the mitigation plan to be provided through SWFWMD, in accordance with Section 373.4137 F.S., the NMFS will be a part of the interagency team that reviews any plans proposed by SWFWMD as mitigation. With appropriate mitigation provided, this project is not anticipated to adversely affect EFH.

9.14.12 PARKS AND RECREATION

There are no parks within or adjacent to the project area; however, recreational activities along S.R. 679 and the surrounding waters include fishing and boating. The closest park is Fort De Soto Park, located approximately 5 miles south of the project area and Bunces Pass. Fort De Soto Park is a Pinellas County park which offers many amenities including camping, canoeing, swimming, fishing, boating, Fort De Soto Park Trail, a paw playground (dog park), and a historic fort. Fort De Soto Park is the largest and most active park in the county, hosting more than 2.7 million visitors each year, most of which access the park via automobile.

A proposed recreational trail, the Bayway Trail South, is planned for this portion of the Pinellas Bayway that would be located adjacent to S.R. 679 and link the mainland to Fort De Soto Park. The proposed trail would also connect the Fort De Soto Trail with the South Beaches Trail and the proposed Bayway Trail North that connects with the Pinellas Trail to the north and the Skyway Trail to the south. Each of these trails is depicted on Figure 4-1 and are included in the *Pinellas County* MPO *Cost Feasible Trailways Projects for 2010-2015*.

The proposed Bayway Trail South was considered in the evaluation and development of bridge alternatives. The Recommended Alternative has been developed to include a multi-use path that will accommodate the planned trail. The Recommended Alternative will also provide enhanced vehicular and pedestrian/bicycle access to Fort De Soto Park since the traffic will not be stopped periodically for the bascule bridge to open. Therefore, this project will have no affect on parks or recreational facilities.

9.14.13 SECTION 4(F) LANDS

The United States Coast Guard (USCG) is no longer part of the United States Department of Transportation (USDOT); therefore, Section 4(f) of the Department of Transportation Act of 1966 does not apply to USCG projects.

9.14.14 FLOODPLAINS

In accordance with Executive Order 11988, "Floodplain Management," USDOT Order 5650.2, "Floodplain Management and Protection," and Chapter 23, Code of Federal Regulations (CFR), Part 650A, encroachment to floodplains from the construction of the proposed project were considered. A section of the *Final Alternative Stormwater Management Facility Report*[12] served as the PD&E Location Hydraulic Report requirements that comply with 23 CFR 650 and 23 CFR 771. The flood risk associated with encroachment to floodplains was analyzed and was identified as minimal encroachment. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panel numbers 12103C0278G and 12103C279G dated September 3, 2003 shows the Pinellas Bayway Structure E location. FEMA FIRM maps are included in the *Final Alternative Stormwater Management Facility Report*, published separately.

The Recommended Alternative falls within Zone AE, an area of 100-year flood where the base flood elevation has been determined (ranges from 9 ft to 12 ft) and flood hazard factors have been determined. These were determined based on tidal influences. The entire project is located within the 100-year storm surge floodplain; however, since it is tidally influenced, no floodplain mitigation is required. As a result, this project will not affect flood heights or floodplain limits. In addition, this project will not have any effects on human life, transportation facilities, and natural and beneficial floodplains. Therefore, it has been determined that this encroachment is not significant.

9.15 UTILITY AND RAILROADS

The type, location, and ownership of existing and planned utilities are summarized in Section 4.0 of this report. Depending on the location and depth of the utilities, implementation of the recommended improvements for the project may require adjustment of some of these facilities.

Costs for utility adjustments are not included in the total estimated project costs presented in Section 9.7, since they will be incurred by the utility owners. However, they are considered in the selection of the Recommended Alternative. Since the project will require the relocation of some utilities, the project is expected to have minimal involvement with utilities. There are no active railroad crossings within the project limits. Therefore, no involvement with railroads is anticipated.

9.16 TRAFFIC CONTROL PLAN

S.R. 679 provides access to numerous residences and businesses along this corridor. Due to its importance as the only vehicular connection to Tierra Verde and Mullet Key, S.R. 679 must remain functional throughout the duration of the construction activities. The existing number of travel lanes should be maintained to the maximum extent possible. Lane closures, if necessary, should occur during off-peak hours.

Both vehicular and vessel maintenance of traffic plans will be required during construction.

9.16.1 MAINTAINANCE OF VEHICULAR TRAFFIC THROUGHOUT CONSTRUCTION

Existing two-way vehicular traffic will continue to use the existing bascule bridge until the proposed replacement structure and approach roadways are constructed. Temporary pavement transitions may be needed to transition between the existing pavement and the newly constructed bridge approaches. Traffic will then be transferred via the temporary pavement to the new bridge. During this period, the permanent roadway transitions can be constructed and the existing bridge demolished before shifting traffic to the permanent pavement.

9.16.2 MAINTAINANCE OF VESSEL TRAFFIC THROUGHOUT CONSTRUCTION

Vessel traffic within the Intracoastal Waterway will experience brief periods of interruption during construction. A notice to mariners will be sent prior to any channel closure or limitations to navigation. However, an approximately 10-mile detour route through the Pass-A-Grille Channel and around Fort De Soto is always available.

9.17 RESULTS OF PUBLIC INVOLVEMENT PROGRAM

A *Public Involvement Program*[13] (PIP) was approved for this study in July 2005. The purpose of the program was to outline the various mechanisms and opportunities FDOT was implementing to inform and solicit responses from interested parties, including local residents, public officials and agencies, and business owners. The program includes early agency coordination through the ETDM and the Advance Notification (AN) process; small group meetings with local residents and business owners; an Alternatives Public Workshop, and a Public Hearing. The results of the program are summarized in the *Final Comments and Coordination Report*[14]. A brief summary of the PIP activities follows.

9.17.1 EFFICIENT TRANSPORTATION DECISION MAKING

The S.R. 679 PD&E Study was submitted to the Environmental Technical Advisory Team (ETAT) via the programming screen of the ETDM process in May 2004. The comment period lasted for a total of 45 days ending in July 2004. From the close of the comment period, FDOT had 60 days to submit a response to each comment. The Programming Screen Summary Report was finalized on December 7, 2004. FDOT anticipates that this process will eventually replace the AN process for early agency coordination.

9.17.2 ADVANCE NOTIFICATION

FDOT, through the AN process, informed a number of federal, state, regional, and local agencies of this project and its scope of anticipated activities. The AN Package was distributed to the Florida State Clearinghouse on July 25, 2005.

The majority of comments requested further coordination throughout the project, especially in regards to wetlands, essential fish habitat, and threatened and endangered species. The comments and corresponding responses are included in the *Final Comments and Coordination Report*.

9.17.3 INTERAGENCY COORDINATION

On August 1, 2005, the FDOT Public Information Officer distributed an electronic notification to elected officials to inform the recipients of the initiation of the S.R. 679 (Pinellas Bayway Structure E) at Intracoastal Waterway PD&E Study. The notification consisted of a brief project description, overview of the project approach, and contact information. The project fact sheet served as an attachment to the kick-off notice. The notification was sent to representatives of the following governmental organizations:

- U.S. Senators
- U.S. Representatives (applicable districts)
- Florida State Senators (applicable districts)
- Florida House of Representatives (applicable districts)
- Pinellas County Board of Commissioners
- Pinellas County Administrator
- Mayor of:
    - City of St. Pete Beach
    - City of St. Petersburg

The lead federal agency for this project is the USCG. Throughout the duration of the PD&E Study, FDOT coordinated informally with the USCG (Miami, Florida office) via phone and email. In addition to participating in the public workshop (April 2006), the USCG provided guidance on the vertical clearance of the structure, navigation issues, coastal engineering, and permitting. FDOT submitted the *Draft Environmental Assessment (EA)* and back-up

documentation to USCG for approval prior to the Public Hearing. The USCG signed the Draft EA for public availability on January 25, 2007.

In addition to the ETDM and AN processes, FDOT initiated coordination with the United States Army Corps of Engineers (USACE). FDOT sent a letter dated April 3, 2006, to the USACE District Engineer regarding the process, feasibility, requirements, and responsibilities of relocating the channel near the structure's crossing of the Intracoastal Waterway. On June 21, 2006, USACE responded via e-mail indicating that the required depth of the Intracoastal Waterway appears to be 9 ft, and that a formal response from the USACE District Office should be forthcoming. No additional response was received. On September 25, 2006, FDOT sent a letter to the USCG asking if USACE should be a Cooperating Agency as part of the ongoing process. On October 10, 2006, the USCG indicated in a letter to FDOT and copied to USACE, that it is appropriate and advantageous that USACE be a Cooperating Agency. Further coordination with the USACE continued in 2008.

In addition to the ETDM and AN processes, FDOT held meetings with local government agencies with jurisdictions in the project area, as listed in Table 9-1. FDOT staff presented project graphics and reports, provided project updates, and obtained feedback from the organizations.

Table 9-1
Local Agency Meetings

Date	Organization	Location
June 14, 2005	City of St. Petersburg Transportation and Parking Division	City of St. Petersburg
April 26, 2006	SWFWMD	SWFWMD
March 14, 2007	Pinellas County Metropolitan Planning Organization Board	Pinellas County Court House
January 25, 2008	USACE	Jacksonville, FL
March 6, 2008	USACE & Pinellas County Dept. of Environmental Management	FDOT District Seven, Tampa, FL
May 1, 2008	USCG	Phone Conference

9.17.4 ALTERNATIVES PUBLIC WORKSHOP

In coordination with the USCG, FDOT held an Alternatives Public Workshop on April 6, 2006, from 5:00 p.m. to 7:00 p.m. at the Island Chapel, 1271 South Pinellas Bayway, Tierra Verde, Florida. The purpose of the meeting was to solicit input from the public regarding the location, design, social, economic, and environmental effects of the proposed alternatives. The proposed alternatives include:

- Alternative 1 − Bridge Rehabilitation
- Alternative 2 − Bridge Rehabilitation with Widening
- Alternative 3 − Low-Level Bascule Bridge Replacement
- Alternative 4 − Mid-Level Bascule Bridge Replacement
- Alternative 5 − High-Level Fixed-Bridge Replacement Over Existing Channel
- Alternative 6 − High-Level Fixed-Bridge Replacement Over Relocated Channel

Various roadway improvement options were also evaluated for the reconfiguration of The Madonna Boulevard/Pinellas Bayway intersection. The options included: relocating The Village driveway to line up with Madonna Boulevard (Option A); relocating Madonna Boulevard to line up with The Village driveway (Option B); and slightly relocating both to "meet in the middle" (Option C). No capacity enhancements are proposed at this time.

The workshop was conducted in an informal format with no formal presentation. Each participant received a handout package, which included the newsletter, matrix, and a comment form. The participants were also encouraged to review the audiovisual presentation, which was continuously looped, before visiting the project display area. The project display area featured project graphics illustrating the proposed alternatives, estimated costs, environmental effects, schedule, and an opportunity for public comment. FDOT representatives were available to answer questions and discuss the project and individuals who desired to make formal comments were encouraged to do so.

Approximately 96 citizens participated in the Alternatives Public Workshop. Approximately 37 individuals submitted written comments at the workshop; 28 individuals mailed comments after the workshop; and four individuals' submitted comments by e-mail. A summary of the written comments is provided in the following bulleted list (the number of comments received is included in parenthesis):

- 46 of the 69 comments favored Alternative 6
- 17 of the 69 comments favored Intersection Option B
- Stated the need for a traffic signal at the Madonna Boulevard/Pinellas Bayway intersection (24)
- Requested consideration of a four-lane alternative (11)
- Identified a preference for a high fixed-bridge (8)

- Requested a decrease in bridge openings (4)
- Expressed concern that Intersection Option A would affect ability for emergency vehicles to access The Village Building #1 (10)
- Requested quick solution to intersection issues (4)
- Requested consideration of bridge aesthetics (3)
- Expressed preference for bascule bridge (3)
- Expressed concerns regarding the loss of recreation use at the northern bridge approach. (3)
- Identified preference for two-lane alternative (2)
- Requested project website (2)
- Expressed funding concerns (2)
- Other concerns included:
    - Impacts to adjacent businesses
    - Construction timeframe
    - Environmental impacts of channel relocation
    - Noise
    - Design of Madonna Boulevard/Pinellas Bayway intersection

9.17.5 PUBLIC HEARING

In coordination with the USCG, the FDOT held a Public Hearing on March 28, 2007 from 4:30 p.m. to 7:00 p.m. at the Tampa Bay Watch Community Center, 3000 South Pinellas Bayway, Tierra Verde, Florida. The purpose of the meeting was to solicit input from the public regarding the location, design, social, economic, and environmental effects of the Recommended Alternative. The alternatives presented included:

- Recommended Alternative (Alternative 6-High-Level Fixed-Bridge Replacement with Channel Relocation) (This was the initial Recommended Alternative)
- No Build Alternative (Alternative 1- Rehabilitation)

The initial Recommended Alternative included the reconfiguration of the Madonna Boulevard/Pinellas Bayway intersection. The recommended intersection option would relocate Madonna Boulevard to line up with The Village driveway (Option B). No capacity enhancements were proposed at this time.

The hearing was conducted in an informal format with a formal opportunity for public testimony. After signing in, each participant received a handout package, which included the newsletter, insert, comment form and speaking card. The participants were also encouraged to review the audiovisual presentation, which was continuously looped, before visiting the project display area.

Approximately 164 individuals participated in the Public Hearing, along with 21 project team members. A total of 52 comments were received during the Public Hearing comment period. At

the hearing, two individuals provided verbal comments during the formal portion, 22 individuals spoke their opinions to the court reporter during the informal portion, and 21 individuals submitted written comments in the comment boxes. The court reporter recorded all verbal comments and prepared a verbatim public hearing transcript. All written comments postmarked by April 9, 2007 were included in the transcript, as well. A summary of the comments is provided in the following bulleted list:

- 37 of the 52 comments identified a preference for a high fixed-bridge
- 9 of the 52 comments expressed preference for bascule bridge
- 12 of the 52 comments did not state any preference, but pointed out concerns
- Stated the need for a traffic signal at the Madonna Boulevard/Pinellas Bayway intersection (12)
- Expressed funding concerns (8)
- Requested quick solution to intersection issues (6)
- Supported toll increase to help funding (5)
- Expressed concerns about island's emergency vehicle access/evacuation (5)
- Expressed no need for a traffic signal at the Madonna Boulevard/Pinellas Bayway intersection (4)
- Requested consideration to extend the bridge further north (4)
- Expressed concern about the bridge being too steep for traffic, pedestrian and\or bicycle use (3)
- Requested consideration of a four-lane alternative (2)
- Requested to raise reminder of causeway road to safer level (2)
- Expressed concern about losing parking for the businesses along Madonna Boulevard (2)
- Expressed concern about who will maintain the depth of the channel and pay for it (2)
- Other concerns included:
    - Impacts to adjacent businesses and recreation areas.
    - Construction timeframe
    - Environmental impacts of channel relocation
    - Noise
    - Design of Madonna Boulevard/Pinellas Bayway intersection
    - Bridge aesthetics
    - Providing enough clearance for high mast boats
    - Need for a traffic signal at Sands Point Drive intersection with the Pinellas Bayway
    - Need for a traffic signal at Bahia Del Mar Boulevard/Palma Del Mar Boulevard intersection with the Pinellas Bayway

9.17.6 OTHER PUBLIC OUTREACH ACTIVITIES

In addition to extensive agency coordination, public workshop, and the public hearing, FDOT also utilized other techniques to disseminate information and obtain feedback from the public. These efforts began early and continued throughout the PD&E Study.

FDOT utilized numerous methods in an effort to invite the public to the April 2006 Alternatives Public Workshop and the March 2007 Public Hearing, many of which are described below. These methods included: email notification from FDOT to the applicable state and local government elected officials which provided a brief synopsis of the project and an attached project newsletter; distribution of newsletters as noted below; legal advertisement published in the *St. Petersburg Times*, the *Island Reporter*, *Paradise News*, and *Tropical Views*; and flyers distributed and posted at The Village at Tierra Verde, the business complex adjacent to the bridge's southern approach, and Fort De Soto Park.

9.17.6.1 Small Group Meetings

The Tierra Verde community has numerous residential units, in addition to a small business community. Almost all of the residents are members of the Tierra Verde Community Association (TVCA); therefore, it was very effective to distribute information through this organization. The TVCA holds monthly board meetings and quarterly public meetings and distributes information to members through an extensive electronic mail distribution and an active website. As indicated in Table 9-2, FDOT presented information to the TVCA Board and residents on several occasions. In addition, FDOT conducted a meeting at the Village at Tierra Verde, which is the residential community adjacent to the bridge's southern approach on the east side. A presentation was also made to the Friends of Tierra Verde.

FDOT also recognized the need to communicate with the Tierra Verde business community. They made several attempts to contact the Tierra Verde Chamber of Commerce, but the organization was non-responsive. FDOT conducted a meeting with the business owners adjacent to the bridge's southern approach on the west side.

9.17.6.2 Newsletters

Two newsletters were distributed for this project to provide project updates, graphics, and FDOT contact information. The first newsletter was distributed in March/April 2006 and explained the study alternatives and served as the invitation to the Alternatives Public Workshop. The second newsletter was distributed in February 2007 to identify the Recommended Alternative and announce the Public Hearing. The newsletters were distributed to all property owners within 300 ft of the centerline of the alternatives. The newsletters were also distributed to federal, state, and local government agencies, civic organizations, including each of the community/homeowner associations on Tierra Verde and Isla del Sol, and other interested parties. Upon approval of the final environmental document, FDOT will distribute a final newsletter which will inform the public of the change in the Preferred Alternative from Alternative 6 – High-Level Fixed-Span over a Relocated Channel to Alternative 5A – High-Level Fixed-Span over the Existing Channel.

Table 9-2
Small Group Meetings

Date	Organization	Location
September 12, 2005	TVCA Monthly Board Meeting	TVCA Board Room
November 17, 2005	TVCA 4th Quarter Public Meeting	TVCA Board Room
March 8, 2006	The Village at Tierra Verde	The Village at Tierra Verde Clubhouse
March 13, 2006	Tierra Verde Business Owners (Adjacent to Bridge)	TVCA Board Room
October 10, 2006	Friends of Tierra Verde	Island Chapel, 1271 South Pinellas Bayway, Tierra Verde

9.17.6.3 Fact Sheet

The District Public Information Officer (PIO) utilized the fact sheet to communicate with elected officials having jurisdiction in the project area. The fact sheet is a brief status report consisting of a brief project description, schedule, and contact information. The project fact sheet is typically distributed on-demand and at major project milestones.

9.17.6.4 Local Publications

In addition to the *St. Petersburg Times*, the Tierra Verde community has three local publications that circulate regularly on the island. FDOT used *The Island Reporter, Paradise News,* and *Tropical Views* to post project updates and inform the public of upcoming meetings. These publications are free to all residents on the island and are distributed bi-monthly or quarterly.

9.18 VALUE ENGINEERING

This PD&E Study was reviewed by the District Seven Value Engineering (VE) team comprised of FDOT staff. The review was completed April 20, 2007. As a result of the review, a *Value Engineering Study*[15] was prepared. The VE team endorsed the initial PD&E Study high-level fixed-bridge over a relocated channel. However, the VE team recommended that the Madonna Boulevard intersection improvements not be constructed, resulting in a $15,601,000 savings.

FDOT crash data from 1999 through 2004 shows the existing intersection at S.R. 679 and Madonna Boulevard has a safety ratio greater than 1.0 for two of the five years. A safety ratio greater than 1.0 indicates that a segment or intersection is experiencing an abnormal amount of crashes compared to the statewide average of an intersection or roadway with similar characteristics. The existing unsignalized split-intersection, comprised of the T-intersection of

Madonna Boulevard at S.R. 679 and The Village at Tierra Verde driveway, located approximately 120 ft north of Madonna Boulevard, creates 57 potential conflict points. By comparison, the realigned Madonna Boulevard/S.R. 679 intersection creates 40 potential conflict points when unsignalized and only 12 potential conflict points when a phased traffic signal is introduced. The proposed realignment of Madonna Boulevard will reduce the number of conflict points, ease driver confusion, and help to improve the safety of the intersection.

S.R. 679 is Access Classification 3. Currently, the additional median opening located at The Village at Tierra Verde driveway on S.R. 679 violates the minimum full median opening spacing requirements as stated by FDOT access Management Rule 14-97. By realigning the intersection, the extra median opening is removed.

Public involvement efforts have been conducted as part of this PD&E Study. Throughout this process of public outreach, there has been a high level of positive support from the public regarding the realignment of Madonna Boulevard.

The $15.6 million for the Recommended Alternative takes into consideration the relocation of three existing businesses and the reduction in available parking stalls. Should this parcel be redeveloped, Pinellas County could potentially request ROW donation as a part of the site plan approval, thus reducing this cost.

For the above stated reasons the design recommendation put forth by the FDOT District Seven Value Engineering Team was not implemented.

9.19 DRAINAGE

A *Final Alternative Stormwater Management Facility Report* was prepared as part of this PD&E Study. Alternative SMF sites were evaluated for the Recommended Alternative, which will require SMFs since the existing bridge is proposed to be completely replaced, changing the geometry. Recommended SMF sites for the Recommended Alternative are included in the Recommended Alternative concept plans in Appendix A. All SMFs within the study area will have one ultimate outfall: Boca Ciega Bay, which is a tidally influenced waterway. Attenuation will not be required in areas with unrestricted discharges to these outfalls. The proposed bridge structure will accommodate a SMF under both the north and south end of the bridge to meet treatment requirements for the Recommended Alternative.

9.20 STRUCTURES

The Recommended Alternative recommends the replacement of the existing low-level bascule bridge with a high-level fixed-bridge with a 65-ft vertical navigational clearance over the existing channel. The proposed structure will meet minimum acceptable new construction design standards for shoulder width and traffic barrier design.

9.21 SPECIAL FEATURES (NOISE BARRIERS, RETAINING WALLS, UNDERDRAINS, ETC.)

No noise barriers are proposed. The Recommended Alternative includes permanent retaining walls at each approach to the replacement bridge. In addition, a new seawall is proposed on the southern and northern approaches. No other special features are proposed.

9.22 ACCESS MANAGEMENT

The current access management classification for S.R. 679 is Access Class 3, which is distinguished by restrictive medians and maximum distance between traffic signals, median openings, and connections.

S.R. 679 currently has no restrictive median separation from south of Structure E to south of S.R. 682. Although Access Class 3 standards require a restrictive median, none is proposed as part of the Recommended Alternative since the need for the improvements is based on the structural condition of the bridge, and the project does not include capacity improvements. However, the number of median openings south of Structure E is proposed to be reduced from two to one with the realignment of The Village driveway to match the existing Madonna Boulevard.

The proposed traffic signal location at the Madonna Boulevard intersection meets signal spacing criteria, being over one-half mile from the nearest signal at S.R. 682.

9.23 AESTHETICS AND LANDSCAPING

The Recommended Alternative can be designed with longer spans on a single pier instead of a group of piles. The result would provide more open, spacious views from both water and nearby land uses. The Recommended Alternative, a high-level fixed-bridge, would result in improved aesthetics, as compared to the bascule bridge replacement or rehabilitation alternatives, since span lengths can be longer and no crutch bents are required. There are no provisions or commitments made regarding special aesthetic features, such as landscaping or hardscaping for this section of S.R. 679.

9.24 REFERENCES

1. *Final Traffic Technical Memorandum;* prepared for Florida Department of Transportation by PBS&J; June 2008.
2. *The Updated Countywide Plan for Pinellas County*; Pinellas Planning Council; Clearwater, Florida; May 3, 2005.
3. *2025 Long Range Transportation Plan*; Pinellas County Metropolitan Planning Organization; Clearwater, Florida; December 2004.
4. *Final Cultural Resource Assessment Survey*; ACI; Sarasota, Florida; February 2006, Revised June 2008.

5. *National Register of Historic Places*; U.S. Department of the Interior, National Park Service; Washington, D.C.

6. *Final Wetland Evaluation and Biological Assessment Report*; PBS&J; Tampa, Florida; June 2008.

7. *Final Contamination Screening Evaluation Report*; Nodarse & Associates; Tampa, Florida; June 2008.

8. *Final Noise Study Report*; Florida Department of Transportation; Tampa, Florida; July 2007, Revised June 2008.

9. *Air Quality Screening Test Memorandum*; Florida Department of Transportation; Tampa, Florida; February 2006.

10. *Project Development and Environment Manual*; Florida Department of Transportation; Tallahassee, Florida; revised April, 2007.

11. *Standard Specifications for Road and Bridge Construction;* Florida Department of Transportation; Tallahassee, Florida; 2007 Edition.

12. *Final Alternative Stormwater Management Facility Report;* PBS&J; Tampa, Florida; June, 2008.

13. *Public Involvement Program;* PBS&J; Tampa, Florida; September 2005.

14. *Final Comments and Coordination Report;* PBS&J; Tampa, Florida; June, 2008.

15. *Value Engineering Study;* Florida Department of Transportation; Tampa, Florida; April 2007.

APPENDICES

Appendix A:	***Recommended Alternative Concept Plans***
Appendix B:	***Life Cycle Costs***
Appendix C:	***SHPO Letter*** ***USFWS Concurrence Letter***
Appendix D:	***Meeting Minutes***

APPENDIX A
RECOMMENDED ALTERNATIVE CONCEPT PLANS

PRELIMINARY

FLIGHT DATE: MAY 7, 2005

RECOMMENDED ALTERNATIVE 5A: HIGH-LEVEL FIXED BRIDGE OVER EXISTING CHANNEL WITH RELOCATED VILLAGE DRIVEWAY

300 BASELINE SURVEY/ CENTERLINE OF CONSTRUCTION	PROPOSED BRIDGE	RECOMMENDED ALTERNATIVE POND SITES
PARCEL LINES	PROPOSED BARRIER/RETAINING WALL	POTENTIAL CONTAMINATION SITE
EXISTING EDGE OF PAVEMENT	PROPOSED SIDEWALK	PROPOSED TRAFFIC SIGNAL
EXISTING RIGHT-OF-WAY	612 FLUCFC CODES	
PROPOSED RIGHT-OF-WAY	WETLANDS	
PROPOSED EDGE OF PAVEMENT	SEAGRASS	

PBS&J
5300 West Cypress Street
Suite 200
Tampa, Florida 33607-1768
(813) 282-7275

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 679	PINELLAS	410755-1-22-01

S.R. 679 (PINELLAS BAYWAY STRUCTURE E) AT INTRACOASTAL WATERWAY
CONCEPT PLANS

SHEET NO. 1

USER: i5309 06/02/2008 12:43:48 PM P:\Pro\eds\FDOT\07\SR 679-100679\CADD\Plan_ReAlt_01.dgn

PRELIMINARY

FLIGHT DATE: MAY 7, 2005

EXISTING GULF INTRACOASTAL WATERWAY

BOCA CIEGA BAY

540

911

0 40 200
Feet

642

612

642

652

540

CONSTRUCT PROPOSED SEAWALL

90' EXIST.

5

280 285 290 295 300 305

679

SMF A-2

PC STA. 302+07.85

END WALL
BEGIN SIDEWALK

540

612

642

612

612 612 612

540

END BRIDGE
BEGIN WALL

642

652

642

642

180' PROP.

540

BOCA CIEGA BAY

911

RECOMMENDED ALTERNATIVE 5A: HIGH-LEVEL FIXED BRIDGE OVER EXISTING CHANNEL WITH RELOCATED VILLAGE DRIVEWAY

300 BASELINE SURVEY/ CENTERLINE OF CONSTRUCTION
PARCEL LINES
EXISTING EDGE OF PAVEMENT
EXISTING RIGHT-OF-WAY
PROPOSED RIGHT-OF-WAY
PROPOSED EDGE OF PAVEMENT

PROPOSED BRIDGE
PROPOSED BARRIER/RETAINING WALL
PROPOSED SIDEWALK
612 FLUCFC CODES
WETLANDS
SEAGRASS

SMF A-2 RECOMMENDED ALTERNATIVE POND SITES
POTENTIAL CONTAMINATION SITE
PROPOSED TRAFFIC SIGNAL

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5300 West Cypress Street
Suite 200
Tampa, Florida 33607-1768
(813) 282-7275

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 679	PINELLAS	410755-1-22-01

S.R. 679 (PINELLAS BAYWAY STRUCTURE E) AT INTRACOASTAL WATERWAY

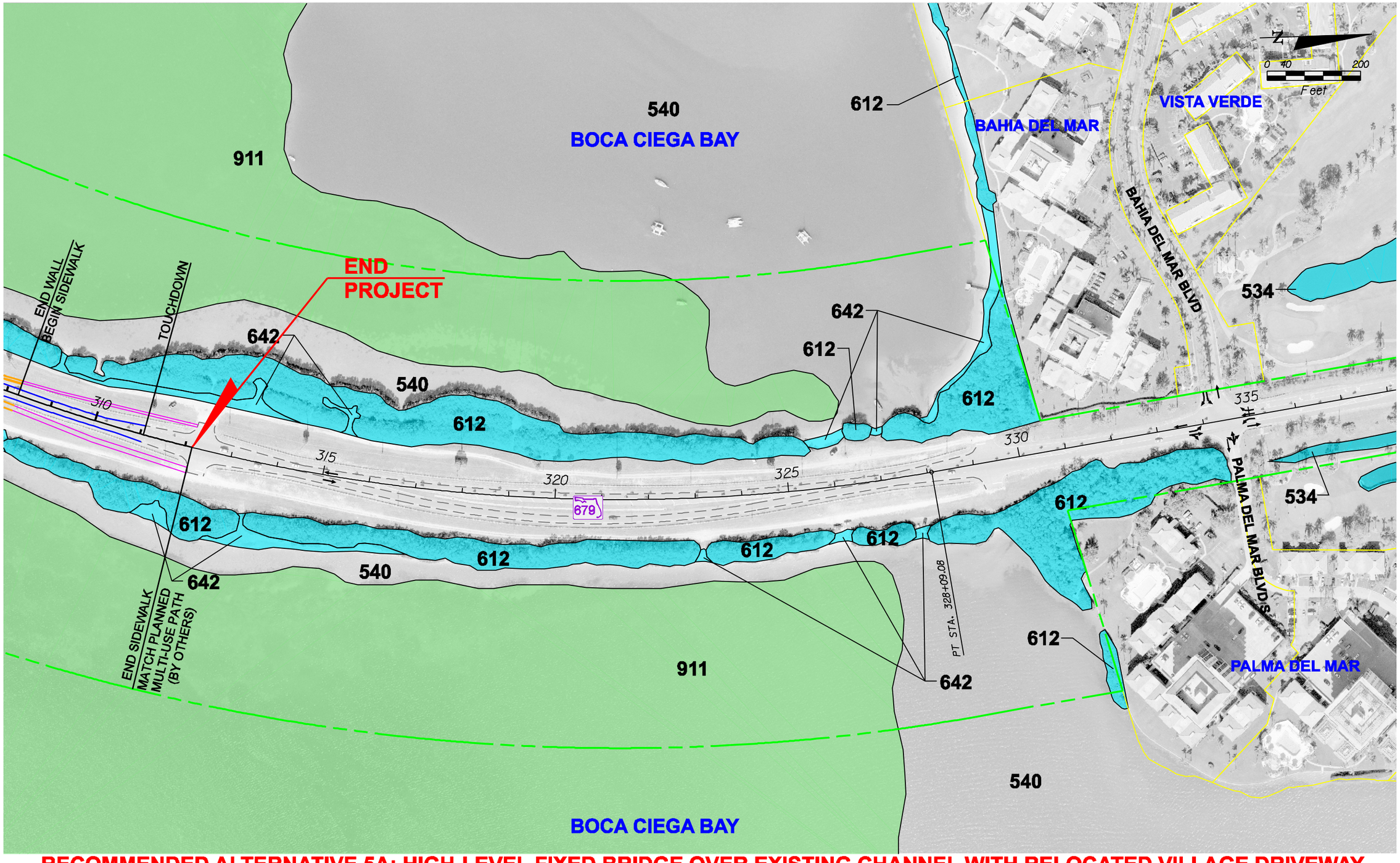
CONCEPT PLANS

SHEET NO. 2

USER: 5309 06/02/2008 12:44:48 PM F:\Projects\FDOT\07\SR 679-100679\CADD\Plan_ReAlt_02.dgn

PRELIMINARY

FLIGHT DATE: MAY 7, 2005



RECOMMENDED ALTERNATIVE 5A: HIGH-LEVEL FIXED BRIDGE OVER EXISTING CHANNEL WITH RELOCATED VILLAGE DRIVEWAY

300 BASELINE SURVEY/ CENTERLINE OF CONSTRUCTION
PARCEL LINES
EXISTING EDGE OF PAVEMENT
EXISTING RIGHT-OF-WAY
PROPOSED RIGHT-OF-WAY
PROPOSED EDGE OF PAVEMENT

PROPOSED BRIDGE
PROPOSED BARRIER/RETAINING WALL
PROPOSED SIDEWALK
612 FLUCFC CODES
WETLANDS
SEAGRASS

SMF A-2 RECOMMENDED ALTERNATIVE POND SITES
POTENTIAL CONTAMINATION SITE
PROPOSED TRAFFIC SIGNAL

PBS&J
5300 West Cypress Street
Suite 200
Tampa, Florida 33607-1768
(813) 282-7275

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 679	PINELLAS	410755-1-22-01

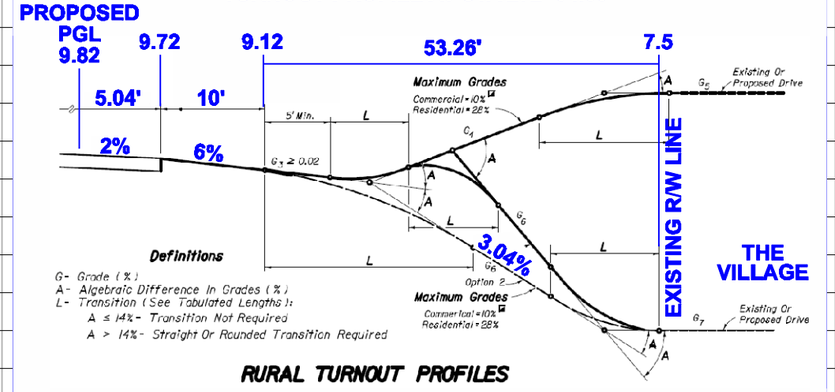
S.R. 679 (PINELLAS BAYWAY STRUCTURE E)
AT INTRACOASTAL WATERWAY
CONCEPT PLANS

SHEET NO. 3

PRELIMINARY

GRADE UP	GRADE DOWN	MAX. ELEV.	BRIDGE LENGTH
6%	5%	90.05'	2889.11'

TURNOUT PROFILE AT STA 272+54.50



RURAL TURNOUT PROFILES
STANDARD INDEX 515

RECOMMENDED ALTERNATIVE 5A: HIGH-LEVEL FIXED BRIDGE OVER EXISTING CHANNEL WITH RELOCATED VILLAGE DRIVEWAY

LEGEND
- EXISTING PROFILE
- PROPOSED PROFILE
- RETAINING WALL

PBS&J
5300 West Cypress Street
Suite 200
Tampa, Florida 33607-1768
(813) 282-7275

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
S.R. 679	PINELLAS	410755-1-22-01

S.R. 679 (PINELLAS BAYWAY STRUCTURE E)
AT INTRACOASTAL WATERWAY
HIGH-LEVEL FIXED BRIDGE PROFILE
EXISTING CHANNEL

SHEET NO. 4

APPENDIX B
LIFE CYCLE COSTS

Alternative 1 - Rehabilitation Capital Costs, Maintenance and Operation

Year		Structural	Mechanical	Electrical	Sub Total	Operation	Maintenance	Total	
0	2007	$18,125	$22,800	$56,400	$97,325	$125,000	$25,000	$247,325	
1	2008	$1,120,000			$1,120,000	$125,000	$25,000	$1,270,000	
2	2009	$0			$0	$125,000	$25,000	$150,000	
3	2010	$0			$0	$125,000	$25,000	$150,000	
4	2011	$13,567,975	$600,000		$14,167,975	$125,000	$25,000	$14,317,975	Initial Rehabilitation
5	2012				$0	$125,000	$25,000	$150,000	
6	2013	$0			$0	$125,000	$25,000	$150,000	
7	2014	$0			$0	$125,000	$25,000	$150,000	
8	2015	$0			$0	$125,000	$25,000	$150,000	
9	2016	$0			$0	$125,000	$25,000	$150,000	
10	2017	$0			$0	$125,000	$25,000	$150,000	
11	2018	$312,500			$312,500	$125,000	$25,000	$462,500	
12	2019	$0			$0	$125,000	$25,000	$150,000	
13	2020	$0			$0	$125,000	$25,000	$150,000	
14	2021	$0			$0	$125,000	$25,000	$150,000	
15	2022	$0			$0	$125,000	$25,000	$150,000	
16	2023	$0			$0	$125,000	$25,000	$150,000	25 years
17	2024	$0			$0	$125,000	$25,000	$150,000	
18	2025	$0			$0	$125,000	$25,000	$150,000	
19	2026	$0	$240,000	$4,200,000	$4,440,000	$125,000	$25,000	$4,590,000	
20	2027	$0			$0	$125,000	$25,000	$150,000	
21	2028	$0			$0	$125,000	$25,000	$150,000	
22	2029	$0			$0	$125,000	$25,000	$150,000	
23	2030	$0			$0	$125,000	$25,000	$150,000	
24	2031	$0			$0	$125,000	$25,000	$150,000	
25	2032	$2,307,500			$2,307,500	$125,000	$25,000	$2,457,500	
26	2033	$0			$0	$125,000	$25,000	$150,000	
27	2034	$0			$0	$125,000	$25,000	$150,000	
28	2035	$0			$0	$125,000	$25,000	$150,000	
29	2036	$0			$0	$125,000	$25,000	$150,000	
30	2037	$762,500			$762,500	$125,000	$50,000	$937,500	
31	2038	$0	$36,000		$36,000	$125,000	$50,000	$211,000	
32	2039	$0			$0	$125,000	$50,000	$175,000	
33	2040	$0			$0	$125,000	$50,000	$175,000	
34	2041	$0			$0	$125,000	$50,000	$175,000	
35	2042	$0			$0	$125,000	$50,000	$175,000	
36	2043	$0			$0	$125,000	$50,000	$175,000	
37	2044	$0			$0	$125,000	$50,000	$175,000	
38	2045	$0			$0	$125,000	$50,000	$175,000	
39	2046	$0			$0	$125,000	$50,000	$175,000	
40	2047	$0			$0	$125,000	$50,000	$175,000	
41	2048	$0			$0	$125,000	$50,000	$175,000	
42	2049	$0			$0	$125,000	$50,000	$175,000	
43	2050	$0			$0	$125,000	$50,000	$175,000	25 years
44	2051	$0	$600,000		$600,000	$125,000	$50,000	$775,000	
45	2052	$281,250			$281,250	$125,000	$50,000	$456,250	
46	2053	$0			$0	$125,000	$50,000	$175,000	
47	2054	$0			$0	$125,000	$50,000	$175,000	
48	2055	$0			$0	$125,000	$50,000	$175,000	
49	2056	$0		$4,200,000	$4,200,000	$125,000	$50,000	$4,375,000	
50	2057	$0			$0	$125,000	$50,000	$175,000	
51	2058	$4,432,500			$4,432,500	$125,000	$50,000	$4,607,500	
52	2059	$0			$0	$125,000	$50,000	$175,000	
53	2060	$0			$0	$125,000	$50,000	$175,000	
54	2061	$0			$0	$125,000	$50,000	$175,000	
55	2062	$13,619,100			$13,619,100	$125,000	$100,000	$13,844,100	
56	2063	$0			$0	$125,000	$100,000	$225,000	
57	2064	$0			$0	$125,000	$100,000	$225,000	
58	2065	$0			$0	$125,000	$100,000	$225,000	
59	2066	$0	$240,000		$240,000	$125,000	$100,000	$465,000	
60	2067	$0			$0	$125,000	$100,000	$225,000	
61	2068	$0			$0	$125,000	$100,000	$225,000	
62	2069	$0			$0	$125,000	$100,000	$225,000	
63	2070	$0			$0	$125,000	$100,000	$225,000	
64	2071	$0			$0	$125,000	$100,000	$225,000	
65	2072	$500,000			$500,000	$125,000	$100,000	$725,000	
66	2073	$0			$0	$125,000	$100,000	$225,000	25 years
67	2074	$0			$0	$125,000	$100,000	$225,000	
68	2075	$0			$0	$125,000	$100,000	$225,000	
69	2076	$0			$0	$125,000	$100,000	$225,000	
70	2077	$0			$0	$125,000	$100,000	$225,000	
71	2078	$0			$0	$125,000	$100,000	$225,000	
72	2079	$0			$0	$125,000	$100,000	$225,000	
73	2080	$0			$0	$125,000	$100,000	$225,000	
74	2081	$0	$360,000		$360,000	$125,000	$100,000	$585,000	
75	2082	$0			$0	$125,000	$100,000	$225,000	
76	2083	$120,000			$120,000	$125,000	$100,000	$345,000	
77	2084	$0			$0	$125,000	$100,000	$225,000	
78	2085	$0			$0	$125,000	$100,000	$225,000	
79	2086	$0			$0	$125,000	$100,000	$225,000	
Total		$37,041,450	$2,098,800	$8,456,400	$47,596,650	$10,000,000	$4,500,000	$62,096,650	
						$14,500,000			

Note: Annual maintenance of existing bridge $25,000 until 2012 when rehabilitation occurs

Alternative 2 - Rehabilitation with Widening Capital Costs, Maintenance and Operation

Year		Structural	Mechanical	Electrical	Sub Total	Operation	Maintenance	Total
0	2007	$18,125	$22,800		$40,925	$125,000	$25,000	$190,925
1	2008	$1,120,000			$1,120,000	$125,000	$25,000	$1,270,000
2	2009				$0	$125,000	$25,000	$150,000
3	2010				$0	$125,000	$25,000	$150,000
4	2011	$24,430,675	$3,600,000	$5,400,000	$33,430,675	$125,000	$25,000	$33,580,675
5	2012	$0	$0	$0	$0	$125,000	$50,000	$175,000
6	2013				$0	$125,000	$50,000	$175,000
7	2014				$0	$125,000	$50,000	$175,000
8	2015				$0	$125,000	$50,000	$175,000
9	2016				$0	$125,000	$50,000	$175,000
10	2017				$0	$125,000	$50,000	$175,000
11	2018				$0	$125,000	$50,000	$175,000
12	2019				$0	$125,000	$50,000	$175,000
13	2020				$0	$125,000	$50,000	$175,000
14	2021				$0	$125,000	$50,000	$175,000
15	2022				$0	$125,000	$50,000	$175,000
16	2023				$0	$125,000	$50,000	$175,000
17	2024				$0	$125,000	$50,000	$175,000
18	2025				$0	$125,000	$50,000	$175,000
19	2026		$480,000		$480,000	$125,000	$50,000	$655,000
20	2027				$0	$125,000	$50,000	$175,000
21	2028				$0	$125,000	$50,000	$175,000
22	2029				$0	$125,000	$50,000	$175,000
23	2030				$0	$125,000	$50,000	$175,000
24	2031				$0	$125,000	$50,000	$175,000
25	2032	$2,307,500			$2,307,500	$125,000	$50,000	$2,482,500
26	2033				$0	$125,000	$50,000	$175,000
27	2034				$0	$125,000	$50,000	$175,000
28	2035				$0	$125,000	$50,000	$175,000
29	2036				$0	$125,000	$50,000	$175,000
30	2037	$959,250			$959,250	$125,000	$75,000	$1,159,250
31	2038		$72,000		$72,000	$125,000	$75,000	$272,000
32	2039				$0	$125,000	$75,000	$200,000
33	2040				$0	$125,000	$75,000	$200,000
34	2041				$0	$125,000	$75,000	$200,000
35	2042			$5,400,000	$5,400,000	$125,000	$75,000	$5,600,000
36	2043				$0	$125,000	$75,000	$200,000
37	2044				$0	$125,000	$75,000	$200,000
38	2045				$0	$125,000	$75,000	$200,000
39	2046				$0	$125,000	$75,000	$200,000
40	2047				$0	$125,000	$75,000	$200,000
41	2048				$0	$125,000	$75,000	$200,000
42	2049				$0	$125,000	$75,000	$200,000
43	2050				$0	$125,000	$75,000	$200,000
44	2051		$1,200,000		$1,200,000	$125,000	$75,000	$1,400,000
45	2052	$656,250			$656,250	$125,000	$75,000	$856,250
46	2053				$0	$125,000	$75,000	$200,000
47	2054				$0	$125,000	$75,000	$200,000
48	2055				$0	$125,000	$75,000	$200,000
49	2056				$0	$125,000	$75,000	$200,000
50	2057				$0	$125,000	$75,000	$200,000
51	2058	$4,120,000			$4,120,000	$125,000	$75,000	$4,320,000
52	2059				$0	$125,000	$75,000	$200,000
53	2060				$0	$125,000	$75,000	$200,000
54	2061				$0	$125,000	$75,000	$200,000
55	2062	$6,081,600			$6,081,600	$125,000	$100,000	$6,306,600
56	2063				$0	$125,000	$100,000	$225,000
57	2064				$0	$125,000	$100,000	$225,000
58	2065				$0	$125,000	$100,000	$225,000
59	2066		$480,000		$480,000	$125,000	$100,000	$705,000
60	2067				$0	$125,000	$100,000	$225,000
61	2068				$0	$125,000	$100,000	$225,000
62	2069				$0	$125,000	$100,000	$225,000
63	2070				$0	$125,000	$100,000	$225,000
64	2071				$0	$125,000	$100,000	$225,000
65	2072	$500,000		$5,400,000	$5,900,000	$125,000	$100,000	$6,125,000
66	2073				$0	$125,000	$100,000	$225,000
67	2074				$0	$125,000	$100,000	$225,000
68	2075				$0	$125,000	$100,000	$225,000
69	2076				$0	$125,000	$100,000	$225,000
70	2077				$0	$125,000	$100,000	$225,000
71	2078				$0	$125,000	$100,000	$225,000
72	2079				$0	$125,000	$100,000	$225,000
73	2080				$0	$125,000	$100,000	$225,000
74	2081		$720,000		$720,000	$125,000	$100,000	$945,000
75	2082				$0	$125,000	$100,000	$225,000
76	2083	$120,000			$120,000	$125,000	$100,000	$345,000
77	2084				$0	$125,000	$100,000	$225,000
78	2085				$0	$125,000	$100,000	$225,000
79	2086				$0	$125,000	$100,000	$225,000
Total		$40,313,400	$6,574,800	$16,200,000	$63,088,200	$10,000,000	$5,750,000	$78,838,200
						$15,750,000		

Note: Annual maintenance of existing bridge $25,000 until 2012 when rehabilitation is complete

Alternative 3 - Low-Level Bascule Capital Costs, Maintenance and Operation

Year		Roadway	Structural	Sub Total	Operation	Fixed Maintenance	Bascule Maintenance	Total	
0	2007			$0	$125,000	$25,000		$150,000	
1	2008			$0	$125,000	$25,000		$150,000	
2	2009			$0	$125,000	$25,000		$150,000	
3	2010			$0	$125,000	$25,000		$150,000	
4	2011	$7,895,047	$26,460,272	$34,355,319	$125,000	$25,000		$34,505,319	
5	2012			$0	$125,000	$12,500		$137,500	1
6	2013			$0	$125,000	$12,500		$137,500	2
7	2014			$0	$125,000	$12,500		$137,500	3
8	2015			$0	$125,000	$12,500		$137,500	4
9	2016			$0	$125,000	$12,500		$137,500	5
10	2017			$0	$125,000	$12,500		$137,500	6
11	2018			$0	$125,000	$12,500		$137,500	7
12	2019			$0	$125,000	$12,500		$137,500	8
13	2020			$0	$125,000	$12,500		$137,500	9
14	2021			$0	$125,000	$12,500		$137,500	10
15	2022			$0	$125,000	$12,500		$137,500	11
16	2023			$0	$125,000	$12,500		$137,500	12
17	2024			$0	$125,000	$12,500		$137,500	13
18	2025			$0	$125,000	$12,500		$137,500	14
19	2026			$0	$125,000	$12,500		$137,500	15
20	2027			$0	$125,000	$12,500		$137,500	16
21	2028			$0	$125,000	$12,500		$137,500	17
22	2029			$0	$125,000	$12,500		$137,500	18
23	2030			$0	$125,000	$12,500		$137,500	19
24	2031			$0	$125,000	$12,500		$137,500	20
25	2032			$0	$125,000	$12,500		$137,500	21
26	2033			$0	$125,000	$12,500		$137,500	22
27	2034			$0	$125,000	$12,500		$137,500	23
28	2035			$0	$125,000	$12,500		$137,500	24
29	2036			$0	$125,000	$12,500		$137,500	25
30	2037			$0	$125,000	$18,750		$143,750	26
31	2038			$0	$125,000	$18,750		$143,750	27
32	2039			$0	$125,000	$18,750		$143,750	28
33	2040			$0	$125,000	$18,750		$143,750	29
34	2041			$0	$125,000	$18,750		$143,750	30
35	2042			$0	$125,000	$18,750		$143,750	31
36	2043			$0	$125,000	$18,750		$143,750	32
37	2044			$0	$125,000	$18,750		$143,750	33
38	2045			$0	$125,000	$18,750		$143,750	34
39	2046			$0	$125,000	$18,750		$143,750	35
40	2047			$0	$125,000	$18,750		$143,750	36
41	2048			$0	$125,000	$18,750		$143,750	37
42	2049			$0	$125,000	$18,750		$143,750	38
43	2050			$0	$125,000	$18,750		$143,750	39
44	2051			$0	$125,000	$18,750		$143,750	40
45	2052			$0	$125,000	$18,750		$143,750	41
46	2053			$0	$125,000	$18,750		$143,750	42
47	2054			$0	$125,000	$18,750		$143,750	43
48	2055			$0	$125,000	$18,750		$143,750	44
49	2056			$0	$125,000	$18,750		$143,750	45
50	2057			$0	$125,000	$18,750		$143,750	46
51	2058			$0	$125,000	$18,750		$143,750	47
52	2059			$0	$125,000	$18,750		$143,750	48
53	2060			$0	$125,000	$18,750		$143,750	49
54	2061			$0	$125,000	$18,750		$143,750	50
55	2062			$0	$125,000	$25,000		$150,000	51
56	2063			$0	$125,000	$25,000		$150,000	52
57	2064			$0	$125,000	$25,000		$150,000	53
58	2065			$0	$125,000	$25,000		$150,000	54
59	2066			$0	$125,000	$25,000		$150,000	55
60	2067			$0	$125,000	$25,000		$150,000	56
61	2068			$0	$125,000	$25,000		$150,000	57
62	2069			$0	$125,000	$25,000		$150,000	58
63	2070			$0	$125,000	$25,000		$150,000	59
64	2071			$0	$125,000	$25,000		$150,000	60
65	2072			$0	$125,000	$25,000		$150,000	61
66	2073			$0	$125,000	$25,000		$150,000	62
67	2074			$0	$125,000	$25,000		$150,000	63
68	2075			$0	$125,000	$25,000		$150,000	64
69	2076			$0	$125,000	$25,000		$150,000	65
70	2077			$0	$125,000	$25,000		$150,000	66
71	2078			$0	$125,000	$25,000		$150,000	67
72	2079			$0	$125,000	$25,000		$150,000	68
73	2080			$0	$125,000	$25,000		$150,000	69
74	2081			$0	$125,000	$25,000		$150,000	70
75	2082			$0	$125,000	$25,000		$150,000	71
76	2083			$0	$125,000	$25,000		$150,000	72
77	2084			$0	$125,000	$25,000		$150,000	73
78	2085			$0	$125,000	$25,000		$150,000	74
79	2086			$0	$125,000	$25,000		$150,000	75
Total		$7,895,047	$26,460,272	$34,355,319	$10,000,000	$1,531,250	$0	$45,886,569	
						$11,531,250			

Note: Annual maintenance of existing bridge $25,000 until 2012 when replacement bridge is open to traffic

Alternative 4 - Mid-Level Bascule Capital Costs, Maintenance and Operation

Year		Roadway	Structural	Sub Total	Operation	Fixed Maintenance	Bascule Maintenance	Total	
0	2007			$0	$125,000	$25,000		$150,000	
1	2008			$0	$125,000	$25,000		$150,000	
2	2009			$0	$125,000	$25,000		$150,000	
3	2010			$0	$125,000	$25,000		$150,000	
4	2011	$9,440,794	$30,605,872	$40,046,666	$125,000	$25,000		$40,196,666	
5	2012			$0	$125,000	$12,500		$137,500	1
6	2013			$0	$125,000	$12,500		$137,500	2
7	2014			$0	$125,000	$12,500		$137,500	3
8	2015			$0	$125,000	$12,500		$137,500	4
9	2016			$0	$125,000	$12,500		$137,500	5
10	2017			$0	$125,000	$12,500		$137,500	6
11	2018			$0	$125,000	$12,500		$137,500	7
12	2019			$0	$125,000	$12,500		$137,500	8
13	2020			$0	$125,000	$12,500		$137,500	9
14	2021			$0	$125,000	$12,500		$137,500	10
15	2022			$0	$125,000	$12,500		$137,500	11
16	2023			$0	$125,000	$12,500		$137,500	12
17	2024			$0	$125,000	$12,500		$137,500	13
18	2025			$0	$125,000	$12,500		$137,500	14
19	2026			$0	$125,000	$12,500		$137,500	15
20	2027			$0	$125,000	$12,500		$137,500	16
21	2028			$0	$125,000	$12,500		$137,500	17
22	2029			$0	$125,000	$12,500		$137,500	18
23	2030			$0	$125,000	$12,500		$137,500	19
24	2031			$0	$125,000	$12,500		$137,500	20
25	2032			$0	$125,000	$12,500		$137,500	21
26	2033			$0	$125,000	$12,500		$137,500	22
27	2034			$0	$125,000	$12,500		$137,500	23
28	2035			$0	$125,000	$12,500		$137,500	24
29	2036			$0	$125,000	$12,500		$137,500	25
30	2037			$0	$125,000	$18,750		$143,750	26
31	2038			$0	$125,000	$18,750		$143,750	27
32	2039			$0	$125,000	$18,750		$143,750	28
33	2040			$0	$125,000	$18,750		$143,750	29
34	2041			$0	$125,000	$18,750		$143,750	30
35	2042			$0	$125,000	$18,750		$143,750	31
36	2043			$0	$125,000	$18,750		$143,750	32
37	2044			$0	$125,000	$18,750		$143,750	33
38	2045			$0	$125,000	$18,750		$143,750	34
39	2046			$0	$125,000	$18,750		$143,750	35
40	2047			$0	$125,000	$18,750		$143,750	36
41	2048			$0	$125,000	$18,750		$143,750	37
42	2049			$0	$125,000	$18,750		$143,750	38
43	2050			$0	$125,000	$18,750		$143,750	39
44	2051			$0	$125,000	$18,750		$143,750	40
45	2052			$0	$125,000	$18,750		$143,750	41
46	2053			$0	$125,000	$18,750		$143,750	42
47	2054			$0	$125,000	$18,750		$143,750	43
48	2055			$0	$125,000	$18,750		$143,750	44
49	2056			$0	$125,000	$18,750		$143,750	45
50	2057			$0	$125,000	$18,750		$143,750	46
51	2058			$0	$125,000	$18,750		$143,750	47
52	2059			$0	$125,000	$18,750		$143,750	48
53	2060			$0	$125,000	$18,750		$143,750	49
54	2061			$0	$125,000	$18,750		$143,750	50
55	2062			$0	$125,000	$25,000		$150,000	51
56	2063			$0	$125,000	$25,000		$150,000	52
57	2064			$0	$125,000	$25,000		$150,000	53
58	2065			$0	$125,000	$25,000		$150,000	54
59	2066			$0	$125,000	$25,000		$150,000	55
60	2067			$0	$125,000	$25,000		$150,000	56
61	2068			$0	$125,000	$25,000		$150,000	57
62	2069			$0	$125,000	$25,000		$150,000	58
63	2070			$0	$125,000	$25,000		$150,000	59
64	2071			$0	$125,000	$25,000		$150,000	60
65	2072			$0	$125,000	$25,000		$150,000	61
66	2073			$0	$125,000	$25,000		$150,000	62
67	2074			$0	$125,000	$25,000		$150,000	63
68	2075			$0	$125,000	$25,000		$150,000	64
69	2076			$0	$125,000	$25,000		$150,000	65
70	2077			$0	$125,000	$25,000		$150,000	66
71	2078			$0	$125,000	$25,000		$150,000	67
72	2079			$0	$125,000	$25,000		$150,000	68
73	2080			$0	$125,000	$25,000		$150,000	69
74	2081			$0	$125,000	$25,000		$150,000	70
75	2082			$0	$125,000	$25,000		$150,000	71
76	2083			$0	$125,000	$25,000		$150,000	72
77	2084			$0	$125,000	$25,000		$150,000	73
78	2085			$0	$125,000	$25,000		$150,000	74
79	2086			$0	$125,000	$25,000		$150,000	75
Total		$9,440,794	$30,605,872	$40,046,666	$10,000,000	$1,531,250	$0	$51,577,916	
						$11,531,250			

Note: Annual maintenance of existing bridge $25,000 until 2012 when replacement bridge is open to traffic

Alternative 5 - High-Level Fixed - Existing Channel Capital Costs, Maintenance and Operation

Year		Roadway	Structure	Total	Operation	Maintenance	Total
1	2007			$0	$125,000	$25,000	$150,000
2	2008			$0	$125,000	$25,000	$150,000
3	2009			$0	$125,000	$25,000	$150,000
4	2010			$0	$125,000	$25,000	$150,000
5	2011	$10,033,952	$27,674,472	$37,708,424	$125,000	$25,000	$37,858,424
6	2012			$0		$12,500	$12,500
7	2013			$0		$12,500	$12,500
8	2014			$0		$12,500	$12,500
9	2015			$0		$12,500	$12,500
10	2016			$0		$12,500	$12,500
11	2017			$0		$12,500	$12,500
12	2018			$0		$12,500	$12,500
13	2019			$0		$12,500	$12,500
14	2020			$0		$12,500	$12,500
15	2021			$0		$12,500	$12,500
16	2022			$0		$12,500	$12,500
17	2023			$0		$12,500	$12,500
18	2024			$0		$12,500	$12,500
19	2025			$0		$12,500	$12,500
20	2026			$0		$12,500	$12,500
21	2027			$0		$12,500	$12,500
22	2028			$0		$12,500	$12,500
23	2029			$0		$12,500	$12,500
24	2030			$0		$12,500	$12,500
25	2031			$0		$12,500	$12,500
26	2032			$0		$12,500	$12,500
27	2033			$0		$12,500	$12,500
28	2034			$0		$12,500	$12,500
29	2035			$0		$12,500	$12,500
30	2036			$0		$12,500	$12,500
31	2037			$0		$18,750	$18,750
32	2038			$0		$18,750	$18,750
33	2039			$0		$18,750	$18,750
34	2040			$0		$18,750	$18,750
35	2041			$0		$18,750	$18,750
36	2042			$0		$18,750	$18,750
37	2043			$0		$18,750	$18,750
38	2044			$0		$18,750	$18,750
39	2045			$0		$18,750	$18,750
40	2046			$0		$18,750	$18,750
41	2047			$0		$18,750	$18,750
42	2048			$0		$18,750	$18,750
43	2049			$0		$18,750	$18,750
44	2050			$0		$18,750	$18,750
45	2051			$0		$18,750	$18,750
46	2052			$0		$18,750	$18,750
47	2053			$0		$18,750	$18,750
48	2054			$0		$18,750	$18,750
49	2055			$0		$18,750	$18,750
50	2056			$0		$18,750	$18,750
51	2057			$0		$18,750	$18,750
52	2058			$0		$18,750	$18,750
53	2059			$0		$18,750	$18,750
54	2060			$0		$18,750	$18,750
55	2061			$0		$18,750	$18,750
56	2062			$0		$25,000	$25,000
57	2063			$0		$25,000	$25,000
58	2064			$0		$25,000	$25,000
59	2065			$0		$25,000	$25,000
60	2066			$0		$25,000	$25,000
61	2067			$0		$25,000	$25,000
62	2068			$0		$25,000	$25,000
63	2069			$0		$25,000	$25,000
64	2070			$0		$25,000	$25,000
65	2071			$0		$25,000	$25,000
66	2072			$0		$25,000	$25,000
67	2073			$0		$25,000	$25,000
68	2074			$0		$25,000	$25,000
69	2075			$0		$25,000	$25,000
70	2076			$0		$25,000	$25,000
71	2077			$0		$25,000	$25,000
72	2078			$0		$25,000	$25,000
73	2079			$0		$25,000	$25,000
74	2080			$0		$25,000	$25,000
75	2081			$0		$25,000	$25,000
76	2082			$0		$25,000	$25,000
77	2083			$0		$25,000	$25,000
78	2084			$0		$25,000	$25,000
79	2085			$0		$25,000	$25,000
80	2086			$0		$25,000	$25,000
Total		$10,033,952	$27,674,472	$37,708,424	$625,000	$1,531,250	$39,864,674

Note: Annual maintenance of existing bridge $25,000 until 2012 when replacement bridge is open to traffic

Alternative 6 - High-Level Fixed - Relocated Channel Capital Costs, Maintenance and Operation

Year		Roadway	Structure	Total	Operation	Maintenance	Total
1	2007			$0	$125,000	$25,000	$150,000
2	2008			$0	$125,000	$25,000	$150,000
3	2009			$0	$125,000	$25,000	$150,000
4	2010			$0	$125,000	$25,000	$150,000
5	2011	$11,404,920	$24,034,472	$35,439,392	$125,000	$25,000	$35,589,392
6	2012			$0		$12,500	$12,500
7	2013			$0		$12,500	$12,500
8	2014			$0		$12,500	$12,500
9	2015			$0		$12,500	$12,500
10	2016			$0		$12,500	$12,500
11	2017			$0		$12,500	$12,500
12	2018			$0		$12,500	$12,500
13	2019			$0		$12,500	$12,500
14	2020			$0		$12,500	$12,500
15	2021			$0		$12,500	$12,500
16	2022			$0		$12,500	$12,500
17	2023			$0		$12,500	$12,500
18	2024			$0		$12,500	$12,500
19	2025			$0		$12,500	$12,500
20	2026			$0		$12,500	$12,500
21	2027			$0		$12,500	$12,500
22	2028			$0		$12,500	$12,500
23	2029			$0		$12,500	$12,500
24	2030			$0		$12,500	$12,500
25	2031			$0		$12,500	$12,500
26	2032			$0		$12,500	$12,500
27	2033			$0		$12,500	$12,500
28	2034			$0		$12,500	$12,500
29	2035			$0		$12,500	$12,500
30	2036			$0		$12,500	$12,500
31	2037			$0		$18,750	$18,750
32	2038			$0		$18,750	$18,750
33	2039			$0		$18,750	$18,750
34	2040			$0		$18,750	$18,750
35	2041			$0		$18,750	$18,750
36	2042			$0		$18,750	$18,750
37	2043			$0		$18,750	$18,750
38	2044			$0		$18,750	$18,750
39	2045			$0		$18,750	$18,750
40	2046			$0		$18,750	$18,750
41	2047			$0		$18,750	$18,750
42	2048			$0		$18,750	$18,750
43	2049			$0		$18,750	$18,750
44	2050			$0		$18,750	$18,750
45	2051			$0		$18,750	$18,750
46	2052			$0		$18,750	$18,750
47	2053			$0		$18,750	$18,750
48	2054			$0		$18,750	$18,750
49	2055			$0		$18,750	$18,750
50	2056			$0		$18,750	$18,750
51	2057			$0		$18,750	$18,750
52	2058			$0		$18,750	$18,750
53	2059			$0		$18,750	$18,750
54	2060			$0		$18,750	$18,750
55	2061			$0		$18,750	$18,750
56	2062			$0		$25,000	$25,000
57	2063			$0		$25,000	$25,000
58	2064			$0		$25,000	$25,000
59	2065			$0		$25,000	$25,000
60	2066			$0		$25,000	$25,000
61	2067			$0		$25,000	$25,000
62	2068			$0		$25,000	$25,000
63	2069			$0		$25,000	$25,000
64	2070			$0		$25,000	$25,000
65	2071			$0		$25,000	$25,000
66	2072			$0		$25,000	$25,000
67	2073			$0		$25,000	$25,000
68	2074			$0		$25,000	$25,000
69	2075			$0		$25,000	$25,000
70	2076			$0		$25,000	$25,000
71	2077			$0		$25,000	$25,000
72	2078			$0		$25,000	$25,000
73	2079			$0		$25,000	$25,000
74	2080			$0		$25,000	$25,000
75	2081			$0		$25,000	$25,000
76	2082			$0		$25,000	$25,000
77	2083			$0		$25,000	$25,000
78	2084			$0		$25,000	$25,000
79	2085			$0		$25,000	$25,000
80	2086			$0		$25,000	$25,000
Total		$11,404,920	$24,034,472	$35,439,392	$625,000	$1,531,250	$37,595,642

Note: Annual maintenance of existing bridge $25,000 until 2012 when replacement bridge is open to traffic

Net Present Value (P) Sensitivity Analysis

Discount Rate	REHABILITATION ALTERNATIVES		BRIDGE REPLACEMENT ALTERNATIVES			
	Minor Rehab	Major Rehab	Low-Level Bascule	Mid-Level Bascule	Fixed - Ex Channel	Fixed - Reloc Channel
0.00%	$62,096,650	$78,838,200	$45,886,569	$51,577,916	$39,864,674	**$37,595,642**
1.00%	$44,731,876	$61,024,508	$40,557,088	$45,972,209	$37,493,105	**$35,334,199**
2.00%	$34,084,903	$49,903,754	$36,789,946	$41,944,774	$35,448,075	**$33,392,942**
3.00%	**$27,311,562**	$42,609,285	$33,932,718	$38,842,124	$33,622,504	$31,665,217
4.00%	**$22,823,949**	$37,567,679	$31,634,270	$36,312,143	$31,957,332	$30,092,353
5.00%	**$19,719,273**	$33,895,667	$29,699,342	$34,158,661	$30,418,214	$28,640,368
6.00%	**$17,474,528**	$31,085,573	$28,015,346	$32,268,252	$28,983,885	$27,288,333
7.00%	**$15,780,696**	$28,838,296	$26,514,740	$30,572,592	$27,640,231	$26,022,443
8.00%	**$14,451,323**	$26,972,991	$25,155,236	$29,028,672	$26,377,203	$24,832,938
9.00%	**$13,371,353**	$25,377,319	$23,909,150	$27,608,135	$25,187,164	$23,712,449
10.00%	**$12,468,046**	$23,979,512	$22,757,515	$26,291,394	$24,063,988	$22,655,098

Best Overall Investment = Bold

Best Investment for Either Build or Rehabilitation Alternatives

APPENDIX C
SHPO LETTER
USFWS CONCURRENCE LETTER

FLORIDA DEPARTMENT OF STATE
Sue M. Cobb
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Kirk Bogen
Florida Department of Transportation
11201 N. McKinley Drive
Tampa, FL 33612

March 17, 2006

RE: DHR Project File Number: 2006-2097
Received by DHR: March 17, 2006
Project: *Final Cultural Resource Assessment Survey Report SR 679 (Pinellas Bayway Structure E) at Intracoastal Waterway Project Development and Environmental Study Pinellas County*

Dear Mr. Bogen:

Our office received and reviewed the above referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966* as amended and *36 CFR Part 800: Protection of Historic Properties*, and Chapter 267, *Florida Statutes*. It is the responsibility of the State Historic Preservation Officer to advise and assist, as appropriate, Federal and State agencies in carrying out their historic preservation responsibilities; to cooperate with Federal and State agencies to ensure that historic properties are taken into consideration at all levels of planning and development; and to consult with the appropriate Federal agencies in accordance with the *National Historic Preservation Act of 1966*, as amended, on Federal undertakings that may affect historic properties and the content and sufficiency of any plans developed to protect, manage, or to reduce or mitigate harm to such properties.

Archaeological Consultants, Inc. conducted a cultural resources survey and did not identify any historic resources within the project's area of potential effect. As a result, the Florida Department of Transportation concluded that no historic properties will be affected by the undertaking. Based on the information provided, our office finds the submitted report complete and sufficient and concurs with the findings.

If you have any questions, please contact Duane Denfeld, Architectural Historian, Transportation Compliance Review Program, by email *dhdenfeld@dos.state.fl.us* or at 850-245-6430.

Sincerely,

Frederick P. Gaske, Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6435
☐ Archaeological Research (850) 245-6444 • FAX: 245-6452
☑ Historic Preservation (850) 245-6333 • FAX: 245-6437
☐ Historical Museums (850) 245-6400 • FAX: 245-6433
☐ Palm Beach Regional Office (561) 279-1475 • FAX: 279-1476
☐ St. Augustine Regional Office (904) 825-5045 • FAX: 825-5044
☐ Tampa Regional Office (813) 272-3843 • FAX: 272-2340

Florida Department of Transportation

CHARLIE CRIST
GOVERNOR

11201 N.
Tampa, I

FWS Log No 41910-2007-I-0267

The proposed action is not likely to adversely affect resources protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) This finding fulfills the requirements of the Act.

David L. Hankla
Field Supervisor

2/12/07
Date

February 6, 2007

Mr. Todd Mecklenborg
U.S. Fish and Wildlife Service
9720 Executive Center Drive, Suite 101
St. Petersburg, Florida 33701

RE: Draft Wetland Evaluation and Biological Assessment Report
SR 679 (Pinellas Bayway Structure E) at Intracoastal Waterway
PD&E Study
WPI Segment No: 410755 1
Pinellas County, Florida

Dear Mr. Mecklenborg:

The Florida Department of Transportation (Department) is conducting a Project Development and Environment (PD&E) Study to address proposed improvements to SR 679 (Pinellas Bayway Structure E) at Intracoastal Waterway.

As part of the National Environmental Policy Act (NEPA) the Department is initiating informal consultation with the U.S. Fish and Wildlife Service. In order to fulfill the requirements of the NEPA process, the Department solicits comments from federal, state, and local agencies. A Wetland Evaluation and Biological Assessment Report (WEBAR) has been prepared for the study.

This proposed project has been evaluated for impacts on federally protected, threatened and endangered species. Based on the results of the literature review and field surveys conducted, the Department has determined that the proposed project may affect, but not likely to adversely affect the West Indian Manatee and five species of marine turtles with the Manatee and Sea Turtle Watch Program Guidelines and the Marine Wildlife Safety Plan implemented during construction. With the implementation of the Sea Turtle and Smalltooth Sawfish Construction Conditions the project may affect, but not likely to adversely affect these species. Finally, with mitigation provided in accordance with the requirements of the permitting agencies, the proposed project may affect, not likely to adversely affect the wood stork or piping plover. Based on the findings of the WEBAR, the proposed project will not likely have an adverse affect or jeopardize the existence of any federally protected species, even though they are known or expected to occur in the study area. Furthermore, the proposed project is not located in an area designated as Critical Habitat by the U.S. Department of the Interior.

If your office concurs with this determination, please respond to the Department by February 20, 2007. Please feel free to call me at (813) 975-6448 if you have any questions.

Sincerely,

Kirk R. Bogen, P.E.
Project Development Engineer

cc: Doug J. Reed, P.E., PBS&J
File

APPENDIX D
MEETING MINUTES

M E M O R A N D U M

FLORIDA DEPARTMENT OF TRANSPORTATION
District Environmental Permit & Utilities Office, MS 7-820

DATE: January 27, 2008

TO: Katasha Cornwell, Assistant District Environmental Permit Administrator

FROM: Melanie A. Calvo, Sr. Scientist (PBS&J)

COPIES: Meeting Attendees

SUBJECT: Minutes for Meeting with the US Army Corps of Engineers (USACE) Regarding Federal Channel Relocation for Bayway Structure E FM 4107551

Attendees from the FDOT: Kirk Bogen (District Project Development Engineer), Megan Arasteh (District Drainage Engineer), Rick Adair (District Environmental Administrator), Katasha Cornwell (Assistant District Environmental Permits Administrator), Melanie Calvo (PBSJ/GEC Environmental Permits Administration), Mark Gosselin (OEA)

BY PHONE: Amy Neidringhaus (Design Project Manager), Jose Danon (Structures), Steve Levine (District Right-of-Way Mapping Engineer) Lonnie Wittmeyer (Property Management)

Attendees from the USACE: L. Renee Perez (Sr. Project Manager), Dan Beasley (Construction-Operations Division, Operations Branch), Brian Hughes (Engineering Division, Design Branch), John Fellows (Tampa, Regulatory Branch), Richard Powell (Planning Section)

MAJOR POINTS OF THE MEETING:

* The FDOT will be responsible in perpetuity for any and all maintenance activities required in the future for the proposed channel or liabilities associated with the relocation.
* Approval from the local sponsor, the West Coast Inland Navigation District (WCIND) is required. A meeting with Chuck Listowski should be coordinated immediately.
* A Maintenance Agreement between the FDOT and the local maintaining authority(ies) needs to be executed. This would be subsequently reviewed by the USACE during their approval process for the relocation of the federal channel. This agreement will establish criteria for future monitoring and maintenance of the channel as well as the disposal of dredge material.

Minutes

A meeting was held on Friday, January 25, 2008 at the ACOE's Jacksonville office to discuss their approval process for the relocation of the federal channel proposed for the Bayway Structure E project.

After the introductions of persons in attendance, Kirk Bogen opened the meeting with a general overview of the project, including general location information and alternatives explored during the PD&E process (including no build, rehabilitation, and replacement alternatives). The US Coast Guard is the lead agency during the PD&E Study process although the USACE is being asked to be a cooperating agency. The recommended alternative for this project is a high level fixed bridge over a channel relocated approximately 400 feet northwards of the existing channel. Mr. Bogen explained that the primary reason for the relocation of the channel is that in order to have the 65' clearance at the channel required by the US Coast Guard (USCG) and to maintain the touchdown point at Madonna Blvd, a 6% grade would be necessary rather than the preferred grade of 5% if the bridge remained in its current location. The steeper grade is not preferable as the bridge has much RV and boat trailering traffic that would have to stop at the end of the steeper slope at the intersection. It was also noted that the bridge will also be used by pedestrians/cyclists. A profile of the proposed bridge with the relocated channel was shown. The FDOT will build this project through a design/build contract.

Megan Arasteh and Mark Gosselin (OEA) then presented the information from the recent bathymetric survey and pointed out the areas which would require dredging. The total length of the proposed relocated channel is 6000 feet. However, only 1400 feet would require dredging (12,000 cy). The existing channel is -20 feet mean lower low water (mllw). The proposed depth of the new channel would be -11 feet mllw.

Mr. Perez clarified that the required depth for the channel would be the design depth of -9 feet mllw with an additional -2 feet for dredging error. If the substrate being dredged is rock, the USACE will require an additional foot. Therefore, if the bottom is sandy, the required depth will be -11 feet mllw; if rocky, the required depth will be -12 feet mllw. He also caution that the angles of turns within the channel and where the proposed relocated channel would re-intersect existing channels should be no greater than the current angles and must meet engineering standards for navigational channels.

Mr. Beasley discussed that currently the existing channel is self-maintaining at its 20 foot depth. The USACE typically locates their channels in the deepest portions of water to reduce future maintenance needs. The USACE will require that any and all additional cost from relocating the channel to the proposed location will be the responsibility of the FDOT in perpetuity. Typically, the costs of the maintenance dredging would be established by the local sponsor and FDOT would provide funding to them (the USACE cannot accept funding from the FDOT). Normally that cost includes preliminary engineering as well as construction costs with a 15% contingency.

Mr. Perez stated that the FDOT would have to execute a maintenance agreement with the local sponsor stating that the FDOT will be responsible for all future costs associated with the channel. This agreement would be required even if the Sediment Transport Study indicated no future dredging would be needed. It was also noted that a post dredging survey is likely to be a requirement of the maintenance agreement. The proposed channel relocation would have to be presented to the West Coast Inland Navigation District (WCIND) and to the Pinellas County Public Works Department. If the either entity opposes the project, the USACE will not approve the relocation. Mr. Perez will be willing to attend a meeting with the WCIND to help us present the information. He strongly recommended that a meeting with WCIND be set up as soon as possible. Any agreement with the WCIND or Pinellas County may impact the existing Project Operation Agreement that the USACE currently has with WCIND. Mr. Perez indicated he would provide us with a copy of that agreement.

Dr. Gosselin (OEA) explained that the proposed Sediment Transport study would take the existing condition model and modify it to model the proposed channel. The model will run for two months to establish a sedimentation rate. Storm surges (50, 100, and 200 year events) will also be included in the model. He asked for clarification if monitoring of the channel would be a requirement of the maintenance agreement. Mr. Perez said that it would likely be incorporated into the agreement as USACE survey teams are not in that area frequently.

A disposal site for the dredge material could potentially be coordinated with WCIND. Most USACE dredge spoil sites are publicly owned.

Mr. Beasley clarified that the USACE would not review the Sediment Transport Study for approval of the channel (although the regulatory staff may require it for sea grass impact concerns). He will require an exact layout of the proposed channel and the perpetual agreement. He cautioned that we should also be aware of utilities that may be in the channel. The USACE will update their maps according to the information submitted. The USACE anticipates that the USCG will move the navigational channel markers, possibly charging FDOT for associated costs.

Mr. Hughes indicated that the potential for cultural resources would have to be coordinated with SHPO for the proposed channel relocation. He anticipated that a magnetometer survey would be required for the channel for potential archeological sites or artifacts.

Mr. Fellows indicated that from a regulatory standpoint the project would be similar to others except that there would be an extra layer of coordination with the USACE staff reviewing the relocation and that sea grass impacts from sedimentation could be a concern. Benthic communities could be an issue depending on what is found in the biological survey. He stressed that the alternative analysis should be clearly explained in the application. As per the USACE, sovereign submerged lands will be handled during

the permitting for the dredging activities. The USACE regulatory permit is not dependent on any other entity aside from the standard Water Quality Certification and feedback from the commenting agencies (US Fish and Wildlife Service, National Marine Fisheries).

The meeting adjourned. Mr. Perez will continue to assist us with coordination of the channel relocation.

ATTENDEES:

Name	Organization/Title/ Division	Email	Phone Number
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Structure E Channel Relocations 1-25-08

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M E M O R A N D U M

FLORIDA DEPARTMENT OF TRANSPORTATION
District Environmental Permit & Utilities Office, MS 7-820

DATE: March 7, 2008

TO: Attendees

FROM: Katasha Cornwell, Asst. District Environmental Permit Admin.

COPIES: Scott Collister, Scott Arnold, Tom Waits, Doug Reed, Sally Prescott

SUBJECT: Minutes for Meeting Regarding Federal Channel Relocation for Bayway Structure E (FM 4107551) March 6, 2008 at 10:00

Attendees: Katasha Cornwell, Duane Milk, Melanie Calvo, Amy Neidringhaus, Kirk Bogen, Tim Folsom, Megan Arasteh, Gabor Farkasfalvy, Mark Gosselin (OEA), Rene Perez (COE), Nicole Elko (Pinellas County) (Sign In Sheet attached)

A meeting was held on March 6, 2008 to follow up from the recent meeting with the US Army Corps of Engineers (USACE) held on January 25, 2008 and to present the proposed project to Pinellas County Department of Environmental Management (project sponsor). The intent of the meeting was to obtain feedback from the USACE and the County regarding the proposed channel realignment including the design, process for obtaining approval and any required agreements.

Kirk opened the meeting by explaining the recommended alternative from the PD&E report (shift the channel 400' north with a bridge at 5% grade) and the currently proposed alternative (shift the channel 175' north so that there is no "initial dredging" with a bridge at 5.6% grade). The bridge will have a 65' vertical navigational clearance and a 100' horizontal clearance. Kirk also explained the possibility of removing a section of the north causeway.

Kirk, Megan and Mark presented the currently proposed channel alignment with the four alternatives on the west end to tie back into the existing channel at Cut P-4 (see below). Again, it was stated that the intent is to have no "initial dredging". Megan explained that the preferred alternative would be Alt 4 which would start bringing the proposed channel back to the existing Cut P-4 (after the 1000' perpendicular alignment) without having to "touch" the other cuts. Rene indicated that the USACE would not likely look favorably on this alternative because it is more preferable to have a "straight shot" for marine safety and he recommended that the Department look at coming from the intersection of Cut P-4 and the existing channel and going straight across to the existing channel on the east side of the bridge (which would not be perpendicular to the bridge).

Rene discussed the review process with the Department. He stated that at a minimum, the Department's final report (which should be a "complete" submittal, showing our

preferred channel alignment) would have to be reviewed by Planning, Engineering, Real Estate, Operations and Legal. Once all offices agreed, then the USACE could approve the relocation. Rene also stated that in order to have any office review and provide comments on alternatives prior to the Department's "final report" the Department would be required to provide funding to the USACE, through the County, due to very tight budget constraints. Depending on the amount of review the Department requested, it might be anywhere from $10,000 to $15,000. Nicole indicated that she had no concerns with entering into a JPA for this funding. Once the funding is in place, Rene said that staff could then be assigned to review and provide guidance on various manuals and design criteria. Kirk asked about the possibility of using ETDM funding, but Rene did not think that funding would cover anything outside of the Regulatory (i.e. permitting) office.

Rene also suggested that the final report provide all of the angles in the channel calculated based on the appropriate design vessel. Rene will provide Megan with the design vessel and will let her know if the channel accommodates one way or two way traffic. Megan will send Rene a reminder e-mail per his request.

Mark provided the status of the sediment transport study. Models have been developed and storm surge runs have been done. They are working on the "wave climate" analysis. This information will be included in the study. Nicole discussed that the new bridge and the removal of the causeway would have some affect on the current condition, but that overall it may be positive.

Katasha requested clarification regarding the elevation that should be used if no "initial dredging" is required. Rene confirmed that an elevation of -11 mean lower low water would be appropriate if no dredging was necessary. The depth of the channel should not be bordered by steep drop-offs. The slope to elevations less than -11 feet should be gradual, per Rene. Rene stated that he would require a pre/post dredge survey to verify the channel elevations.

Duane discussed the "canal easement" that Survey and Mapping has found for the area. Rene stated that any existing easements would have to be replaced in-kind (or modified) until the existing easements are intersected (i.e. same width on each side of the new center line). A meeting with FDEP may be required.

Duane also asked whether or not a disposal site would be required now if no "initial dredging" was proposed. Rene indicated that the Department could state that a disposal site would be provided at the time dredging is required, but that the USACE would not likely look favorably on that and it would be in the Department's best interest to have a disposal site that could be referenced in the final report. The size and design of the disposal site may also need to be researched. No testing of sediment is required until dredging takes place.

Nicole reiterated that the channel is in Outstanding Florida Waters and an Aquatic Preserve and reminded the Department that any dredging would be highly scrutinized. The County does not have any disposal sites (they typically use geotubes and transport

the material off site). Also, due to the limited quantity of potential dredged material, Nicole said that the County would not entertain the idea of allowing sediment to be deposited at Egmont Key or Ft Desoto for beach nourishment. The Tampa Port Authority apparently does have a disposal site, but it may be cost prohibitive to transport sediment to that location. The Department will look into options.

Finally, the types of agreements and the order that the agreements would be written was discussed. Rene reiterated that whatever part of the channel(s) the Department relocates will be the Department's to maintain in perpetuity. The Department acknowledged that responsibility. Rene stated that the USACE and Pinellas County already have an agreement in place. Rene did not anticipate that this agreement would have to be modified, but he indicated that his Legal staff thought that an MOA specifically for this channel may be required. Rene stated that once the channel relocation was approved, then the USACE and the County could begin working on their MOA. An agreement between the Department and the County will also be required as the USACE cannot accept funds for dredging from the Department. Rene cautioned Nicole that she should not start drafting an agreement until the MOA with the USACE was completed. Nicole stated that she would like language in the agreement with the Department that will leave an option open for the Department to do the dredging (instead of the USACE) if necessary (i.e. if the USACE does not have funding or proposed work in the area).

ACTION REQUIRED:

1) **Megan to send Rene a reminder e-mail regarding the design vessel. DONE.**
2) **Amy to coordinate with Survey and Mapping and Tampa Port Authority regarding potential disposal sites. IN PROCESS (Steve Levine also investigating).**
3) **Kirk to follow up with Nicole regarding agreements she indicated she would provide to the Department. DONE (but no response back).**
4) **Katasha to update David Pelham and Terry Puckett regarding soil boring and sediment testing (i.e. not needed right now) for channel relocation. DONE.**

Bayway Structure E // FM 4107551
Alternatives for channel “tie in”.