Dunedin Causeway Bridge Replacement Feasibility Study

Dunedin Causeway Boulevard
From Royal Stewart Parkway to Gary Circle

Pinellas County, Florida

Prepared for:

Pinellas County Department of Public Works

Prepared by:

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Certificate of Authorization 4213

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Florida PE No. 43235

This Dunedin Causeway Bridge Replacement Feasibility Study evaluates the engineering and environmental aspects for the various alternatives to replace the bridges and develops an opinion of probable construction costs for the proposed project.

September 2009

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Section 1 Summary

1.1 PURPOSE OF FEASIBILITY STUDY AND PROJECT DEVELOPMENT

Preparation of the Dunedin Causeway Bridge Replacement Feasibility Study is the first step towards rehabilitating or replacing the bridges on the Causeway. The project can be developed and constructed in four primary phases, as shown in **Table 1-1**:

Table 1-1: Project Development Phases

Elements	Phase I Feasibility Study	Phase 2 PD&E Study	Phase 3 Final Design	Phase 4 Construction
Ownership		City of Dunedin, Pinellas County, FDOT		
Financing	Feasibility & Probable Costs	Seek Funding Commitments	Secure Funding	
Engineering	Conceptual Recommendations	Alternative Selection	Final Design	CE&I Inspection
Environmental	Feasibility/ Fatal Flaw Analysis	Secure Environmental Documents	Obtain Permits	
Construction	Preliminary Probable Costs	Refine Probable Costs	Engineer's Estimate	Bid Cost
DURATION (months)	3-6	18-30	15-18	18-24

This Feasibility Study considers a No-build alternative, and three build alternatives: a low level (21 ft [foot] ± vertical clearance) build alternative, mid level (45 ft ± vertical clearance) build alternative, and high level (75 ft ± vertical clearance) build alternative vertical profiles for the replacement of the existing Dunedin Causeway bascule bridge. Also considered was the in-kind replacement of the existing relief bridge. Roadway alternatives include three horizontal alignment alternatives, including north, existing, and south alignments, for each one of the three profiles. As the first step the Feasibility Study is to provide the basic foundation for the subsequent phases in the project's development, and "recommend" a preferred alternative. However the Feasibility Study does not select an alternative. This is done during the Project Development and Environment (PD&E) Study Phase.

The Project Development and Environment (PD&E) Study phase can be considered the most time consuming phase due to its "process oriented" nature and the degree of uncertainty in obtaining regulatory approval of the necessary environmental documentation. Typically, the public initially gets

involved in this phase to provide feedback that will help shape and define the project. Most elements of this Feasibility Study can be incorporated into the PD&E Study.

The lead federal agency will require that an environmental analysis be undertaken as mandated by the National Environmental Policy Act (NEPA), during the permitting or federal funding process. This analysis will document the impact on the natural, physical, social and cultural environments and whether its construction to move forward into design is in the best interest of the public. The results of this environmental analysis play a significant role in the selection of the preferred alternative during the PD&E phase.

The PD&E Study process generally takes 18-24 months to complete depending on the significance of the determination of the impacts associated with the project. This impact determination is known as the Class of Action Determination. If the project is determined to have no significant impact on the environment, a Categorical Exclusion is prepared within a 12 to 24 month process. If the extent of the impacts is uncertain, an Environmental Assessment is prepared within an 18 to 30 month process. If the impacts are significant, an Environmental Impact Statement (EIS) is required, taking up to three years to complete depending on the complexity of the measures taken to mitigate the impacts.

1.2 RECOMMENDATIONS

In order to evaluate the study alternatives, an evaluation matrix was prepared using quantifiable criteria that include environmental mitigation, utility relocation, construction of roadway and bridges, preliminary engineering and right of way (ROW). Preliminary cost estimates were prepared for all alternatives, including ROW acquisition, maintenance of traffic, mobilization, engineering preliminary/final design, construction and contingencies. A Life Cycle Analysis was performed and the results of the analysis leads to the first recommendation:

Recommendation #1: The high level profile (Alternative D) with the south alignment is the recommended alternative.

Opinion of probable costs for this alternative are summarized in **Table 1-2**:

Table 1-2: Recommended Alternative

Evaluation Criteria	High Level Alternative, South Alignment
PROJECT COST ESTIMATES	
Construction Cost	
- Roadway, Drainage, Lighting, etc.	$ 25,986,686
- Structures	$ 39,873,963
Environmental Mitigation Cost	$ 35,009
Utility Relocation Cost	$ 283,250
Preliminary Engineering & PD&E Cost (15%)	$ 9,879,097
Construction Engineering & Inspection Cost (10%)	$ 6,586,065
Total Project Cost	$ 82,644,070
OPERATION AND MAINTENANCE	
75 Year Total O&M Cost	$ 2,098,826
75 YEAR TOTAL PROJECT COST	$ 84,742,896

Probable costs tabulated in this report at the 0.00% discount rate are based on 2009 dollars. If the project is constructed in future years between 2010 and 2019, the yearly estimate of probable costs are shown below in **Table 1-3**.

Table 1-3: FDOT Future Years Inflation Factors for Alternative D

Fiscal Year	Inflation Factor	PDC Multiplier	Future Probable Cost
2009	—	1	$82,644,070
2010	5.00%	1.05	$86,776,274
2011	4.50%	1.097	$90,660,545
2012	4.00%	1.141	$94,296,884
2013	3.50%	1.181	$97,602,647
2014	3.30%	1.22	$100,825,766
2015	3.30%	1.26	$104,131,529
2016	3.30%	1.302	$107,602,580
2017	3.30%	1.345	$111,156,275
2018	3.30%	1.389	$114,792,614
2019	3.30%	1.435	$118,594,241

Source: Office of Financial Development. (Fiscal Year 2009 is July 1, 2008 to June 30, 2009)

In conclusion of this Feasibility Study, the following is recommended:

Recommendation #2: The project is feasible and should continue to Phase 2 – PD&E. The PD&E study process in Phase 2 will evaluate the alternatives in detail and select a final preferred alternative.

Section 2 Introduction

2.1 PROJECT LOCATION

The project is located in the western portion of central Pinellas County, Florida (see **Figure 2-1)**.

The proposed project limits on Dunedin Causeway Boulevard extend from Royal Stewart Parkway on the west to Gary Circle on the east.

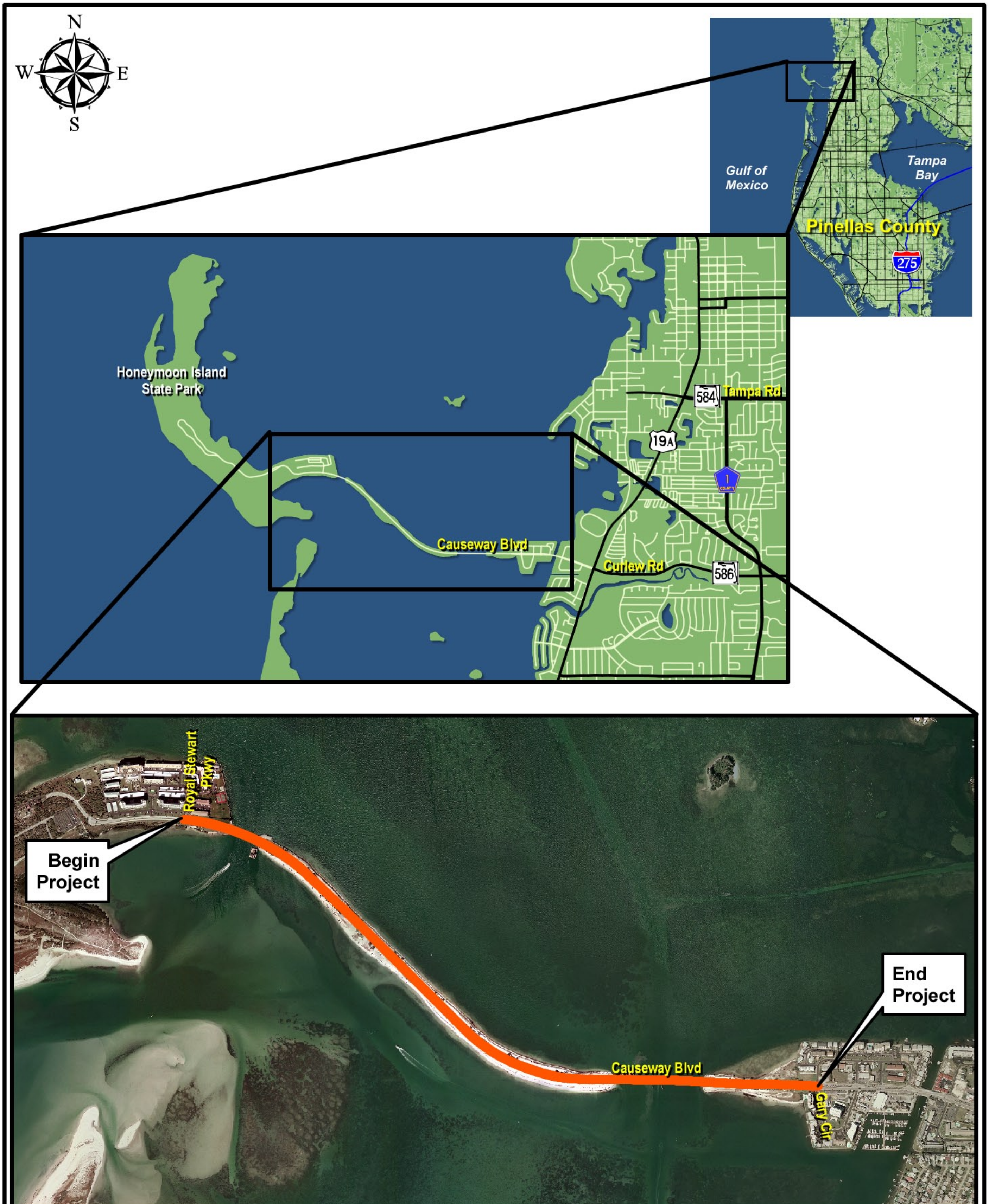
Within the project limits, there are two existing bridges. The west bridge (Bridge No. 150067), located at approximately 600 ft east of Royal Stewart Parkway, is at the west end of Dunedin Causeway Boulevard. To the east, is the bascule (Bridge No. 150068) over the Intracoastal Waterway.

2.2 FEASIBILITY STUDY OBJECTIVES

The Pinellas County Department of Public Works commissioned HDR Engineering, Inc. to perform a Feasibility Study to evaluate viable and economical concepts for the replacement of the existing Dunedin Causeway Bridges. The Feasibility Study evaluates constructability, safety and overall cost factors. Included in this study was the development and evaluation of alternative bridge concepts, roadway alignments, typical sections, and environmental and ROW impacts within the selected corridor.

The objective of the Study is to provide an opinion of probable costs that includes a preferred bridge type, roadway alignment, typical section, potential ROW impacts, and methodology for treatment and management of environmental impacts for the Dunedin Causeway and bridges. A second objective of this study is to identify the necessary steps that must be taken to capture Federal Funding opportunities for this project should it move forward into the Project Development and Environment (PD&E) Study phase.

This Feasibility Study is not meant as a substitute for a PD&E Study. A PD&E Study will document environmental and engineering analyses to assist the Pinellas County Board of County Commissioners and the lead federal agency reach a decision on the type, location and conceptual design of the necessary improvements. A PD&E Study will include the project planning (corridor location), preliminary engineering (conceptual design), and environmental studies necessary for a federal agency to approve the proposed improvements.



Pinellas County PUBLIC WORKS — Dunedin Causeway Bridge Replacement Feasibility Study	**LOCATION & STUDY AREA MAPS**	**FIGURE 2-1**

Section 3 Existing Conditions

3.1 EXISTING ROADWAY CHARACTERISTICS

Photos of the existing bridges and causeway are included in **Figures 3-1** and **3-2**, respectively.

3.1.1 FUNCTIONAL CLASSIFICATION

The existing Causeway Boulevard is functionally classified as an "urban minor arterial" by the Florida Department of Transportation (FDOT), the Pinellas Metropolitan Planning Organization (MPO) and the Federal Highway Administration (FHWA), see **Figure 3-3**. The causeway provides the sole roadway link between the mainland and Honeymoon Island, and serves as a principal hurricane evacuation route for the residents of the island.

3.1.2 TYPICAL SECTIONS

The existing bridge typical section is shown in **Figure 3-4**. Originally the bridges consisted of two 13 ft lanes and 3 ft sidewalks on each side. In 1996, the Pinellas Trail Spur was constructed creating a 6 ft clear sidewalk on the south side of the bridges.

The existing roadway within the study limits is a two lane roadway that transitions to a four lane urban street when approaching the east end of the causeway. The existing roadway typical sections are shown in **Figures 3-5** and **3-6**.

The existing causeway between the West (Relief) and East (Main) bridges is a two-lane two-way rural roadway with 12 ft travel lanes and paved flush shoulders that vary in width from 4 ft to 6 ft. There are existing guardrails placed outside of the paved shoulders on both sides. Behind the guardrail on the south side of the causeway, there is a 12 ft multi-purpose trail running along the causeway. This typical section also applies to the roadway segment between the main bridge and Gary Circle at the east end of the project.

On the east and west approaches to the main bridge, the roadway consists of two 13 ft travel lanes. On the north side, there is a 4 ft paved shoulder with curb and gutter; the paved shoulder tapers off when approaching the bridge. Guardrails exist between the travel lane and the paved shoulder. The multi-purpose trail that varies from 8 ft to 12 ft in width runs along the south side. Guardrails exist between the travel lane and the trail.

Bridge No. 150068 - East (Main) Bridge

North side looking west

South side looking west

Bridge No. 150067 - West (Relief) Bridge

North side looking west

South side looking east

Pinellas County PUBLIC WORKS — Dunedin Causeway Bridge Replacement Feasibility Study	**PHOTOS OF THE EXISTING BRIDGES**	**FIGURE 3-1**

Utilities - north side of relief bridge


South causeway at main bridge looking west

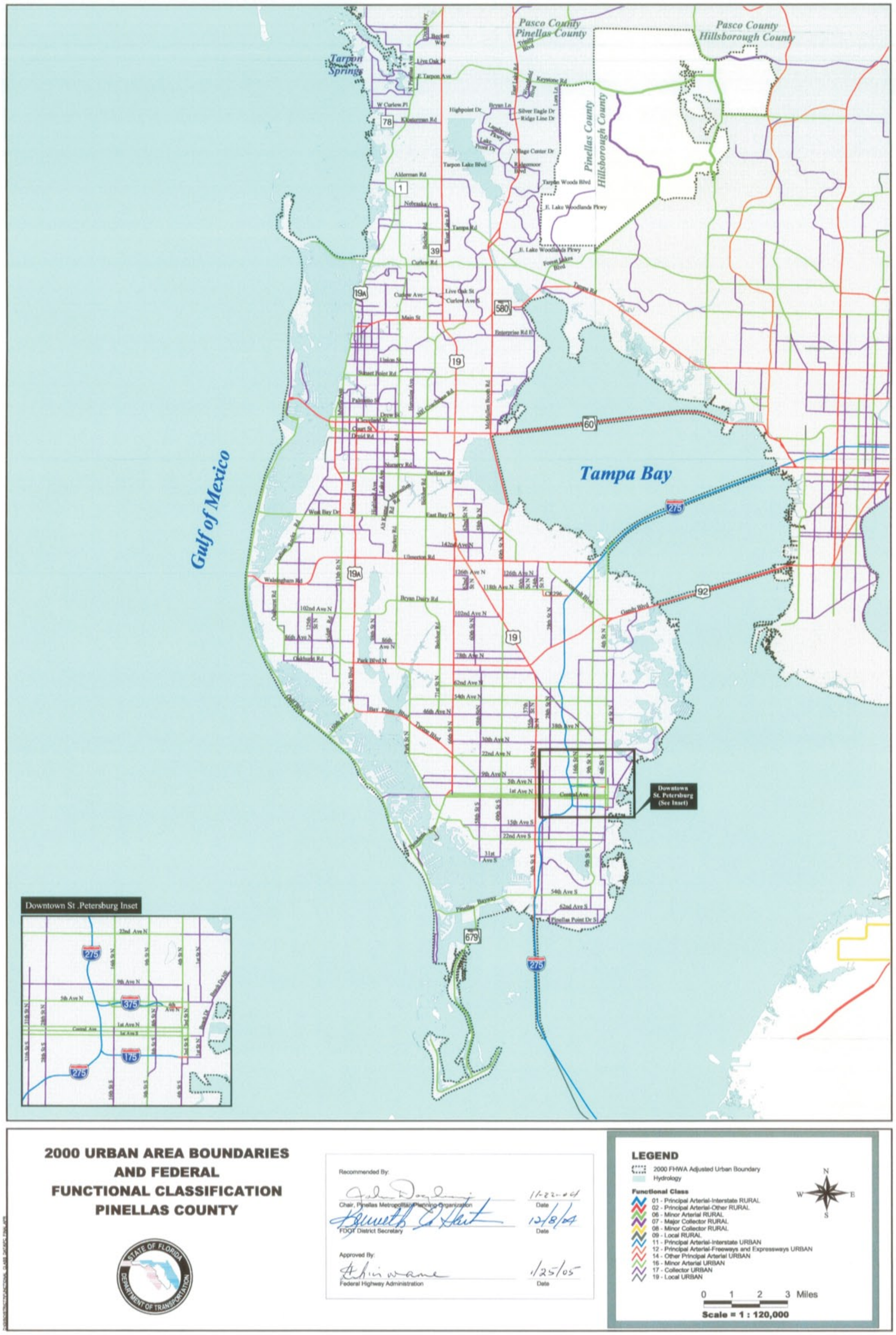

Pinellas Trail spur on south side of causeway


Pinellas Trail on south approach looking west

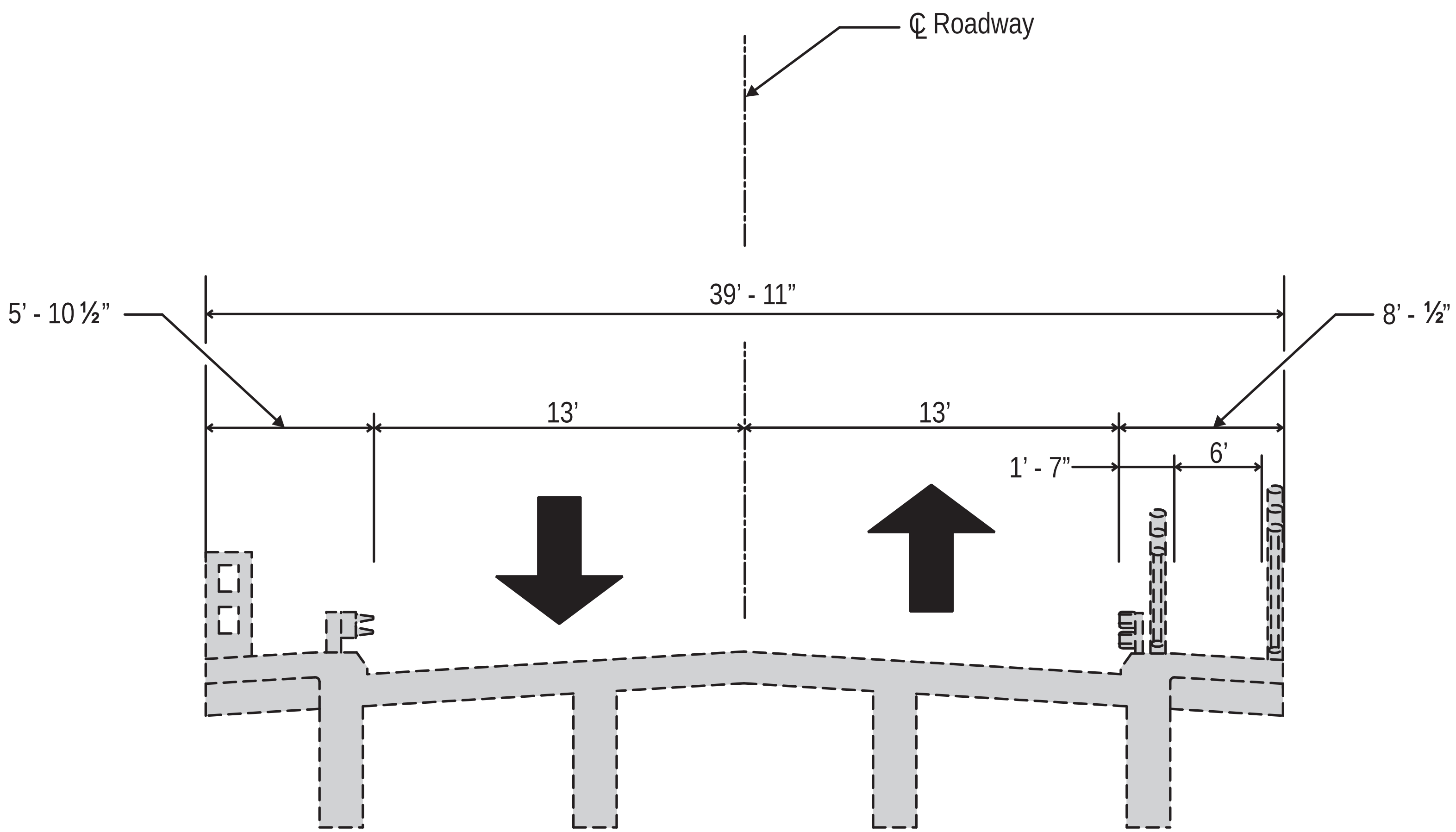

Seagrass beds exposed at low tide


Drainage flume directly discharging to Gulf

Pinellas County PUBLIC WORKS Dunedin Causeway Bridge Replacement Feasibility Study	**PHOTOS OF THE EXISTING CAUSEWAY**	**FIGURE 3-2**



Pinellas County PUBLIC WORKS Dunedin Causeway Bridge Replacement Feasibility Study	**FUNCTIONAL CLASSIFICATION**	**FIGURE 3-3**

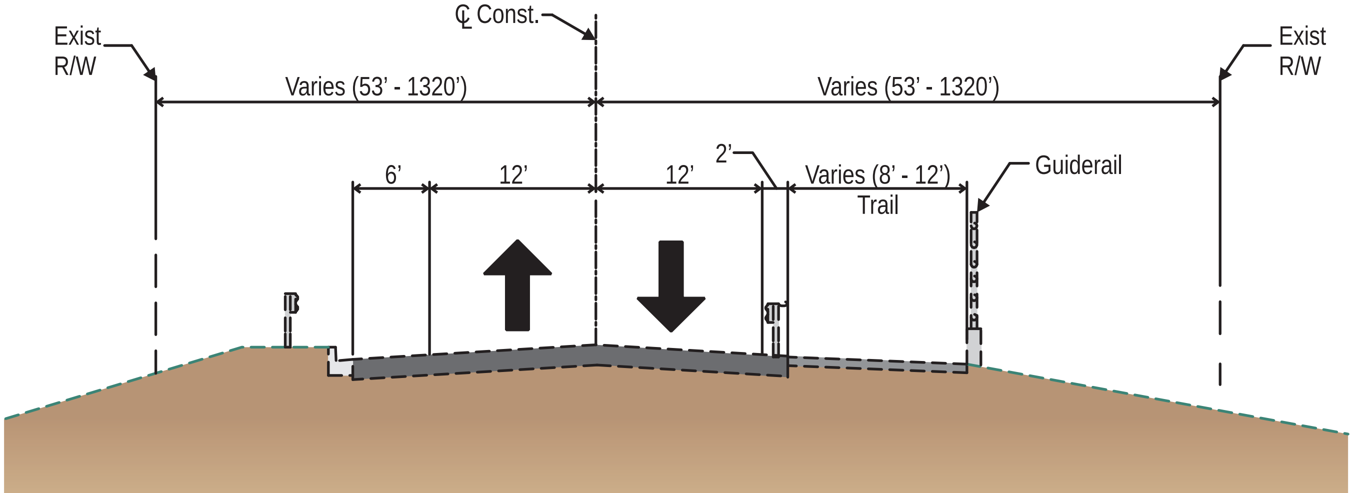


Existing Typical Section
Bridge No's 150067 & 150068
Looking East

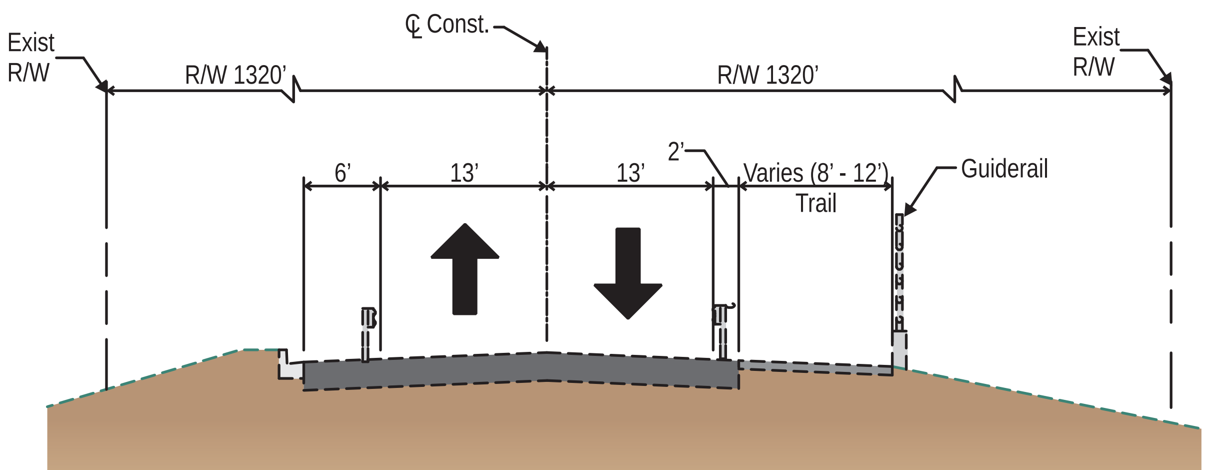
Dunedin Causeway
Bridge Replacement
Feasibility Study

EXISTING BRIDGE TYPICAL SECTION

FIGURE 3-4

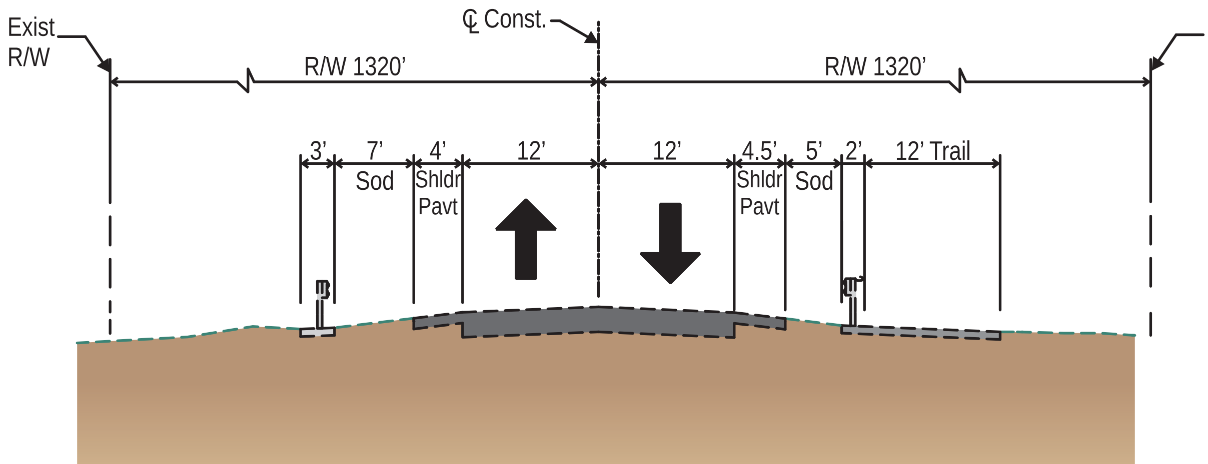


Existing Typical Section
Approaches to Relief Bridge (#150067)
Looking East

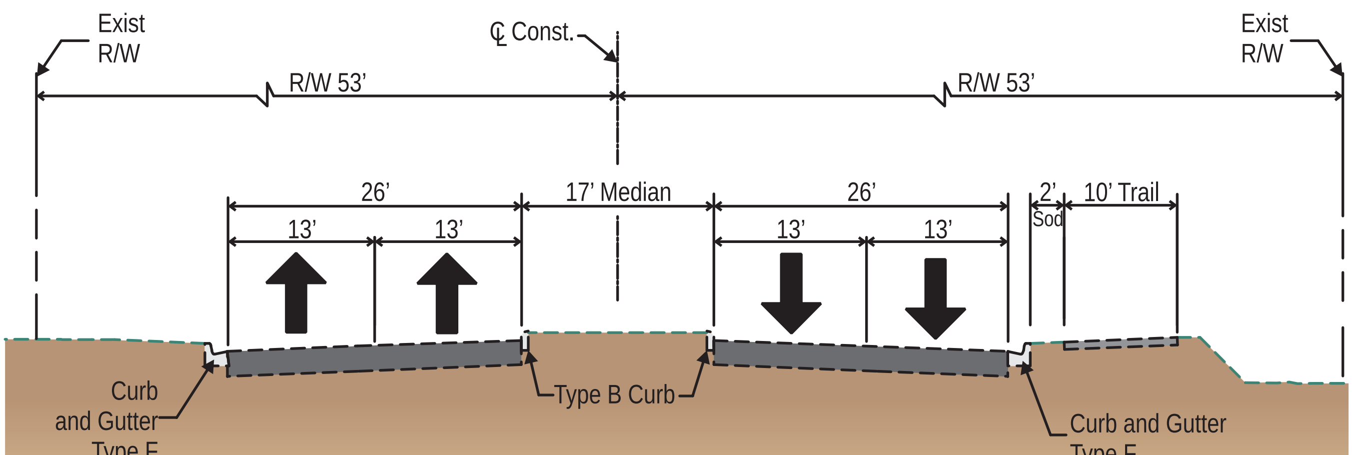


Existing Typical Section
Approaches to Main Bridge (#150068)
Looking East

Pinellas County PUBLIC WORKS — Dunedin Causeway Bridge Replacement Feasibility Study	**EXISTING TYPICAL SECTIONS BRIDGE APPROACHES**	**FIGURE 3-5**



Existing Typical Section
Causeway Boulevard
Looking East



Existing Typical Section
Causeway Boulevard
Between Woodette Drive to Gary Circle
Looking East

Pinellas County PUBLIC WORKS — Dunedin Causeway Bridge Replacement Feasibility Study	**EXISTING ROADWAY TYPICAL SECTIONS**	**FIGURE 3-6**

On the east and west approaches to the relief bridge, the roadway consists of two 12 ft travel lanes. On the north side, there is a 6 ft paved shoulder with curb and gutter that tapers off when approaching the bridge. Guardrails exist outside of the curb. Along the south side, the multi-purpose trail varies from 10 ft to 12 ft in width. Guardrails exist between the travel lane and the trail.

3.1.3 PEDESTRIAN AND BICYCLE FACILITIES

The segment of the Dunedin Causeway Boulevard between Royal Stewart Parkway and Gary Circle has the Pinellas Trail Spur running on the south side. The multi-purpose trail generally varies from 10 ft to 12 ft in width along the roadway section. The trail width is reduced to 6 ft on the main and relief bridges, which were modified in the 1990's for the incorporation of the trail. Guide rails exist at various locations to shield drop-off hazards. Hand rails also exist where there are guardrails between the eastbound travel lane and the trail. The trail surface is primarily asphalt concrete in good condition.

Besides the Pinellas Trail Spur, there are no sidewalks along the roadway within the project limits. The bridges have 3 ft sidewalks on the north side, which is a substandard width.

No bike lanes or storage facilities for bikes are provided within the project limits. Although paved shoulders are provided along the causeway, the poor condition of the surface and narrow width (less than 5 ft), coupled with the discontinuity (i.e. no shoulders on the bridges), discourage their use by bicyclists.

3.1.4 RIGHT OF WAY

A 106 ft wide ROW is provided from Royal Stewart Parkway to the west approach of the relief bridge. The ROW width increases to 220 ft on the bridge approach. From the west end of the relief bridge to 200 ft west of Gary Circle, the ROW width is 2640 ft. The ROW to the east of Gary Circle is 106 ft in width. FDOT ROW maps are presented in **Appendix E**.

3.1.5 HORIZONTAL ALIGNMENT

The Causeway Boulevard has two horizontal curves within the project limits. The first horizontal curve (Curve No. 1) starts from the west of the project limits, crosses the relief bridge, and ends east of the relief bridge. The curve is 3750 ft in length with a curvature of 2º 00 min. The superelevation of Curve No. 1 is 0.027 ft/ft. The relief bridge is superelevated.

The second horizontal curve (Curve No. 2) starts on the causeway and ends on the west approach to the main bridge. The curve is 1740 ft in length with a curvature of 2 º 30 min. The superelevation of Curve

No. 2 is 0.033 ft/ft. East of Curve No. 2, the roadway remains tangent all the way to the end of the project. The main bridge is on the tangent.

Based on the superelevation rates adopted for the existing horizontal curves, the roadway was originally designed based on a 40 mph design speed.

3.1.6 VERTICAL ALIGNMENT

The centerline elevations of the existing roadway vary from a low elevation of 7.00 ft above mean sea level (MSL) at Royal Stewart to a high elevation of 19.50 ft on the relief bridge. The Dunedin Causeway between the relief and main bridges is at the elevation of 7.00 ft except for the approach grades to the bridges. The highest elevation on the drawbridge is elevation 27.85 ft. The centerline elevation returns to 7.00 ft east of the main bridge.

The approach grade to the relief bridge is 3.0% on either side. The length of the crest curve on the relief bridge is 500 ft, which results in a stopping sight distance of 424 ft. The length of the sag curve on either side of the relief bridge is 300 ft.

The approach grade to the main bascule bridge is also 3.0% on either side. The length of the crest curve on the main bridge is 900 ft, which results in a stopping sight distance of 566 ft. The length of the sag curve on either side of the main bridge is 300 ft.

3.1.7 DRAINAGE

The Dunedin Causeway (Causeway) is located at the head of St. Joseph Sound. The Causeway, and the associated Dunedin Causeway Bridge, marks the northern terminus of the Gulf Intracoastal Waterway. The tidally influenced waterway is subject to relatively unmitigated storm surges as it is located in close proximity to the open waters of the Gulf of Mexico.

Throughout the causeway runoff from the roadway basically sheet flows over grassed or sand surfaces en route to St. Joseph Sound. No cross drains exist within the project limits. The bridge approaches are drained by curb inlets that collect surface runoff and convey it directly to the bay by pipe systems and flumes. Bridge deck drainage for both bridges have scuppers in the deck that drain directly to the bay. No stormwater management system exists within the study area to provide runoff treatment or attenuation.

The entire project limit is located within a tidally influenced area with the defined 100-year floodplain associated with a storm surge. The estimated 100-year floodplain elevations defined by the Federal Emergency Management Agency (FEMA) ranges from 15.0 ft to 18.0 ft (NGVD 1929).

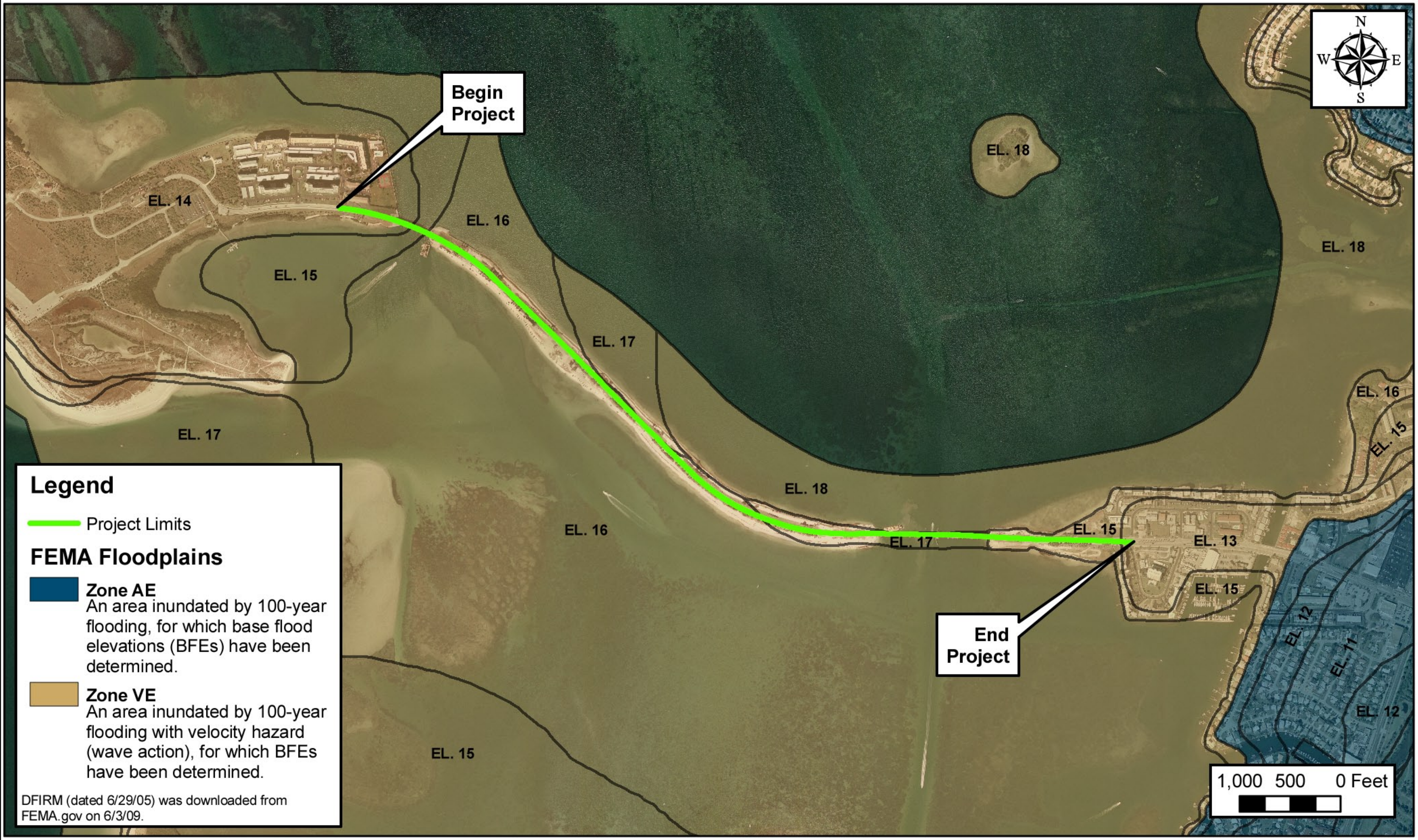
The FEMA Flood Insurance Rate Maps (FIRM) for Pinellas County – Community Numbers 12103C0062G and 12103C0066G are shown in **Figure 3-7,** indicate the entire project limit positioned in both Zone AE and Zone VE with elevations ranging from 13.0 ft to 18.0 ft (NGVD 1929). FEMA indentifies Zone AE as areas with base flood elevations determined. FEMA also defines Zone VE as areas of coastal flood with velocity hazard attributed to tidal surge wave action.

Tidal data was collected from Florida Department of Environmental Protection, National Oceanic and Atmospheric Administration, and National Ocean Service. Tide station number 872-6809, named "Honeymoon Island" (inside), is located in the project vicinity. Data from the above tide station, with a tidal epoch ranging from 1983 to 2001, show approximate mean high water (MHW) and mean low water (MLW) elevations of +0.80 ft NAVD 88 (+1.54 ft NGVD 29) and -1.26 ft NAVD 88 (-0.52 ft NGVD 29), respectively. **Table 3-1** summarizes tidal data.

Table 3-1: Tidal Data

Tidal Datum	Elevation (ft) (NGVD 29)	Elevation (ft) (NAVD 88)
Mean Higher High Water (MHHW)	+1.89	+1.15
Mean High Water (MHW)	+1.54	+0.80
Mean Sea Level (MSL)	+0.55	-0.19
Mean Tide Level (MTL)	+0.51	-0.23
Mean Low Water (MLW)	-0.52	-1.26
Mean Lower Low Water (MLLW)	-1.05	-1.79

The U.S. Department of Agriculture (USDA) Soil Conservation Services (SCS) Soil Survey of Pinellas County, Florida, soils classification map (issued September 1972) indicates that the soil type in the corridor consists of Made Land (Ma). The Made Land soil map unit consists of mixed sand, clay, hard rock, shells, and shell fragments that have been transported and reworked, and leveled by earth moving equipment. Many areas consist of material that has been dredged from the bay and used to fill in diked areas. Rocks ½ in to 12 inches in diameter are common. Made Land occurs mainly in urban areas, along the coast and keys, and as manmade islands built in shallow water. In coastal areas it has been built up to provide desirable locations for residential developments.



Dunedin Causeway Bridge Replacement Feasibility Study

FEMA MAP
FIRM Pinellas County: 12103C0062G and 12103C0066G

FIGURE 3-7

The soil survey map for the project area is shown in **Figure 3-8**. Estimated depth to seasonal high water table (SHWT) for the soils within the project limits are not provided by the USDA, as shown in **Table 3-2.** SHWT estimation is very difficult to determine for these soils because of the nonhomogenous nature of the soils and absence of soils stains. For purposes of the project drainage evaluation, mean high water elevation is assumed as the SHWT due to the project site close proximity to the Gulf of Mexico.

Table 3-2: USDA Soils

USDA Soils	SHWT Depth Elevation (ft)	Hydrologic Soil Group
Made Land	N/A (+1.54)[1]	N/A

1. SHWT assumed to be MHW due to proximity to Gulf (NGVD 29)

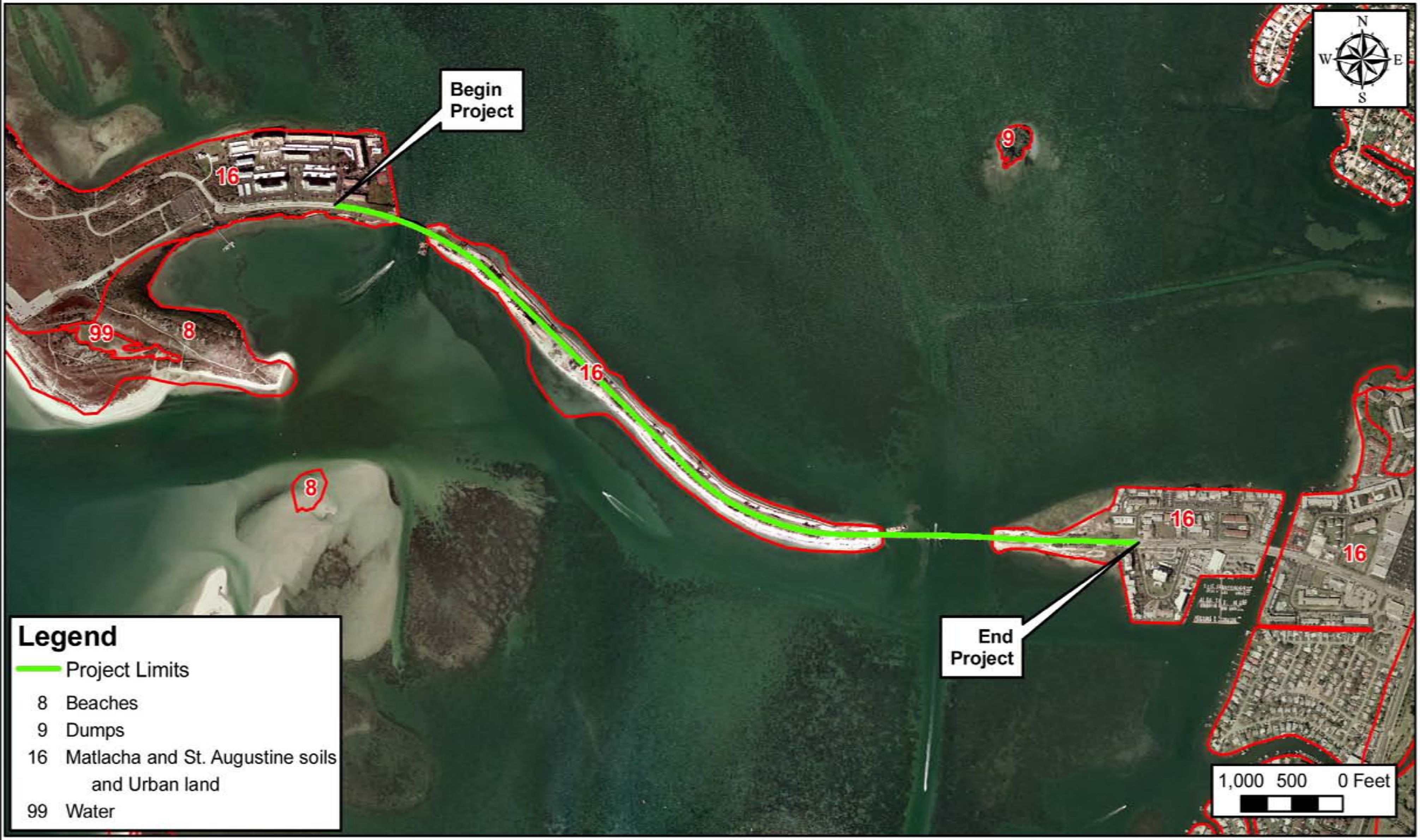
3.1.8 GEOTECHNICAL DATA

No geotechnical data and/or borings were performed for this Feasibility Study. Boring data is available within the vicinity of the study from the 90% Bridge Rehabilitation plans, dated in 2008. Two borings, approximately 28 ft into the bottom of the channel, were drilled by PSI Industries, Inc. near the proposed fender system piling. The borings indicate very dense granular material that would be suitable for drilled shaft construction. It is expected that concrete pile driving will require preformed holes. The Belleair Causeway bridges in Clearwater Harbor utilized 3 ft, 4 ft and 5 ft diameter shafts in similar soil stratums. This Feasibility Study will assume drilled shaft construction for the opinion of probable costs.

3.1.9 CRASH DATA

Traffic crash data was provided by Pinellas County for crashes occurring within the study limits during a 5-year period between Year 2003 and Year 2008. A total of 48 traffic crashes occurred on Dunedin Causeway Boulevard approximately between Royal Stewart Parkway and Gary Circle, as shown in **Figure 3-9**.

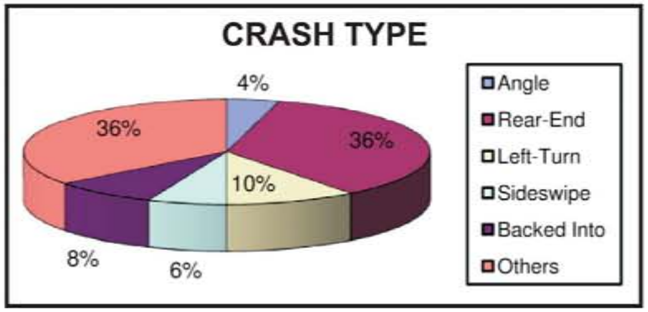
The figure includes graphical summaries of crashes by site location, collision type, lighting conditions, and pedestrian/bicyclist involvement. Approximately 17% of these crashes occurred on the bridges. One third of the total crashes were rear-end collisions. These rear-end crashes are indicative of the frequency of unexpected slowing or stopping for either turning vehicles or bridge openings. In addition to crash types, 73% of the crashes occurred during daylight hours and 8% collisions involve pedestrian or bicyclists.

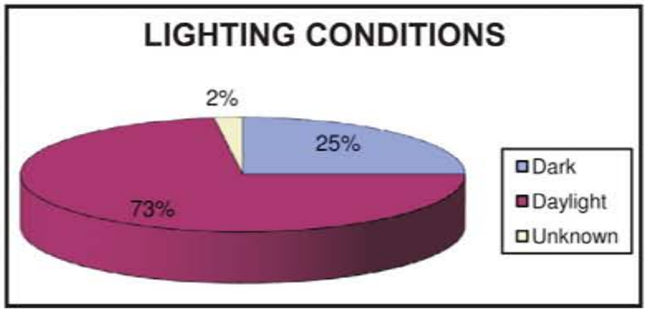


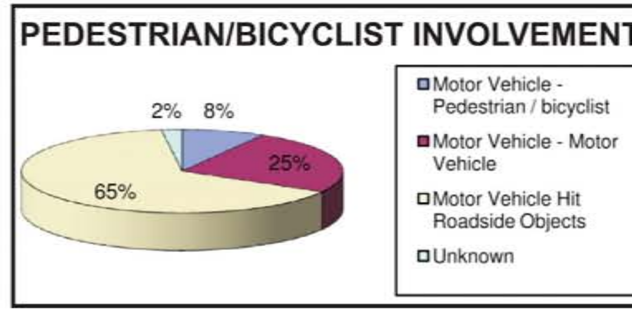
Dunedin Causeway Bridge Replacement Feasibility Study

SOILS MAP

FIGURE 3-8







Dunedin Causeway Bridge Replacement Feasibility Study

TRAFFIC CRASHES BY TYPE & LOCATION

FIGURE 3-9

3.1.10 INTERSECTIONS AND SIGNALIZATION

There are no signalized intersections within the study limits. Traffic signals and gates are located on both approaches to the bascule span on the main bridge to control traffic during bridge openings.

There are two side street intersections within the study limits. At the west end of the project, Royal Stewart Parkway, which leads into a residential complex, intersects (T-intersection) with Causeway Boulevard. At the east end of the project, Gary Circle/Woodette Drive intersects with Causeway Boulevard. Both intersections are under STOP sign control. There are no exclusive left turn or right turn lanes leading to these side streets.

Beach access driveways exist at various locations within the study limits. There are no turning lanes provided on Causeway Boulevard.

3.1.11 LIGHTING

Street lighting is provided along the entire roadway. Lights are located along the north side of the roadway on approximately 200 ft spacing. Single luminaries are provided on each pole approximately 25 ft to 30 ft high. Along the roadway and bridge the electrical service is aerially-mounted between light poles.

3.1.12 UTILITIES

Utility Survey of Dunedin Causeway Bridge Replacement

The following is a review of the Utilities located on the Dunedin Causeway.

Progress Energy

Progress Energy has an overhead Distribution 69 KV line located on the north side of the Causeway attached to 45 ft concrete poles. The replacement of the Dunedin Bascule Bridge will impact the Progress Energy facilities and will require Progress Energy to relocate their facilities out of conflict.

Bright House Networks

BHN has a subaqueous fiber optic cable (FOC) crossing the channel located on the north side of the Bascule Bridge, the BHN facilities are attached to Progress Energy's poles on both the east and west approaches to the Bascule Bridge. The BHN facilities attached to the Progress Energy poles on both the approaches will need to be relocated during construction.

Clearwater Gas System

Clearwater Gas has a subaqueous 8 in polyethelene (P.E.) gas line crossing the channel located on the south side of the Bascule Bridge. The Clearwater Gas line is located 6 to 10 feet off the edge of pavement on both the east and the west approaches to the Bascule Bridge. The gas line on both the approaches is in conflict and will need to be relocated during construction.

Verizon

Verizon has subaqueous conduit crossing the channel located on the north side of the Bascule Bridge. The four 4 in PVC conduits should not be in conflict with the proposed bridge replacement in the channel or on the east and west approaches to the bridge.

Knology

Knology's facilities are attached to the Progress Energy 45 ft concrete poles located on the north side of the Causeway . The replacement of the Dunedin Bascule Bridge will impact Knology's facilities and will require Knology to relocate their facilities out of conflict.

City of Dunedin Waste Water

The City of Dunedin Waste Water has a proposed subaqueous 8 in HDPE forcemain (FM) crossing the channel located on the north side of the Bascule Bridge. There are no conflicts with the proposed 8 in FM on the Bascule Bridge east or west approaches.

City of Dunedin Public Works and Utilities Department is currently working with their consultant to design a utility replacement pipe project along Causeway Boulevard. Within the study limits, the existing 8 in force main will be replaced with a proposed 8 in high density polyethelene (HDPE) force main.

City of Dunedin Water

The City of Dunedin Water has an existing subaqueous 20 in watermain (WM) crossing the channel located on the north side of the Bascule Bridge. There are no conflicts with the 20 in WM on the Bascule Bridge east or west approaches.

Part of the existing water main will also be replaced with a proposed 20 in HDPE water main. At the relief channel, the existing subaqueous force main and water main will be maintained. At the main channel, the existing subaqueous water main will be maintained while the existing subaqueous force main will be replaced.

Pinellas County Highway

Pinellas County Highway does not have facilities that will be impacted by this project. Utility lines, and their respective owners, along Causeway Boulevard within the study limits are shown in **Table 3-3**.

Table 3-3: Utility Contacts Within Study Limits

Utility Company	Contact	Phone / Fax No.
Progress Energy 3300 Exchange Place NP4A Lake Mary, Fl. 32746	Sharon Dear	(407) 942-9421
Verizon of Florida 1280 Cleveland Street Clearwater, FL 33755	Raul Ojeda	(727) 562-1130
Bright House Networks, 700 Carillon Pkwy Suite 6 St. Petersburg, Fl. 33716	Scott Creasy	(727) 329-2817
Clearwater Gas System 400 N. Myrtle Ave. Clearwater, Fl. 33755	Bruce Griffin	(727) 562-4900 ex. 7423
Pinellas County Utilities 14 S. Fort Harrison Clearwater, Fl. 33756	R.W. Grubbs	(727) 464-3874
City of Dunedin Water P.O. Box 1348 Dunedin, Fl. 34697	Douglas Hutchens	(727) 298-3005
City of Dunedin Waste Water P.O. Box 1348 Dunedin, Fl. 34697	Douglas Hutchens	(727) 298-3005
Knology of Florida 3001 N. Gandy Blvd. Pinellas Park, Fl. 33782	Jay Young	(727) 239-0156
Pinellas County Highway 22211 US Hwy. 19 North Clearwater, Fl. 33765	John Holt	(727) 464-8900

Most of the utilities run parallel along the north side of the causeway. At both the main and relief channels, subaqueous crossings are primarily located at the north side of the existing bridges. At the relief channel, there are some utilities attached to the bridge to cross the channel.

3.1.13 PAVEMENT CONDITIONS

The pavement within the study limits appears to be in fair condition except for one location at the west end of the project, where there are small potholes and asphalt patches and the pavement seems to be deteriorating. This could result from stress or inadequate pavement drainage. Overall, the traffic lanes

appear to be adequate structurally to accommodate the existing traffic loads, and the surface provides an adequate surface to provide satisfactory operating conditions.

3.1.14 POSTED SPEED LIMITS

The posted speed limit varies along Dunedin Causeway. East of the relief bridge the posted speed limit is 35 miles-per-hour (mph). The posted speed limit west of the relief bridge is 25 mph.

3.1.15 ACCESS MANAGEMENT CLASSIFICATION

This is a County facility and is not classified per FDOT Rule Chapter 14-97.

3.2 EXISTING BRIDGES

Two bridges currently carry Dunedin Causeway traffic over St. Joseph Sound. The west (relief) bridge (Bridge No. 150067) is located on the west side of the Dunedin Causeway. The east (main) bridge (Bridge No. 150068) crosses the Intracoastal Gulf Waterway at St. Joseph Sound. Both bridges are 39 ft 11 in wide and carry one lane of traffic in each direction. The original main and relief bridges had two 13 ft lanes and two 3 ft 4 in sidewalks with metal handrails. In 1996, the sidewalks were widened to incorporate the Pinellas Trail onto the Dunedin Causeway. The south sidewalks on the main and relief bridges were widened to 6 ft 0 in.

3.2.1 TYPE OF STRUCTURES

West (Relief) Bridge (Bridge No. 150067)

This bridge is a 384 ft long, 8-span low level structure. Each span is equally spaced at 48 ft and utilizes 4 – 48 in deep prestressed concrete I-beams and a 7 in cast-in-place concrete deck supported by concrete pile bents with 20" piles. This bridge is referred to as *Dunedin Causeway Relief Bridge.*

East (Main) Bridge (Bridge No. 150068)

This bridge is a 1,191 ft long, 23 span structure (including the movable span) over the Intracoastal Gulf Waterway. The 133 ft ½ in bascule span is a double-leaf bascule that has steel main girders with concrete counterweight leaves that rotate about fixed trunnions. The machinery is a Hopkins trunnion design with an Earle 800 enclosed gear reducer. The control house is located on the north side of the east end of the trunnion span. A total of 10 approach spans on each side of the bridge utilize 48 in deep prestressed concrete I-beams and a 7 in cast-in-place concrete deck supported on concrete pile bents with 20" piles. The prestressed I-beams span 48 ft for a total of 480 ft on each side. Adjacent to the bascule

piers, the flanking spans are 48 ft 8 ½ in on each side of the bascule bridge. This bridge is referred to as the *Dunedin Causeway Bridge*.

3.2.2 CURRENT CONDITION AND YEAR OF CONSTRUCTION

West (Relief) Bridge (Bridge No. 150067)

The Bridge Inspection Report dated September 6, 2007 served as the basis for existing conditions for the Dunedin Causeway Relief Bridge. The Dunedin Causeway Relief Bridge has a sufficiency rating of 58 and is classified as *"functionally obsolete."* The National Bridge Inventory (NBI) rating of the bridge superstructure and substructure is "good" and the deck is rated as "satisfactory." The bridge is currently not posted for weight restrictions as none are required based on the current load analysis. Bridge No. 150067 was constructed in 1963. The bridge is classified as Scour Critical.

East (Main) Bridge (Bridge No. 150068)

The Bridge Inspection Report dated July 31, 2007 served as the basis for existing conditions for the Dunedin Causeway Bridge over the St. Joseph Sound. The Dunedin Causeway Bridge has a sufficiency rating of 48.6 and is classified as "*functionally obsolete*". The NBI rating of the bridge is "satisfactory" for the superstructure, substructure and deck. The bridge is not posted for weight restriction as none are required based on the current load analysis. Bridge No. 150068 was constructed in 1963. The bridge is on a 12 month inspection frequency for Movable and Fracture Critical components. The bridge is classified as Scour Susceptible – High Priority requiring scour inspections and monitoring for every 100-year storm event.

3.2.3 HORIZONTAL AND VERTICAL ALIGNMENT

The horizontal alignment of the relief bridge is centered on a 3750 ft long curve. The bridge crosses the Intracoastal on a 30 degree skew. The approach spans of the relief bridge are on a 3 percent grade with a 300 ft vertical curve on each approach roadway and a crest vertical curve of 500 ft exists on the bridge. A vertical clearance of 15.0 ft above mean sea level (MSL) or the equivalent of 14.2 ft above *mean high water* (MHW) is provided. The horizontal clearance within the equal length spans of the bridge is approximately 46.5 ft.

The horizontal alignment of the main bridge is on a tangent section. The approach spans are on a 3 percent grade with a 300 ft vertical curve on each approach to the bascule span and a 900 ft crest vertical curve over the channel. The bascule span of the main bridge is a level structure. The bascule span has a

minimum vertical navigational clearance of 19.5 ft above *mean sea level* (MSL) or the equivalent 18.7 ft above *mean high water* (MHW) and a horizontal navigational clearance of 90 ft between fenders.

3.2.4 CHANNEL DATA

The existing navigational channel through St. Joseph Sound is part of the Gulf Intracoastal Waterway, which is maintained by the Army Corps of Engineers; the U.S. Coast Guard has navigational jurisdiction. The width of the maintained navigational channel is 90 ft at the main bridge. The estimated depth at the center of the channel was approximately 15 ft 7 in when measured on July 2007. Channel and navigational data are also included on the National Oceanic and Atmospheric Administration (NOAA) Nautical Chart No. 11411, Intracoastal Waterway, from Tampa Bay to Port Richey, dated March 2008.

East (Main) Bridge

The existing bascule bridge (Bridge No. 150068) at the main channel is rated as a “Scour Susceptible, High Priority” in the available Phase 2 Scour Evaluation Report prepared by the Florida Department of Transportation (FDOT), dated November 25, 2006. This bridge crossing, in combination with the relief bridge, conveys the St Joseph Sound tidal waters across the causeway. The Phase 1 report (dated March 18, 1990) indicates that the channel bed has degraded approximately 8.5 ft across the entire bridge opening, since its construction in 1961. The channel appears to have stabilized since 1985 as no appreciable degradation has been recorded after this date. The channel bed material is comprised of sands and shells underlined with clay and limestone. Sand cement abutment protection and sheet piling countermeasures are noted to be in good condition.

Hydraulic analysis performed in the Phase 2 Scour Evaluation study, with the two-dimensional RMA-2 finite element model, predicts average high velocity through the bridge opening of 5.9 feet per second (fps). A total scour depth of approximately 33.2 ft (based on 6.2 ft of contraction and 27.0 ft local scour) is predicted for a Category I hurricane event. The Phase 2 report recommends proceeding with the geotechnical study and a Phase 3 report, due to the aggressive hydraulic exposure and significant scour estimate. The bascule bridge is noted to have unknown foundations since pile driving records are not available. The existing plans show 18 in square precast concrete piling was used at the bascule pier with a 65 ton capacity. However, tip elevations are unknown. A Phase 3 report was not available at the time of this Feasibility Study.

West (Relief) Bridge

The relief bridge (Bridge No. 150067) at the west channel is rated as a "Scour Critical" channel. This rating was elevated from "Scour Susceptible, High Priority" after completion of the Phase 3 report prepared by the Florida Department of Transportation (FDOT), dated January 20, 2006. A Phase 4 report was not available during the preparation of this report. Review of the Phase 1 reports indicates that the channel bed, comprised mostly of sands and shells, has lowered approximately 6 to 10 ft when compared to its original plans developed for the 1963 bridge construction. The scour bed appears to be stabilizing due to the significant bed lowering indicated by the recent bridge inspection reports. Failure of sand cement abutment protection and undermining of the sheet piling have been reported.

Hydraulic analysis performed in the Phase 2 study, with the two-dimensional RMA-2 finite element model, predicts average high velocities through the bridge opening of 8.9 fps. A scour prediction of approximately 12.9 ft was estimated for a hurricane Category 1 storm surge condition. From a hydraulic standpoint, this storm produces higher scour depths due to increased flow velocity through the bridge opening as the flood stage approaches the over topping elevation.

Geotechnical analysis prepared in the Phase 3 scour evaluation study, using the FB-PIER software deemed this crossing as "Scour Critical". This analysis was performed from estimated pile tip elevations as there is no construction pile driving records. Based on the assumed pile tip elevations, the bridge is considered unstable during a 100 year storm due to the structural analysis showing the bridge to exhibit significant deflection causing the piles to crack. The geotechnical report indicates the upper soil layer, about 20 ft in depth, consisting of very loose fine sands with very stiff to very hard limestone below sands layer. The report states that non-scourable material is present in this layer, thus the 100-year scour elevation of -32.8 may not be realized. It is important to note that despite the fact that the structural analysis was performed using a higher scour critical elevation (-19.8), the structure will be unstable during a 100-year storm.

3.2.5 BRIDGE OPENINGS

The Dunedin Causeway drawbridge can be opened on demand by utilizing the following call sign WHZ 750 and calling channel 16. Opening frequencies are controlled by the bridge tender, who works for Pinellas County on a contract basis. The bridge is manned 24 hours a day.

Data related to the opening frequencies of the Dunedin Causeway Bridge was obtained from the Pinellas County Public Works Department. The bridge opened 1023 times from February 2008 to January 2009. Data regarding the opening frequencies for the months of March, April, May and September of 2008

could not be located, and thus, not included in this report. The average number of bridge openings per month remains fairly consistent over time ranging from 69 (average of 2 per day) to a high of 153 (average of 5 per day). The data shows a strong trend of weekend recreational openings. The highest percentages of openings occur between the hours of 10 am to 6 pm. The opening frequency is illustrated in **Figure 3-10**. Information regarding the height of the boats requesting the bridge opening was not collected.

3.2.6 SHIP IMPACT DATA

No historical data was available regarding any ship collisions with the bridge structures.

3.3 NEED FOR IMPROVEMENT

The causeway is currently the only link between the mainland and the Honeymoon Island State Park and an adjacent residential area. The roadway connects Causeway Boulevard on the island with other north-south roadways in Pinellas County and serves as the only hurricane evacuation route for Honeymoon Island.

3.3.1 STRUCTURAL DEFICIENCIES

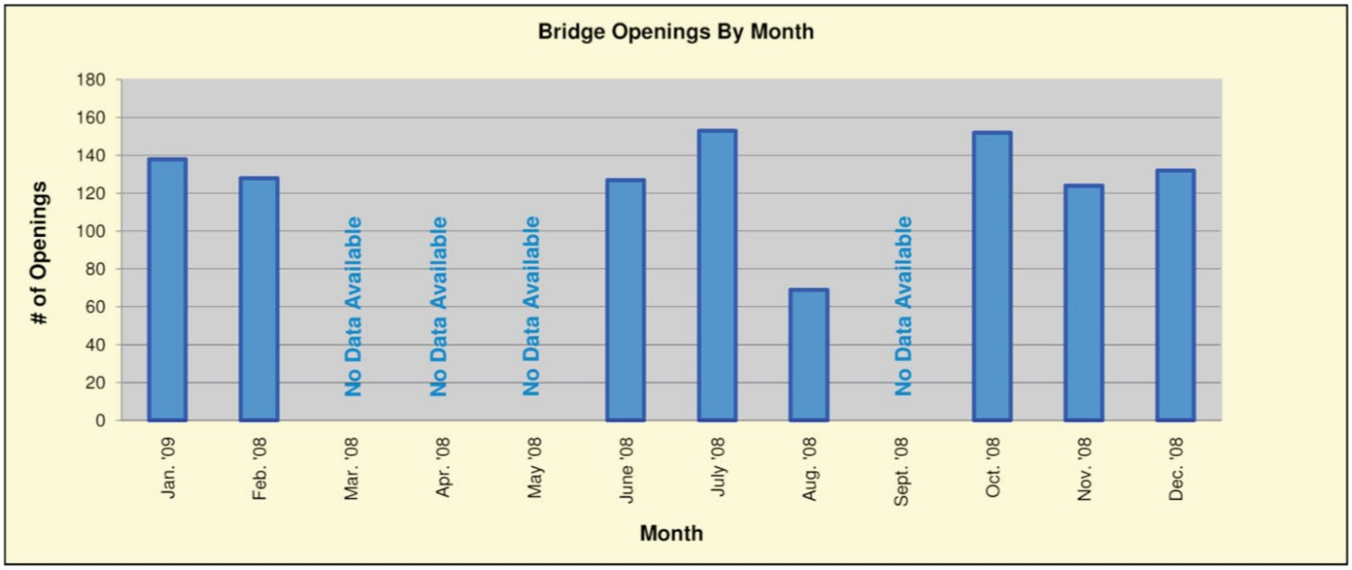
The existing bridges were completed in 1963 and are approaching the end of their original life expectancy of 50 years. Maintenance and operating costs of the bridges are increasing due to the deterioration of the structural steel components and machinery in the drawbridge.

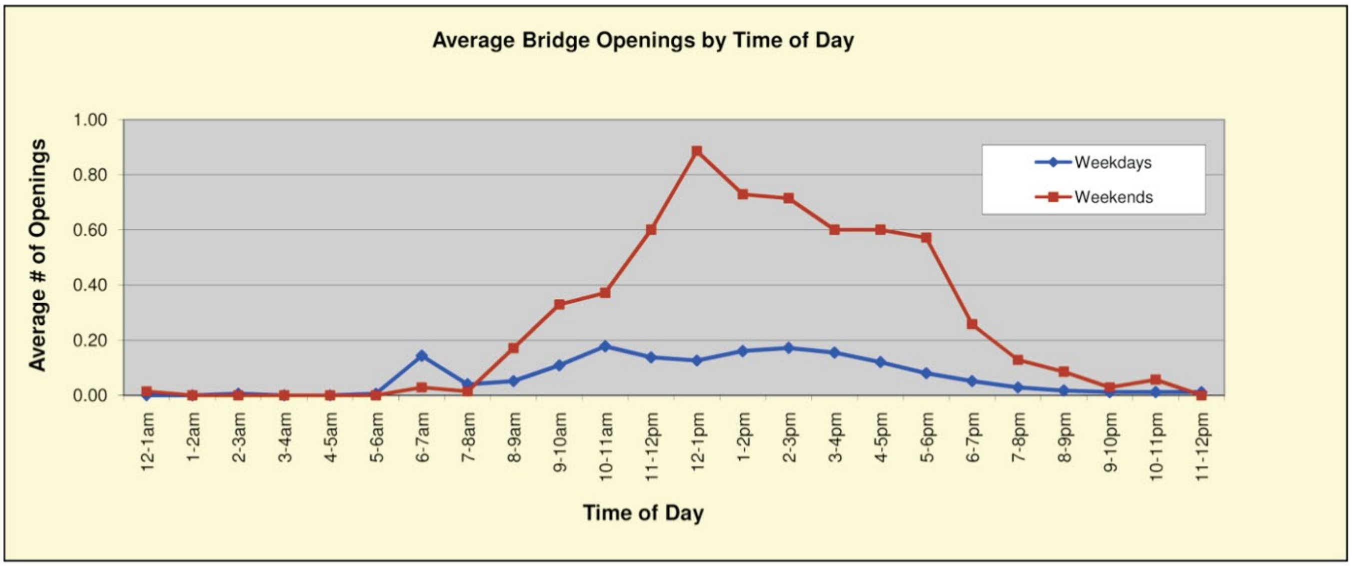
Periodic Inspections

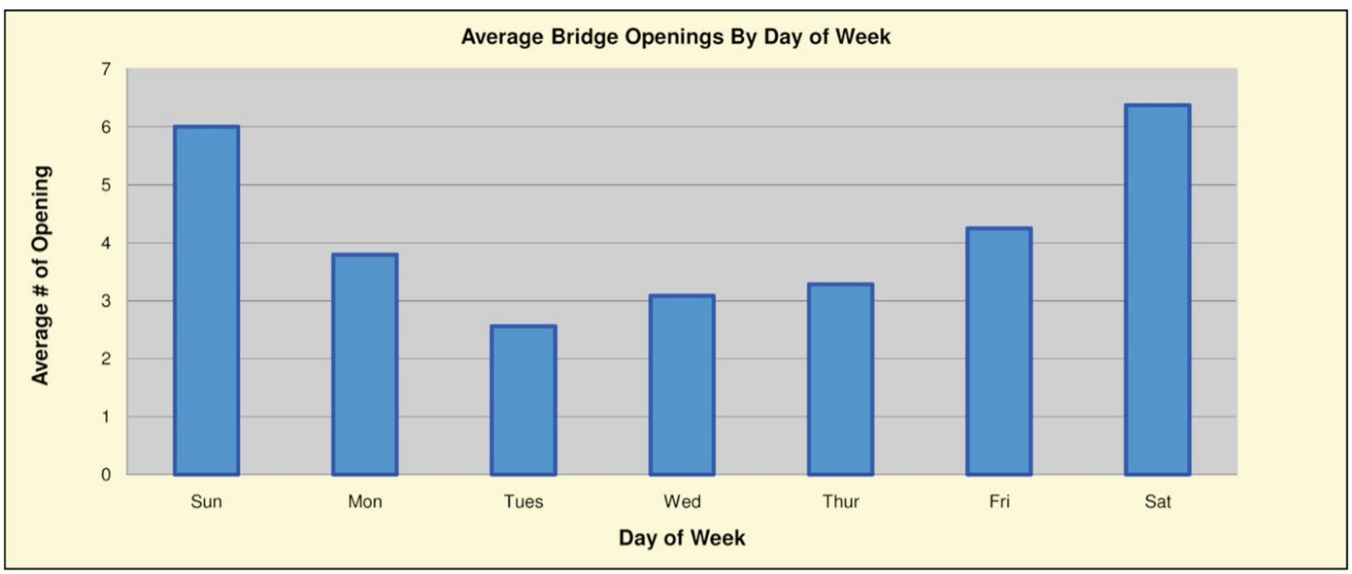
A rigorous inspection program to maintain the safety and structural integrity of the bridges consists of the following:

- Biennial Structural Inspections by FDOT
- Biennial Underwater Inspections by FDOT
- Annual Electrical and Mechanical Inspections of the Moveable bridge by FDOT
- Frequent Inspections by Pinellas County to complement Biennial program

The inspection program has revealed Structural, Electrical and Mechanical issues with the bridges. Cracks and spalls on the concrete elements has resulted in corroded reinforcement of the piles, caps,







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BRIDGE OPENING FREQUENCIES

FIGURE 3-10

beams, deck, handrail, bulkheads, etc. There is significant corrosion of the drawbridge steel superstructure. In addition, antiquated mechanical and electrical equipment has required frequent maintenance and repairs.

Routine and Preventative Maintenance

Maintaining the serviceability of the causeway and bridges is accomplished by performing routine and preventive maintenance. Maintenance of the roadway, bridges and Pinellas Trail Spur is the responsibility of Pinellas County. The City of Dunedin maintains the grass and planted medians and ROW (maintenance cost data was not available). The costs incurred by Pinellas County since 1997 for the bascule bridge, as well as projected costs, are summarized in **Table 3-4**.

Table 3-4: Pinellas County Routine and Preventive Bridge Maintenance Costs

Year	Costs
1997 to 2000	$612,521
2001 to 2005	$934,049
2006 to 2010	$1,163,995
2011 to 2015	$1,450,549
2016 to 2020	$1,807,648
2021 to 2024	$2,252,659
Cumulative Total costs:	**$8,221,421**

Major and Minor Repairs

Extending the service life of the bridge is accomplished by performing periodic maintenance and structural repairs. History of repair and structural work performed by Pinellas County is summarized in **Table 3-5**.

Table 3-5: Pinellas County History of Repair Costs

Item	Costs
1987 – Fender System / Sub-aqueous	$150,000
1990 – Structural Repairs	$350,000
1992 – Guardrail Installation	$250,000
1995 – Mechanical Repairs	$769,000
1996 – Trail Construction	$682,000
1997 – Mechanical Repairs	$7,800
2001 – Control and Gate Lights	$4,500
2003 – Seawall Construction (400 ft)	$200,000
2005 – Replace Live Load Shoes	$6,000

Item	Costs
2006 – Utility Relocation	$65,000
2009 – Bridge Repairs, New Fender System, Painting	Estimate $3,300,000 Bid $1,639,000
2014 – Repairs	$10,500,000

Both bridges have undergone repairs over the years to maintain their integrity. However, the operating machinery and controls are original for the drawbridge. Two major repairs have been programmed to extend the service life of the bridge prior to replacement. The 2009 repairs (Coastal Marine Construction, Inc. was the low bidder) are intended to extend the service life up to the next scheduled major repair in 2014. This major repair will provide another 8 years of service life, requiring a bridge replacement around 2025. The repair costs continue to escalate as the bridge continues to age beyond the 50-year design life.

Furthermore, a considerable amount of time and money has been spent on improving the substructure of the existing bridge approaches. Improvements to the substructure, include but are not limited to installation of pile jackets to numerous pre-stressed concrete piles, and corrective repairs on undermined abutments.

Currently, the existing causeway bridges do not meet current design standards and are classified as "functionally obsolete." The Dunedin Causeway east (main) bridge currently has a sufficiency rating of 486 and is considered structurally deficient. The current replacement timeframe for the bridges is in the early 2020's. Replacement of the existing bridges and improvement to the causeway will result in improved traffic flow, increased safety for area residents, and reduced operating and maintenance costs.

3.3.2 SAFETY CONCERNS

Traffic crash data was provided by Pinellas County for crashes occurring within the study limits during 2003 and 2008. Characteristics of these crashes are summarized in **Section 3.1.9**. During this 5-year period a total of 48 traffic crashes occurred on Dunedin Causeway Boulevard between Royal Stewart Parkway and Gary Circle. Approximately one-third of the crashes were rear-end collisions during day light hours. These rear-end crashes are indicative of frequent unexpected slowing or stopping for either turning vehicles or bridge openings.

The lack of shoulders on the bridges, particularly the 1,191 ft drawbridge, leaves no refuge area for disabled vehicles. A breakdown or accident on the bridge typically stops all traffic in one direction until such time as the vehicle(s) can be towed off the bridge.

The risk of scour at both bridges, discussed in **Section 3.2.4**, is also a major safety concern. At the main bridge, the Phase 2 Scour Report considers the bridge to be Scour Susceptible – High Priority, which requires annual underwater inspections and following a severe storm event or tidal surge. The report also recommends that a schedule for replacement or a plan for permanent countermeasures be prepared depending on the perceived risk. The same recommendations are provided for the relief bridge in the Phase 3 Scour Report.

3.4 ENVIRONMENTAL CHARACTERISTICS

The Dunedin Causeway (Causeway) is located at the head of St. Joseph Sound. The Causeway, and the associated Dunedin Causeway Bridge, marks the northern terminus of the Gulf Intracoastal Waterway. From this point, northbound watercraft enter into the unprotected, open waters of the Gulf of Mexico.

Constructed from dredged material in 1963, the Causeway has developed distinct ecological habitats within the estuarine intertidal system. Representative habitats include submerged seagrass meadows, intertidal mudflats, emergent plant communities, and unvegetated beach sands. The upland portions of the Causeway are vegetated by native salt-tolerant grasses and sedges, along with native and non-native landscape species. The Causeway provides feeding, nesting and cover opportunities to numerous wildlife species who, due to the popularity of the Causeway's recreational features, must share the aquatic and terrestrial habitats with the general public.

The proposed replacements of the existing bascule and relief bridges will result in impacts to the natural environment. HDR has collected pertinent environmental data in order to analyze potential impacts with regards to various bridge types and alignments. The purpose of the environmental portion of the study is to quantify the various environmental impacts and use these data as a decision-making tool in determining the preferred bridge designs.

3.4.1 DATA COLLECTION

Aerial photography was flown specifically for this project. The aerials were flown during low tide and nearly windless conditions. The aerial photography was flown at an altitude of fifteen hundred feet (1500 ft) with a low-distortion 6 in precision aerial mapping camera. The aerial photos consist of high-quality, natural color imagery featuring an approximate 3 in resolution.

The limits of seagrass communities, intertidal wetlands and uplands were determined through photointerpretation of the project aerial photography and field verified by pedestrian ground-truthing

during periods of low tide. Field reconnaissance was performed in December 2008 and January 2009. All limits of seagrass communities presented in this study have been digitally mapped and geo-referenced to the State Plane Coordinate System. Specific elevations used in this environmental narrative are referenced to 1988 North American Vertical Datum (NAVD88). Refer to **Appendix A** for delineated aerial photographs that depict wetland communities in the vicinity of the existing bascule bridge and relief bridge.

Seagrass meadows, areas of open water, and intertidal estuarine wetlands have been classified in accordance with the U.S. Fish and Wildlife Service's (USFWS) Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979) and utilized by the USFWS National Wetland Inventory (NWI) program. In addition, all delineated areas have been classified in accordance with the Florida Land Use, Cover and Forms Classification System (FLUCFCS) developed by the Florida Department of Transportation (FDOT, 1999). As a note, portions of the causeway landward of the intertidal wetland limits were delineated as upland.

3.4.2 WETLAND DESCRIPTIONS

Although not technically classified as "wetlands", the open water portions of St. Joseph Sound below mean lower low water (MLLW) are regarded as "deep water habitat" and consist of the subtidal portions of St. Joseph Sound that lack emergent vegetation or subtidal seagrass communities. The MLLW elevation is approximately -1.79 ft. The substrate consists mainly of unconsolidated sands and shell hash material. The NWI classification for the open water portions is E1UBL (Estuarine, Subtidal, Unconsolidated Bottom, Permanently Flooded) and the FLUCFCS classification is FLUCFCS 540 (Bays and Estuaries).

Areas of dense, submerged aquatic vegetation in the form of seagrass meadows occur on the north and south side of the causeway and adjacent to both causeway bridges. Field reconnaissance revealed the presence of three seagrass species. The dominant, and most visible species, is shoal grass (*Halodule wrightii*). The two other observed species include turtle grass (*Thalassia testudinum*) and manatee grass (*Syringodium filiforme*). It was observed that a narrow strip of seagrass immediately adjacent to the causeway and bridge areas exposes during periods of low tide (intertidal), however a majority of seagrass meadows along the causeway are sub-tidal and are rarely, if ever, exposed even during the lowest tides. The NWI classification for the inter-tidal seagrass communities is E2AB3M (Estuarine, Intertidal, Aquatic Bed, Rooted Vascular, Irregularly Exposed) and for the sub-tidal seagrass; E1AB3L (Estuarine,

Subtidal, Aquatic Bed, Rooted Vascular, Subtidal). The FLUCFCS classification is FLUCFCS 911 (Sea Grass).

Expansive areas of unvegetated mud and beach sands occur on both sides of the causeway and adjacent to both bridges. This wetland type constitutes the largest aerial cover within the study area and includes tidal flats that extend waterward out to the MLLW elevation and unconsolidated beach sands that extend landward up the Mean High Water elevation of approximately 0.80 ft. As a note, extensive portions of beach sands and mudflats along the causeway are covered in limestone rocks and boulders. In addition, large pieces of concrete bridge pilings are located around the periphery of bridge abutments. The occurrences of these man-made elements do not affect the jurisdictional aspects of the project. The NWI classification for the intertidal flats is E2USM (Estuarine, Intertidal, Unconsolidated Shore, Irregularly Exposed) and the FLUCFCS classification is 651 (Tidal Flats). The NWI classification for the unvegetated, intertidal beach sands is E2USP (Estuarine, Intertidal, Unconsolidated Shore, Irregularly Flooded) and the FLUCFCS classification is 652 (Shorelines).

Emergent vegetation and scrub-shrub communities inhabit the intertidal zone in narrow strips along the undisturbed portions of the causeway and also occur in small, patchy areas adjacent to the causeway bridges and portions of the mainland. Localized areas of saltmarsh cordgrass (*Spartina alterniflora*) occur along the southern shoreline of Honeymoon Island adjacent to Causeway Boulevard. This species is considered to inhabit the "low marsh" portion of the estuarine environment that is flooded on a daily basis in the intertidal zone. Areas of saltmarsh cordgrass are classified by NWI as E2EM1N (Estuarine, Intertidal, Emergent, Persistent, Regularly Flooded).

Wetland areas characterized as "high marsh" are dominated by plant species that include sea purslane (*Sesuvium portulacastrum*), saltmeadow cordgrass (*Spartina patens*), salt grass (*Distichlis spicata*), sea oxeye daisy (*Borrichia frutescens*), seashore paspalum (*Paspalum vaginatum*) and saltwort (*Batis maritima*). The upper limits of the high marsh zone is estimated to be 2.26 ft. Areas of emergent "high marsh" are classified by NWI as E2EM1P (Estuarine, Emergent, Persistent, Irregularly Flooded). The FLUCFCS classification system draws no distinction between "low and high marsh" and lumps the communities together as FLUCFCS 642 (Saltwater Marshes).

The Causeway area is situated in a relatively high-energy setting, and for this reason, scrub-shrub communities (including mangroves) are limited to protected "high marsh" settings. A direct result of the wave-driven environment is the lack of red mangrove (*Rhizophora mangle*) communities along the

Causeway shoreline. Instead, concentrations of black mangrove (*Avicennia germinans*) and white mangrove (*Laguncularia racemosa*) are present in protected areas leading up to both bridges. Additional species that also occur within this zone and include bigleaf sumpweed (*Iva frutescens*), saltwater falsewillow (*Baccharis angustifolia*) and the invasive Brazilian pepper (*Schinus terebinthifolius*). The intertidal scrub-shrub community is classified by NWI as E2SS3P (Estuarine, Intertidal, Scrub-Shrub, Broad-Leaved Evergreen, Irregularly Flooded).

3.4.3 UPLAND DESCRIPTIONS

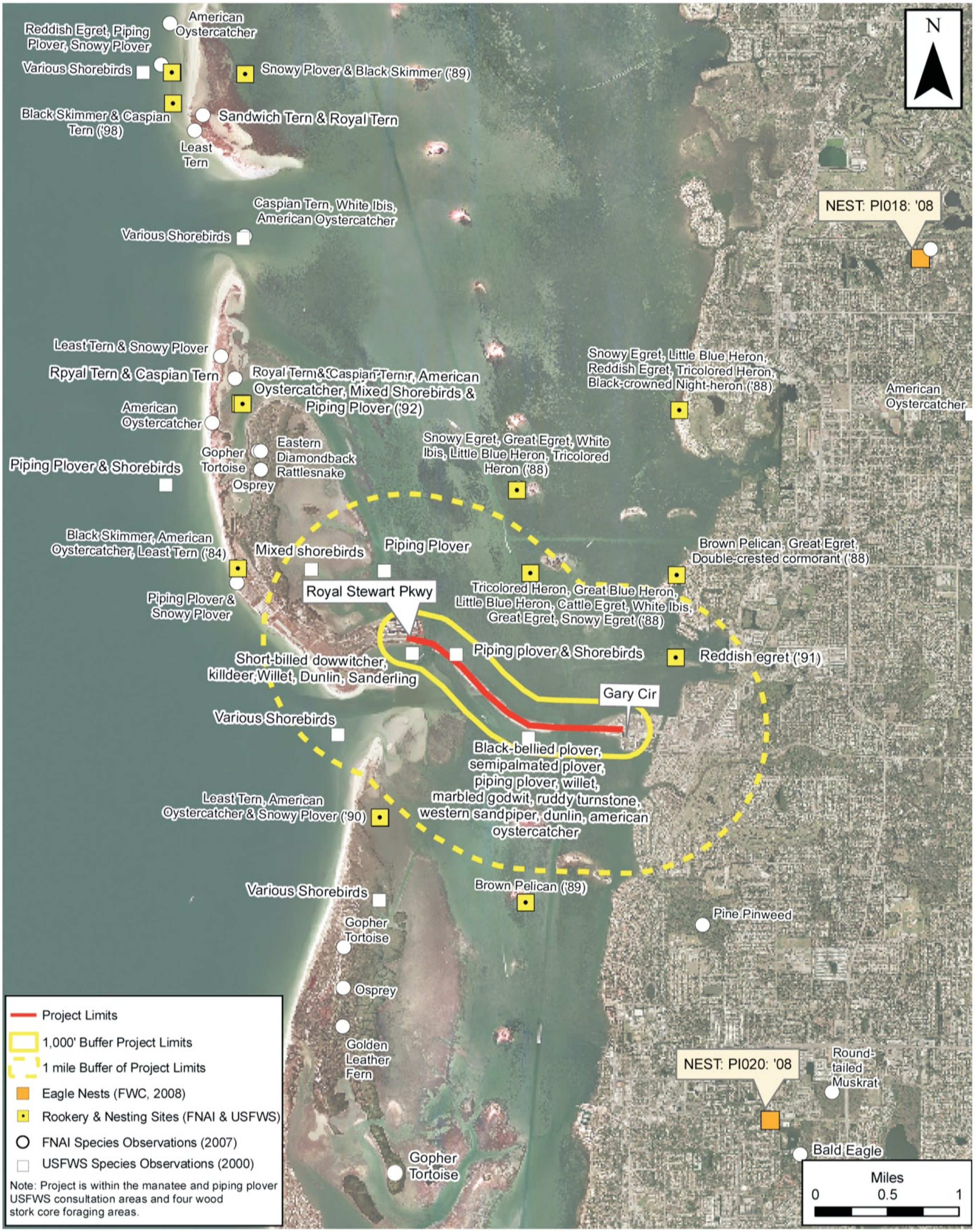
Portions of the causeway and the mainland that are landward of the high marsh zone (approx. >2.26 ft.) are considered upland. Uplands within the study limits consist of the roadway associated vehicular access roads on the causeway. Areas of naturally-occurring vegetation and vegetated landscaping above the high marsh zone are also included in the upland category. Examples of upland vegetation include cabbage palms (*Sabal palmetto*), hawthorn (*Crataegus sp.*), seagrape (*Coccoloba uvifera*), oleander (*Nerium oleander*), seashore paspalum (*Paspalum vaginatum*), beggarticks (*Bidens alba*) and moonflower (*ipomea alba*).

3.4.4 ENDANGERED AND THREATENED SPECIES AND ESSENTIAL FISH HABITAT

HDR reviewed The Florida Natural Areas Inventory (FNAI) "Species and Natural Community Tracking List of Pinellas County" to identify listed species that have the potential to occur within the ecological habitats found along the Dunedin Causeway. An attached Standard Data Report from FNAI identifies element occurrence records of listed species within the vicinity of the Causeway (**Appendix G**). In addition, GIS data from FNAI, US Fish and Wildlife Service (USFWS), and Florida Fish and Wildlife Conservation Commission (FWC) was used to map and identify species element occurrences within the local area and relevant protected species consultation areas (**Figure 3-11**).

HDR environmental scientists performed pedestrian and vehicular surveys in December 2008 and January 2009 to identify habitat and use by listed species along the Dunedin Causeway. Coordination with National Marine Fisheries Service (NMFS) was conducted to identify species which may use Essential Fish Habitat (EFH) along the Causeway (Dave Rydene, NMFS, personal communication, 1/28/09). In addition, correspondence occurred with the staff from Honeymoon Island, City of Dunedin Parks and Recreation, and the Clearwater Marine Aquarium to further assess potential of occurrence of listed

species and use of EFH. Based on the above information a compilation of Federal and State listed species with potential to occur within the vicinity of the Dunedin Causeway was developed (**Table 3-6**).



Pinellas County PUBLIC WORKS — Dunedin Causeway Bridge Replacement Feasibility Study	**DOCUMENTED SPECIES OCCURRENCES**	**FIGURE 3-11**

Table 3-6: Listed Species with Potential for Occurrence within the Project Vicinity

SPECIES COMMON NAME	SPECIES SCIENTIFIC NAME	FEDERAL STATUS	STATE STATUS	POTENTIAL FOR OCCURRENCE
Mammals				
West Indian Manatee	Trichechus manatus	E	E	High
Florida mouse	Podomys floridanus	N	S	Low
Sherman's fox squirrel	Sciurus niger shermani	N	S	Low
Birds				
Wood stork	Mycteria americana	E	E	Low
Piping plover	Charadrius melodus	T	T	Low
Bald eagle	Haliaeetus leucocephalus	N	N	Low
Florida sandhill crane	Grus canadensis pratensis	N	T	Low
Least tern	Sterna antillarum	N	T	High*
Snowy plover	Charadrius melodus	N	T	High*
American oystercatcher	Haematopus palliatus	N	S	High*
Black skimmer	Rynchops niger	N	S	High*
Brown pelican	Pelecanus occidentalis	N	S	High*
Florida burrowing owl	Athene cunicularia floridana	N	S	Low
Little blue heron	Egretta caerulea	N	S	High*
Reddish egret	Egretta rufescens	N	S	High*
Scott's Seaside Sparrow	Ammodramus maritimus peninsulae	N	S	Low
Snowy egret	Egretta thula	N	S	High*
Tricolored heron	Egretta tricolor	N	S	High*
White ibis	Eudocimus albus	N	S	High*
Reptiles				
Green sea turtle	Chelonia mydas	E	E	Low
Hawksbill sea turtle	Eremochelys imbricata	E	E	Low
Kemp's ridley	Lepidochelys kempii	E	E	Low
Leatherback sea turtle	Dermochelys coriacea	E	E	Low
Loggerhead sea turtle	Caretta caretta	T	T	Low
Eastern indigo snake	Dymarchon corais couperi	T	T	Low
Gopher tortoise	Gopherus polyphemus	N	T	Low
American alligator	Alligator mississippiensis	SAT	S	Low
Fish				
Smalltooth sawfish	Pristis pectinata	E	E	Low
Gulf sturgeon	Acipenser oxyrinus desotoi	T	S	Low
Plants				
Florida spiny-pod	Matelea floridana	N	E	Low
Sand butterfly pea	Centrosema arenicola	N	E	Low
Nodding pinweed	Lechea cernua	N	T	Low

E – Listed as Endangered, T- Listed as Threatened, S – Species of Special Concern, SAT – Similarity in appearance to a listed species, N – Not Listed
*Incidental occurrence only, with "Low" potential for nesting or breeding.

Mammals

Manatee

The West Indian Manatee is a federal and state listed endangered species. The project is located within the USFWS West Indian Manatee consultation area. Projects that fall within the consultation area should assess potential impacts to the Manatee and consultation with USFWS should be initiated. Manatees are known to frequent St. Joseph Sound and the Intracoastal Waterway. According to personnel of the Clearwater Marine Aquarium manatees have been observed within 40 to 50 feet of the Dunedin Causeway. Sporadic occurrences of manatee occur within the vicinity of the causeway and may occur at anytime during the year. To ensure that no manatees are harmed during construction, special provisions should be written into the construction contract. The Standard Manatee Construction Conditions (March 1996 or later) should be implemented. If explosives are used in the water to demolish the existing bridge structures, a Blasting Plan and a Watch Program should be submitted to USFWS for approval prior to any blasting activity.

Florida Mouse

The Florida mouse is a state listed species of special concern. FNAI reports that the Florida mouse has the potential to occur near the east end of the Dunedin Causeway. The Florida mouse inhabits xeric upland communities with sandy soils, including scrub, sandhill, and disturbed sites where they inhabit burrows of the gopher tortoise. In the absence of gopher tortoises, Florida mice will dig their own burrows or use those of old field mice. There is likely no suitable habitat within the potential project area for the Florida mouse and it is unlikely that this species will be affected by the project.

Sherman's Fox Squirrel

The Sherman's Fox Squirrel is also a state listed species of special concern. It inhabits sandhills (high pine), pine flatwoods, and pastures and other open, disturbed habitats with scattered pines and oaks. They depend on a variety of oak trees for seasonal food and nest material. Longleaf pine cones and seeds are also important foods. While FNAI reports that the Sherman's fox squirrel has the potential to occur near the east end of the Dunedin Causeway there is likely no suitable habitat within the potential project area, and it is unlikely that this species will be affected by the project.

Birds

An FNAI and USFWS search indicated that two element occurrences of wading bird rookeries have been reported within one mile of the Dunedin Causeway. It was reported that these rookeries contained great

egret, reddish egret, snowy egret, tricolored heron, and white ibis, and were located on coastal islands north of the causeway. A variety of State Listed wading birds (little blue heron, reddish egret, snowy egret, tricolored heron, and white ibis) and shore birds (American oystercatcher, black skimmer, and brown pelican) listed as Species of Special Concern frequent the Dunedin Causeway. However, there is no shorebird nesting reported within a mile of the causeway, and the wading bird rookeries are well beyond 1000 feet of the causeway. Therefore, the project is not anticipated to affect the wading bird rookeries or shore bird nesting.

Additional assessment indicated that the existing vegetational community along the Dunedin Causeway which has minimal tree canopy is not characteristic of potential habitat for the bald eagle. The bald eagle is protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. A search of FNAI element occurrence records, the FWC's Eagle Nest Database, and field reviews identified no existing or recently active eagle nests within the vicinity of the causeway. Therefore, the project is not anticipated to affect the bald eagle's foraging or nesting habitat. However, further assessment and pre-construction surveys would be recommended for wading bird rookeries, shore bird nesting, and bald eagle nests.

Wood Stork

The wood stork is a federally and state listed endangered species. The USFWS designates a 15-mile radius core foraging area (CFA) surrounding wood stork rookeries in the southwest/central Florida area. Wetland impacts within CFA require wood stork foraging mitigation of like hydroperiod to compensate for lost fish biomass. The Dunedin Causeway falls within four CFA's for FWC documented rookeries. However, wood storks forage mainly in shallow water in freshwater marshes, swamps, lagoons, ponds, tidal creeks, flooded pastures and ditches, where they are attracted to falling water levels that concentrate food sources. There are no expected wetland habitat impacts of this type within the potential project area, and there are no documented occurrences of the wood stork within the causeway vicinity. Therefore, no significant adverse affects are anticipated for the wood stork.

Piping Plover

The piping plover is a federally and state listed threatened species. The Dunedin Causeway is located within the USFWS piping plover consultation area. The piping plover may use coastal Pinellas County for wintering habitat. This species normally utilizes outer beaches and tidal sand and mud flats. The Dunedin Causeway is a common place for observing migratory shore birds like the piping plover.

However, the area is not suitable for nesting because of the small area and human activity. Minimal non-disturbed habitat for plovers exists within the causeway vicinity. It is not anticipated that the project will impact or reduce any potential piping plover habitat and should have negligible effect on the species.

Florida Sandhill Crane

The FNAI reports that the Florida sandhill crane has the potential to occur near the east end of the Dunedin Causeway. It is not a federally listed species, but it is listed as threatened by the FWC. The sandhill crane prefers wet prairies, marshy lake margins, low-lying improved cattle pastures, and sparsely vegetated marshes. Suitable foraging and nesting habitat does not occur within the potential project area and therefore the project is unlikely to affect the species.

Least Tern

The least tern is a state listed threatened species. It is a small migratory shore bird found in coastal areas throughout Florida, including beaches, lagoons, bays, and estuaries. They are increasingly found using artificial nesting sites, including gravel rooftops, dredge spoil islands or other dredged material deposits, construction sites, causeways, and mining lands. Nesting areas have a substrate of well-drained sand or gravel and usually have little vegetation. While it is likely that the least tern can be found the along the Dunedin Causeway, it is unlikely for least tern nesting to occur due to the small area and frequent human and urban wildlife activity. It is not anticipated that the project will impact or reduce any potential habitat for the least tern.

Snowy Plover

The snowy plover is also a state listed threatened shore bird. It is a small bird restricted to dry, sandy beaches, where it nests in shallow depressions, usually near some vegetation or debris. It is also found foraging in tidal flats along inlets and creeks. The Dunedin Causeway is frequented by a variety of shorebirds. However, there are no documented occurrences of nesting by the snowy plover along the causeway, and there is no suitable shorebird nesting habitat within the along the causeway in part to frequent human and urban wildlife activity. It is unlikely that the project will have any affect on this species.

Florida Burrowing Owl

The Florida burrowing owl is a state listed species of special concern. FNAI data indicates that the Florida burrowing owl has the potential to occur near the east end of the Dunedin Causeway. The Florida burrowing owl is a small, ground-dwelling owl which inhabits high, sparsely vegetated, sandy ground.

Natural habitats include dry prairie and sandhill. However, they make extensive use of disturbed areas such as pastures, airports, ball fields, parks, school grounds, university campuses, road ROWs, and vacant spaces in residential areas. Suitable habitat for the Florida burrowing owl does not occur along the causeway, and it is unlikely that the project will have any affect on this species.

Scott's Seaside Sparrow

The Scott's seaside sparrow is found in coastal habitats dominated by extensive stands of black needlerush, with smooth cordgrass and scattered areas of saltgrass. It is a state listed species of special concern whose Florida range along the Gulf coast has typically been from Pasco County north to Wakulla County with scattered sites in Franklin County west to St. Vincent Island. However, it has been recently reported in Pinellas County. It is rare for this species to occur in Pinellas County, and there is likely no suitable coastal habitat within the potential project area. Therefore it is unlikely that this project will affect this species.

Reptiles

Sea Turtles

The Atlantic loggerhead turtle is a federal and state listed threatened species. Adults may be found in any coastal waters in Florida. It nests extensively on ocean beaches, particularly in southern Florida, and juveniles and adults utilize inshore habitats such as bays and lagoons. The potential exists for juveniles or adults to use estuarine habitats, similar to those within the vicinity of the Dunedin Causeway. However, there are no documented occurrences of the loggerhead turtle near the causeway and its occurrence is not anticipated. Special provisions however should be employed during the construction phase of the project to prevent harm to any marine turtles (**Appendix G**). There are four other federal and state listed endangered sea turtles that could also occur in the Intracoastal Waterway, the Atlantic green turtle, the hawksbill sea turtle, the leatherback sea turtle, and the Kemp's ridley turtle. The special provisions mentioned above should apply to all marine turtles.

Eastern Indigo Snake

The eastern indigo snake is a federal and state listed threatened species. FNAI reports that it has the potential to occur within the vicinity of the Dunedin Causeway. However, there have been no documented occurrences near the causeway. The eastern indigo snake generally requires very large tracts to survive. Although the upland area at the coastline may be characteristic of the type of habitat sometimes utilized by the indigo, these areas are too small and fragmented to provide habitat for this

snake. Therefore, the probability of the eastern indigo snake occurring within the potential project area is low; and the project is unlikely to affect the species or its habitat. However, it is recommended that Standard Protection Measures for the Eastern Indigo Snake be incorporated into construction plans.

Gopher Tortoise

The gopher tortoise is listed as threatened by the FWC. The gopher tortoise is typically found in dry upland habitats, including sandhills, scrub, xeric oak hammock, and dry pine flatwoods. They also commonly use disturbed habitats such as pastures, old fields, and road shoulders. The gopher tortoise excavates deep burrows for refuge. During field surveys the gopher tortoise was not observed along the Dunedin Causeway and no habitat with the potential to support the species was identified along the causeway. However, a comprehensive pre-construction survey for tortoises and their burrows should occur prior to any construction activity. If the gopher tortoise or tortoise burrows are identified during construction, coordination with the FWC will be required. According to new guidelines (September 2007), this will require coordination for a relocation permit.

American Alligator

The American alligator is not likely to be found in the potential project area, because the saltwater habitats are not preferred by this species.

Fish

Smalltooth Sawfish

The smalltooth sawfish is a federal and state listed endangered species. The smalltooth sawfish is a large, ray-like fish usually found in shallow coastal waters very close to shore over muddy and sandy bottoms. They are often found in sheltered bays, on shallow banks, and in estuaries or river mouths. The current range of this species has been reduced to peninsular Florida. They are relatively common only in the Everglades region at the southern tip of the state. Proposed critical habitat for the smalltooth sawfish consists of two locations, the Charlotte Harbor Estuary and the Ten Thousand Islands/Everglades. The occurrence of the smalltooth sawfish within St. Joseph Sound is rare. It is unlikely that the project will affect the smalltooth sawfish, however, provisions for its protections should be included in a Biological Assessment, and provisions should be written into the construction contract to ensure its protection during construction. If bridge demolition is expected to involve explosives smalltooth sawfish protection provisions should be written into the Blasting Plan. This species would be addressed in the EFH Report.

Gulf Sturgeon

The gulf sturgeon is federally listed as threatened and is listed as a species of special concern by the FWC. The gulf sturgeon is generally found in Florida's Gulf coastal waters, foraging in the Gulf and associated estuaries and spawning in major coastal rivers. Non-breeding animals have been observed in Tampa Bay, however there is a low potential for the species within the Intracoastal Waters of the Dunedin Causeway. Though it is unlikely for the sturgeon to be found in the potential project area, provisions for protection of the sturgeon should be included in a Biological Assessment. To ensure that no sturgeon is harmed during construction, special provisions should be written into the construction contract and addressed in the Blasting Plan if bridge demolition is expected to involve explosives. This species would be addressed in the EFH Report.

Plants

Florida Spiny-pod

Florida spiny-pod is a state listed endangered species. While FNAI reports it as having the potential to occur near the east end of the Dunedin Causeway it is very unlikely. It is found growing in hammock communities which does not exist within along the causeway. Pinellas County is not included in this species geographical range for Florida. It is unlikely that this project will affect this species or its habitat.

Sand Butterfly Pea

The sand butterfly pea is a state listed endangered species. It is a perennial vine found in sandhill, scrubby flatwoods, and dry upland woods. FNAI reports that this species has the potential to occur within the vicinity of the Dunedin Causeway. However, no suitable habitat likely exists within the potential project area and it is unlikely that this species will be affected by the project.

Nodding Pinweed

Nodding pinweed is a state listed threatened species. It is found growing in scrub habitats. FNAI reports that the nodding pinweed has the potential to occur near the east end of the Dunedin Causeway. However, there is no suitable habitat within the potential project area and it is unlikely that the project will affect this species.

Essential Fish Habitat

All wetland communities (subtidal and intertidal) found along the causeway and mainland fringes are designated as Essential Fish Habitat by the National Marine Fisheries Service (NMFS). This designation

will require coordination with NMFS during the environmental permitting process to ensure that mitigation strategies to compensate for unavoidable wetland impacts meet with federal approval.

The estuarine wetlands of St. Joseph Sound are designated EFH for juvenile and adult brown shrimp (*Penaeus aztecus*), gray snapper (*Lutjanus griseus*), gulf stone crab (*Menippe adina*), pink shrimp (*Penaeus duorarum*), red drum (*Sciaenops ocellatus*), Spanish mackerel (*Scomberomorus maculates*), spiny lobster (*Panulirus argus*), stone crab (*Menippe mercenaria*), and white shrimp (*Penaeus setiferus*).

Adult brown shrimp are most abundant in offshore waters less than 180 ft (55 m) deep on soft muddy bottoms and can be found on bottoms consisting of mud, sand, and/or silt. Spawning occurs offshore in depths greater than 45ft (14 m) and appears to be correlated with bottom temperatures between 17 and 29 degrees Centigrade. Data suggests brown shrimp postlarvae are omnivorous and spend the winter in offshore bottom sediments and migrate into estuaries in the spring. Nursery areas are generally dominated by smooth cordgrass (*Spartina alterniflora)*. Juvenile and adult brown shrimp move back offshore by winter. These cordgrass-dominated nurseries do not exist in the potential impact areas of the project. Very slight construction-related and fill impacts will occur to vegetated unconsolidated shoreline and seagrass beds. Potential brown shrimp impacts are expected to be minimal and localized to the area of construction.

Gray snapper habitat is variable including irregular bottom area offshore. The species is also found over smooth bottom near sea grass beds and mangrove thickets. Adults spawn in the summer in shallow water. They feed on fish, shrimp and other crustaceans and feed in grass flats in late afternoon and evening. Very slight construction-related and fill impacts will occur to vegetated unconsolidated shoreline and seagrass beds. Potential gray snapper impacts are expected to be minimal and localized to the area of construction.

The Florida stone crabs are found in estuaries and shallow water areas, but they have size-specific shelter limitations (body-sized cavities and ledges). The female produces eggs from spring to fall, spawning through five larval stages in estuaries. Juveniles are omnivores feeding on mollusks, crustaceans, flatworms and vegetative matter. Due to shelter requirements, stone crabs are not generally found in openly exposed estuarine waters, however suitable stone crab habitat does exist along the Dunedin Causeway around the bridge abutments and the rocks, boulders, and abandoned bridge pilings along the causeway. Minimal potential stone crab impacts are expected.

Pink shrimp tend to favor hard bottom (calcareous shell) in water depths of 36-121 ft (11-37 m). Spawning generally occurs inshore at 12-52 ft (4-16 m) with temperatures ranging from 17 to 29 degrees Centigrade. These postlarvae migrate to smooth cordgrass (*Spartina alterniflora)* dominated nurseries in late spring and early summer. The large pink shrimp begin leaving the estuary in late summer for offshore waters. Pink shrimp are the dominant species in Florida Bay. Their favored cordgrass-dominated nurseries do not exist in the potential impact areas of the project. Very slight construction-related and fill impacts will occur to vegetated unconsolidated shoreline. Potential pink shrimp impacts are expected to be minimal and localized to the area of construction.

Red drum adults and juveniles prefer shallow bay bottoms or oyster reef substrates in waters of 165 ft (50 m) or less. Red drum adults spawn in high salinity estuaries (salinity range 25-35 ppt), inlets, or passes along beaches in the late summer with water temperatures of 22-30 degrees Centigrade. Eggs and larvae are transported into estuarine systems by the current. Juveniles prefer grassy to muddy bottoms. They use progressively higher salinity ranges as the larvae develop into juveniles and adults. Very slight construction-related and fill impacts will occur to vegetated unconsolidated shoreline and seagrass beds. Potential red drum impacts are expected to be minimal and localized to the area of construction.

Spanish mackerel occurs in fast moving schools in warm water. A sub population exists in the Gulf. They force schools of small fish into bundles for feeding, also feeding on squid. They are found over grass beds and reefs when water temperatures drop below 21 degrees Centigrade, primarily in open water channels connecting estuarine water to marine passage. They spawn offshore, and migrate northward in the spring. Very slight construction-related and fill impacts will occur to vegetated unconsolidated shoreline and seagrass beds associated with the shallow waters of the project area. Potential Spanish mackerel impacts are expected to be minimal and localized to the area of construction

The Florida spiny lobster is located in and around the coastal waters of Florida. Its diet is varied, consisting primarily of scavenged carrion but also feeding on small mollusks, other crustaceans, and sea vegetation. Adults mate from March to June. These lobsters are primarily nocturnal, hiding during the day under ledges. They are deep-water creatures inhabiting reefs and hard bottom. The existence of suitable habitat does not occur in the proposed limits of construction. The spiny lobster is not expected to be impacted.

Adult white shrimp favor highly organic muddy/peaty bottom types. In Florida, spawning usually takes place offshore beginning in April in 20-80 ft (6-24 m) of water with temperature ranges of 17 to 29

degrees C. Some inshore spawning does occur at or near inlets. The white shrimp postlarvae have a spring migration to smooth cordgrass (*Spartina alterniflora)* dominated nurseries. Large white shrimp leave the estuary in late summer for offshore waters while smaller shrimp may remain in the estuary throughout the winter. These shrimp tend to grow rapidly in late winter and early spring before migrating offshore. These cordgrass-dominated nurseries do not exist in the potential impact areas of the project. Very slight construction-related and fill impacts will occur to vegetated unconsolidated shoreline and seagrass beds. Potential white shrimp impacts are expected to be minimal and localized to the area of construction.

Conclusions and Recommendations

Preliminary field reviews of the project corridor identified no federally listed species. Data searches and pedestrian surveys should be conducted as the basis of a Biological Assessment to determine the potential for listed species to be affected by the project. Concurrence of effect should be coordinated with USFWS.

The West Indian Manatee is the only federal-listed species that has a moderate to high probability of occurring within the project area. The FNAI search did not identify element occurrences of manatee along the Dunedin Causeway, and no manatee aggregation sites were identified in the vicinity of the causeway, there is a potential for occurrence.

To ensure that no manatees, marine turtles, smalltooth sawfish, or sturgeon are harmed during construction, special provisions should be written into the construction contract. The Standard Manatee Protection - Construction Conditions and Blasting Conditions (March 1996 or later) and the Construction Special Provisions – Sturgeon Protection Guidelines should be implemented. If explosives are used in the water to demolish the existing bridge structures, a Watch Program for the manatee should be submitted to the FWC at least 30 days prior to the proposed date of the blast for approval prior to any blasting activity. Sturgeon and sawfish protection guidelines should be coordinated with the NMFS and USFWS. In addition, best management practices should be used during the construction of this project.

Estuarine wetland habitats within the project study area including submerged subtidal seagrass beds/meadows, intertidal saltwater marshes, and intertidal flats are designated EFH by NMFS. Potential minimal construction-related impacts should be addressed as impacts to wetlands and EFH. Impacts may be primarily temporary, construction-related impacts and shading impacts (though higher bridge height may reduce overall shading impacts). The construction of the Dunedin Causeway Bridge may result in

shading impacts to seagrass, minimal seagrass fill, marsh and tidal flat shading, and marsh and tidal flat fill. Very slight construction-related and fill impacts may occur to vegetated unconsolidated shoreline and sea grass beds. Preliminary identification of EFH impacts has been determined during this Feasibility Study. An EFH Report would identify and quantify impacts, and a mitigation plan would be developed and coordinated with NMFS, the Southwest Florida Water Management District, and the US Army Corp of Engineers.

Construction of this new bridge, adjacent to the existing alignment, will occur within the existing ROW. Construction-related impacts will likely occur only to disturbed, moderate quality EFH areas. There is the potential for minor temporary impacts to these previously disturbed areas. Though minimized to the extent feasible, temporary impacts will likely result from removal of the old bridge and potentially, blasting may occur. Potential EFH impacts are expected to be minimal and localized to the area of construction. Final determination of direct, secondary and cumulative impacts would be determined during the permitting process in the final design phase of the proposed project.

A mitigation plan for minimal unavoidable impacts to EFH should be approved by NMFS to satisfy the consultation procedures outlined in 50 CFR Section 600.920, of the regulation to implement the EFH provisions of the Magnuson-Stevens Act. There are potential mitigation opportunities within the vicinity of the project, including restoring large boat propeller scars via a seagrass sediment tube restoration technique utilizing natural recruitment or seagrass planting and estuarine marsh habitat and tidal channel creation. In addition, interpretive signage and seagrass signs could be incorporated for public education. Mitigation restoration and creation may have to be qualitatively/quantitatively monitored for success.

3.4.5 AQUATIC PRESERVES AND OUTSTANDING FLORIDA WATERS

The sovereign submerged lands of St. Joseph Sound are part of the Pinellas County Aquatic Preserve, which was established in March 1972. In 1975, the State of Florida enacted the Aquatic Preserve Act to establish a standard of management criteria to protect and preserve the exceptional aesthetic, biological and scientific values for future generations.

As a result of its designation as an Aquatic Preserve, the waters of St. Joseph Sound were classified as an Outstanding Florida Water (OFW) in March 1979, and as such, are afforded the highest level of protection by the state. By statute, no degradation of water quality may occur within an OFW as a result of proposed activities associated with the bridge replacement.

3.4.6 CULTURAL AND ARCHEOLOGICAL RESOURCES

Two bridges and a causeway comprise the built resources in the immediate project area. A bascule bridge structure (FDOT Bridge No.150068) spans the Intracoastal Waterway portion of St. Joseph Sound. A low level fixed bridge structure (Bridge No. 150067), which functions as a relief structure, spans St. Joseph Sound between the Dunedin Causeway and Honeymoon Island. Dunedin Causeway is a made land feature, fill for which appears to have been dredged from the adjoining bay bottom. All three features were constructed in 1963-1964 and are therefore not considered historical resources at this time.

A review of the Florida Master Site File determined that no recorded archaeological sites or historic structures are located within 4000 feet of the project limits. Although the project area has not been subjected to a cultural resource assessment survey, surveys were performed in past decades to the immediate west, east, and south of the project area. To the west, Honeymoon Island State Park was surveyed for archaeological sites in 1979 (Baker 1979). No archaeological sites were documented at or in the vicinity of the island's eastern shore at the landfall of the relief bridge. The mainland portion of Dunedin was included in a county-wide cultural resource survey (Austin et al. 1991). Immediately south of the Dunedin Causeway, a survey for submerged cultural resources was conducted in association with proposed improvements to the Hurricane Pass navigation channel (Hall 2000). The survey detected three magnetic anomalies south and southwest of Honeymoon Island, west of the project area. There are no known historic structures on the causeway, the eastern tip of Honeymoon Island, or on the mainland immediately east of the main bridge. In summary, no known cultural resources are located within or adjacent to the project area.

Given the recent construction date for the two bridge structures and the Dunedin Causeway, no historic structures will be affected by the proposed bridge replacements.

3.4.7 PERMITTING REQUIREMENTS

Potential impacts to seagrasses, intertidal wetlands, or open-water associated with the proposed bridge replacements will be regulated by the Southwest Florida Water Management District (SWFWMD) and the U.S. Army Corps of Engineers (USACE). In addition to environmental permitting agencies, a permit from the U.S. Coast Guard (USCG) will be required for the project.

An Environmental Resource Permit (ERP) will be required from SWFWMD to permit potential environmental impacts, mitigation strategies, and to satisfy state water-quality criteria. The SWFWMD will coordinate with other state regulatory agencies who are obligated to review and comment on ERP

applications. SWFWMD will seek comments from the Florida Fish and Wildlife Conservation Commission (FFWCC) to ensure that the project will not result in adverse impacts to state-listed species. SWFWMD will require the future contractor to follow the Standard Manatee Protection Guidelines (FFWCC) and utilize "turtle friendly" lighting systems during construction to avoid adverse impacts to these species.

SWFWMD will also solicit comments from the Florida Division of Historical Resources (DHR) to ensure that the project will not adversely impact cultural and archeological resources prior to issuance of the ERP. SWFWMD will also coordinate with the Florida Department of Environmental Protection (FDEP) to determine if a State Submerged Lands (SSL) lease will be required for the bridge replacements. At this time it appears that all proposed work will be confined to submerged lands that fall under County ownership and not require a new lease agreement with FDEP.

The USACE will require a Section 404 Dredge and Fill Permit to authorize potential environmental impacts associated with the roadway portions of the project and bridge abutments. The Section 404 permit will also authorize any mitigation plan that compensates for unavoidable wetland impacts. The USACE will solicit comments from the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) regarding the presence and potential impacts to federally-protected species. The USACE must receive State Water Quality Certification from SWFWMD before issuing the Section 404 Permit.

A bridge permit from the USCG is required for the new construction, navigational modification or replacement of any bridge over navigable waters of the United States. The USCG will review and authorize the bridge replacements pursuant to Section 9 of the Rivers and Harbors Act of 1899. The USCG will solicit comments and opinions from the NMFS and the U.S. Environmental Protection Agency (USEPA) regarding the potential for biological impacts and water-quality issues.

3.5 CONTAMINATION SCREENING EVALUATION

3.5.1 LAND USES

Current land use was characterized by the City of Dunedin Land Use Map as residential high, residential medium, and recreation/open space which were verified during the field review. The eastern portion of the corridor is residential medium, the causeway is recreation/open space and the western portion of the corridor is residential high. Future land use along the corridor is consistent with the current land use.

Historical Land Uses - Aerial Photograph Review

Historical land use observations are based on a review of historic aerial photographs from the corridor for the years 1926, 1942, 1951, 1957, 1965, 1973 and 1980. The aerial photograph review provided a history of corridor land use and, most importantly, visual evidence of land use that may indicate a potential for adverse environmental impacts along the corridor.

- In the 1926, 1942, 1951, and 1957 aerial photographs, the Dunedin Causeway did not exist. Additionally there is very little to no development in the eastern area of the current corridor where the corridor makes landfall.
- The 1965 aerial photographs show the Dunedin Causeway for the first time. There is very little development on the eastern end of the corridor and no development at all on Honeymoon Island.
- In the 1973 aerial photographs development has increased in the eastern portion of the corridor and Royal Stewart Arms is first noted.
- The 1980 aerial photographs revealed Royal Stewart Arms, Honeymoon Island, the Dunedin Causeway, and the eastern portion of the corridor much as it was observed during the filed review.

3.5.2 HYDROGEOLOGIC FEATURES

Regional Geology

The corridor is located on the Gulf Coastal Lowlands physiographic province of west central Florida. The groundwater table is at or near the land surface throughout the corridor. Surface and near surface sediments in Pinellas County consist of unconsolidated quartz sand, clays, marl, limestone and dolomite. These sediments range in age from Early Miocene to Holocene.

Regional Topography

The United States Geological Survey (USGS) found that topographic elevations in the area of the corridor range from less than five-feet to less than ten-feet national geodetic vertical datum (NGVD). The topography along the corridor is relatively flat.

Surface Water

St. Joseph Sound is located adjacent to both sides of the corridor. The Gulf of Mexico is located to the west of the project corridor. No other surface water bodies were identified during the investigation.

Geotechnical Data

The U.S. Department of Agriculture Soil Conservation Services Soil Survey of Pinellas County, Florida, soils classification map (issued September 1972) indicates that the soil type in the corridor consist of Made Land. The Made Land soil map unit consists of mixed sand, clay, hard rock, shells, and shell fragments that have been transported and reworked, and leveled by earth moving equipment. Many areas consist of material that has been dredged from the bay and used to fill diked areas. Rocks ½ in to 12 inches in diameter are common. Made Land occurs mainly in urban areas, along the coast and keys, and as manmade islands built in shallow water. In coastal areas it has been built up to provide desirable locations for residential developments.

3.5.3 METHODOLOGY

Site Reconnaissance

HDR conducted a field review of the project corridor in order to verify information obtained from the regulatory file and historical aerial photographs reviews (discussed previously); as well as to identify other potential environmental conditions in the corridor.

Regulatory Review

A regulatory review (records search) of federal and state environmental records was conducted in March 2009. The records reviewed include information compiled by the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP). Environmental Data Management Inc. (EDM) of Largo, Florida conducted a database search of potential hazardous and petroleum sites within the corridor. A copy of this report is included in **Appendix C**. The following USEPA and FDEP data base listings were reviewed:

- National Priorities (Superfund) List (NPL);
- Comprehensive Environmental Response, Compensation, and Liability Information List (CERCLIS);
- Archived CERCLIS Sites (NFRAP);
- Emergency Response Notification System List (ERNS);
- Resource Conservation and Recovery Information System (RCRIS) Handlers with Corrective Action (CORRACTS);
- Resource Conservation and Recovery Act (RCRA) – Treatment, Storage and/or Disposal Sites (TSD);

- RCRA – Large Quantity Generators, Small Quantity Generators, Categorically Exempt Small Quantity Generators and Transporters (NONTSD);
- Tribal Tanks List (TRIBLTANKS);
- Tribal Lust List (TRIBLLUST);
- Brownfields Management System (USBRWNFLDS);
- State NPL Equivalent (STNPL);
- State CERCLIS Equivalent (STCERC)
- Solid Waste Facilities List (SLDWST);
- Underground/Aboveground Storage Tanks List (TANKS);
- Leaking Underground Storage Tanks List (LUST);
- State Designated Brownfields List (BRWNFLDS);
- State Voluntary Cleanup List (VOLCLNUP);
- State Institutional and/or Engineering Controls (INSTENG); and
- State Dry Cleaners List (DRY).

3.5.4 PROJECT IMPACTS

Findings developed through historical and regulatory searches, as well as corridor inspections by the assessment team are summarized in this Section. Results of the environmental screening were factored into the “current on-site conditions” category of the risk analysis.

Sites were ranked in accordance with Chapter 22 of the PD&E manual, summarized below:

- **None** – 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 indicates 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 that identify known soil and/or water contamination and that the problem does not need remediation, is being remediated (i.e., air stripping of ground water, etc.), or that continued monitoring is required. The complete details of

remediation requirements are important to determine what must be done 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. A recommendation must be included for what further assessment is required. Properties that were previously used as gasoline stations and have not been evaluated or assessed would probably receive this rating.

Project Impacts

The corridor screening evaluation resulted in no sites ranked High, Medium or Low. Two sites, Marker 1 Marina and Royal Stewart Arms were ranked as a "None" risk ranking. Marker 1 Marina was ranked "None" as it has received a No Further Action from the FDEP and the distance from the corridor. Royal Stewart Arms was ranked "None" given the time since the underground storage tank (UST) was removed from the site, 1992, the distance from the corridor and that no UST is currently located on the site.

3.5.5 RECOMMENDATIONS

Based on a review of the regulatory files, historical aerial photographs and the site visit, two sites along the corridor have a "None" risk ranking potential for contamination issues. As the process moves forward a revisiting of the regulatory files and site inspection should be performed. Also an asbestos survey should be performed prior to the demolition of either structure.

It should be noted that all but the most extensive investigation could fail to identify a buried, covered-over, or localized subsurface event of toxic or hazardous waste or uncontrolled dumping within the study area that is not visible at the ground surface. This report is also limited to the information available at the time the field inspections and agency file searches were performed.

3.6 OTHER CONSIDERATIONS

3.6.1 CITY OF DUNEDIN MASTER PLAN

The Dunedin Causeway Master Plan, developed by the City of Dunedin Leisure Services Department and Robert P. Resch, III – Architect in 2005.

This Master Plan was developed to provide a road map for improvements to the Dunedin Causeway and to address various issues presented during the public input process. The key recommendations of the Master Plan were the following:

- Address jurisdictional issues with a joint resolution of the City of Dunedin and Pinellas County, declaring the Causeway a waterfront linear recreation area and referring to an inter-local agreement to delineate responsibilities.
- Develop an inter-local agreement to delineate City and County responsibilities for improvements, operation and maintenance of the Causeway.
- Create a single one-way (no asphalt) drive lane for off road traffic, with delineated parking spaces for the various recreational uses.

There were additional recommendations of the Master Plan, however, the ones listed are the key items impacted by construction of replacement bridges within alternative alignments.

The Master Plan was meant to address jurisdictional issues, beautification needs, maintenance needs, and address existing and future use needs. The Master Plan suggested to manage off-road traffic by creating a one-way drive along the perimeter of the Causeway, adding a traffic light to allow ingress and egress of off-road vehicles as well as provide picnic tables, landscaping, restroom facility and beach re-nourishment.

It is our understanding that a formal agreement or adoption of the Master Plan between the City of Dunedin and Pinellas County has not occurred. There were no discussions, coordination or involvement by the City of Dunedin or the public in the development of this Feasibility Study. For purposes of this Feasibility Study, the City of Dunedin Master Plan is acknowledged, but it was not a factor in determining how it would be impacted by the various alignments and profiles considered. It is suggested that when the project moves forth into the Preliminary Design Phase, coordination with the City of Dunedin should occur in finalizing the proposed bridge replacement alignment and profile.

Section 4 Design Controls and Standards

4.1 DESIGN STANDARDS

The primary design standards used in developing the project concepts are the 2009 edition of FDOT Plans Preparation Manual, the 2007 edition of Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, Commonly known as the "Florida Greenbook", the 2004 edition of AASHTO A Policy on Geometric Design for Streets and Highways, and applicable Pinellas County standards.

4.2 DESIGN CONTROLS

Causeway Boulevard is part of Pinellas County road system and designated as County Road 712 (C.R. 712) within the study limits. It is functionally classified as an “urban minor arterial” by the FDOT and Pinellas MPO and approved by the Federal Highway Administration (FHWA).

The design speed used in developing the concept plans is 40 mph. This design speed was selected based on several factors, including original design speed, existing posted speed limits, functional classification, and roadside characteristics, etc. Judging from the existing horizontal alignment and adopted superelevation rates, the original design speed was 40 mph. The existing causeway has a posted speed limit of 35 mph and seemingly is providing a comfortable driving environment to the public. There are no convincing reasons to change the existing posted speed limit. A design speed of 5 mph greater than the expected posted speed is adopted as the design speed.

4.3 ROADWAY DESIGN CRITERIA

Two sets of design criteria were prepared and shown in **Table 4-1**. The first set of design criteria is prepared based on the Florida Greenbook, since Causeway Boulevard is part of Pinellas County road system. Considering the nature of this Feasibility Study, a second set of design criteria is prepared based on the FDOT Plans Preparation Manual. These criteria are the minimum values that could be used on the project, and as a good engineering practice, improved design values should be adopted in the design.

Table 4-1: Design Criteria

Design Element	FDOT P.P.M. Criteria	Florida Greenbook Criteria	Values Adopted In Study
Functional Classification	Urban Collector	Urban Collector	Urban Collector
Basic No. of Lanes	2 (1 in each direction)	2 (1 in each direction)	2
Design Speed	40 mph	40 mph	40 mph
Lane Widths	11 ft	11 ft	12 ft
Minimum Sidewalk Width	5 ft	4 ft	5 ft
Minimum Bike Lane Width	4 ft	4 ft	5 ft
Minimum Shared Use Path Width	12 ft	10 ft	12 ft
Shoulder Width on Bridge	8 ft	n/a	10 ft
Maximum Profile Grade - Roadway	9%	9%	5% (High Level)
Maximum Profile Grade - Sidewalk & Path	5%	5%	5% (High Level)
Minimum Length of Crest Vertical Curves	3V = 120 ft	3V = 120 ft	1200 ft (High Level)
Minimum Length of Sag Vertical Curves	3V = 120 ft	3V = 120 ft	350 ft (High Level)
Maximum Superelevation	0.05	0.05	0.05

Design Element	FDOT P.P.M. Criteria		Florida Greenbook Criteria		Comment
	Minimum Value	Source	Minimum Value	Source	
Functional Classification	Urban Collector		Urban Collector	Section C.2, Chapter 1	
Basic No. of Lanes	2 (1 in each direction)	2025 Long Range Transportation Plan	2 (1 in each direction)	2025 Long Range Transportation Plan	2025 Cost Feasible Plan shows this facility being a two lane undivided.
Design Vehicle	WB-62FL	P.P.M. Volume I Section 1.12 Jan. 2009	WB-50	Section C.2, Chapter 3	
Design Year	N/A		N/A		
Design Speed (mph)	40	5 mph above existing posted speed	40	35 mph recommended minimum design speed, Table 3-1	

Design Element	FDOT P.P.M. Criteria		Florida Greenbook Criteria		Comment
	Minimum Value	Source	Minimum Value	Source	
Lane Widths (ft)	11 (see comment)	P.P.M. Volume I Table 2.1.1 Jan. 2009	11	Table 3-7	12 ft in industrial areas when ROW is available
Minimum Sidewalk Width (ft)	5 (with buffer strip)	P.P.M. Volume I Section 8.3.1 Jan. 2009	4	Section C.10.a.3, Chapter 3	
Minimum Bike Lane Width (ft)	4	P.P.M. Volume I Table 2.1.2 Jan. 2009	4	Section C.10.b, Chapter 3	Urban area
Minimum Shared Use Path Width (ft)	12	P.P.M. Volume I Section 8.6.2 Jan. 2009	10	Section C.2, Chapter 9	Two-way operation
Typical Roadway Cross Slopes (ft/ft)	0.02	P.P.M. Volume I Figure 2.1.1 Jan. 2009	0.02	Section C.7.b.2, Chapter 3	
Cross Slope (ft/ft) on Bridge Deck	0.02	P.P.M. Volume I Section 2.1.5 Jan. 2009	n/a		
Typical Shoulder Cross Slope (ft/ft) (flush shoulder)	0.06	P.P.M. Volume I Table 2.3.4 Jan. 2009	Min. 0.03 Max. 0.08	Section C.7.c.2, Chapter 3	
Median Width (ft)	12 (see comment)	P.P.M. Volume I Table 2.2.1 Jan. 2009	Not required	Section C.7.e, Chapter 3	Intended for paved and painted left turns
Shoulder Width (ft) on Bridge	8	P.P.M. Volume I Figure 2.0.2 Jan. 2009	n/a		Low volume, Undivided, Collectors
Shoulder Width (ft) without Shoulder Gutter	8 with 5 paved	P.P.M. Volume I Table 2.3.4 Jan. 2009	6	Section C.7.c.1	2-lane undivided collector, low volume
Shoulder Width (ft) with Shoulder Gutter	13.5 with 6 paved	P.P.M. Volume I Table 2.3.4 Jan. 2009	6	Section C.7.c.1	2-lane undivided collector, low volume

<table>
<tr><th rowspan="2">Design Element</th><th colspan="3">FDOT P.P.M. Criteria</th><th colspan="2">Florida Greenbook Criteria</th><th rowspan="2">Comment</th></tr>
<tr><th>Minimum Value</th><th colspan="2">Source</th><th>Minimum Value</th><th>Source</th></tr>
<tr><td>Cross Slope: Maximum algebraic difference between edge of pavement and shoulder in (%)</td><td>7</td><td colspan="2">P.P.M. Volume I Figure 2.3.1 Jan. 2009</td><td>7</td><td>Section C.7.c.2, Chapter 3</td><td></td></tr>
<tr><td>Roadside Slopes: Front Slopes (without curb and gutter)</td><td>0 ft-5 ft Height of fill

5 ft-20 ft Height of fill</td><td>1:6, where ROW is insufficient, 1:6 to edge of clear zone then 1:3

1:6 to edge of clear zone then 1:3, where ROW is insufficient, 1:6 to edge of clear zone then 1:2</td><td>P.P.M. Volume I Table 2.4.1 Jan. 2009</td><td>1:4 or flatter, not be steeper than 1:3 within clear zone</td><td>Section C.7.f.2, Chapter 3</td><td>Urban Collector</td></tr>
<tr><td>Roadside Slopes: Front Slopes (with curb and gutter)</td><td>All Height of fill</td><td>1:2 or to suit property owner, not flatter than 1:6.</td><td>P.P.M. Volume I Table 2.4.1 Jan. 2009</td><td>1:4 or flatter, not be steeper than 1:3 within clear zone</td><td>Section C.7.f.2, Chapter 3</td><td></td></tr>
<tr><td>Roadside Slopes: Back Slopes (without curb and gutter)</td><td>All Height of fill</td><td>1:4 when ROW permitted, or 1:3</td><td>P.P.M. Volume I Table 2.4.1 Jan. 2009</td><td>1:4 desirable, not be steeper than 1:3 within clear zone</td><td>Section C.7.f.2, Chapter 3</td><td></td></tr>
</table>

Design Element	FDOT P.P.M. Criteria Minimum Value	FDOT P.P.M. Criteria Source		Florida Greenbook Criteria Minimum Value	Florida Greenbook Criteria Source	Comment
Roadside Slopes: Back Slopes (with curb and gutter)	All Height of fill	1:2 or to suit property owner, not flatter than 1:6.	P.P.M. Volume I Table 2.4.1 Jan. 2009	1:4 or flatter, not be steeper than 1:3 within clear zone	Section C.7.f.2, Chapter 3	
Roadside Slopes: Transverse Slopes	All Height of fill	1:4	P.P.M. Volume I Table 2.4.1 Jan. 2009	n/a		
Border Width (ft) (with flush shoulder)	33	P.P.M. Volume I Table 2.5.1 Jan. 2009		n/a		
Border Width (ft) (with curb and gutter)	12	P.P.M. Volume I Table 2.4.2 Jan. 2009		n/a		Travel lane at curb and gutter
Maximum Profile Grade (%) (Roadway)	9	P.P.M. Volume I Table 2.6.1 Jan. 2009		9	Table 3-4	Collector, urban area, flat terrain
Maximum Profile Grade (%) (Sidewalk & Shared use path)	5	P.P.M. Volume I Section 8.3.1, 8.6.4 Jan. 2009		5	Section C.10.a.3, Chapter 3	Based on ADA requirements
Roadway Base Clearance (ft)	1	P.P.M. Volume I Table 2.6.3 Jan. 2009		n/a		
Maximum change in grade without vertical curve (%)	0.80	P.P.M. Volume I Table 2.6.2 Jan. 2009		0.80	Table 3-5	

Design Element	FDOT P.P.M. Criteria		Florida Greenbook Criteria		Comment
	Minimum Value	Source	Minimum Value	Source	
Minimum Profile Grade for Curb & Gutter Sections (%)	0.3	P.P.M. Volume I Table 2.6.4 Jan. 2009	0.3	Section C.5.b, Chapter 3	
Minimum Distance between VPIs (ft) For Curb and Gutter Section	250	P.P.M. Volume I Table 2.6.4 Jan. 2009	n/a		
Minimum Stopping Sight Distance (ft) (grade≤ 2%)	305	P.P.M. Volume I Table 2.7.1 Jan. 2009	305	Table 3-6	
Maximum Deflection without Horizontal Curve	2° 00 ft	P.P.M. Volume I Table 2.8.1a Jan. 2009	n/a		
Desirable Length of Horizontal Curve (ft)	15V = 600	P.P.M. Volume I Table 2.8.2a Jan. 2009	n/a		
Minimum Length of Horizontal Curve (ft)	400	P.P.M. Volume I Table 2.8.2a Jan. 2009	900 ft for a central angle of 1 degree or 500 ft for a central angle of 5 degree	Section C.4.a, Chapter 3	
Maximum Curvature of Horizontal Curve	10° 45 ft	P.P.M. Volume I Table 2.8.3 Jan. 2009	10° 45 ft	Table 3-3	Urban Environment (e_{max}=0.05)
Maximum Horizontal curvature using normal cross slope (ft)	3° 45 ft	P.P.M. Volume I Table 2.8.4 Jan. 2009	n/a		

Design Element	FDOT P.P.M. Criteria Minimum Value	FDOT P.P.M. Criteria Source	Florida Greenbook Criteria Minimum Value	Florida Greenbook Criteria Source	Comment
Minimum K Values for Crest Vertical Curves	70	P.P.M. Volume I Table 2.8.5 Jan. 2009	70	Table 3-6	
Minimum Length of Crest Vertical Curves (ft)	3V = 120	P.P.M. Volume I Table 2.8.5 Jan. 2009	3V = 120	Table 3-6	
Minimum K Values for Sag Vertical Curves	64	P.P.M. Volume I Table 2.8.6 Jan. 2009	64	Table 3-6	
Minimum Length of Sag Vertical Curves (ft)	3V = 120	P.P.M. Volume I Table 2.8.6 Jan. 2009	3V = 120	Table 3-6	
Standard Superelevation Transition Split	0.8L on tangent 0.2L on curve	P.P.M. Volume I Section 2.9 Jan. 2009	n/a		
Maximum Superelevation e_{max}	0.05	P.P.M. Volume I Section 2.9 Jan. 2009	0.05	Figure 3-2	Urban environment
Superelevation Transition Slope Rates	1:125	P.P.M. Volume I Table 2.9.4 Jan. 2007	1:125	Section C.4.d, Chapter 3 Index 511, Design Standard 2008	Urban highway
Minimum Recoverable Terrain (ft) With Flush Shoulder	18	PPM Volume 1 Table 211.11 Jan. 2009	10	Table 3-12	
Horizontal Clearance	In accordance with Table 2.11.1 thru Table 2.11.10, P.P.M. and Index 700, Design Standards	P.P.M. Volume I Section 2.11 Jan. 2009	Beyond shoulder; outside clear zone where possible	Section C.7.j.4.(a), Chapter 3	

Design Element	FDOT P.P.M. Criteria		Florida Greenbook Criteria		Comment
	Minimum Value	Source	Minimum Value	Source	
Minimum Vertical Clearance for Signs	17 ft 6 in	P.P.M. Volume I Figure 2.10.2 Jan. 2009	16 ft	Section C.7.j.4.(b), Chapter 3	
Minimum Vertical Clearance for Signals	17 ft 6 in	P.P.M. Volume I Figure 2.10.3 Jan. 2009	16 ft	Section C.7.j.4.(b), Chapter 3	

4.4 DRAINAGE DESIGN CRITERIA

Drainage design for the project shall comply with the drainage requirements set forth in the Pinellas County Land Development Code, Pinellas County Storm Water Management Plans, and Pinellas County Department of Public Works Pond Design Criteria. Stormwater management and treatment criteria shall comply with regulations of the Southwest Florida Water Management District (SWFWMD) and Florida Department of Transportation (FDOT). **Table 4-2** is an abbreviated summary of design criteria anticipated for the project.

Table 4-2: Drainage Design Criteria

Roadway Controls
Minimum low edge of roadway- five (5) feet above the mean sea level, or the lowest edge of pavement shall be above the 25-year storm event as indicated on the Pinellas County SMP, whichever is more stringent, Pinellas County Code, Section 154-103.
Minimum longitudinal grade- 0.40% minimum longitudinal grade for curb and gutter per Pinellas County Code, Section 154-10; however, 0.32% minimum for hardship conditions as approved by the County.
Roadway Base Clearance- 1 ft (min) above Design Highwater Elevation for urban (curb & gutter) roadway sections; 2 ft (min.) for rural roadway sections.
Drainage Conveyance
Stormdrains- system calculations will conform to the Pinellas County Public Works “Storm Sewer Tabulation Form”, with 10-year storm design frequency (< 200 acres).
Curb inlets- use Inlet Types 1, 2, 3 or 4 per FDOT Standard Index or inlet Types RC-3 or RC-4 per Pinellas County Standards.
Roadside ditch- 10-year storm, Rational Method design
Stormwater Management
Design tailwater for the ponds will be based on the greater of either the mean high tide, outfall stormdrain, or ditch backwater stage resulting from the pond’s design flows, or elevation 3.0 (NGVD 29) in accordance with Pinellas County Stormwater Master Plan.

Pond design highwater- determined by 25-year/ 24-hour (12 in) Florida Modified hydrograph. Peak discharge attenuation not required.
Seasonal Highwater freeboard- to reduce the potential for mosquito-breeding opportunities and to facilitate maintenance, the pond bottom shall be 2 feet above the seasonal high ground water elevation
Dry Detention Treatment Volume- ½ in of runoff of the contributing area plus an additional 50% for OFW requirements (St. Joseph Sound is an OFW).
Treatment- demonstrate no net increase in nutrients per the Dr. Harper TMDL methodology.
Floodplain Mitigation- not required due to receiving tidal waterway.
Bridge Hydraulics
Hydraulic model- conduct hydrodynamic modeling inclusive of normal tide and storm surge condition for the 50-year, 100-year and 500-year storm surge event. Determine scour depth predictions for all the modeled conditions.

4.5 BRIDGE DESIGN CRITERIA

4.5.1 SPECIFICATIONS, CODES, MANUALS AND DESIGN REQUIREMENTS

The design will conform to the latest requirements of the following specifications, codes, manuals and design requirements:

AASHTO Publications

1. AASHTO/AWS D1.5M/D1.5-2008 Bridge Welding Code
2. Construction Handbook for Bridge Temporary Works, 1st Edition (1995) with 2008 interims
3. Guide Design Specifications for Bridge Temporary Works, 1st Edition (1995) with 2008 interims
4. Guide Manual for Condition Evaluation and Load and Resistance Factor Rating (LRFR) of Highway Bridges (2003) with 2005 interim
5. LRFD Bridge Design Specification, 4th Edition (2007) with 2008 Interims
6. LRFD Movable Highway Bridge Design Specifications, 2nd Edition (2007) with 2008 Interims
7. Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals (2001) with 2002, 2003 and 2006 interims

FDOT Publications

1. Plans Preparation Manual, Volume 1, January 2009 (Topic No.: 625-000-007)
2. Plans Preparation Manual, Volume 2, January 2009 (Topic No.: 625-000-008)

3. Drainage Manual (Topic No.: 625-040-001)
4. 2008 Design Standards with latest Design Standards Modifications (Topic No.: 625-010-003)
5. CADD Production Criteria Handbook
6. FDOT Standard Specifications for Road and Bridge Construction
7. FDOT Structures Manual (SDG)
8. Bridge Load Rating, Permitting and Posting Manual (Topic No: 850-010-035)
9. Soils and Foundation Handbook 2006
10. Pinellas County Department of Public Works Publications Standard Technical Specifications for Roadway and Related Construction
11. Public Works Standard Engineering Details

4.5.2 NAVIGATIONAL CLEARANCES

Guide Clearances are defined as the navigational clearances established by the Coast Guard for a particular navigable water of the United States which will ordinarily receive favorable consideration under the bridge permitting process (33 CFR Chapter 1, Subchapter J - Bridges) as providing for the reasonable needs of navigation. They are not intended to be regulatory in nature or to form a legal basis for approving or denying a bridge permit application. Under the circumstances of a particular case, greater or lesser clearances for a proposed bridge may be required or approved as meeting the reasonable needs of navigation for that particular location. Excerpts of the Clearance Guide for the project site is provided in **Table 4-3**:

Table 4-3: Excerpts of Coast Guard Clearance Guide

Gulf Intracoastal Waterway, Florida to Texas				
		Channel Width	Vertical Clearance	Datum
Caloosahatches River to Tampa Bay	Swing or bascule	90 ft.	21 ft. (closed)	MHW
	Fixed or vertical lift	90 ft.	65.0 ft.	MHW
Tampa Bay to Apalachee Bay	Fixed or vertical lift	90 ft.	65.0 ft.	MHW

Low Level Profile

The Clearance Guide for waterways between Caloosahatches River to Tampa Bay has a requirement of a minimum vertical clearance of 21 ft to MHW for a swing or bascule bridge. The low level proposed alternative in **Section 5.2.1** provides for 21 feet of vertical clearance. The corresponding channel width clearance guide for horizontal clearance is 90 ft clear between fenders. For the Belleair Causeway bridge, a 100 ft horizontal clearance was required, see **Appendix D** email correspondence with the US Coast Guard. It is expected that the horizontal clearance for the main channel will need to satisfy the 100 ft horizontal requirement.

High Level Profile

The Clearance Guide has a requirement of a minimum vertical clearance of 65 ft to MHW for a fixed bridge. According to the Coast Guard, the minimum vertical clearance may actually be higher if it is shown that the 65 ft vertical clearance would disrupt navigation to local mariners based on a future boat survey see **Appendix D** email correspondence with the US Coast Guard. The Belleair Causeway intracoastal high level bridge provides 74 ft of vertical clearance. The boat traffic at the Belleair Causeway is estimated to be twice the marine traffic at the Dunedin Causeway main bridge. At the time of this Feasibility Study, the boat survey did not include the height of the masts, therefore, it is possible for 65 ft to be approved by the Coast Guard. A boat survey would need to be performed to determine if 65 ft would be acceptable. For this Feasibility Study, the high level proposed alternative in **Section 5.2.3** provides for 75 feet of vertical clearance. The minimum horizontal clearance for the main channel will be 100’.

Mid Level Profile

The mid level profile proposed in **Section 5.2.2** is a compromise between a low level and high level alternative. During the Feasibility Study, a 40 ft fixed mid level bridge was proposed to the US Coast Guard (USCG), see **Appendix D** email correspondence with the US Coast Guard. The response was that a minimum of a 65 ft vertical clearance is required and that it may even be higher depending on the potential disruption to local mariners. Consequently, a mid level bascule was selected for the mid level alternative providing a 45 ft minimum vertical clearance and a 100 ft horizontal clearance.

Movable Bridges

The FDOT provides the following commentary in the Structures Manual, Section 8 – Movable Bridge:

Single leaf bascules are not allowed, but may be considered for small channel openings where navigational and vehicular traffic is low and with approval from the Structures Design Office (SDO). Assure reliable operation of movable bridges through redundancy features in drive and control systems, for both new and rehabilitation projects.

The Dunedin Causeway bridge falls within the guidelines set forth in the above FDOT directive. There are single leaf bascule projects being permitted and built in Florida for owners other than FDOT. An example is the Matlacha Bridge Replacement on County Road 78 (Pine Island Road) over Matlacha Pass in Lee County, Florida. For the purposes of this Feasibility study a single leaf bascule meeting USCG horizontal and vertical clearance requirements was chosen. The approach spans are assumed to be prestressed concrete beams on concrete piers.

This single leaf bascule option will be evaluated with an open steel grid deck. To overcome some of the issues with open steel grid decks such as ridability, skid resistance, and cyclist comfort, an exodermic (closed) deck is provided within the sidewalk and shared use trail in lieu of a concrete filled grid deck.

The double leaf bascule was not chosen for further study here as it is approximately 20 to 30 percent more expensive than a single leaf. During the PD&E process, it is expected that the double leaf bascule alternative would need to be considered.

A closed deck system was also not chosen as it is more compatible with the double leaf bascule. Additional weight and wind loading factors add significant loading to the machinery and bascule pier.

Section 5 Alternatives Analysis

This Feasibility Study considers a No-build alternative requiring rehabilitation of the existing bridges. Rehabilitating the existing bridge for the 75-year evaluation period was not considered a practical alternative. Therefore, rehabilitation with an eventual replacement in-kind at a future date was considered as the No-build alternative. Other alternatives considered include a low level (21 ft ± vertical clearance), mid level (45 ft ± vertical clearance), and high level (75 ft± vertical clearance) vertical profiles for the replacement of the existing bascule bridge structure (Bridge No. 150068). Replacement in kind with a 12 ft ± vertical clearance profile was considered for the relief bridge (Bridge No. 150067)

Roadway alternatives evaluated included three horizontal alignment alternatives, including north, existing, and south alignments, for each one of the three profiles. All proposed construction schemes must provide for a minimum traffic control scheme that maintains one lane of traffic in each direction at all times, except for short duration periods during placement of beams or other construction that should be done without traffic. The access to County and State parks, condominiums, and other facilities is to be maintained during construction.

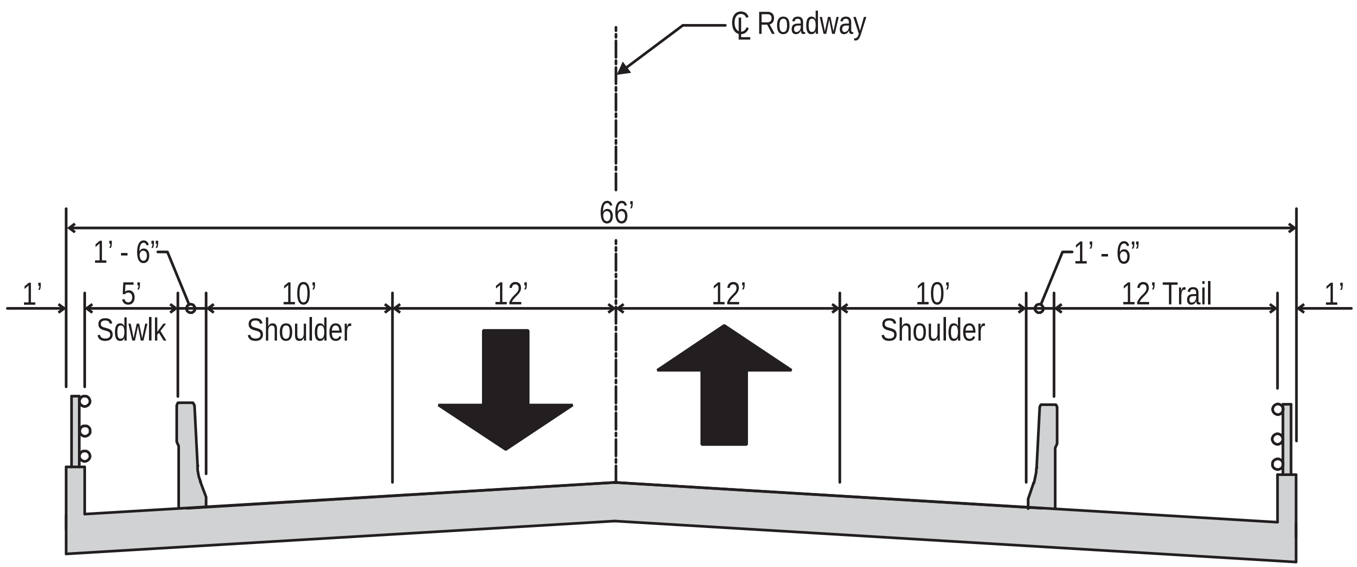
5.1 TYPICAL SECTIONS

To develop an improved roadway and bridge system along the Causeway Boulevard that is in the best overall public interest, engineering, environmental, and economic factors must be taken into consideration. The improved facility should be designed to safely and efficiently accommodate the projected design year vehicular traffic, pedestrian and bicycle traffic, as well as boat traffic. However, a comprehensive traffic study is not scoped for this Feasibility Study, and it is anticipated that it will be conducted during the next project development phase (PD&E Study).

Before alternative alignments can be developed for evaluation, typical sections must be generated for the roadway and bridge segments based on applicable roadway design criteria described in **Section 4.0**.

5.1.1 BRIDGES

A uniform typical section is developed for both the main and relief bridges and shown in **Figure 5-1**. The bridge typical section consists of one 12 ft travel lane with a 10 ft shoulder in each direction. A 5 ft sidewalk is provided on the north side behind the traffic railing and a 12 ft multi-purpose trail is provided on the south side behind the traffic railing. Bicycles can be accommodated either on the outside shoulders or on the protected multi-purpose trail. Stormwater runoff will be collected on the bridge and conveyed



Proposed Typical Section No. 1
Bridge No's 150067 & 150068
Looking East

Pinellas County PUBLIC WORKS Dunedin Causeway Bridge Replacement Feasibility Study	**PROPOSED BRIDGE TYPICAL**	**FIGURE 5-1**

to selected treatment ponds before being discharged into St. Joseph Sound. This typical section will also be applied to the segment with permanent retaining walls on the bridge approaches.

5.1.2 ROADWAY

While the main and relief bridges will be replaced, the majority of the causeway within the study limits will be milled and resurfaced. A 5 ft continuous new sidewalk is proposed behind the existing guardrail on the north side of the causeway. The existing multi-purpose trail will remain on the south side, as shown in Roadway Typical Section No. 1, see **Figure 5-2**.

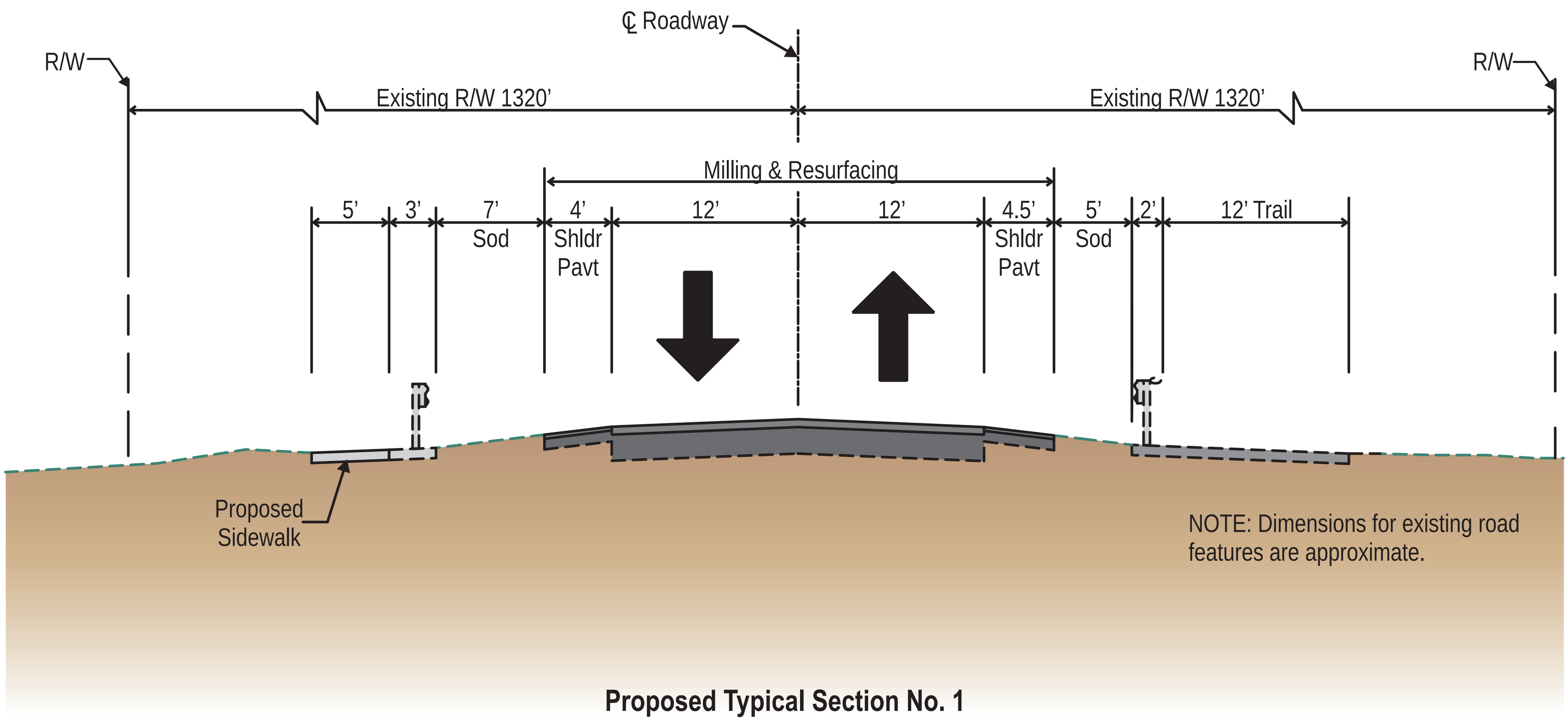
On each bridge approach, a relatively short segment of roadway will be reconstructed to connect the reconstructed bridge approach and the milled and resurfaced existing roadway. Two alternative roadway typical sections are developed for the roadway reconstruction. Both roadway typical sections contain one 12 ft travel lane in each direction and provide for left turn lanes to allow storage and refuge at the major driveway access points. A 5 ft sidewalk on the north side and a 12 ft multi-purpose trail on the south side are provided on both typical sections. Guardrails are proposed to separate the sidewalk/trail from the roadway.

Roadway Typical Section No. 2 is an urban alternative and shown in **Figure 5.3**. Type F curb & gutter is used to convey stormwater runoff to curb inlets. Between the travel lane and Type F curb & gutter, a 4 ft bike lane is provided to accommodate the potential bicyclists who prefer riding on the roadway than on the trail.

Roadway Typical Section No. 3 is a rural alternative and shown in **Figure 5-4**. An 8 ft outside paved shoulder with shoulder gutter is provided on both sides.

For both alternatives, the development of the roadway typical sections also include drainage considerations. Stormwater runoff will be collected in a closed drainage system and conveyed to the selected treatment ponds.

Although both alternatives will fit within the existing ROW, the rural typical section with shoulder gutter will require a relatively wider footprint. Considering the constrained land use on the causeway, the urban typical section was selected to develop the alternative alignments for evaluation.

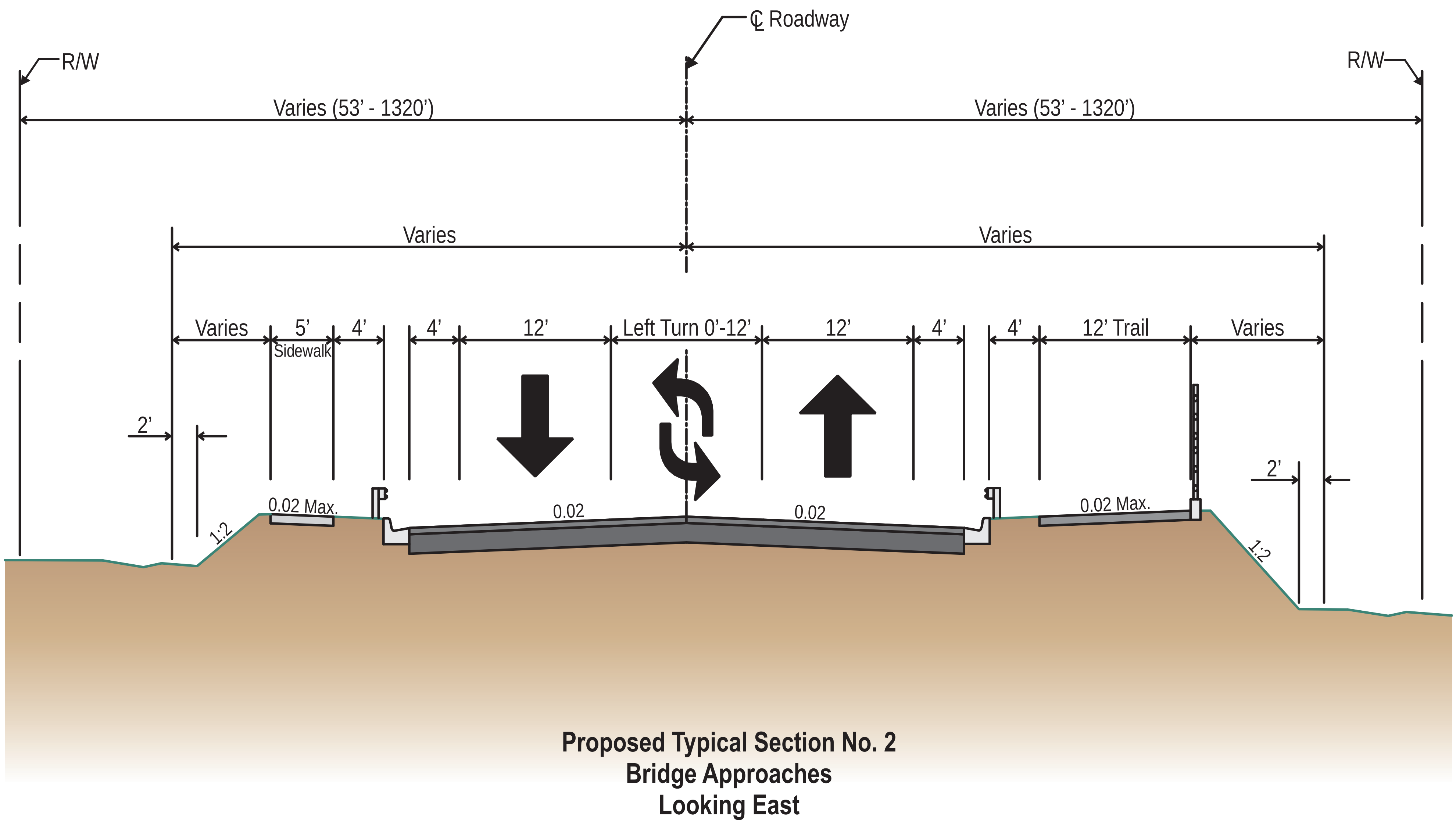


Proposed Typical Section No. 1
Causeway Boulevard
Looking East

Dunedin Causeway
Bridge Replacement
Feasibility Study

PROPOSED ROADWAY TYPICAL NO. 1

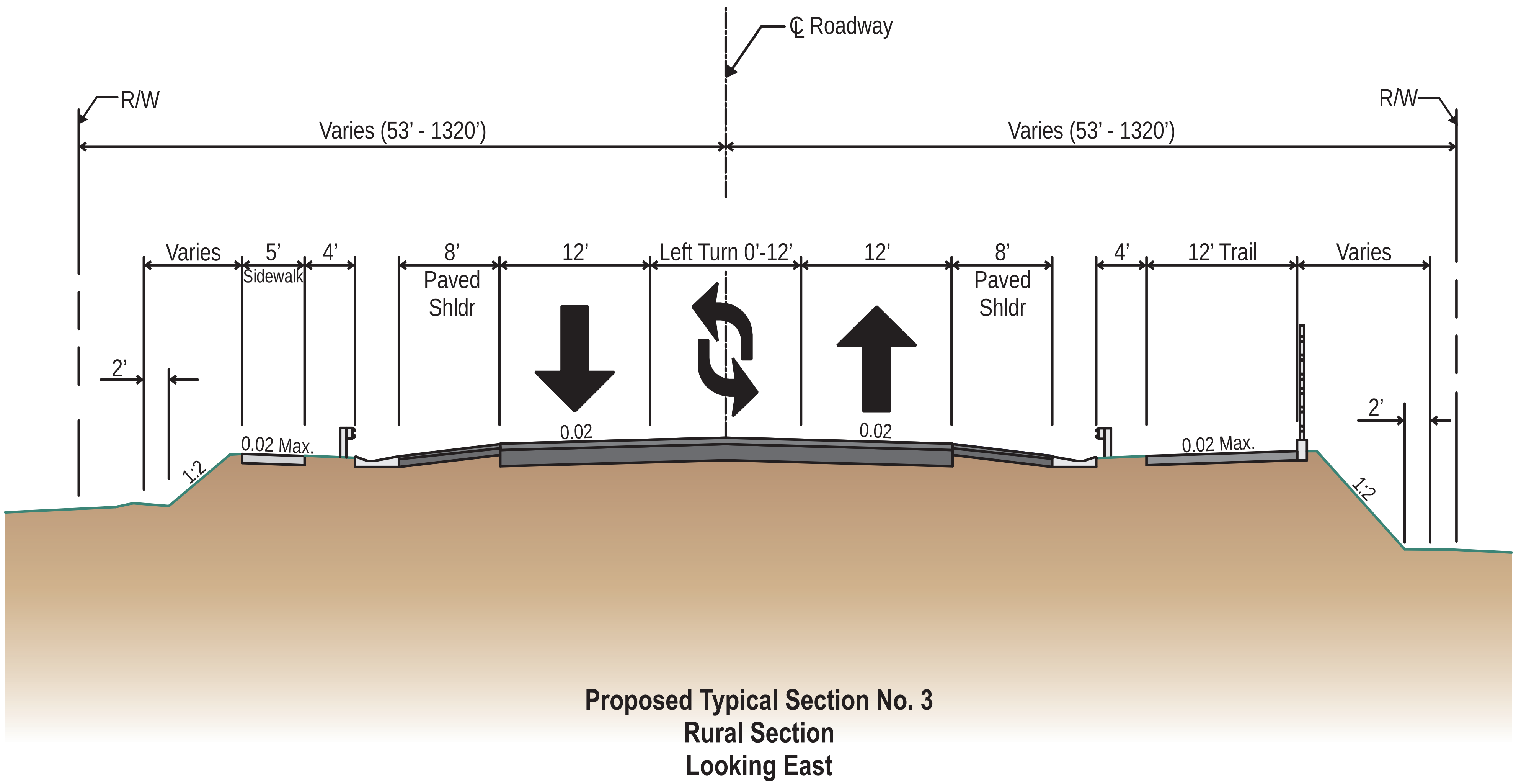
FIGURE 5-2



Dunedin Causeway
Bridge Replacement
Feasibility Study

PROPOSED ROADWAY TYPICAL NO. 2

FIGURE 5-3



Dunedin Causeway
Bridge Replacement
Feasibility Study

PROPOSED ROADWAY TYPICAL NO. 3

FIGURE 5-4

5.2 EAST (MAIN) BRIDGE

Three profile alternatives, requiring different bridge types, were evaluated as follows:

- Low Level Bascule (Drawbridge) 21 ft clearance
- Mid Level Bascule (Drawbridge) 45 ft clearance
- High Level Fixed Span 75 ft clearance

In addition, three preliminary horizontal alignment alternatives were evaluated for the main bridge (Bridge No. 150068), see **Figure 5-5**:

- South-shifted alignment
- Centered alignment
- North-shifted alignment

This section will describe in greater detail the issues related with each alternative.

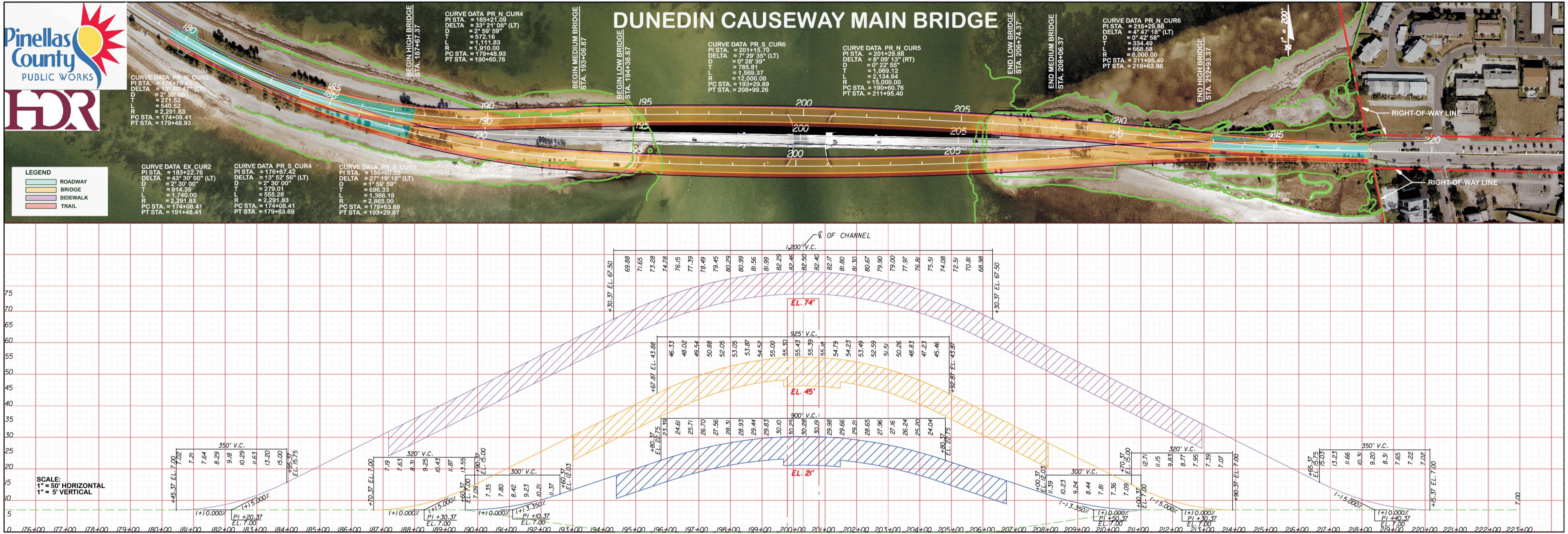
5.2.1 LOW LEVEL PROFILE ALTERNATIVE

A low level profile providing minimum 21 feet of vertical clearance was evaluated for this alternative, see **Figure 5-6**.

The low level bridge, with a total length of 1,235 ft 6 in, consists of AASHTO beam approaches, a single leaf bascule and Mechanically Stabilized Earth (MSE) walls. The plan and elevation of the bascule bridge is shown on **Figure 5-7**.

Typical sections of the bascule main span and the AASHTO beam east and west approaches is shown in **Figure 5-8**.

For purposes of this Feasibility Study, the following structural features are proposed. A 179 ft 6 in bascule main span providing for 100 ft horizontal and 21 ft vertical clearance at the main channel. The east and west approaches consist of Florida-I 63 in standard prestressed beams (Index 20063), spaced at 9 ft 9 in, providing 4- 132 ft spans on either side of the bascule bridge. Drilled shaft foundations, similar to the Belleair Causeway bridge replacement bridge, are proposed.

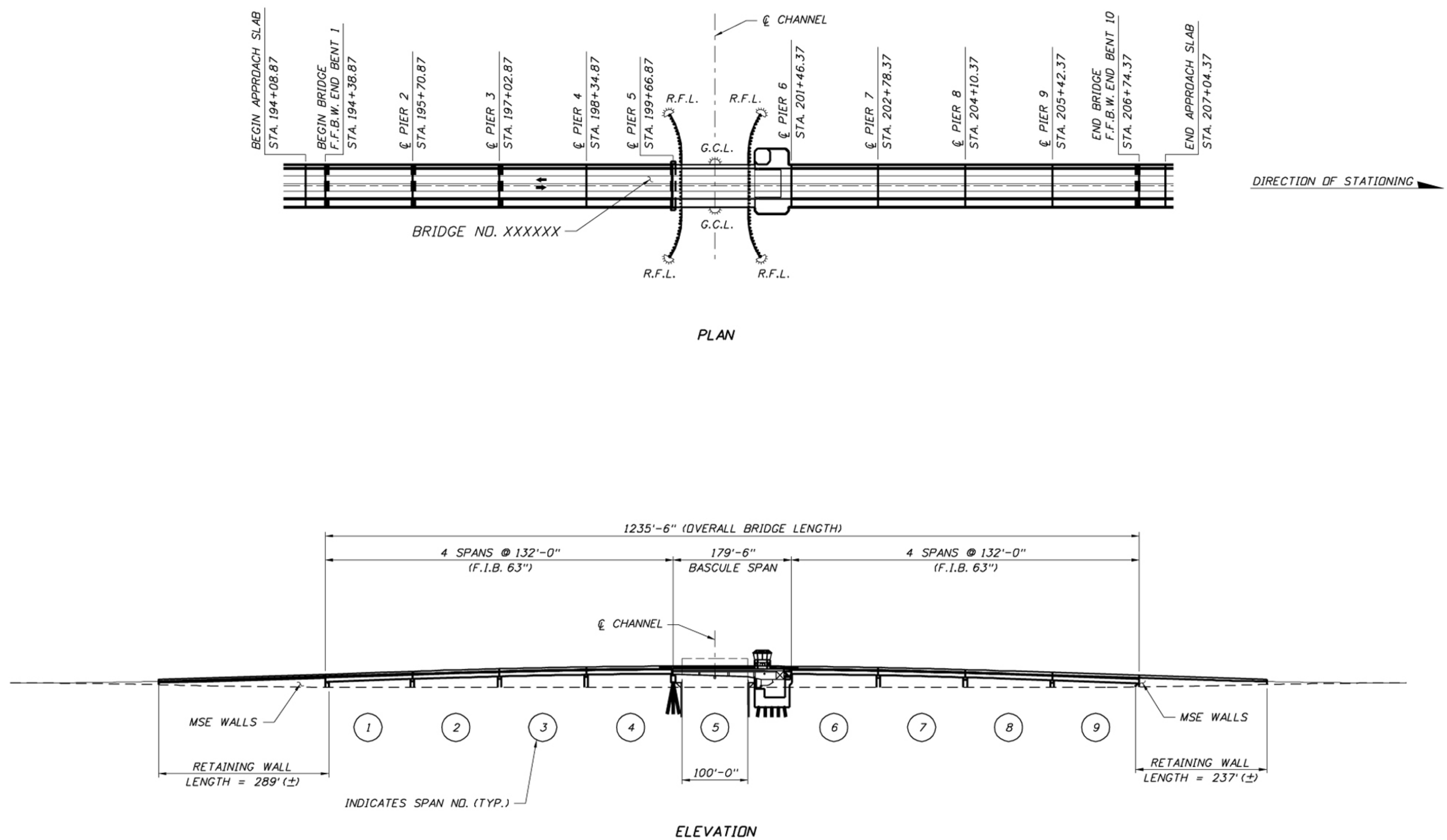


Pinellas County PUBLIC WORKS

Dunedin Causeway Bridge Replacement Feasibility Study

EAST (MAIN) BRIDGE HORIZONTAL ALIGNMENT AND PROFILE ALTERNATIVES

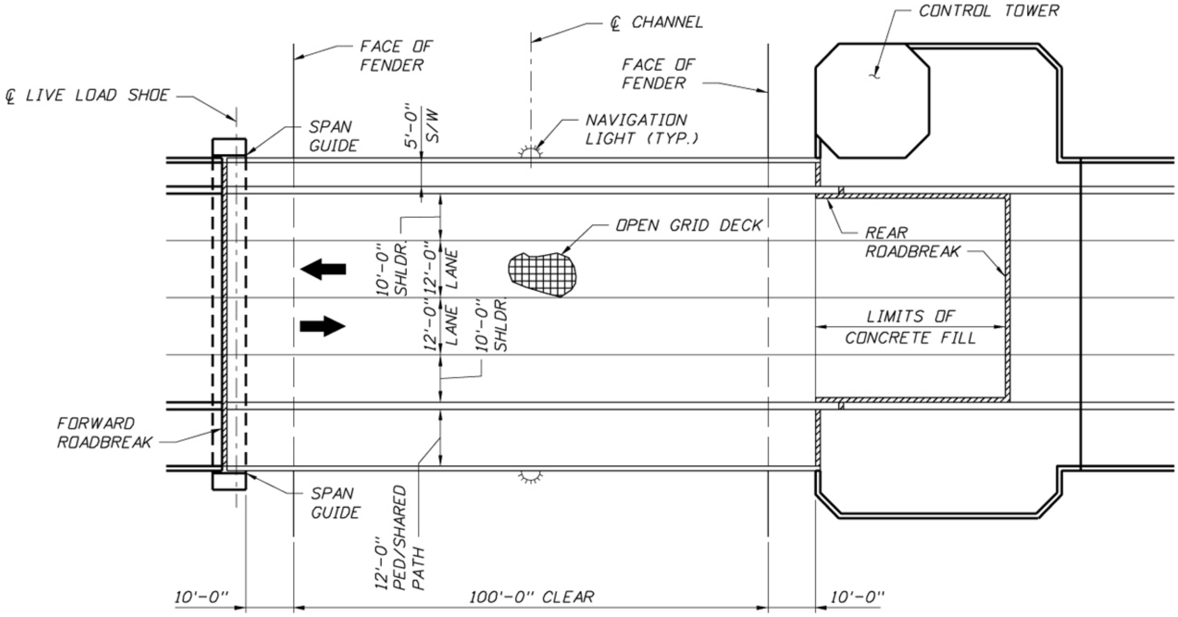
FIGURE 5-5



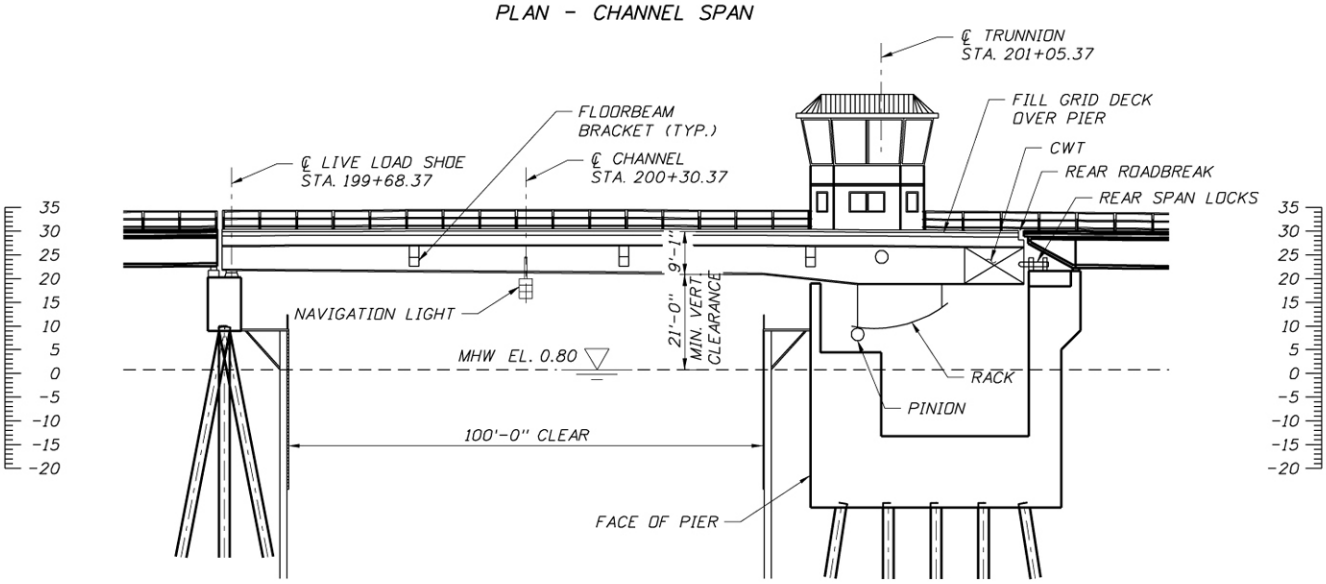
Dunedin Causeway
Bridge Replacement
Feasibility Study

LOW LEVEL PLAN AND ELEVATION

FIGURE 5-6

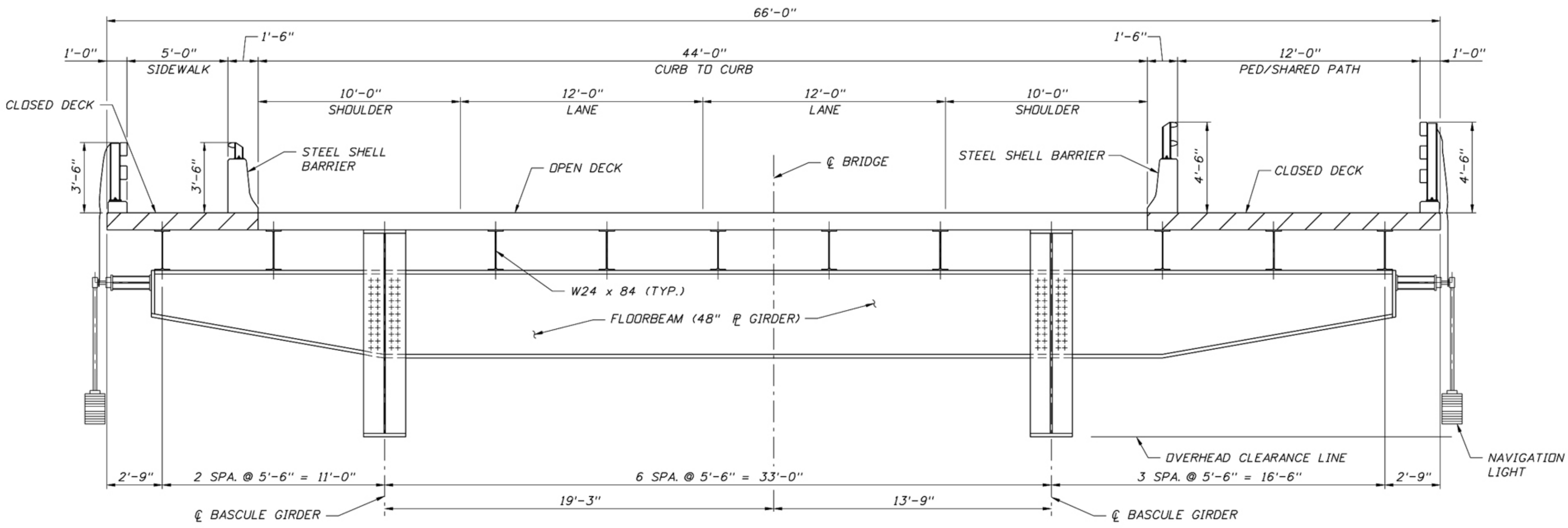


PLAN - CHANNEL SPAN

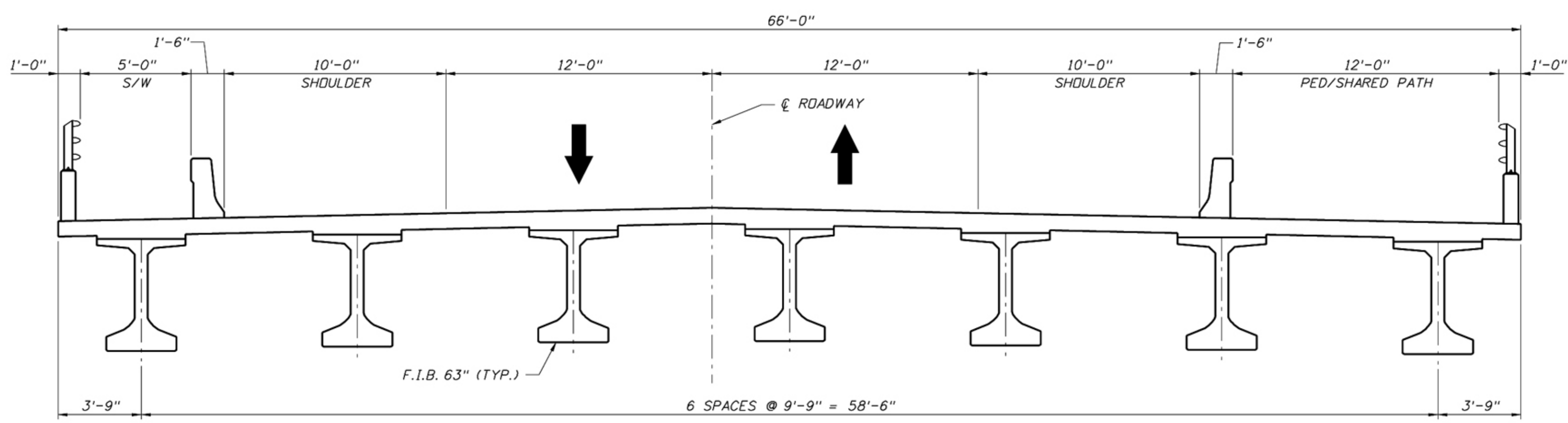


ELEVATION - CHANNEL SPAN

Pinellas County PUBLIC WORKS — Dunedin Causeway Bridge Replacement Feasibility Study	**LOW LEVEL BASCULE PLAN AND ELEVATION**	**FIGURE 5-7**



TYPICAL SECTION – CHANNEL SPAN



TYPICAL SECTION – APPROACH SPANS

Dunedin Causeway
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BASCULE AND APPROACH TYPICAL SECTIONS

FIGURE 5-8

5.2.2 MID LEVEL PROFILE ALTERNATIVE

A mid level profile providing minimum 45 feet of vertical clearance was evaluated for this alternative, see **Figure 5-9**.

The mid level bridge, with a total length of 1,499 ft 6 in, consists of AASHTO beam approaches, a single leaf bascule and Mechanically Stabilized Earth (MSE) walls. The plan and elevation of the bascule bridge is shown on **Figure 5-10**.

Typical sections of the bascule main span and the AASHTO beam east and west approaches is shown in **Figure 5-11**.

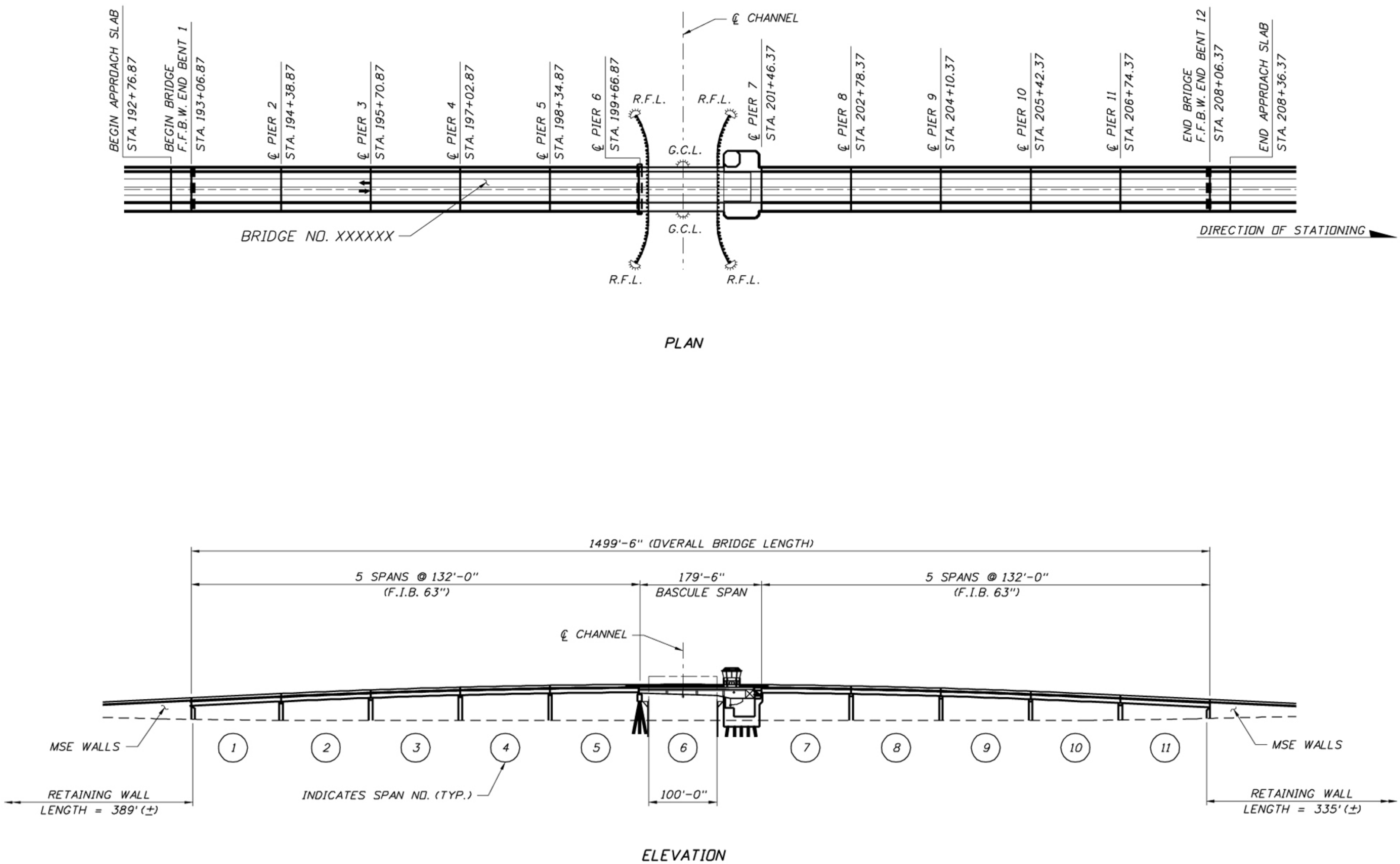
For purposes of this Feasibility Study, the following structural features are proposed. A 179 ft 6 in bascule main span providing for 100 ft horizontal and 45 ft vertical clearance at the main channel. The east and west approaches consist of Florida-I 63 in standard prestressed beams (Index 20063), spaced at 9 ft 9 in, providing 5- 132 ft spans on either side of the bascule bridge. Drilled shaft foundations, similar to the Belleair Causeway bridge replacement bridge, are proposed.

5.2.3 HIGH LEVEL PROFILE ALTERNATIVE

A high level profile providing minimum 75 feet of vertical clearance was evaluated for this alternative, see **Figure 5-12**.

The high level bridge, with a total length of 2,526 feet, consists of AASHTO beam approaches, AASHTO beam main span and Mechanically Stabilized Earth (MSE) walls. Typical sections of the main span and east and west approaches is shown in **Figure 5-13**.

For purposes of this Feasibility Study, the following structural features are proposed. A 150 ft main span consisting of Florida-I 63 in standard prestressed beams (Index 20063), spaced at 6 ft, providing 100 ft horizontal and 75 ft vertical clearance at the main channel. The east and west approaches consist of Florida-I 63 in standard prestressed beams (Index 20063), spaced at 9 ft 9 in, providing 9- 132 ft spans on either side of the main channel. Drilled shaft foundations, similar to the Belleair Causeway bridge replacement bridge, are proposed.



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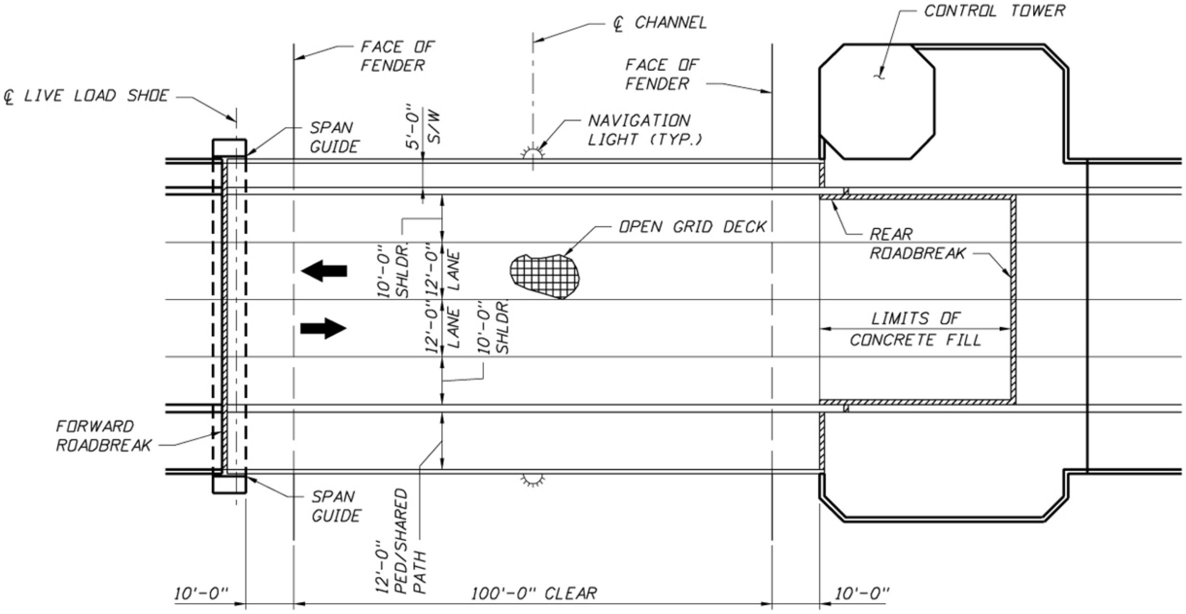
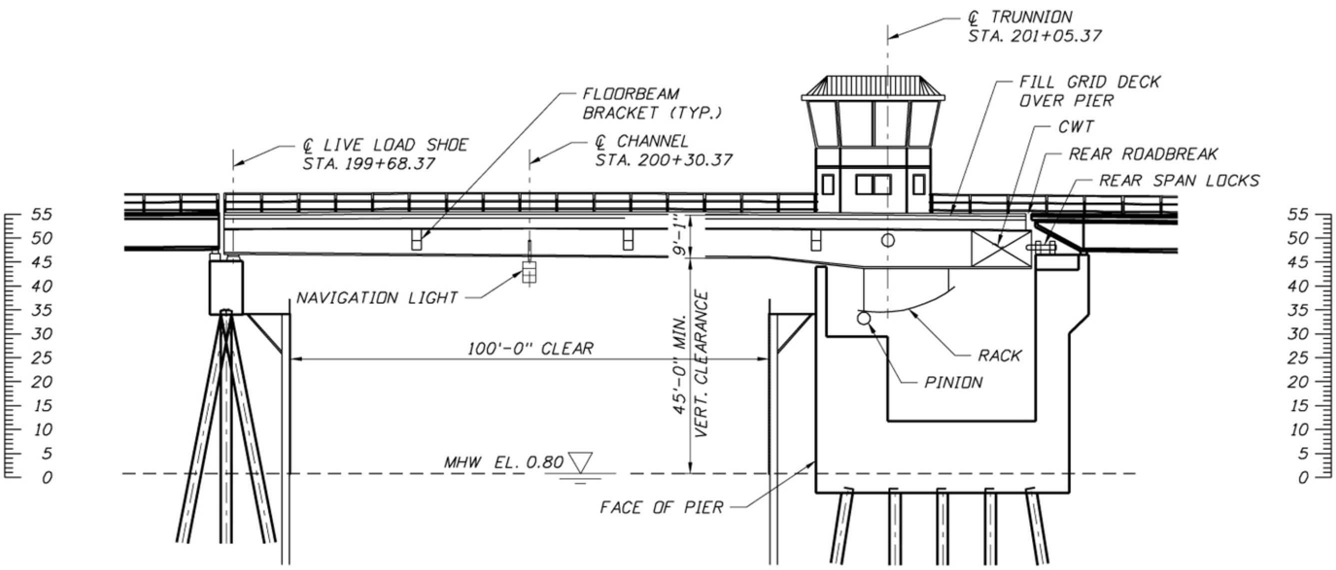
MID LEVEL PLAN AND ELEVATION

FIGURE 5-9

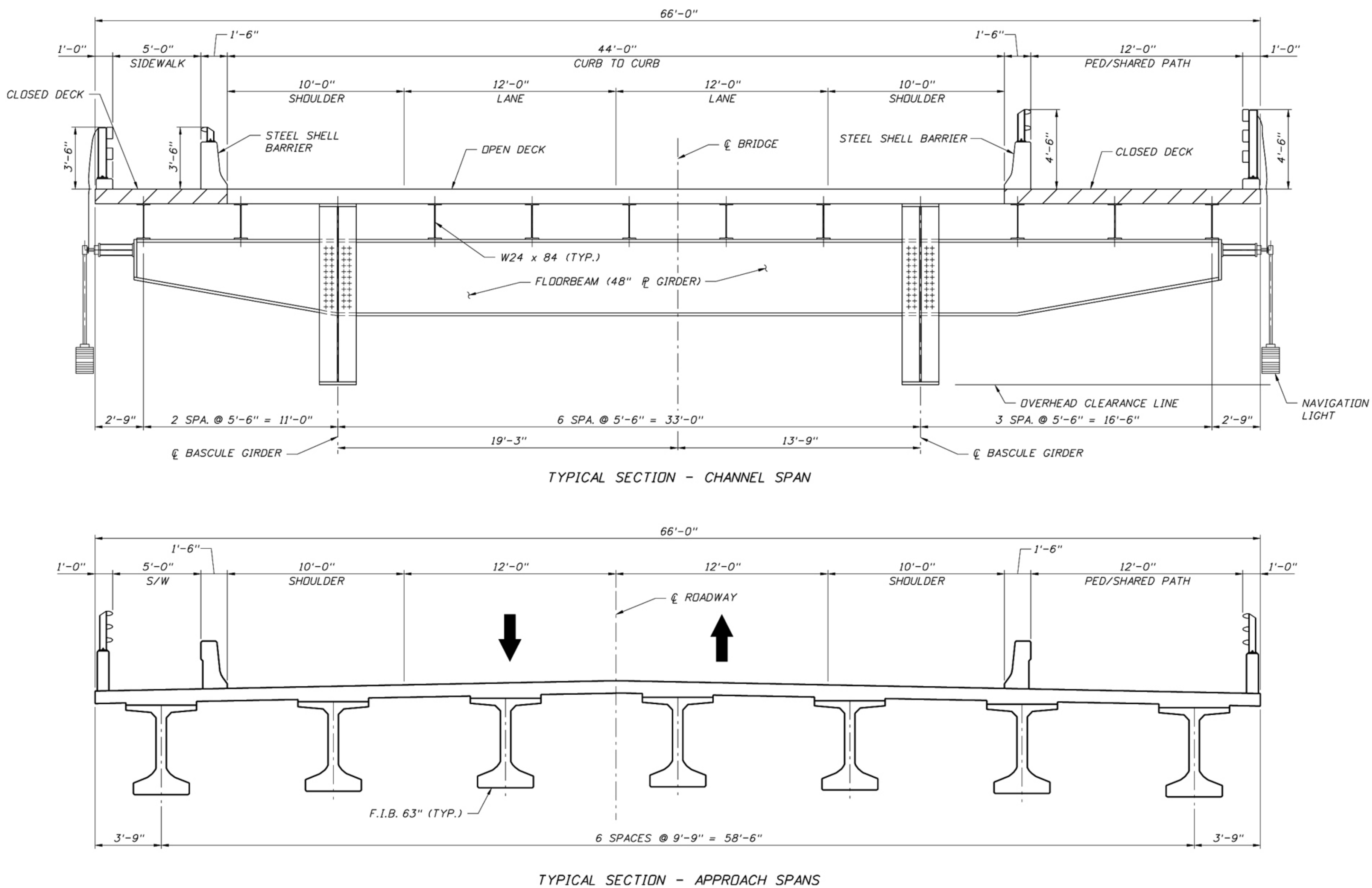


PLAN - CHANNEL SPAN



ELEVATION - CHANNEL SPAN

Pinellas County PUBLIC WORKS — Dunedin Causeway Bridge Replacement Feasibility Study	**MID LEVEL BASCULE PLAN AND ELEVATION**	**FIGURE 5-10**



Dunedin Causeway
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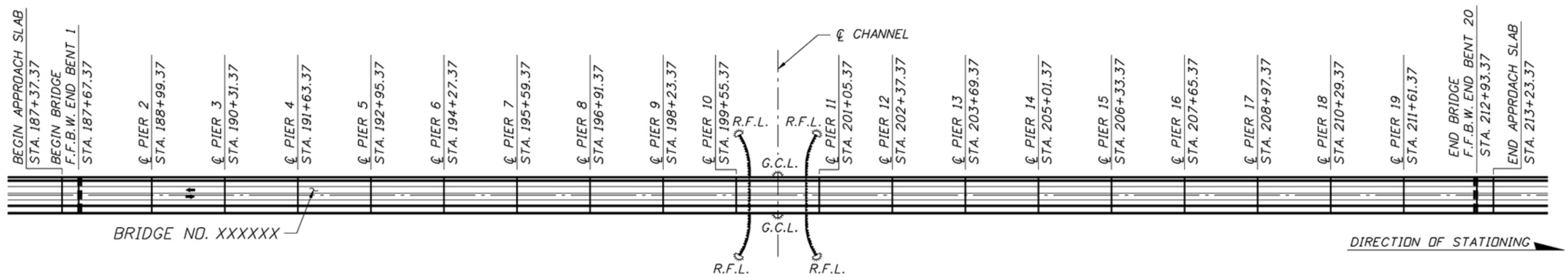
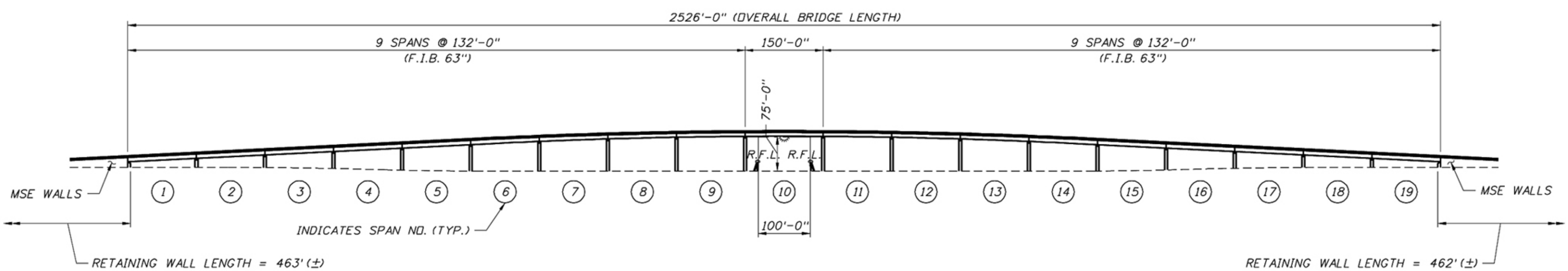
BASCULE AND APPROACH TYPICAL SECTIONS

FIGURE 5-11



PLAN



ELEVATION

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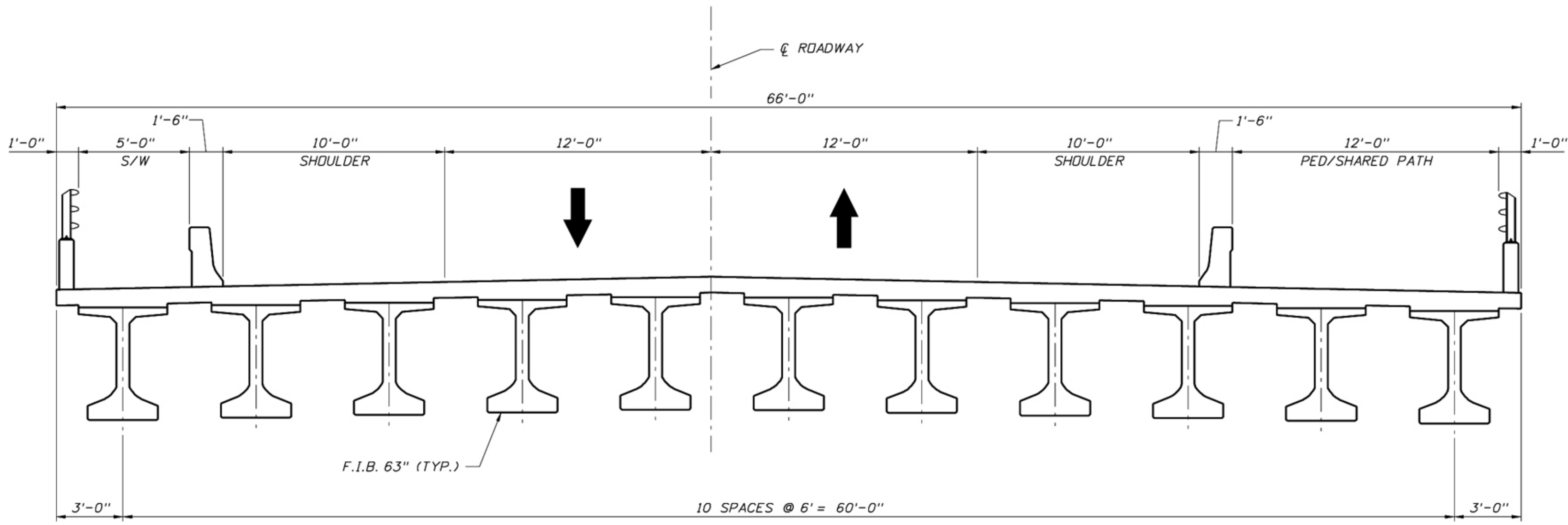
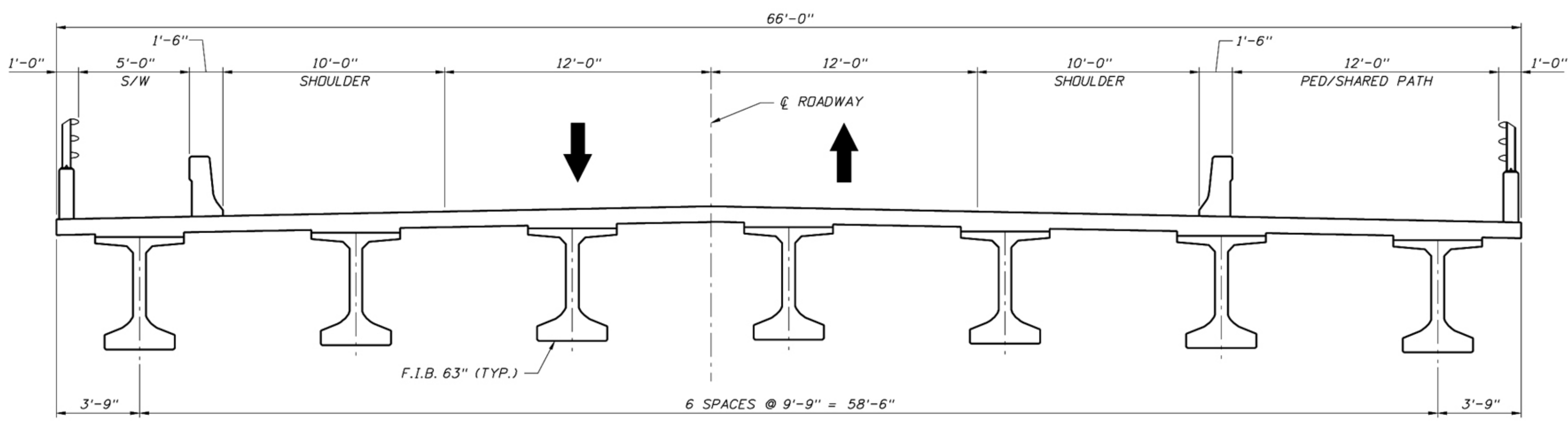
HIGH LEVEL PLAN AND ELEVATION

FIGURE 5-12



TYPICAL SECTION - CHANNEL SPAN



TYPICAL SECTION - APPROACH SPANS

Dunedin Causeway
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MAIN SPAN AND APPROACH TYPICAL SECTIONS

FIGURE 5-13

5.2.4 HORIZONTAL CENTER ALIGNMENT ALTERNATIVE

The center alignment alternative will replace the new main bridge on the existing horizontal alignment. The major advantage of this alternative is the new main bridge and its approach roadway will remain in the center of the existing causeway footprint, therefore, the encroachment into and the impact on the existing causeway beach and the surrounding underwater environment will be minimized. The existing main bridge has to be demolished before construction begins, and the causeway has to remain closed during construction. As the sole roadway link between the mainland and Honeymoon Island, keeping the causeway closed for a rather long period of time (2-3 years) is not practical; and it is not anticipated that this alternative will be well received by the local community and the public.

A center alignment alternative considering phased construction or partial replacement of the bridge was considered not practical or cost effective. The existing causeway is only two lanes, one per each traffic direction, and a phased construction alternative will only allow a single lane on the bridge during the duration of construction. This alternative will increase the construction time, require flaggers to be present to guide traffic into a single lane and places the public close to construction activities. There are also constructability concerns with phased construction around the existing bascule pier. Partial demolition of the existing bascule pier is not feasible and would be required in a center alignment alternative. Options to offset the proposed bascule piers from the existing piers will lead to an offset in the current navigational channel, which is also considered not feasible. Therefore, this alternative is not furthered considered since it provides the most negative impact to the travelling public.

5.2.5 HORIZONTAL NORTH AND SOUTH SHIFT ALIGNMENT ALTERNATIVES

The northern alignment alternative will shift the centerline of the bridge approximately 80 feet to the north. This alignment will provide 20-30 feet of open space between the new and existing bridges to facilitate bridge construction. The main bridge will be on a horizontal curve with a 15000 ft radius. At both ends, the new alignment will tie into the existing alignment as soon as possible.

The southern alignment alternative will shift the centerline of the bridge approximately 80 feet to the south. This alignment will also provide 20-30 feet of open space between the new and existing bridges to facilitate bridge construction. The main bridge will be on a horizontal curve with a 12000 ft radius. The new alignment will tie into the existing alignment at both ends as soon as possible.

Both the northern and southern alignments will generally fit into the existing causeway footprint. The alignment geometrics are aesthetically pleasant and meet design criteria. The length differences of new

bridges and reconstructed roadways between these two alternatives are insignificant. The encroachment into the existing beach area and the impact on natural environment is kept at a minimum for both alternatives.

As for traffic control during construction, for both alignment alternatives traffic will be maintained on the existing bridge while constructing the replacement bridge. Short-term lane closures and/or diversions might be needed when constructing the tie-in roadways. As discussed in **Section 3.1.12**, the existing and proposed utilities are primarily located on the north side of the causeway. The northern alignment will require major utility relocations within the study limits. This disadvantage weighs in and plays a more important role in alternative comparison since both alternatives are similar in terms of other evaluation criteria.

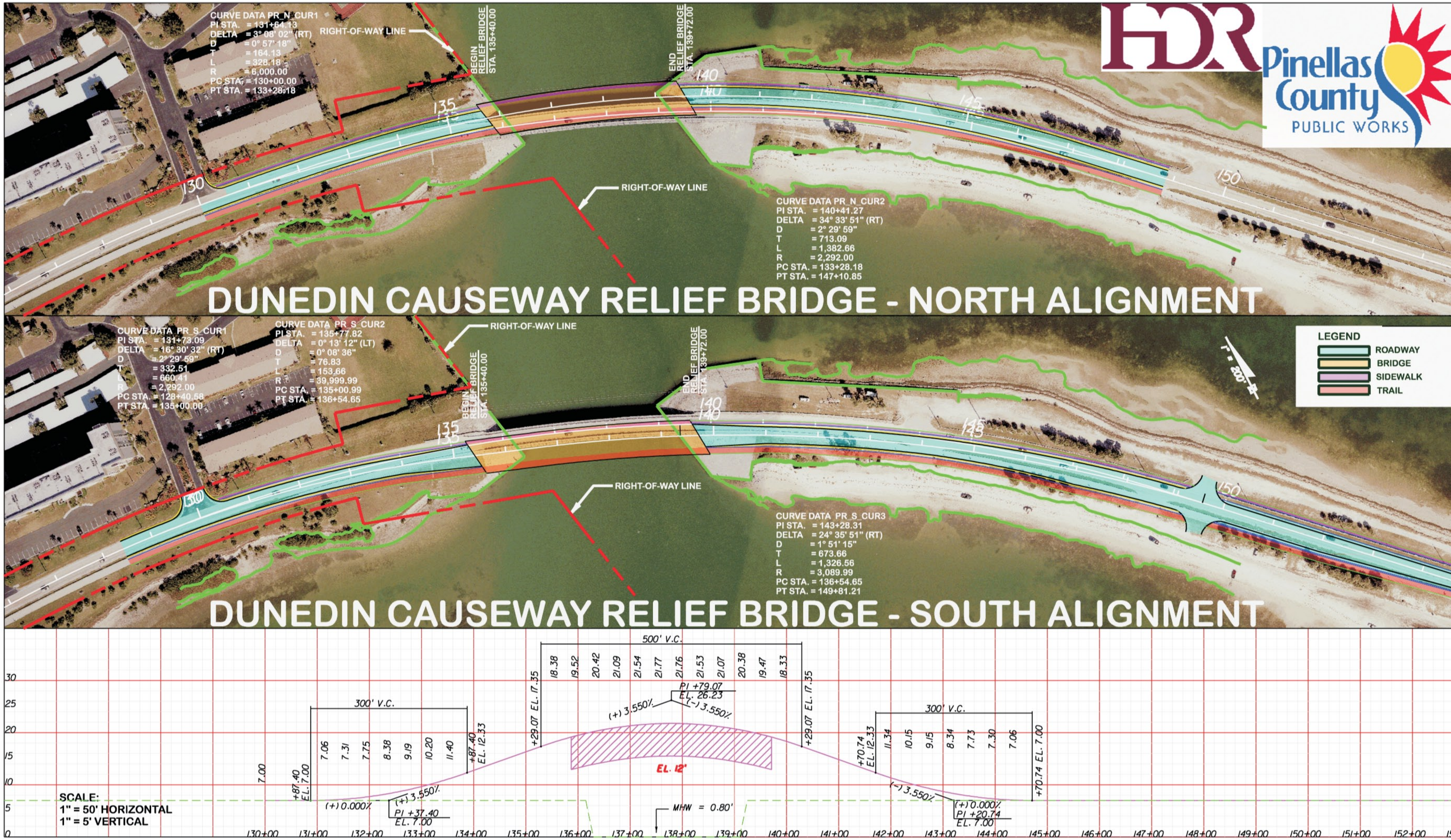
5.3 WEST (RELIEF) BRIDGE

Although it is stated in the scope that the relief bridge (Bridge No. 150067) will be evaluated for replacement in kind within the same alignment and no alternative alignments are to be evaluated, due to the narrow width of the existing bridge, it is impossible to maintain one lane of traffic in each direction at all times when replacing the bridge on the existing alignment. Therefore, two additional preliminary horizontal alignment alternatives were evaluated for the relief bridge: a south shift and north shift alignment, as shown in **Figure 5-14**. Both horizontal alignment shifts will enable maintenance of vehicular traffic, pedestrian and bicycle traffic on the existing bridge while phase constructing the replacement bridge. A vertical profile providing 12 ft of clearance was used for each alignment alternative.

5.3.1 HORIZONTAL NORTH SHIFT ALIGNMENT

The northern shift maintenance of traffic and bridge construction phasing requirements are shown in **Figure 5-15 and 5-16**. A two phase maintenance of traffic scheme is shown. The following are some pros and cons with the northern shift:

- Pro – Two phase construction reduces construction time
- Pro – Pedestrian traffic is uninterrupted during Phase I construction and maintained furthest away from construction activities during Phase 2 construction
- Con – During Phase 2, pedestrian traffic needs to be moved across the Causeway traffic from the south fascia to the north fascia
- Con – Requires removal of portion of existing bridge to build Phase I of proposed bridge
- Con – Requires relocation of existing utilities that are on the north side of the existing bridge

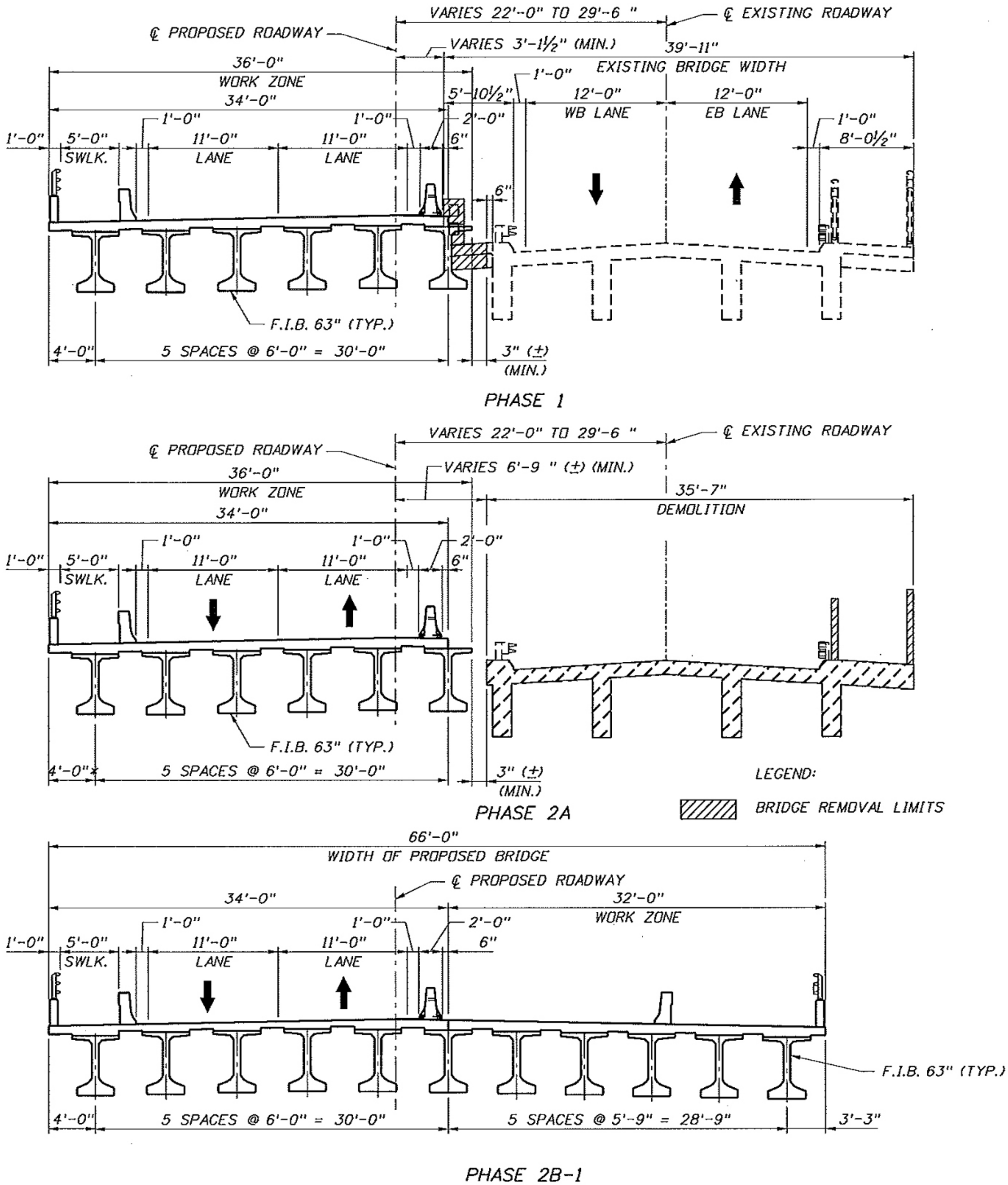


Pinellas County PUBLIC WORKS

Dunedin Causeway Bridge Replacement Feasibility Study

WEST (RELIEF) BRIDGE HORIZONTAL ALIGNMENT ALTERNATIVES

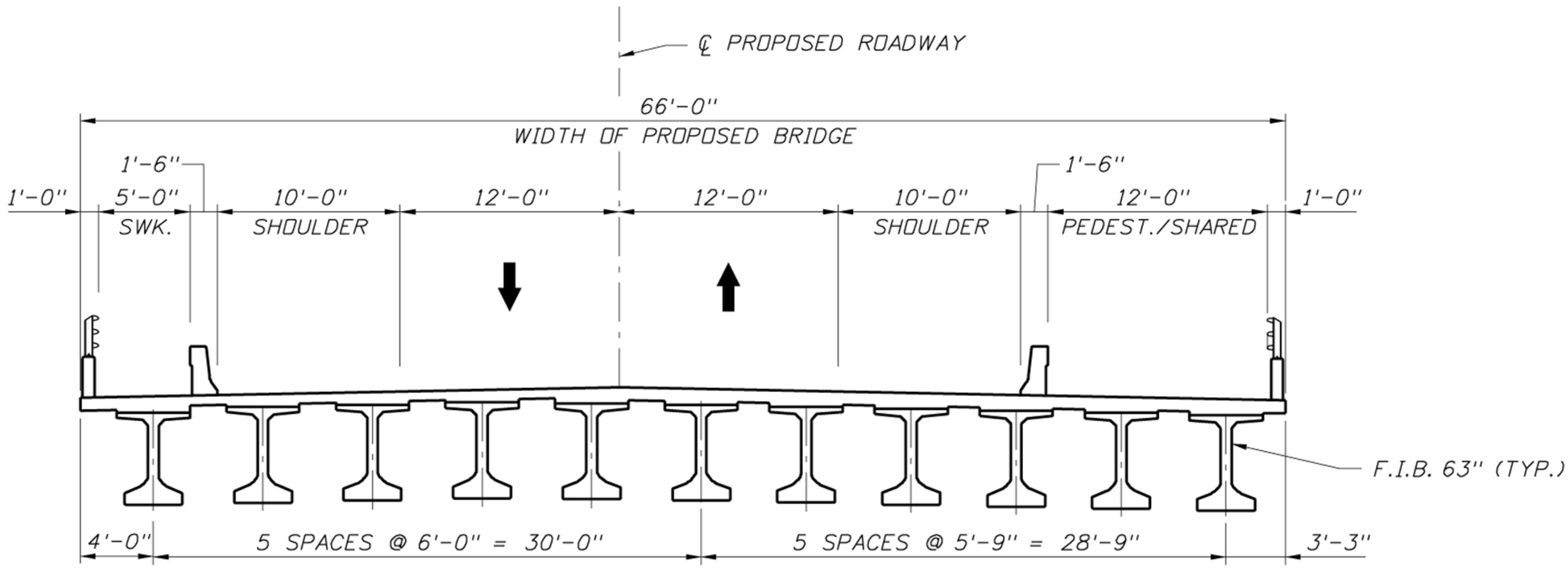
FIGURE 5-14



Dunedin Causeway Bridge Replacement Feasibility Study

WEST (RELIEF BRIDGE) NORTH ALIGNMENT CONSTRUCTION PHASING (1 OF 2)

FIGURE 5-15



FINAL CONFIGURATION

Dunedin Causeway
Bridge Replacement
Feasibility Study

WEST (RELIEF BRIDGE) NORTH ALIGNMENT
CONSTRUCTION PHASING (2 OF 2)

FIGURE 5-16

5.3.2 HORIZONTAL SOUTH SHIFT ALIGNMENT

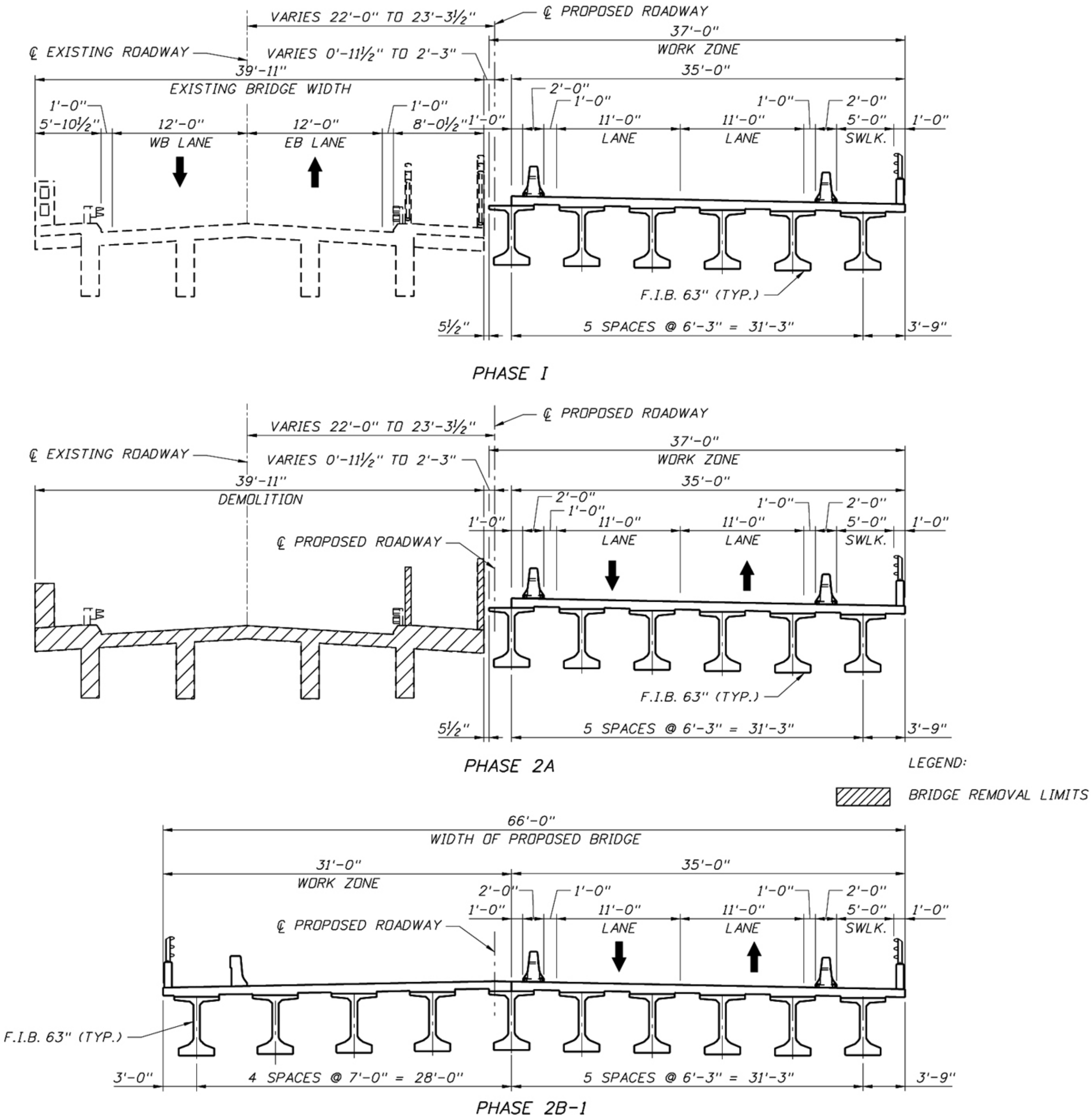
The southern shift maintenance of traffic and bridge construction phasing requirements is shown in **Figure 5-17 and 5-18**. A two phase maintenance of traffic scheme is shown. The following are some pros and cons with the southern shift:

- Pro – Two phase construction reduces construction time
- Pro – Pedestrian traffic is minimally uninterrupted during phased construction
- Pro – Requires no relocation of existing utilities
- Con – Pedestrian traffic is closer to construction activities

5.3.3 VERTICAL PROFILE

The vertical profile for the west (relief) bridge has been set to provide a minimum of 12 feet of vertical clearance to the mean high water (MHW) elevation, see **Figure 5-19**. This FDOT requirement is considered sufficient clearance above the water where additional corrosion inhibitors are not necessary in the concrete mix. FDOT utilizes Calcium Nitrate as a corrosion inhibitor but it provides a concrete mix that is difficult to work with. Having to use this mitigation method should be avoided where possible.

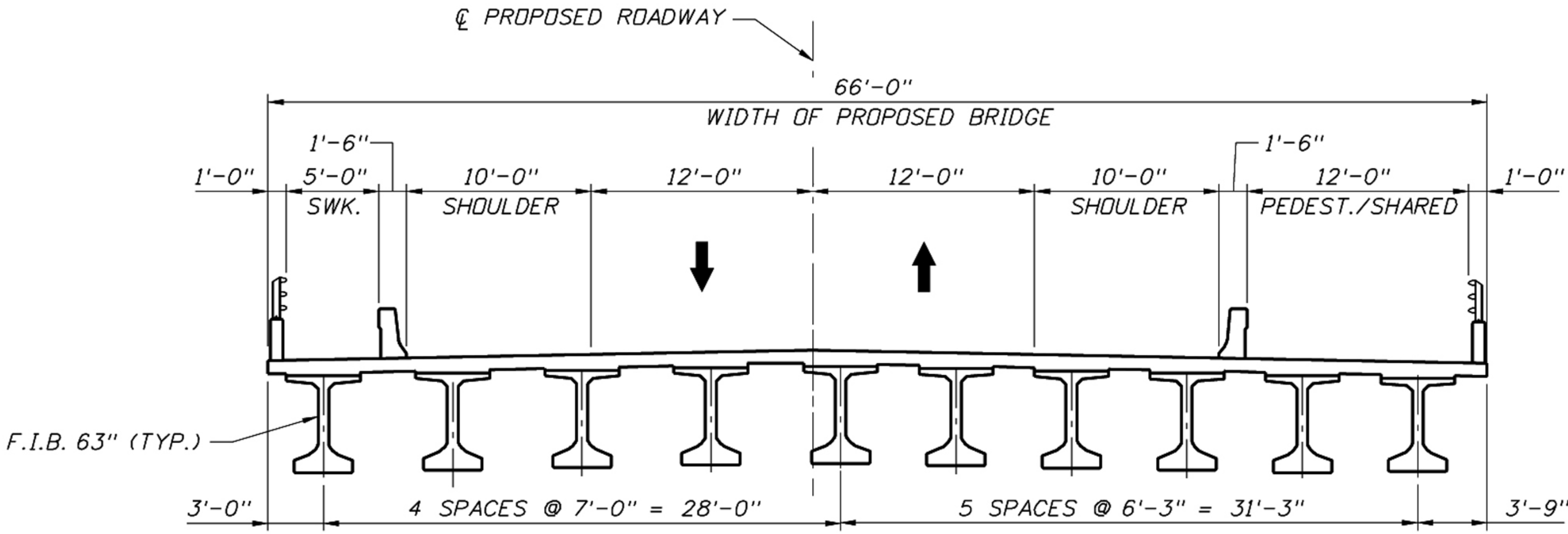
For purposes of this Feasibility Study, the following structural features are proposed. A total bridge length of 432 feet consisting of Florida-I 63 in standard prestressed beams (Index 20063). Due to phased construction requirements, the beam spacing will be different between the phases of construction. Beam spacing for the north alignment is spaced at spaced at 5 ft 9 in and 6 ft, providing 3- 144 ft spans. Beam spacing for the south alignment is spaced at spaced at 6 ft 3 in and 7 ft, providing 3- 144 ft spans. Drilled shaft foundations, similar to the Belleair Causeway bridge replacement bridge, are proposed.



Dunedin Causeway Bridge Replacement Feasibility Study

WEST (RELIEF BRIDGE) SOUTH ALIGNMENT CONSTRUCTION PHASING (1 OF 2)

FIGURE 5-17



FINAL CONFIGURATION

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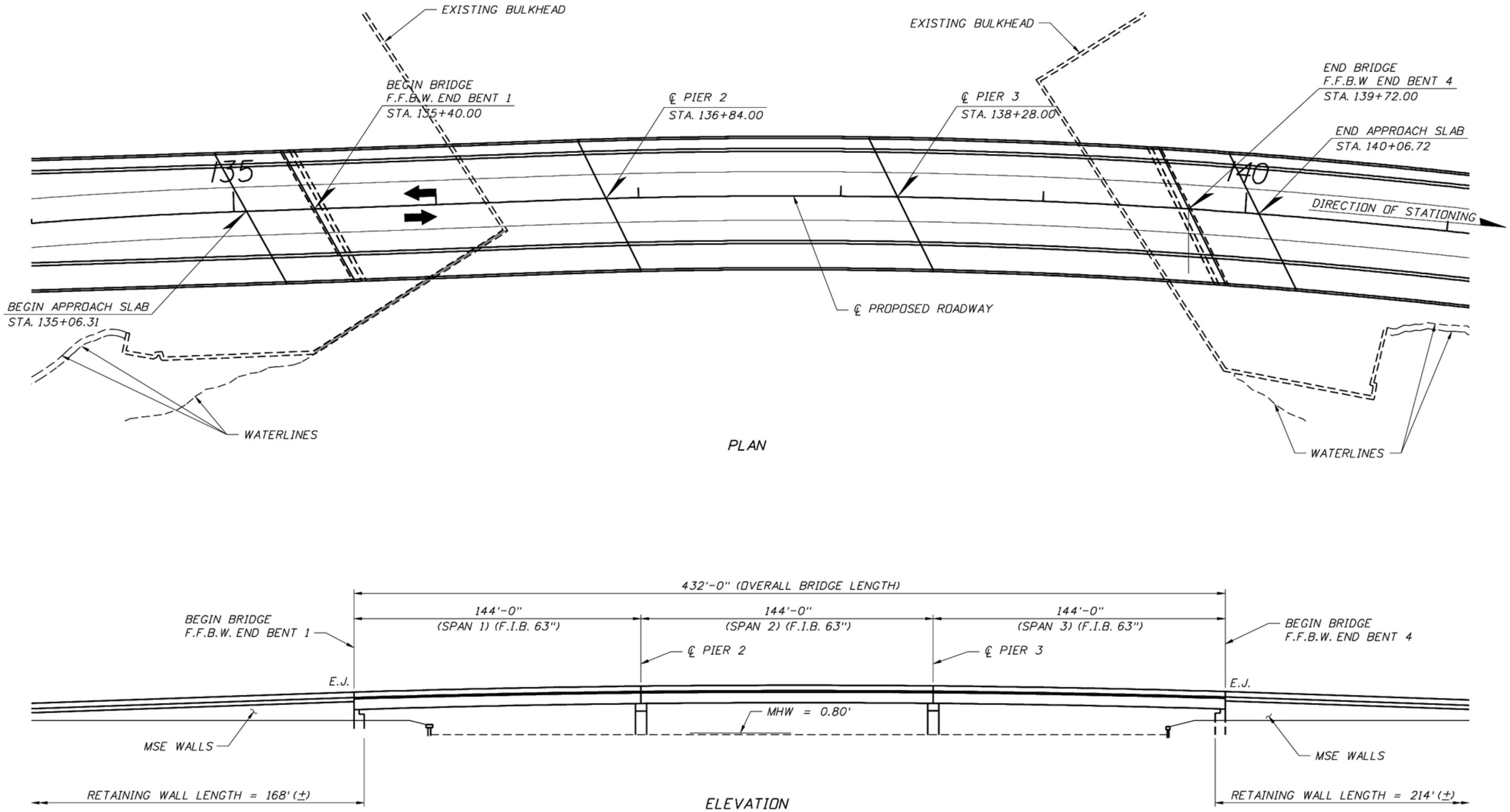
Feasibility Study

WEST (RELIEF BRIDGE) SOUTH ALIGNMENT
CONSTRUCTION PHASING (2 OF 2)

FIGURE 5-18



Dunedin Causeway Bridge Replacement Feasibility Study

WEST (RELIEF) BRIDGE PLAN AND ELEVATION

FIGURE 5-19

5.4 STORMWATER MANAGEMENT ALTERNATIVES

The same type of drainage conveyance systems will be necessary for all the studied horizontal and vertical alignments. All roadway bridge approach typical sections considered in this report require closed storm sewer systems to convey runoff to the stormwater management facilities. Drainage for the relief bridge deck will match the current drainage system which consists of sheet flow to the bridge end inlets. However, the proposed deck drainage system for the east (main) bridge will be in an improvement over the current drain system that uses a scupper system. A stormsewer system will result in an a water quality improvement for St Joseph Sound as it will direct all bridge deck runoff to the treatment ponds. The same drainage approach and construction cost is anticipated, regardless of which horizontal and vertical alignment is selected for the project. No drainage improvements are considered along the causeway since this area will only be resurfaced.

Water quality from runoff within the project area will be significantly improved. Stormwater management facilities will be built to provide treatment for the bridge deck and bridge approach roadway. Because of the tidal nature of St Joseph Sound, water quantity (peak flow attenuation) and floodplain mitigation will not be required. Stormwater management requirements were established in a permit pre-application meeting held in the SWFWMD on 2/24/2009. In addition to meeting the presumptive criteria for water quality, SWFWMD requested that water quality be analyzed from a Total Maximum Daily Load (TMDL) perspective should St. Joseph Sound be deemed an impaired waterway with respect to nutrients.

Where possible, two alternative stormwater management facilities were identified for each basin. For purposes of this study, each basin is defined as the roadway bridge approach, including the contributing drainage area from the bridge deck. Due to the in-situ soil conditions (sandy soils directly influenced by the tidal exchange) alternate pond sites were evaluated as dry treatment facilities discharging to an Outstanding Florida Water (OFW). As a result of the Aquatic Preserve Act, enacted by the State of Florida in 1975, St. Joseph Sound was classified as OFW in March 1979. As such, an additional 50% treatment is required. A volume of 0.75 in (0.5 in required by SWFWMD and 0.25 in for OFW) over the directly connected impervious areas would be required for the pond treatment design.

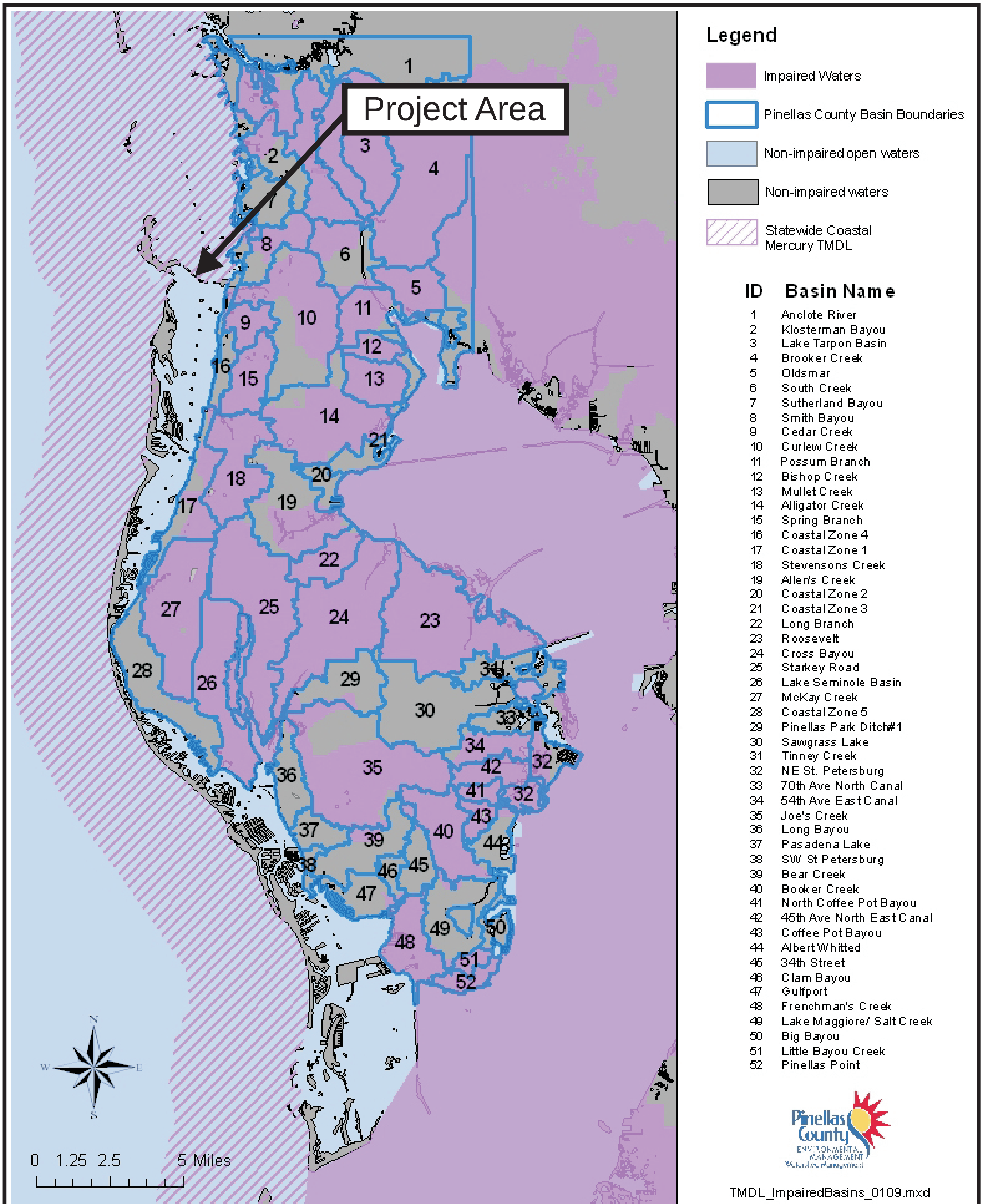
It should be noted that dry treatment systems, via soils percolation, are very favorable from a TMDL perspective. The pollutant removal efficiency for dry systems is approximately 80% and achievement of water quality net improvement waterway would be readily accomplished because currently there is no treatment provided at the site, no additional lanes will be added by the project and runoff from the entire

project area will be routed through ponds. Of further consideration is the permitting environment throughout the state. An anticipated new permitting Statewide Rule, scheduled to be implemented in 2009, has been postponed to 2010. Changes in the design requirements and design methodology are anticipated. At this time, the project area is rated as an impaired waterway for mercury, low priority, scheduled for TMDL establishment on 2011 (see **Figure 5-20**). Guidelines or procedures to evaluate mercury removal rates are not available from the water management district. Therefore, water quality analysis utilizing the Dr. Harper guidelines for nutrient removal are not required at this time from the permitting agency.

Preliminary pond sizing was performed that comply with Pinellas County and SWFWMD stormwater management requirements. For the east (main) bridge approaches standalone pond sites were estimated with fifteen (15) ft maintenance berms, 1:4 bank slopes, and 0.75 ft of retention storage for dry treatment. Due to the limited ROW and upland area along the causeway, only treatment swales are considered for the relief bridge roadway approaches. These swale area requirements are based on swales with no maintenance berms, 1:3 side slopes, 5 ft bottom width and retention storage depth of 0.75 ft. A summary of the estimated feasible pond site area, storage requirement and recommendations is summarized on **Table 5-1**.

Table 5-1: Alternative Pond Sites Summary

Location	Basin (Pond)	Required Treatment Volume (acre ft)	Pond Area (acre)	Comment
West (Relief) Bridge - West Approach	Basin 1 (Pond 1)	0.10	0.31	Only one treatment pond is viable on the north side due to tight ROW, land elevation and limited upland area.
West (Relief) Bridge – East Approach	Basin 2 (Pond 2)	0.16	0.54	Only one treatment swale is viable on the north side due to tight ROW, land elevation and limited upland area.
East (Main) Bridge – West Approach	Basin 3 (Ponds 3A & 3B)	0.27	0.73	Two viable sites are feasible for each alignment. The preferred site is the one that maximizes land use under the bridge deck as it minimizes the area's recreational impact.
East (Main) Bridge – East Approach	Basin 4 (Ponds 4A & 4B)	0.19	0.56	Two viable sites are presented for each alignment. The preferred site is the one that maximizes land use under the bridge deck as it minimizes the area's recreational impact.



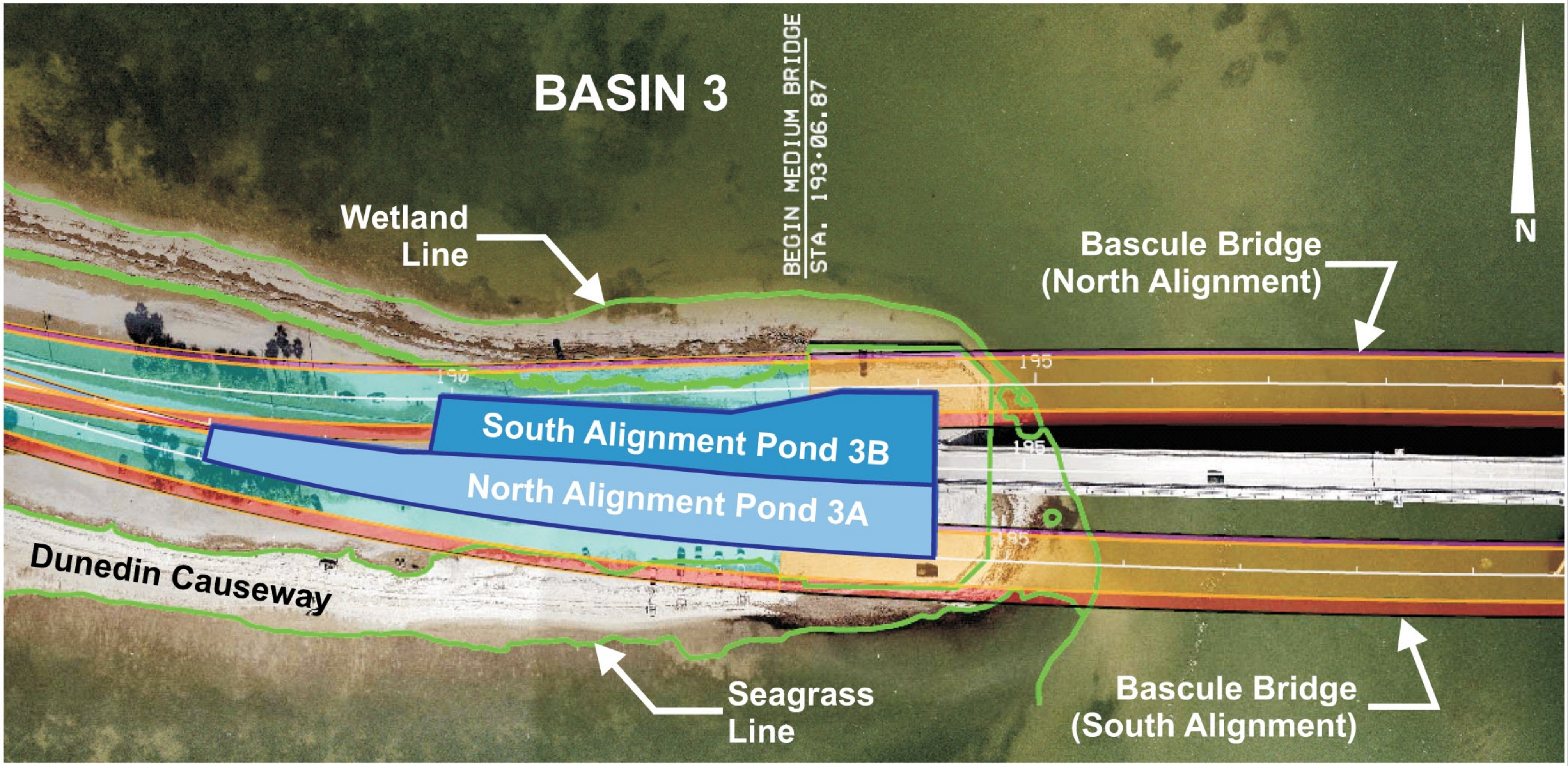
Dunedin Causeway Bridge Replacement Feasibility Study

PINELLAS COUNTY IMPAIRED WATERS

FIGURE 5-20

Viable pond sites for the east (main) bridge north and south alignment, with the mid level bridge vertical profile, are presented on **Figures 5-21 and 5-22**. These sites are outside of the roadway/ bridge footprint. Alternate sites for these ponds (not shown on the figures) consist of reshaping the ponds to use the available area under the bridge deck. Pond sites for the low level and high level bridge are not included but they lie in similar locations with configuration adjustments due to differing abutment location. It is noted that only one feasible site is available for the east and west side of the relief bridge approaches (see **Figures 5-23 and 5-24**). All viable pond sites presented in this study are within the existing ROW, thus no ROW acquisition is necessary. Alternate pond sites outside of the roadway ROW are not presented because they would lie outside of the project limits and would prove to be cost prohibitive due to the adjacent developments along the Dunedin Causeway.

From a roadway horizontal alignment comparison standpoint, the required stormwater management facility sizes will not vary based on the selected alignment. Exact pond location and configuration is the only variable to be considered. Because minimization to recreational areas of the causeway is a key project objective, the recommended pond locations maximize the use of area under the bridge deck. In relation to the roadway vertical profile, the high level bridge provides the maximum area for pond use under the bridge deck due to its longer bridge length and more distant abutment toe setback to the seawall. The low level bridge provides the least useable pond area under the bridge deck. Should the low or mid level bridge be selected, the pond under the bridge would have to be wider and part of the pond may lie outside of the bridge deck footprint due to the reduced area below the bridge deck.



Dunedin Causeway
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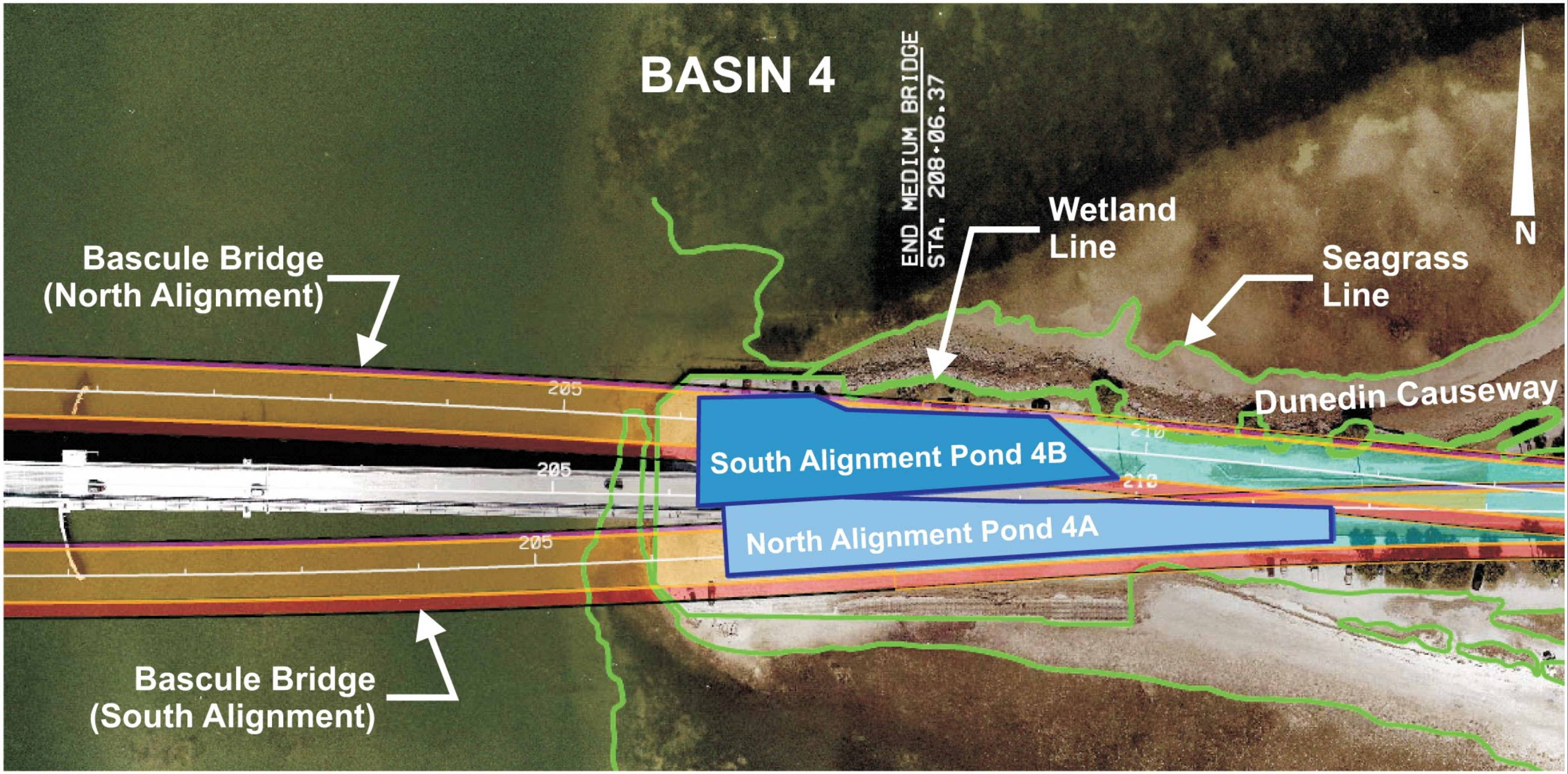
STORMWATER MANAGEMENT FACILITIES FOR
EAST (MAIN) BRIDGE WEST ABUTMENT
WITH MID LEVEL BRIDGE

FIGURE 5-21



Dunedin Causeway
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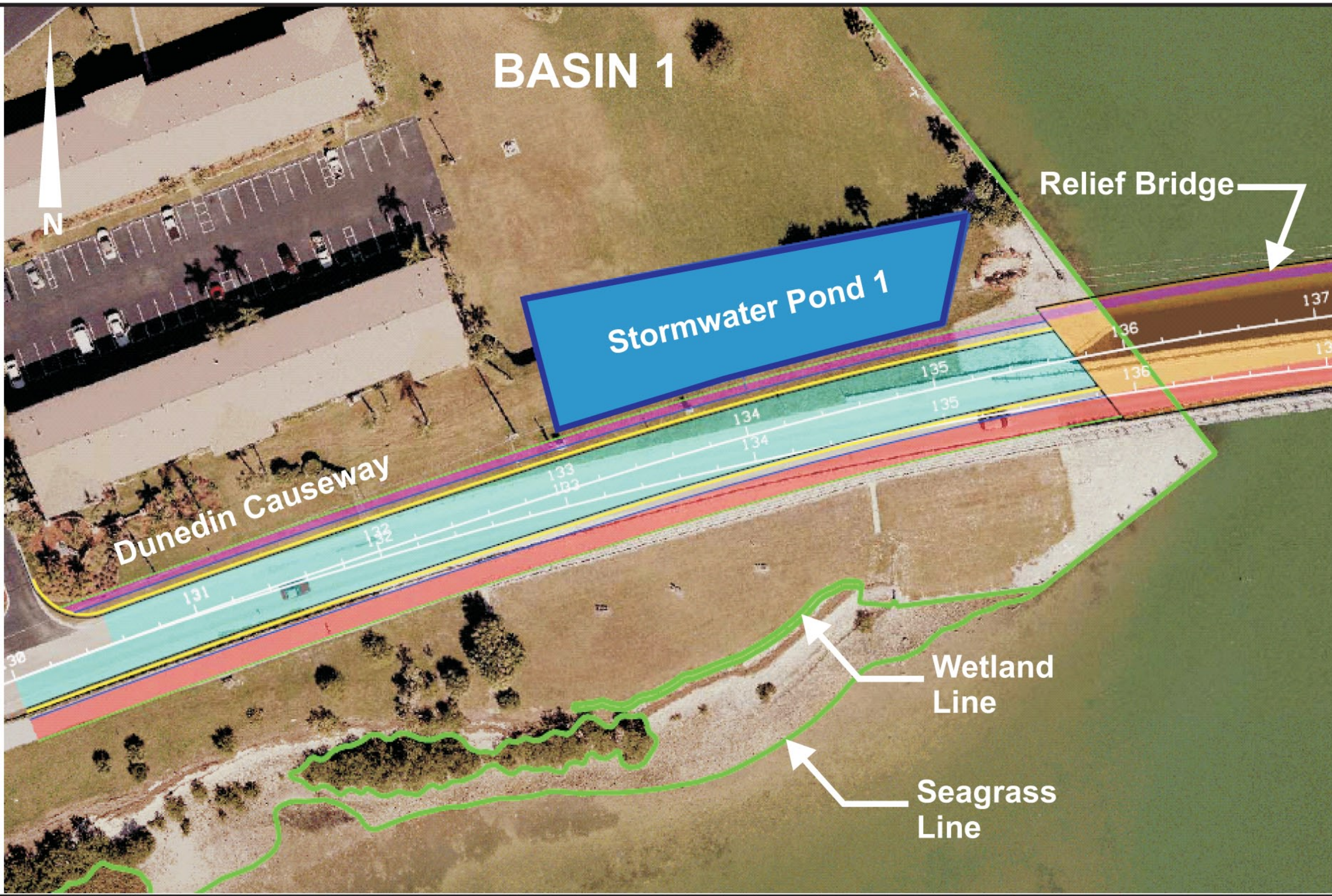
STORMWATER MANAGEMENT FACILITIES FOR EAST (MAIN) BRIDGE EAST ABUTMENT WITH MID LEVEL BRIDGE

FIGURE 5-22



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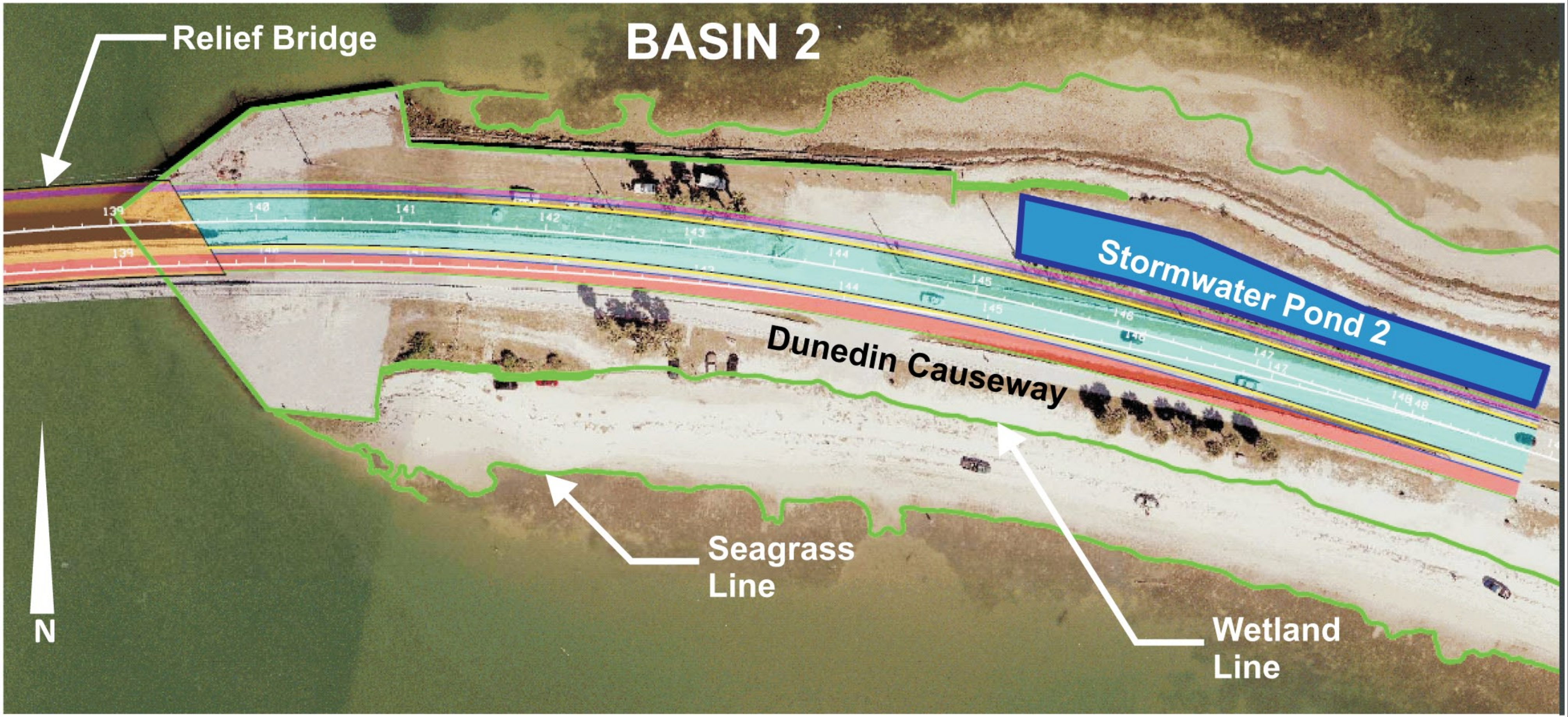
STORMWATER MANAGEMENT FACILITIES FOR RELIEF BRIDGE WEST ABUTMENT

FIGURE 5-23



Dunedin Causeway Bridge Replacement Feasibility Study

STORMWATER MANAGEMENT FACILITIES FOR EAST (MAIN) BRIDGE EAST ABUTMENT

FIGURE 5-24

5.4.1 DRAINAGE COSTS

Preliminary cost estimates have been developed for the drainage conveyance systems and stormwater management ponds using the FDOT average unit costs from May 1, 2008 and April 30, 2009. Cost estimates for the storm sewers are conservatively based on the high level bridge, which results in the longest project length. Inlets spaced 300 ft apart, with an average 24 in pipe diameter are assumed for the storm sewer system cost estimate for the bridge approaches. Pond construction cost estimates are also based on the high-level bridge. It is noted that pond construction cost for the low level and mid level bridge would result in minor cost differences for these treatment facilities. Pond costs are based on 4 ft depth excavation and sodding of the entire surface area, and do not include cost of fence around the perimeter. All drainage costs are included in the roadway engineers estimate included in **Appendix F**.

5.5 WETLAND IMPACTS

5.5.1 ANALYSIS OF SEAGRASS AND WETLAND IMPACTS

Impacts to seagrass areas and intertidal wetland communities have been analyzed for the proposed main bridge replacement pursuant to the proposed vertical and horizontal alternatives (**Table 5-2** and **Table 5-3**). Potential impacts have been quantified for both north and south-alignments with respect to the low and mid level bascule alternatives and the high level fixed span alternative.

Seagrass and wetland impacts have also been quantified for the proposed west (relief) bridge replacement (**Table 5-4**). The relief bridge will be replaced in-kind with a prestressed concrete beam bridge, however the study has examined impacts associated with north and south-shifted alternatives.

Table 5-2: Impact Quantities for Main Bridge Replacement (North Alternative)

Wetland Community Types and Impacts	Low level Bascule	Mid level Bascule	High level Fixed Bridge
Unconsolidated Shoreline Shading	0.03 ac.	0.03 ac.	0.16 ac.
Unconsolidated Shoreline Fill	0.14 ac.	0.14 ac.	0.002 ac.
Emergent Shading	0.00 ac.	0.0004 ac.	0.07 ac.
Emergent Fill	0.07 ac.	0.07 ac.	0.00 ac.
Mangrove Shading	0.00 ac.	0.00 ac.	0.002 ac.
Mangrove Fill	0.01 ac.	0.01 ac.	0.00 ac.
Seagrass Shading	0.03 ac.	0.03 ac.	0.03 ac.*
Seagrass Fill	0.00 ac.	0.00 ac.	0.00 ac.
Total Shading Impacts	**0.06 ac.**	**0.06 ac.**	**0.26 ac.**
Total Fill Impacts	**0.22 ac.**	**0.22 ac.**	**0.002 ac.**
Total Impacts	**0.28 ac.**	**0.28 ac.**	**0.26 ac.**

* Seagrass shading for the high level fixed-span bridge is not considered a permanent impact due to light penetration under the new span.

Table 5-3: Impact Quantities for Main Bridge Replacement (South Alternative)

Wetland Community Types and Impacts	Low level Bascule	Mid level Bascule	High level Fixed Bridge
Unconsolidated Shoreline Shading	0.03 ac.	0.03 ac.	0.28 ac.
Unconsolidated Shoreline Fill	0.14 ac.	0.14 ac.	0.00 ac.
Emergent Shading	0.00 ac.	0.00 ac.	0.07 ac.
Emergent Fill	0.07 ac.	0.07 ac.	0.00 ac.
Mangrove Shading	0.00 ac.	0.00 ac.	0.00 ac.
Mangrove Fill	0.01 ac.	0.01 ac.	0.02 ac.
Seagrass Shading	0.08 ac.	0.08 ac.	0.08 ac.*
Seagrass Fill	0.00 ac.	0.00 ac.	0.00 ac.
Total Shading Impacts	**0.23 ac.**	**0.26 ac.**	**0.36 ac.**
Total Fill Impacts	**0.13 ac.**	**0.10 ac.**	**0.00 ac.**
Total Impacts	**0.36 ac.**	**0.36 ac.**	**0.36 ac.**

* Seagrass shading for the high level fixed-span bridge is not considered a permanent impact due to light penetration under the new span.

Table 5-4: Impact Quantities for West (Relief) Bridge Replacement (North and South Alternatives)

Wetland Community Types and Impacts	North Shift Alternative	South Shift Alternative
Unconsolidated Shoreline Shading	0.00 ac.	0.00 ac.
Unconsolidated Shoreline Fill	0.00 ac.	0.00 ac.
Emergent Shading	0.00 ac.	0.00 ac.
Emergent Fill	0.00 ac.	0.00 ac.
Mangrove Shading	0.00 ac.	0.00 ac.
Mangrove Fill	0.00 ac.	0.00 ac.
Seagrass Shading	0.00 ac.	0.00 ac.
Seagrass Fill	0.00 ac.	0.00 ac.
Open Water Shading	0.00 ac.	0.00 ac.
Open Water Fill	0.00 ac.	0.00 ac.
Total Shading Impacts	**0.00 ac.**	**0.00 ac.**
Total Fill Impacts	**0.00 ac.**	**0.00 ac.**
Total Impacts	**0.00 ac.**	**0.00 ac.**

5.5.2 DISCUSSION OF POTENTIAL IMPACTS

East (Main) Bridge - North Shift

Impacts associated with the north-shift alignment for the low and mid level bascule and the high level fixed-span replacement are quantified in **Table 5-2**. All three bridge types impact 0.03 acres of seagrass areas adjacent to the existing bascule bridge. For all three bridge types, the impacts are the result of shading and not from dredge & fill activities. The low level and mid level bascule replacements would result in permanent shading impacts to seagrass areas that would require mitigation by state and federal permitting agencies. Shading impacts from the high level fixed-span bridge would most likely not require mitigation from the regulatory agencies as it can be shown that the bridge span would be at an adequate height as to allow sufficient light under the bridge to ensure survivability.

The low level and mid level bascule bridges would result in 0.01 acres of fill impacts to mangrove-dominant wetlands along the existing shoreline. Mitigation will be required for the loss of these wetland resources. The high level fixed-span bridge would result in 0.002 acres of shading impacts to mangroves and should not require mitigation.

Both the low level and mid level bascule bridges would result in 0.07 acres of fill impacts to emergent wetlands. In addition to fill impacts, the mid level bascule bridge would result in a very small (18 square feet) of shading impacts to emergent wetlands. Mitigation would be required for all of these impacts. Analysis has shown that the high level fixed-span bridge would result in 0.07 acres of shading impacts to emergent wetlands, however the regulatory agencies will most likely not require mitigation for these impacts.

The low level and mid level bascule bridges would result in shading and fill impacts to un-vegetated shoreline. Fill impacts would total 0.14 acres and shading impacts would total 0.03 acres for both bridge types. Mitigation will be required for the 0.14 acres of fill placed on the un-vegetated portions of shoreline, however the 0.03 acres of shading should not require mitigation. The high level fixed span bridge would result in negligible fill impacts (73 square feet) and shading impacts of 0.16 acres to portions of un-vegetated shoreline.

East (Main) Bridge - South Shift

Impacts associated with the south-shift alignment for the low and mid level bascule and the high level fixed-span replacement are quantified in **Table 5-3**. All three south-shifted bridge types impact 0.08

acres of seagrasses. Impacts for all three bridge types are the result of shading and not from dredge & fill activities. The low level and mid level bascule replacements would result in permanent shading impacts to seagrass areas. Mitigation would be required for these impacts. Shading impacts from the high level fixed-span bridge would most likely not require mitigation.

All three bridge types avoid fill and shading impacts to mangroves and emergent wetland communities.

Impacts to un-vegetated shoreline for the low level bascule bridge would total 0.15 acres of shading and 0.13 acres of fill. The mid level bascule bridge would result in 0.18 acres of shading and 0.10 acres of fill impacts. The fill impacts for both bridge types will require mitigation, while the shading impacts should be exempt from mitigation. The high level fixed-span bridge would result in 0.28 acres of shading impacts to un-vegetated shoreline that will most likely not require mitigation.

The low level and mid level bascule bridges would result in 0.01 acres of fill impacts to mangrove-dominant wetlands along the existing shoreline. Mitigation will be required for the loss of these wetland resources. The high level fixed-span bridge would result in 0.002 acres of shading impacts to mangroves and should not require mitigation.

Both the low level and mid level bascule bridges would result in 0.07 acres of fill impacts to emergent wetlands. In addition to fill impacts, the mid level bascule bridge would result in a very small (18 square feet) of shading impacts to emergent wetlands. Mitigation would be required for all of these impacts. Analysis has shown that the high level fixed-span bridge would result in 0.07 acres of shading impacts to emergent wetlands, however the regulatory agencies will most likely not require mitigation for these impacts.

The low level and mid level bascule bridges would result in shading and fill impacts to un-vegetated shoreline. Fill impacts would total 0.14 acres and shading impacts would total 0.03 acres for both bridge types. Mitigation will be required for the 0.14 acres of fill placed on the un-vegetated portions of shoreline, however the 0.03 acres of shading should not require mitigation. The high level fixed span bridge would result in negligible fill impacts (73 square feet) and shading impacts of 0.16 acres to portions of un-vegetated shoreline.

West (Relief) Bridge - North Shift

The north-shift alignment of the relief bridge will not impact wetland communities and will not require mitigation.

West (Relief) Bridge - South Shift

The south-shift alignment of the relief bridge will not impact wetland communities and will not require mitigation.

5.5.3 POTENTIAL MITIGATION STRATEGIES

Mitigation for unavoidable impacts to wetlands will be required by the SWFWMD and the USACE. Mitigation can be satisfied through the creation of new wetland areas from existing uplands, the restoration of former wetlands, and the enhancement or preservation of existing wetlands. Regardless of what mitigation strategy is employed to compensate for impacts, it is critical that the preferred mitigation plan be acceptable to the regulatory agencies and in the County's best interest. The mitigation must also be cost-effective with regards to land acquisition, design and construction costs and costs associated with long-term maintenance and monitoring requirements. The following are potential mitigation alternatives that could be employed:

Wetland Restoration / Enhancement

A potential mitigation site was identified east of the existing bascule bridge (**Figure 5-25**) and north of Causeway Boulevard. The approximate ½ acre site has been severely degraded by vehicular impacts as evidence by deep ruts and tire tracks. The site is void of vegetation normally associated with land in the estuarine intertidal zone. A restoration / enhancement strategy would require only minor grading activities to eliminate the damage caused by vehicles. A planting plan would install native wetland plant species such as sea oxeye daisy, saltmeadow cordgrass, sea purslane, salt grass, seashore paspalum and saltwort to provide immediate cover and encourage natural recruitment. Over time, it is expected that black and white mangroves would colonize the site and enhance plant diversity. Restoration and enhancement would target primarily high marsh systems to create a mosaic of intertidal wetland communities and encourage increased wildlife utilization. This potential site is advantageous in that the property is already owned by the County, a minimal amount of earthwork would be required to establish optimum grades and proposed plant species are inexpensive and commercially available.

Pinellas County PUBLIC WORKS

Dunedin Causeway Bridge Replacement Feasibility Study

POTENTIAL MITIGATION SITE FOR WETLAND RESTORATION/ENHANCEMENT

FIGURE 5-25

Seagrass Restoration

In the event that the Wetland Restoration / Enhancement site illustrated in **Figure 5-25** does not fulfill mitigation requirements, there are opportunities to perform additional mitigation within the vicinity of the project. Examination of the project aerials has revealed the presence of numerous boat propeller scars within the seagrass meadows that surround the Causeway. Two areas are particularly scarred, both on the south side of the causeway immediately adjacent to the bascule bridge and adjacent to the relief bridge (**Figure 5-26**). Pedestrian surveys during periods of low tide have also identified numerous propeller scars on the immediate shoreline in the popular boat launch area west of the bascule bridge.

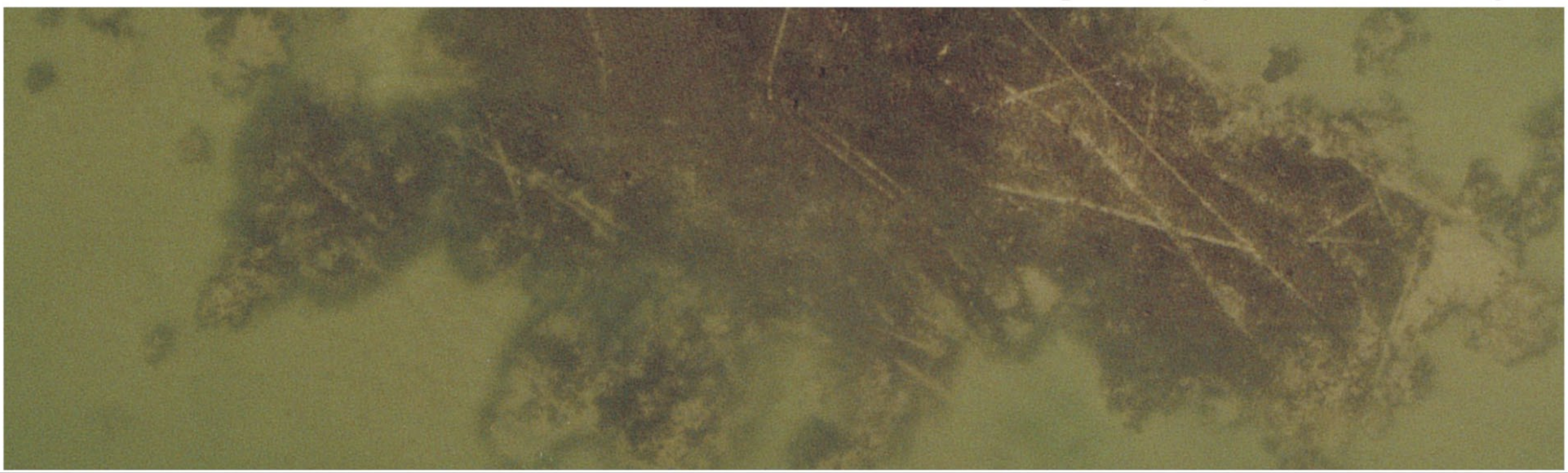
The proposed restoration plan would utilize a proven technique that would employ “sediment tubes” within propeller scars specifically targeted for restoration. The sediment tube fills the trench created by the boat propeller and allows seagrasses to colonize by enabling the seagrass to send out runners over the new substrate. The tubes are constructed by filling a biodegradable cotton-based fabric with native sand and shell hash substrate and sewing both ends closed. Over time, the sediment tube degrades and all that remains is the newly-colonized seagrass in the area of the former trench.

Seagrass Preservation

The waters of St. Joseph Sound surrounding the Causeway are very shallow and the areas north and south of the Causeway exhibit extensive submerged and intertidal seagrass meadows. The causeway experiences heavy recreational boat traffic for fishing, water skiing, and picnic activities that frequently impact seagrass communities. A potential mitigation strategy would install seagrass warning buoys at strategic locations on the edge of seagrass areas to lessen the chance of boat groundings and/or boat propeller scars. An additional measure would install educational signs along popular boat launch areas of the Causeway to inform boaters of the critically important role that seagrass communities serve to the estuarine ecosystem.

Top Photo: Prop Scars Adjacent to Relief Bridge

Bottom Photo: Prop Scars Adjacent to Bascule Bridge



Dunedin Causeway
Bridge Replacement
Feasibility Study

POTENTIAL MITIGATION OPPORTUNITIES
PROP-SCAR RESTORATION

FIGURE 5-26

5.5.4 MITIGATION COSTS

It is anticipated that the one-half acre conceptual Mitigation Restoration / Enhancement site will provide adequate mitigation for the minor impacts associated with the main bascule replacement. Preliminary cost estimates for excavation and planting of this County-owned parcel are based on recent industry costs. It is estimated that approximately 1600 cubic yards of excavation will be required to restore upland portions of the site to intertidal elevations and create optimal planting elevations for salt-tolerant plant species. Installation of herbaceous plants on 2-ft centers will provide immediate coverage and stabilization of open soil. Shrubs installed on 5-ft centers will provide species diversity and enhance habitat value for area wildlife. Details pertaining to mitigation costs are presented in **Appendix F**.

5.6 ALTERNATIVES EVALUATION MATRIX

5.6.1 EAST (MAIN) BRIDGE

A comparison of the three horizontal alignment alternatives and the three profile alternatives is provided in **Table 5-5**. For this Feasibility Study, only impacts that can be quantified in terms of costs, construction means and methods, and environmental will be evaluated. Impacts that are subjective cannot be quantified into measurable costs and are not evaluated.

Table 5-5: East (Main) Bridge Alternatives Evaluation Matrix

Evaluation Criteria	North Alignment			Center Alignment			South Alignment		
	Low Level (21')	Mid Level (45')	High Level (> 65')	Low Level (21')	Mid Level (45')	High Level (> 65')	Low Level (21')	Mid Level (45')	High Level (> 65')
CONSTRUCTION IMPACTS									
Bridge Closed During Construction	No	No	No	Yes	Yes	Yes	No	No	No
Pedestrian Traffic Closed for Construction	No	No	No	Yes	Yes	Yes	No	No	No
RIGHT OF WAY IMPACTS									
Additional Roadway ROW Needed	No	No	No	No	No	No	No	No	No
Stormwater Pond ROW Needed	No	No	No	No	No	No	No	No	No
Wetland Mitigation ROW Needed	No	No	No	No	No	No	No	No	No
NATURAL ENVIRONMENT AFFECTS									
Shading and Fill Impacts (Acres)	0.28 ac.	0.28 ac.	0.26 ac.	0.00 ac.	0.00 ac.	0.00 ac.	0.36 ac.	0.36 ac.	0.36 ac.
T&E Species Impacts	None	None	None	None	None	None	None	None	None
Contamination Impacts	None	None	None	None	None	None	None	None	None
Cultural Resource Impacts	None	None	None	None	None	None	None	None	None
UTILITY IMPACTS									
Utility Relocations	5	5	5	-	-	-	4	4	4
PROJECT COST ESTIMATES									
Construction Cost									
- Roadway, Drainage, Lighting, etc.	$19,710,057	$22,445,738	$21,100,836	$ -	$ -	$ -	$19,745,003	$22,445,644	$21,118,777
- Structures	$31,849,101	$36,845,841	$34,815,179	$ -	$ -	$ -	$31,849,101	$36,845,841	$34,815,179
Environmental Mitigation Cost	$35,009	$35,009	$35,009	$ -	$ -	$ -	$35,009	$35,009	$35,009
Utility Relocation Cost	$793,250	$793,250	$793,250	$ -	$ -	$ -	$205,250	$205,250	$205,250
Preliminary Engineering & PD&E Cost (15%)	$7,733,874	$8,893,737	$8,387,402	$ -	$ -	$ -	$7,739,116	$8,893,723	$8,390,093
Construction Engineering & Inspection Cost (10%)	$5,155,916	$5,929,158	$5,591,601	$ -	$ -	$ -	$5,159,410	$5,929,149	$5,593,396
Total Project Cost	$65,277,206	$74,942,733	$70,723,277	$ -	$ -	$ -	$64,732,889	$74,354,615	$70,157,704

The center alignment was not quantified for the following two reasons. First, if the option to close the bridge during construction is assumed, the impacts to the public cannot be quantified in this Feasibility Study. Second, if the option to phase construct the bridge is assumed, the construction cost is typically at least 20% greater than either the north or south shift alignments. In addition, the increase in construction time cannot be quantified in this Feasibility Study.

As a result of the comparison, the southern horizontal alignment is selected over the center and northern alignment for further life-cycle cost estimation.

5.6.2 WEST (RELIEF) BRIDGE

A comparison of the three horizontal alignment alternatives is included in **Table 5-6**.

Table 5-6: West (Relief) Bridge Alternatives Evaluation Matrix

Evaluation Criteria	North Alignment	Center Alignment	South Alignment
CONSTRUCTION IMPACTS			
Bridge Closed During Construction	No	Yes	No
Pedestrian Traffic Closed for Construction	Yes	Yes	No
RIGHT OF WAY IMPACTS			
Additional Roadway ROW Needed	No	No	No
Stormwater Pond ROW Needed	No	No	No
Wetland Mitigation ROW Needed	No	No	No
NATURAL ENVIRONMENT AFFECTS			
Shading and Fill Impacts (Acres)	0.00 ac.	0.00 ac.	0.00 ac.
T&E Species Impacts	None	None	None
Contamination Impacts	None	None	None
Cultural Resource Impacts	None	None	None
UTILITY IMPACTS			
Utility Relocations	7	-	4
PROJECT COST ESTIMATES			
Construction Cost			
- Roadway, Drainage, Lighting, etc.	$4,867,909	$ -	$ 4,564,500
- Structures	$5,058,784	$ -	$5,058,784
Environmental Mitigation Cost	$ -	$ -	$ -
Utility Relocation Cost	$1,277,700	$ -	$78,000
Preliminary Engineering & PD&E Cost (15%)	$1,489,004	$ -	$1,443,493
Construction Engineering & Inspection Cost (10%)	$992,669	$ -	$962,328
Total Project Cost	$13,686,067	$ -	$12,107,104

The center alignment was not quantified for the following two reasons. First, if the option to close the bridge during construction is assumed, the impacts to the public cannot be quantified in this Feasibility Study. Second, if the option to phase construct the bridge is assumed, the construction cost will be greater than either the north or south shift alignments due to only being able to maintain one lane of traffic in either direction. In addition, the increase in construction time, the inconvenience to the travelling public and safety concerns cannot be quantified in this Feasibility Study.

As a result of the comparison, the southern horizontal alignment is selected over the center and northern alignment for further life-cycle cost estimation.

Section 6 Life Cycle Cost Analysis

Life-cycle cost analysis (LCCA) is an evaluation technique applicable for the consideration of certain transportation investment decisions. Specifically, when it has been decided that a project will be implemented, LCCA will assist in determining the best, lowest-cost, alternative to accomplish the project. The LCCA approach enables the total cost comparison of competing design and rehabilitation alternatives. All of the relevant costs that occur throughout the life of an alternative, not simply the original expenditures, are included.

Typically, life cycle analysis is used to evaluate the most cost efficient bridge replacement option when multiple alternatives are competing for limited funds. This is currently the situation at the Dunedin Causeway, where decisions need to be made whether to rehabilitate the existing bridge or replace the bridge with a fixed or movable bridge evaluating alternate horizontal alignments and profiles.

This section will provide our approach to determining the relevant costs needed to evaluate the various alternatives, described in **Section 5.2** and **Section 5.3**, in an LCCA analysis.

6.1 BRIDGE COST DATA

A detailed evaluation to determine the appropriate bridge structure costs was performed. This section summarizes how the proposed structure costs were developed.

Movable bridge costs were developed for the no-build, low level and mid level profile alternatives for the east (main) bridge. Cost estimates were based on preliminary design of movable bridge components and estimated quantity take-offs.

An alternative evaluation and selection is to be performed at the PD&E Study phase. The information and evaluation of alternatives for this Feasibility Study is to provide an Opinion of Probable Cost in order to establish a project cost that will be further developed and refined during the PD&E Study and final design phases.

6.1.1 LOW LEVEL BASCULE

The low level vertical profile will require a movable bridge to allow navigation of the main channel. A minimum vertical clearance of 21 ft with a 100 ft horizontal clearance is required by the U.S. Coast

Guard. **Section 5.2.1** provides further discussion of the low level bridge profile alternative characteristics.

For purposes of this Feasibility Study, the existing twin leaf bascule bridge is assumed to be replaced with a single leaf bascule bridge. The single leaf bridge will have an overall reduced construction cost since there is only one bascule pier and one set of operating machinery to install and maintain. The new leaf would have a span length of approximately 164 ft which is not excessive by current design standards. An advantage of a single leaf bridge is that the machinery and control systems are located on the same side of the bridge, reducing the need for submarine cables. Visually the bridge would appear similar to the existing structure. **Table 6-1** provides the estimated probable low level bascule bridge costs used for the low level profile.

Table 6-1: Probable Low Level Bascule Bridge Costs

Low Level Bascule Bridge 21 ft vertical clearance, 100 ft horizontal clearance				
Cost Item	**Quantity**	**Units**	**Unit Cost**	**Cost**
Foundation				
Bascule Pier Piles	3600	lin ft	$625	$2,250,000
Bascule Pier Footing	1800	cu yd	$600	$1,080,000
Rest Pier Piles	300	lin ft	$625	$187,500
Pile Cap (rest pier)	200	cu yd	$600	$120,000
Bascule Piers	2820	cu yd	$800	$2,256,000
Fender System	1	lot	$800,000	$800,000
Bascule Leaves				
Girders	435000	lbs	$2.25	$978,750
Stringers	107640	lbs	$1.75	$188,370
Floor Beams	37360	lbs	$1.95	$72,852
Counterweights	765	cu yd	$1,000	$765,000
Deck - open grid	8580	sq ft	$40	$343,200
Deck - Filled grid	1520	sq ft	$80	$121,600
Sidewalk (FRP PL)	780	sq ft	$15	$11,700
Bike Path (FRP PL)	1560	sq ft	$15	$23,400
Seal Concrete		sq yd	Included in cofferdams	
Railing	370	lin ft	$100	$37,000
Barrier Curb	340	lin ft	$250.	$85,000
Trunions/Bearings	2	lot	$500,000	$1,000,000

Low Level Bascule Bridge 21 ft vertical clearance, 100 ft horizontal clearance				
Cost Item	**Quantity**	**Units**	**Unit Cost**	**Cost**
Operator House	100	cu yd	$1,750	$175,000
Operator House Architectural	1	lot	$350,000	$350,000
Span/Tail Locks	2	lot	$250,000	$500,000
Operating Machinery	1	lot	$3,500,000	$3,500,000
Electrical Power feed	1	lot	$750,000	$750,000
Bridge Control System	1	lot	$750,000	$750,000
Traffic Gates and Signals	6	lot	$50,000	$300,000
Bridge Lighting	1	lot	$15,000	$15,000
Submarine cable (lights only)	1	lot	$350,000	$350,000
Standby Generator	1	lot	$250,000	$250,000
Cofferdams(for Construction)	1	lot	$1,250,000	$1,250,000
Dewatering	1	lot	$750,000	$750,000
		Total Cost		**19,260,372**

6.1.2 MID LEVEL BASCULE

The cost of a mid level bascule bridge with a minimum vertical clearance of 45 ft with a 100 ft horizontal clearance was also calculated. **Section 5.2.2** provides further discussion of the mid level bridge profile characteristics.

The mid level bascule proposed is a single leaf bridge. It has the same advantages discussed for the low level bridge and will visually appear similar to the existing structure. **Table 6-2** provides the estimated probable mid level bascule bridge cost used for the mid level profile. The mid level alternative is slightly higher than the low level alternative. The mid level bascule will have an increase in bascule pier concrete, but a decrease in the bascule pier foundation compared to the low level bascule. The reason for the decrease in the foundation costs is due to the 45 ft vertical clearance of the mid level bascule bridge, when the leaf is in the open position the counterweight will be above the MHW elevation. This allows the bascule pier to rest on water line footings instead of a cofferdam foundation. In contrast, the low level bridge requires a cofferdam foundation since in the open position, the leaf will travel below the MHW elevation, requiring the pier to be watertight.

Table 6-2: Probable Mid Level Bascule Bridge Costs

Mid Level Bascule Bridge 45 ft vertical clearance, 100 ft horizontal clearance				
Cost Item	**Quantity**	**Units**	**Unit Cost**	**Cost**
Foundation				
Bascule Pier Piles	3600	lin ft	$625	$2,250,000
Bascule Pier Footing	1800	cu yd	$600	$1,080,000
Piles - rest pier	300	lin ft	$625	$187,500
Pier Cap (rest Pier)	200	cu yd	$600	$120,000
Bascule Piers	3600	cu yd	$800	$2,880,000
Fender System	1	lot	$800,000	$800,000
Bascule Leaves		lot		
Girders	435000	lbs	$2.25	$978,750
Stringers	107640	lbs	$1.75	$188,370
Floor beams	37360	lbs	$1.95	$72,852
Counterweights	765	cu yd	$1,000	$765,000
Deck - open grid	8580	sq ft	$40	$343,200
Deck - Filled grid	1520	sq ft	$80	$121,600
Sidewalk (FRP PL)	780	sq ft	$15	$11,700
Bike Path (FRP PL)	1560	sq ft	$15	$23,400
Railing	370	lin ft	$100	$37,000
Barrier Curb	340	lin ft	$250	$85,000
Seal Concrete		sq yd	Included in cofferdams	
Trunions/Bearings	2	lot	$500,000	$1,000,000
Operator House	100	cu yd	$1,750	$175,000
Operator House Architectural	1	lot	$350,000	$350,000
Span/Tail Locks	2	lot	$250,000	$500,000
Operating Machinery	1	lot	$3,500,000	$3,500,000
Electrical Power feed	1	lot	$750,000	$750,000
Bridge Control System	1	lot	$750,000	$750,000
Traffic Gates and Signals	6	lot	$50,000	$300,000
Bridge Lighting	1	lot	$15,000	$15,000
Submarine Cable (lights only)	1	lot	$350,000	$350,000
Standby Generator	1	lot	$250,000	$250,000
Cofferdams(for Construction)	1	lot	$1,000,000	$1,000,000
Dewatering	1	lot	$750,000	$750,000
		Total Cost		**$19,634,372**

6.1.3 BASCULE OPERATING AND MAINTENANCE COSTS

Operating costs and routine maintenance costs were also estimated for the existing movable bridge, proposed low level and mid level bascules. The costs, shown in **Table 6-3**, are computed with the following assumptions:

- Bridge Tenders are present 24 hrs a day
- Existing bridge and low level bridge open approximately 1800 times per year
- Mid level bridge opens 40% less than the low level bridge per year
- The Bridge is Lubricated monthly and the generator is exercised for 1 hour
- Traffic gate arms are replaced annually
- A seven minute opening cycle is assumed
- Roadway lighting operates for 10 hours per day year round

Table 6-3: Probable Initial Yearly Operating & Maintenance Costs

Bridge Operating Costs			
Cost Item (annual)	**Existing Bridge**	**Low Level Bascule**	**Mid Level Bascule**
Operating Cost	$ 1,450,549/5 yrs = $290,110		
Bridge Operators		$ 150,000	$ 150,000
Electrical Power		$ 1,946	$ 1,781
Fuel		$ 1,350	$ 1,350
Total Operating Costs		$ 153,296	$ 153,131
Maintenance Costs			
Routine Maintenance (lubrication, etc)		$ 11,400	$ 11,400
Routine Repairs			
Traffic Gates		$ 11,200	$ 11,200
Lamps		$ 5,200	$ 5,200
Limit Switch adjustment		$ 12,600	$ 12,600
Painting and other maintenance repairs		$ 10,800	$ 10,800
Total Maintenance Costs	**$ 290,110**	**$ 51,200.00**	**$ 51,200.00**

In **Section 3.2.5**, based on data collected for the bridge openings over an 8 month period, the existing bridge opened 1023 times. If the number of openings are projected over a 12 month period, and ignoring August due to the unusual low number of openings reported, the range of expected openings should be

between 1500 and 1800 openings per year. For purposes of this Feasibility Study, 1800 openings per year was assumed.

A further breakdown of how the operating and maintenance costs are computed is provided in **Table 6-4**.

Table 6-4: Operating & Maintenance Costs Breakdown

Electrical Power Consumption						
Bascule Bridge operating power requirements						
# opening x 7 minutes cycle time x KW (motor loads) x 1hr/60 minutes = KWH						
	# Openings	**Drive Motor size**	**KWH**	**$/KWH**	**$**	
Existing	1800	42	2699	$ 0.06	$ 162	
Low level	1800	150	6885	$ 0.06	$ 413	
Mid Level	1080	150	6885	$ 0.06	$ 248	
Bridge Lighting Loads						
	# Lamps	**Unit KW Consumption**	**Total Annual***	**$/KWH**	**$**	
Roadway	20	0.15	3650	$ 0.06	$ 657	
Pier Lighting	20	0.1	3650	$ 0.06	$ 438	
Misc Lighting	20	0.1	3650	$ 0.06	$ 438	
					$ 1533	
* Total Annual = 10 hrs x 365 days = 3650 hours						
	Bridge Operation	**Lighting**	**Total**			
Existing	$ 162	$ 1,533	$ 1,695			
Low Level	$ 413	$ 1,533.00	$ 1,946			
Mid Level	$ 248	$ 1,533.00	$ 1,781			
Generator Fuel Consumption						
	Generator Size	**Gal/Hr**	**$/Gal**	**Hrs/Year**	**$**	
Existing	63	8.45	$ 3	20	$ 507	assume 100kw generator
Low Level	275	22.5	$ 3	20	$ 1350	assume 275 kw generator
Mid Level	275	22.5	$ 3	20	$1350	assume 275 kw generator
Hrs/Year = 1 hour per month plus 8 hours misc = 20						
Routine Maintenance						
2 men 1 day per month = 192 hours at $50/hr =				$ 9,600		
Assume $150 Lubricants per month x 12 months =				$ 1,800		

Electrical Power Consumption			
Routine Repairs			
Traffic gate Arm Replacement			
Cost of Arm ($2000 material)		$ 2,000	
Labor to change (2 men 1 day = 16 hours at $50/hr)		$ 800	
		$ 2,800	per occurrence
	x 4 per bridge	$ 11,200	
Lamp Replacement			
Roadway Lights			
Lamps ($100 each) - assume 2 year life		$ 1,000	
Labor (2 men 2 hours/lamp = 4 hours at $50/hr)		$ 2,000	
		$ 3,000	
Other Lamps			
Lamps $5 each - assume 1 year life		$ 200	
Labor 1 man 1 hour each at $50/hr		$ 2,000	
		$ 2,200	
Total lamp replacement costs =		$ 5,200	
Limit Switch Adjustments/Misc Repairs			
Labor (2 men , 1 day per month at $50/hr)		$ 9,600	
Materials ($250/month)		$ 3,000	
Total LS and Misc Elect Repairs		$ 12,600	
Painting and Misc Repairs			
Labor (2 men, 1 day per month at $50/hr)		$ 9,600	
Materials ($100/month)		$ 1,200	
		$ 10,800	

6.1.4 NO-BUILD ALTERNATIVE

The No-Build Alternative provides a baseline from which to measure the performance, costs and impacts of all alternatives. It assumes no capacity improvements will be made to the facility. The crash rate may increase if capacity and safety related improvements are not made. This alternative does not preclude routine maintenance work. Continued maintenance and repair would not address the existing functional deficiencies. Pinellas County Public Works Department has scheduled a $10,500,000 major repair in 2014, which will extend the service life of the existing bridge for another 8 to 10 years.

For purposes of this Feasibility Study, the existing bridge was assumed capable of being maintained up to Year 2045. Built in 1963, the existing bridges would be 82 years old before replacement in-kind at Year 2045.

For the no-build alternative, the movable bridge is to be rehabilitated to current code requirements. A review of maintenance records indicate continuous electrical issues with traffic gates and lights, as well as occasional span drive and lock problems. Given the age of the structure, these problems are symptomatic of a deteriorating electrical system. The frequency of these operational issues will continue to increase unless remedial actions are taken. The mechanical systems inspection notes indicate plastic flow of the gear teeth and noticeable tooth wear. The bascule bridge steel components have pack rust and corrosion at the flanges and gusset plates. This deterioration indicates that a major structural rehabilitation will be required. Based upon the review of the inspection report, the following rehabilitation work would be required to be addressed to extend the design life beyond 2014:

- Replace deck (open grid deck)
- Remove bascule leaves and rehabilitate
- Repairs to bascule piers
- Paint structure
- Miscellaneous steel repairs
- Miscellaneous concrete repairs
- Repair all bridge joints/roadway breaks
- Complete rehabilitation of span drive machinery
- Complete rehabilitation of span lock machinery
- Replace all electrical cables and conduits
- Replace submarine cable
- New standby generator with automatic transfer switch
- Rehabilitate MCC and control desk as required
- Replace traffic gates and lights
- Rehabilitate operator house

The estimated costs required for a rehabilitation of the existing bridge are summarized in **Table 6-5**.

Table 6-5: Probable Rehabilitation Costs

Rehabilitation of Existing Structure					
Cost Item	**Work Task**	**Units**	**Quantity**	**Unit Cost**	**Cost**
Foundation					
Piles - bascule Pier	Repairs	lot	1	$2,000,000	$2,000,000
Pier Cap	Misc concrete repairs	cu yds	20	$3,500	$70,000
Piles - rest pier	Repairs	lot	1	$750,000	$750,000
Pier Cap (rest Pier)	Misc concrete repairs	cu yds	10	$3,500	$35,000
Bascule Piers	Misc concrete repairs	cu yds	50	$3,500	$175,000
Fender System	Replace	lot	1	$175,0000	$1750000
Bascule Leaves	Remove and rehabilitate	lot	2	$2,000,000	$4,000,000
Girders					0
Stringers					0
Floor beams					0
Counterweights	Misc concrete repairs	cu yds	10	$3,500	$35,000
Deck - Open grid	Replace	sq yds	380	$400	$152,000
Deck - Filled grid	N/A	sq yds	260	$450	$117,000
Side walk	Rehabilitate	sq yds	200	$200	$40,000
Bike Path	N/A	sq yds			
Railing	Replace	lin ft	101	$150	$15,150
Barrier Curb	N/A	lin ft			
Trunnions/Bearings	Rehabilitate	each	4	$100,000	$400,000
Operator House	Rehabilitate	lot	1	$250,000	$250,000
Span/Tail Locks	Replace	each	2	$250,000	$500,000
Operating Machinery	Replace	each	2	$3,000,000	$6,000,000
Electrical Power feed	Replace	lot	1	$750,000	$750,000
Bridge Control System	Replace	lot	1	$750,000	$750,000
Traffic Gates and Signals	Replace	each	4	$100,000	$400,000
Bridge Lighting	Rehabilitate	lot	1	$75,000	$75,000
Submarine Cable	Replace	lot	1	$500,000	$500,000
Standby Generator	Replace	lot	1	$175,000	$175,000
		Total Costs:			**$18,939,150**

The costs listed in **Table 6-5** are based on current 2009 prices; therefore if the necessary rehabilitation work occurs in 2014, the total cost of rehabilitation will become $23,105,763 an increase of 22%. The

22% mark-up is computed based on a 3.3% rate of inflation applied to the 2010 cost up to 2014. It is expected that in 2045, the bridge will be replaced in-kind with a new low level movable bridge. By 2045, the existing bridge will be 82 years old, significantly past its 50 year design life. The cost of the new bridge in 2045 is assumed to be the cost of the low level bascule, based on the 2010 cost estimate provided in this report, with a 211% mark-up. The 211% markup is computed based on a 3.3% rate of inflation applied to the 2010 cost up to 2045. Costs for future roadway, design and construction inspection fees have been included in the 2045 bridge replacement cost, see **Appendix H**.

A key component of the No-build alternative which has not been included in the cost is the cost of permanent countermeasures required to the existing foundations to eliminate or minimize the scour impacts on the foundations. The permanent countermeasures design is not within the scope of services of this Feasibility Report. For purposes of this Feasibility Study, the existing bascule bridge is assumed to be rehabilitated for a service life up to 2045, but the cost of scour countermeasures throughout this life span has not been addressed or quantified in terms of cost. This should be a major consideration if the No-build alternative was to be recommended based on the Life Cycle analysis.

6.1.5 FIXED BRIDGE UNIT COSTS APPROACH

A detailed evaluation was also performed for the development of a unit cost for the fixed bridges. The fixed bridges include the high level bridge alternative, the approaches to the low level and mid level bascule bridge alternatives and the west (relief) bridge structure.

The approach to developing a unit cost ($/sq. ft.) for the relief bridge was to utilize design and bid data obtained from the October 2006 Bids for the Belleair Beach Causeway Bridge Replacement project. This project, which is currently under construction, was awarded to the Joint Venture of Misener Marine & Johnson Bros. for $72.2 million. The project included a 3-span, 324 ft Relief Bridge and a 3,350 ft long high level bridge. The high level bridge consisted of a post-tensioned main span and a combination of post-tensioned flat slab approaches conventional AASHTO beam approaches. The typical section included 8 ft sidewalks on either side of the roadway and one-lane of traffic in each direction, for a total width of 65 ft. The foundations utilized drilled shaft construction for both the relief and high level bridges.

The Dunedin Causeway bridges include a proposed 3-span, 432 ft relief bridge and a 2,526 ft long high level bridge alternative. The high level bridge, unlike Belleair Causeway, is proposed as a conventional

AASHTO beam bridge. It is anticipated that drilled shaft foundations will be suitable for the bridges on Dunedin Causeway.

For the low level and mid level alternatives, the goal was to develop the cost of the conventional AASHTO bridge approaches by using a unit cost derived from the Belleair project bids. Foundation quantities from the Belleair Causeway high level bridge were adjusted to satisfy the proposed pier column heights and proposed span lengths to compute estimated costs. The unit costs were developed by dividing the estimated costs by the respective deck area.

6.1.6 WEST (RELIEF) BRIDGE

Table 6-6 shows a summary of the tabulated bids for the Belleair relief bridge and the corresponding unit costs per square ft.

Table 6-6: Belleair Causeway Relief Bridge Unit Costs

Total Cost Relief Bridge		
Area: 21060 ft^2		
	Cost Relief Bridge	**Cost per ft^2**
HDR Est 2006	\$2,389,986	\$113
HDR Est 2009	\$2,303,212	\$109
Bid 1	\$2,680,963	\$127
Bid 2	\$2,514,934	\$119

The evaluation of the bid tabs, focusing on the relief bridge costs only, show a unit bid cost in the range of \$119/sq. ft. to \$127/sq. ft. HDR's engineer's estimate at time of bid (2006) was approximately \$2.4 million or \$113/sq. ft. If current FDOT historical pricing for 2009 is utilized, the unit cost of the relief bridge will be approximately \$109/sq. ft. The lower unit cost in 2009 can be attributed to the current economic times where construction pricing has decreased from previous years.

FDOT's Structures Manual, Volume 1, Chapter 9 "BDR Cost Estimating" suggest a unit cost of \$85-\$155/sq. ft. for prestressed girder bridge types. FDOT's Policy Planning Office has provided updated information for bridge costs in the Tampa Bay (District 7) area, see **Table 6-7**.

Table 6-7: Bridge Cost Per Square Foot, Revised June 2009

	Cost Per Square Foot
New Construction	
Low Level	$135
Mid Level	$155
High Level	$185
Bascule	$1,830

Note:
1. Figure are for construction costs per square ft of deck area.
2. All figures exclude costs for ROW, bridge approaches and approach slabs.
3. Figures account for recent increases in concrete and steel, and the effects of labor and material shortages in construction.
4. The costs developed for this report are not site-specific and should be used for preliminary estimating purposes only.

Based on all cost information gathered, the Office of Planning bridge cost of $135/sq. ft. of low level bridge seems to be a reasonable value that for estimating probable cost of the relief bridge. The results of the Belleair bids evaluation resulted in unit costs in the range of $109 to $127/sq. ft. ***A unit cost of $135/sq. ft. will be utilized* to determine the probable construction cost of the Dunedin Causeway west (relief) bridge.**

6.1.7 EAST (MAIN) BRIDGE FIXED BRIDGE SPANS

For the high level bridge, the same approach in evaluating the Belleair Causeway bids, focusing on the high level bridge only, was undertaken and summarized in **Table 6-8**.

Table 6-8: Belleair Causeway High Level Bridge Unit Costs

Total Cost High Level Bridge		
Area: 217750 ft^2		
	Cost High Level Bridge	Cost per ft^2
HDR Estimate 2006	$44,216,422	$203
HDR Estimate 2009	$46,395, 908	$213
Bid 1	$48,781,533	$224
Bid 2	$ 47,952,541	$220

For the high level bridge, the costs were significantly greater than the relief bridge unit costs. It was assumed that the costs of the post-tensioned flat slab approaches and the spliced girder main span

significantly increased the overall cost per square ft values. This unit cost would be unreasonably high for a conventional AASHTO beam high level bridge.

An additional step was performed that provided further refinement to the bid tabulation values from the Belleair Causeway project. A section of the Belleair Causeway high level approaches, consisting of a 5-spans of 150 ft, was isolated from the overall bid into its superstructure and substructure pay items.

- The quantities for the Dunedin Causeway high level bridge alternative were calculated and costs computed based on the average of the Belleair bids for each superstructure pay item, except for the prestressed beams. For the prestressed beams, current FDOT unit pricing was used.
- For the Dunedin Causeway high level bridge alternative, the height requirement for the columns was determined based on the proposed vertical profile of the high level alternative. The quantities for the proposed bridge were calculated and cost computed based on the average of the Belleair bids for each substructure pay item.
- This approach assumes that the proposed Dunedin Causeway high level bridge alternative will be a smaller version of the Belleair Causeway bridge. By utilizing the same foundations and adjusting the column heights, a tabulation of both the superstructure and substructure costs for the Dunedin Causeway high level bridge alternative was developed.
- By adjusting the column heights, a tabulation of both the superstructure and substructure costs for the Dunedin Causeway low level and mid level approaches was also developed.

The result of this evaluation is summarized in **Table 6-9** and calculation summaries provided in **Appendix F**.

Table 6-9: Dunedin Causeway Bridge Unit Costs

Bridge Alternatives	Low Level		Mid Level		High Level	
	Length (ft)	Area (SF)	Length (ft)	Area (SF)	Length (ft)	Area (SF)
	1056	69696	1320	87120	2526	166716
	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft
Superstructure	$4,893,725	$70	$117,156	$70	$11,847,012	$71
Substructure	$4,112,101	$59	$6,181,641	$71	$13,835,183	$83
Total Cost	$9,005,826	$129	$12,298,797	$141	$25,125,592	$154

By utilizing a section of the Belleair Causeway bridge that is similar to the proposed Dunedin Causeway east bridge, an estimated cost of $154/sq. ft. based on Belleair bid tabs was derived. Similarly, for the

low level and mid level approaches, unit costs of $129/sq. ft. and $141/sq. ft. respectively, were also derived.

FDOT's Structures Manual, Volume 1, Chapter 9 "BDR Cost Estimating" suggest a unit cost of $85-$155/sq. ft. for prestressed girder bridge types. FDOT's Policy Planning Office, see **Table 6-7**, provides unit cost values for the high level, mid level and low level bridges that are higher than those computed and shown in **Table 6-9**. We propose to adopt the values provided in **Table 6-7** since it will not underestimate nor significantly overestimate the projected costs. **For purposes of this Feasibility Study, *a unit cost of $135/sq. ft. (low level), $155/sq. ft. (mid level) and $185/sq. ft. (high level) , will be utilized* to determine the probable construction cost of the Dunedin Causeway main bridge alternatives.** See **Section 5.2** for further discussion on these alternatives.

6.1.8 FIXED BRIDGE MAINTENANCE COSTS

The Office of Policy Planning has in the past produced a report titled, "Transportation Costs". The last edition of this report was issued in March 2005. In this report, bridge maintenance costs were estimated in a range varying from $0.01/sq. ft. to $0.04/sq. ft. of bridge deck. **For purposes of this Feasibility Study, *a unit cost of $0.04/sq. ft. will be utilized* to determine the probable maintenance cost of the Dunedin Causeway fixed bridges.** This includes the east (main) bridge alternatives and the west (relief) bridge, see **Table 6-10**.

Table 6-10: Fixed Bridge Yearly Maintenance Costs

Alternates	Existing		Low Level		Mid Level		High Level		West (Relief)	
	Length (ft)	Area (SF)	Length (ft)	Area (SF)	Length (ft)	Area (SF)	Length (ft)	Area (SF)	Length (ft)	Area (SF)
	1056	69696	1056	69696	1320	87120	2526	166716	432	28512
	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost
Total Cost	$0.04	$2,788	$0.04	$2,788	$0.04	$3,485	$0.04	$6669	$0.04	$1,140

6.1.9 RETAINING WALLS

Installation of permanent Mechanically Stabilized Earth (MSE) retaining walls will be necessary along the roadways approaching the proposed Dunedin Causeway bridges. To develop an accurate unit cost ($/sq. ft.) for the proposed retaining walls, quantities were selected from retaining wall systems 5b and 5c used along the Belleair Beach Causeway. These walls are an accurate representation of the retaining

walls planned for the Dunedin Causeway as the system does not require any anchor installation, and is not tied into the substructure of the bridge.

The unit cost of the walls, shown in **Table 6-11**, include the cost of the retaining wall system, anti-graffiti sacrificial coating, and a concrete parapet with pedestrian/bicycle sidewalk.

Table 6-11: Retaining Wall Unit Costs

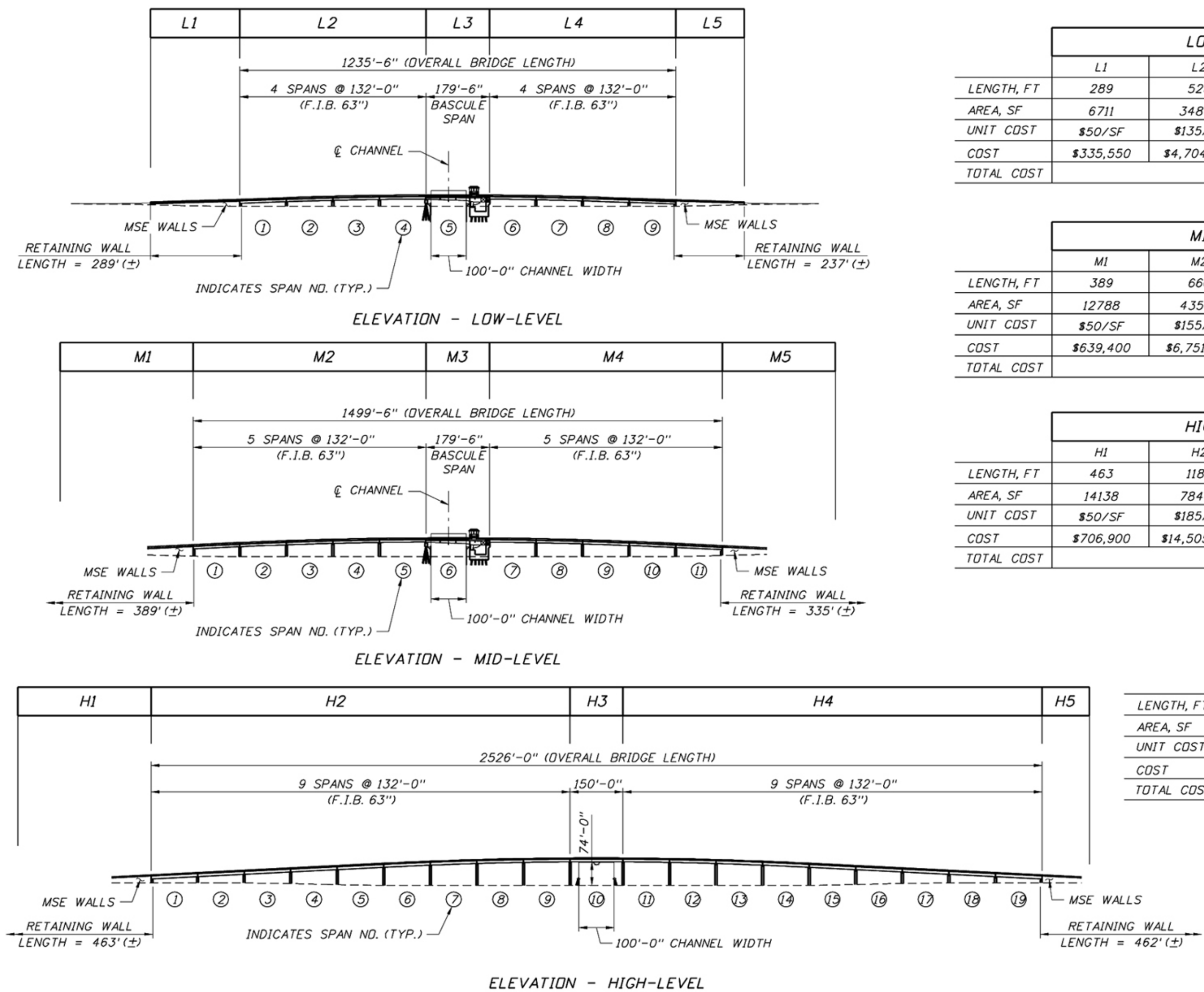
Retaining Walls				
	Wall 5b		Wall 5c	
Area	436.4 ft^2		1916 ft^2	
	Total Cost	Cost per ft^2	Total Cost	Cost per ft^2
HDR Estimate 2006	$11,544	$26	$81,198	$42
HDR Estimate 2009	$11,898	$27	$52,411	$48
Bid 1	$28,972	$66	$134,866	$70
Bid 2	$19,336	$44	$102,668	$54
Weighted Average		$41		$48

FDOT's Structures Manual, Volume 1, Chapter 9 "BDR Cost Estimating" suggest a unit cost of $27/sq. ft. for permanent MSE retaining walls. It is important to note that the FDOT estimate does not include the cost of anti-graffiti coating or the installation of concrete parapets, both of which are expected to be used for the Dunedin Causeway. **For purposes of this Feasibility Study, *a unit cost of $50/sq. ft. will be utilized* to determine the probable construction cost of the retaining walls along the Dunedin Causeway.**

6.1.10 SUMMARY

Probable construction costs for the proposed bridges can be summarized in **Figure 6-1**. For details on the various profiles, see **Section 5**.

For the No-Build Alternative, the existing bridge was assumed capable of being maintained up to Year 2045. It is expected that in 2045, the bridge will be replaced in-kind with a new low level movable bridge. The cost of the new bridge in 2045 is assumed to be the cost of the low level bascule, based on the 2009 cost estimate provided in this report, with a 211% mark-up. The 211% markup is computed based on a 3.3% rate of inflation applied to the 2009 cost up to 2045. **Table 6-12** shows the No-Build Alternative costs.



LOW LEVEL ALTERNATIVE

	L1	L2	L3	L4	L5
LENGTH, FT	289	528	179.5	528	237
AREA, SF	6711	34848	11847	34848	5679
UNIT COST	$50/SF	$135/SF	$1626/SF	$135/SF	$50/SF
COST	$335,550	$4,704,480	$19,260,372	$4,704,480	$283,950
TOTAL COST					$29,288,832

MID LEVEL ALTERNATIVE

	M1	M2	M3	M4	M5
LENGTH, FT	389	660	179.5	660	335
AREA, SF	12788	43560	11847	43560	10164
UNIT COST	$50/SF	$155/SF	$1657/SF	$155/SF	$50/SF
COST	$639,400	$6,751,800	$19,634,372	$6,751,800	$508,200
TOTAL COST					$34,285,572

HIGH LEVEL ALTERNATIVE

	H1	H2	H3	H4	H5
LENGTH, FT	463	1188	150	1188	462
AREA, SF	14138	78408	9900	78408	14111
UNIT COST	$50/SF	$185/SF	$185/SF	$185/SF	$50/SF
COST	$706,900	$14,505,480	$1,831,500	$14,505,480	$705,550
TOTAL COST					$32,254,910

RELIEF BRIDGE

	WALL 1	WALL 2	W1+W2	BRIDGE L
LENGTH, FT	168	214	382	432
AREA, SF	3958	4906	8864	28512
UNIT COST		$50/SF		$135/SF
COST		$443,200		$3,849,120
TOTAL COST			$4,292,320	

NOTE:
FOR RELIEF BRIDGE DETAILS SEE B1-1.

Pinellas County PUBLIC WORKS

Dunedin Causeway Bridge Replacement Feasibility Study

PROBABLE CONSTRUCTION COSTS PER ALTERNATIVE

FIGURE 6-1

Table 6-12: No-Build Alternative Costs

Cost Item (annual)	Existing Bridge
2014 Major Rehabilitation	$ 23,105,763
2045 Bridge Replacement *	$ 91,088,268

* includes a 211% markup for a low-level replacement

In addition, the probable yearly operating and maintenance costs per Alternative can be summarized in **Table 6-13**.

Table 6-13: Probable Yearly Operating & Maintenance Costs

Bridge Operating Costs					
Cost Item (annual)	Alt A No Build	Alt B Low Level Bascule	Alt C Mid Level Bascule	Alt D High Level Fixed	West (Relief)
Bascule Operating Costs	$ 152,202	$ 153,296	$ 153,131	—	—
Bascule Maintenance Costs	$ 290,110	$ 51,200	$ 51,200	—	—
Fixed Spans Maintenance Costs	$ 2,788	$ 2,788	$ 3,485	$ 6,669	$ 1,140
Total Yearly O&P Costs	$ 445,100	$ 207,284	$ 207,816	$ 6,669	$ 1,140

6.2 LIFE CYCLE EVALUATION

For purposes of this evaluation, a 75 year period is utilized to evaluate each alternative. It is assumed that the existing Dunedin Causeway Bridge cannot be rehabilitated for the entire 75 year period to provide 120+ years of service. Year 2045 was chosen as a bridge replacement year for a rehabilitated bridge, providing 80+ years of service. For the new bridge options, Year 2010 is considered the base year (0 yr for the LCCA). If the replacement of the bridges is delayed, the LCCA results will remain the same since all values will be affected relative to the base year.

The following alternatives to be considered in **Section 5** as part of this Feasibility Study:

- Alternative A: No Build - Bridge Rehabilitation (2014) with Future Bridge Replacement (2045)
- Alternative B: Bridge Replacement (2010) with Low Level Bascule Bridge
- Alternative C: Bridge Replacement (2010) with Mid Level Bascule Bridge
- Alternative D: Bridge Replacement (2010) with High Level Fixed Bridge

6.2.1 INFLATIONARY FACTORS IMPACTING PROBABLE CONSTRUCTION COSTS

FDOT Office of Policy Planning issues a "Transportation Costs" report that provides an opportunity to approximately adjust costs, or estimated costs, for a future project from the current Fiscal Year. In this report, cost inflation factors are also referred to Present Day Cost (PDC) multipliers, see **Table 6-14**. PDC multipliers are purely advisory.

Table 6-14: FDOT Future Years Inflation Factors

Fiscal Year	Inflation Factor	PDC Multiplier
2009	—	1.000
2010	5.0%	1.050
2011	4.5%	1.097
2012	4.0%	1.141
2013	3.5%	1.181
2014	3.3%	1.220
2015	3.3%	1.260
2016	3.3%	1.302
2017	3.3%	1.345
2018	3.3%	1.389
2019	3.3%	1.435

Source: Office of Financial Development. (Fiscal Year 2009 is July 1, 2008 to June 30, 2009)

Unit costs proposed in this Feasibility Study are based on current trends that can change with the current economic conditions. However, based on FDOT's Office of Value Engineering "Life-Cycle Cost Analysis for Transportation Projects" report date June 1990, it recommends inflation to be disregarded in a Life Cycle Analysis. The reasons are summarized as follows:

- Inflation rates are not easily obtainable for a 75 year life cycle projection. These unreliable inflation rates can produce inaccurate results in determining an alternative.
- Inflation affects different segments of the economy. Therefore it is difficult to predict how the various components in an alternative will be impacted by inflation throughout the 75 year projection.
- It is reasonable to expect inflation to impact all of the alternatives, therefore relative comparison of alternatives with and without inflation should produce the same results.

Inflation factors are applied in this Feasibility Study utilizing "engineering judgment". The following life cycle variables have an inflationary factor in the estimated cost:

- Movable Bridge Estimated Probable Operating and Maintenance Costs will have an increase in cost within the 75 year forecast estimated at 3.3% inflation rate.
- Fixed Bridge Estimated Probable Maintenance Costs will have an increase in cost within the 75 year forecast estimated at 3.3% inflation rate.
- The No-build alternative, discussed further in **Section 6.1.4**, consists of rehabilitation of existing bridge and replacement at a future date. The bridge replacement cost has been estimated with a 3.3% inflation rate.
- Total estimated probable construction costs will be calculated based on present day value (2009). Since the project will need to go through a Preliminary Engineering/PD&E Study and Final Design phases before going into construction, the construction costs will be increased by the inflation factors given in **Table 6-14**. This approach will assure that Pinellas County accounts for the funding that will be required depending on what year bids are received.

6.2.2 NET PRESENT WORTH

The Present Worth method will be utilized for this cost analysis. This method takes all capital costs, including maintenance and operating costs, over the 75 year life of each alternative and equates it to present dollars.

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 operating costs. Life Cycle Cost Analysis from year 2010 through 2084 shows the respective capital, operating and maintenance costs for each alternative and is provided in **Appendix H**. All costs were computed utilizing 2009 dollars and have been projected over the 75 year life at a 3.3% annual rate increase.

For purposes of this evaluation, a "discount rate", or commonly referred to as an interest rate, is used to evaluate the time value of money. Based on FDOT's Office of Value Engineering "Life-Cycle Cost Analysis for Transportation Projects" report date June 1990, it recommends a 7% discount for use on FDOT projects. Due to the high variability in today's economy, the results provided in this analysis will consider discount rates ranging from 0 – 10%. **Table 6-15** provides a summary for the probable total cost for each bridge alternative over the 75 year life cycle.

Table 6-15: Net Present Worth

Discount Rate	Rehabilitation / Replacement	Bridge Replacement		
	Alternative A No-Build	Alternative B Low Level Bascule	Alternative C Mid Level Bascule	Alternative D High Level Fixed
0.00%	284,916,221	$94,716,858	$99,691,535	**$34,353,736**
1.00%	199,859,288	$68,768,419	$73,702,507	**$33,211,306**
2.00%	143,803,595	$53,992,048	$58,882,647	**$32,433,334**
3.00%	106,107,169	$45,277,415	$50,123,370	**$31,855,714**
4.00%	80,294,704	$39,930,368	$44,731,429	**$31,391,851**
5.00%	62,324,010	$36,502,676	$41,259,069	**$30,995,126**
6.00%	49,614,220	$34,199,528	$38,911,727	**$30,639,885**
7.00%	**40,485,033**	**$32,574,968**	**$37,243,580**	**$30,311,671**
8.00%	33,824,019	$31,372,835	$35,998,531	**$30,002,121**
9.00%	**28,884,097**	$30,442,300	$35,025,782	$29,706,255
10.00%	**25,157,330**	$29,692,232	$34,234,209	$29,421,015

Bold and highlighted values represent most cost efficient choice per given discount rate

For each discount rate, the best economic investment is highlighted. ***For purposes of this Feasibility Study, Alternative D (the High Level Fixed Bridge) is recommended.***

Table 6-16 shows a breakdown of the capital, operation and maintenance costs for the four alternatives. The values are shown at the 0.00% discount rate. Based on capital costs alone, without including operating and maintenance, the low level bascule is the most economical bridge alternative. Once the operating and maintenance costs are considered over the life of the structure, the high level fixed bridge is the most cost effective of the alternatives. The cost to operate a bascule bridge is about 33 times greater than the costs to maintain a high-level fixed-span bridge. The cost of bridge tenders, and the maintenance required for the bascule span's moving parts, the operating and maintenance costs for the bascule spans nearly double the initial capital cost. The cost of the high level fixed bridge remains fairly constant throughout its life span due to the low maintenance and operational cost required to keep the bridge functional.

Table 6-16: Summary of Alternatives (0.00%)

Construction Alternatives	Alternative A No Build	Alternative B Low Level Bascule	Alternative C Mid Level Bascule	Alternative D High Level Fixed
Capital Cost	$190,146,758	$29,288,832	$34,285,572	$32,254,910
Maintenance and Operational Cost	$94,769,463	$65,428,026	$65,405,963	$2,098,826
Total Probable Cost	$284,916,221	$94,716,858	$99,691,535	$34,353,736

As the discount rate increases, the Maintenance and Operational costs occurring over the 75 year life cycle diminish in value making the other alternatives cost competitive. The analysis shows that at a discount rate (or interest rate) of 9% or higher, the No-build rehabilitation and future replacement of the existing bridge is the most economical option. Discount rates greater than 0.00% assumes that the owner has the funds available and is able to invest the money so that it gains interest until the future investment is made. In our approach, the No-build assumes the bridge is replaced in Year 2045.

For most public agencies, funding for their work program is appropriated on an annual basis. Further, the annual demand for infrastructure needs and improvement exceeds the available annual funds, therefore the opportunities for investments are minimal. Most agency's are able to plan within a 5-year or a 10-year Capital Improvement Plan, but rarely does the agency have the funding already available for projects listed in these long-term plans. Therefore, depending on the owner's investment strategies and funding availability, the Net Present Worth results in **Table 6-15** are provided considering discount rates ranging from 0 – 10%.

Section 7 Opinion of Probable Costs

7.1 OPINION OF PROBABLE COSTS

In order to evaluate the study alternatives, an evaluation matrix (**Table 7-1**) was prepared using quantifiable criteria to include environmental, cultural, potential hazardous material and costs. Costs include environmental mitigation, utility relocation, construction of roadway and bridges, preliminary engineering/PD&E Study and ROW. Preliminary cost estimates were prepared for all Alternatives, including ROW acquisition, maintenance of traffic, mobilization, engineering preliminary/final design, construction and contingencies.

Table 7-1: Alternative Evaluation Matrix

Evaluation Criteria	No Build*	North Alignment			Center Alignment			South Alignment		
	Rehabilitation / Replacement	Low Level (21')	Mid Level (45')	High Level (> 65')	Low Level (21')	Mid Level (45')	High Level (> 65')	Low Level (21')	Mid Level (45')	High Level (> 65')
CONSTRUCTION IMPACTS										
Bridge Closed During Construction	Yes	No	No	No	Yes	Yes	Yes	No	No	No
Pedestrian Traffic Closed for Construction	Yes	No	No	No	Yes	Yes	Yes	No	No	No
RIGHT OF WAY IMPACTS										
Additional Roadway R/W Needed	No	No	No	No	No	No	No	No	No	No
Stormwater Pond R/W Needed	No	No	No	No	No	No	No	No	No	No
Wetland Mitigation R/W Needed	No	No	No	No	No	No	No	No	No	No
NATURAL ENVIRONMENT AFFECTS										
Shading and Fill Impacts (Acres)	0.00 ac.	0.28 ac.	0.28 ac.	0.26 ac.	0.00 ac.	0.00 ac.	0.00 ac.	0.36 ac.	0.36 ac.	0.36 ac.
T&E Species Impacts	None	None	None	None	None	None	None	None	None	None
Contamination Impacts	None	None	None	None	None	None	None	None	None	None
Cultural Resource Impacts	None	None	None	None	None	None	None	None	None	None
UTILITY IMPACTS										
Utility Relocations	1	5	5	5	-	-	-	4	4	4
PROJECT COST ESTIMATES										
Construction Cost										
- Roadway, Drainage, Lighting, etc.	$ 76,437,476	$ 24,577,966	$ 27,313,648	$ 25,968,745	$ -	$ -	$ -	$ 24,612,912	$ 27,313,554	$ 25,986,686
- Structures	$ 114,783,522	$ 36,907,885	$ 41,904,625	$ 39,873,963	$ -	$ -	$ -	$ 36,907,885	$ 41,904,625	$ 39,873,963
Environmental Mitigation Cost	$ 108,878	$ 35,009	$ 35,009	$ 35,009	$ -	$ -	$ -	$ 35,009	$ 35,009	$ 35,009
Utility Relocation Cost	$ 659,320	$ 2,070,950	$ 2,070,950	$ 2,070,950	$ -	$ -	$ -	$ 283,250	$ 283,250	$ 283,250
Preliminary Engineering & PD&E Cost (15%)	$ 28,683,150	$ 9,222,878	$ 10,382,741	$ 9,876,406	$ -	$ -	$ -	$ 9,228,120	$ 10,382,727	$ 9,879,097
Construction Engineering & Inspection Cost (10%)	$ 19,122,100	$ 6,148,585	$ 6,921,827	$ 6,584,271	$ -	$ -	$ -	$ 6,152,080	$ 6,921,818	$ 6,586,065
Total Project Cost	$ 239,794,446	$ 78,963,273	$ 88,628,800	$ 84,409,344	$ -	$ -	$ -	$ 77,219,255	$ 86,840,982	$ 82,644,070
OPERATION AND MAINTENANCE										
75 Year Total O&M Cost	$ 94,769,463	$ 65,428,026	$ 65,405,963	$ 2,098,826	$ -	$ -	$ -	$ 65,428,026	$ 65,405,963	$ 2,098,826
75 YEAR TOTAL PROJECT COST	$ 334,563,909	$ 144,391,299	$ 154,034,763	$ 86,508,170	$ -	$ -	$ -	$ 142,647,281	$ 152,246,945	$ 84,742,896

* Estimating improvements to occur in 2045. Cost for 2045 are estimated by using a 211% markup to the 2009 costs based on a 3.3% rate of inflation applied to the 2009 cost up to 2045. Therefore, 2045 costs = 2009 costs x 3.11.

For purposes of this Feasibility Study, Alternative D (the High Level Fixed Bridge) is recommended.

It is important to understand that this Feasibility Study is recommending an alternative based only on a cost evaluation. A final "alternatives analysis" should be performed during the PD&E Study, and a final "selection" of an alternative should be made only after the alternatives analysis process is complete.

Probable costs tabulated in this report at the 0.00% discount rate are based on 2009 dollars. Modifying **Table 6-14** provided in **Section 6.2.1**, we can estimate the probable costs for the project if the bids are received between 2010 and 2019 as follows, see **Table 7-2**:

Table 7-2: FDOT Future Years Inflation Factors for Alternative D

Fiscal Year	Inflation Factor	PDC Multiplier	Future Probable Cost
2009	—	1	$82,644,070
2010	5.00%	1.05	$86,776,274
2011	4.50%	1.097	$90,660,545
2012	4.00%	1.141	$94,296,884
2013	3.50%	1.181	$97,602,647
2014	3.30%	1.22	$100,825,766
2015	3.30%	1.26	$104,131,529
2016	3.30%	1.302	$107,602,580
2017	3.30%	1.345	$111,156,275
2018	3.30%	1.389	$114,792,614
2019	3.30%	1.435	$118,594,241

Source: Office of Financial Development. (Fiscal Year 2009 is July 1, 2008 to June 30, 2009)

7.2 FUTURE FUNDING OPPORTUNITIES

A secondary objective of the Dunedin Causeway Bridge Replacement Feasibility Study is to identify potential funding opportunities for the project and outline steps that are necessary to qualify the proposed project for the funding. Outside funding sources could be comprised of federal funds specifically allocated to the County through the County's receipt of a Federal Earmark, funds becoming available through the future Re-authorization of SAFTEA-LU, or federal funds allocated to the County by the State of Florida via methods addressed in the FDOT's Work Program Instructions. Details pertaining to each are as follows:

7.2.1 FEDERAL EARMARK OR RE-AUTHORIZATION OF SAFETEA-LU:

Capturing Federal funding using these two methodologies is a function of two separate processes within the Congressional budgeting process. The first process is budgeting, which is where the original funding structure of the bill is established and specific items are identified in the bill for federal funding. In this case funding for the Dunedin Causeway could be budgeted under the Re-Authorization of the SAFTEA-LU. The second process is appropriations. Once a bill is budgeted, the next step is appropriations of the funds. It is at this time that the Dunedin Causeway has the potential to be identified for a Federal Earmark.

All federally funded or authorized projects must be approved by the appropriate lead federal agency. The lead federal agency must ensure that the requirements contained in the National Environmental Policy Act (NEPA) and other appropriate federal environmental laws, rules and procedures are complied with prior to authorizing a federal action (such as the use of federal funds). For the Dunedin Causeway project, the County can comply with the various federal requirements by using information developed in the Feasibility Study to undertake the ETDM and PD&E Study processes. A key for this next step will be identifying the lead federal agency, which can be either the US Coast Guard or the Federal Highway Administration. Once one of these agencies becomes the lead federal agency, the proposed project would need to be coordinated with other agencies via the use of the ETDM process. Once the ETDM and the PD&E Study processes are completed, the project would become eligible for any federal funding opportunities.

7.2.2 THE FDOT BRIDGE REPLACEMENT PROGRAM

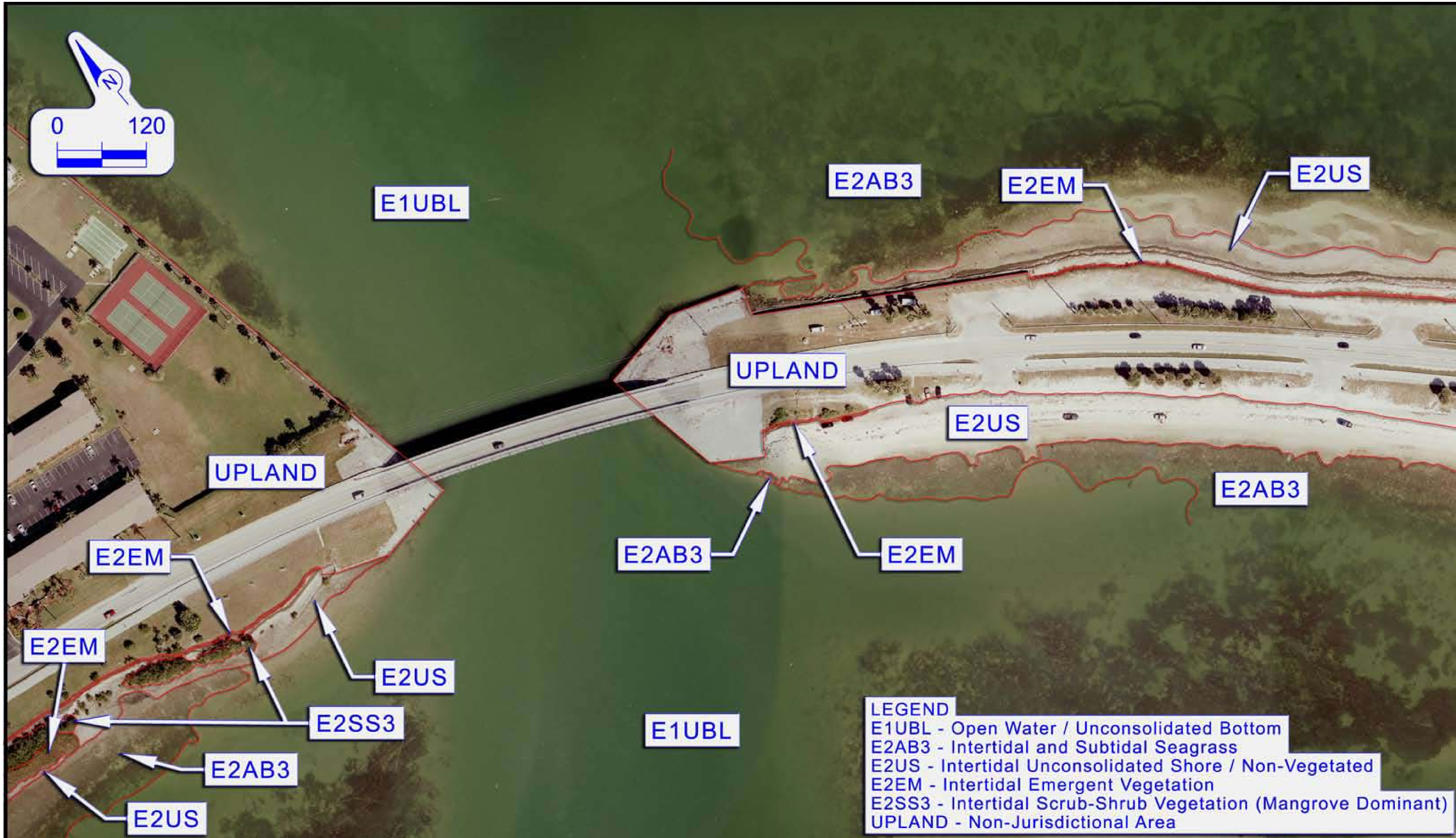
The Bridge Replacement Program is a statewide program administered by the FDOT's Work Program Development and Operations Office. As part of this program, proposed bridge projects are identified and sorted through a review process conducted by the State's Maintenance Office. In order to qualify the bridge replacement for funding opportunities, it should be identified as structurally deficient bridge. Structurally deficient bridges are those whose sufficiency rating is below 50. The Dunedin Causeway east (main) bridge currently has a sufficiency rating of 48.6 and is considered structurally deficient. The Dunedin Causeway facility is not on the State Highway System (SHS), but it is part of the Federal Aid System and would qualify for potential Bridge Replacement Program funding. It should be noted that the Dunedin Causeway bridges will compete with bridges located on the SHS for this funding and use of funding for the proposed project will require approval by FDOT's executive management. To enable this

bridge replacement project to be considered for this program, the County will need to work with the local FDOT District 7 Structures Office to have their office support the proposed project in an effort to have it added to the statewide list of bridge replacement projects.

Section 8 Appendices

Appendix A

Wetland and Seagrass Delineations

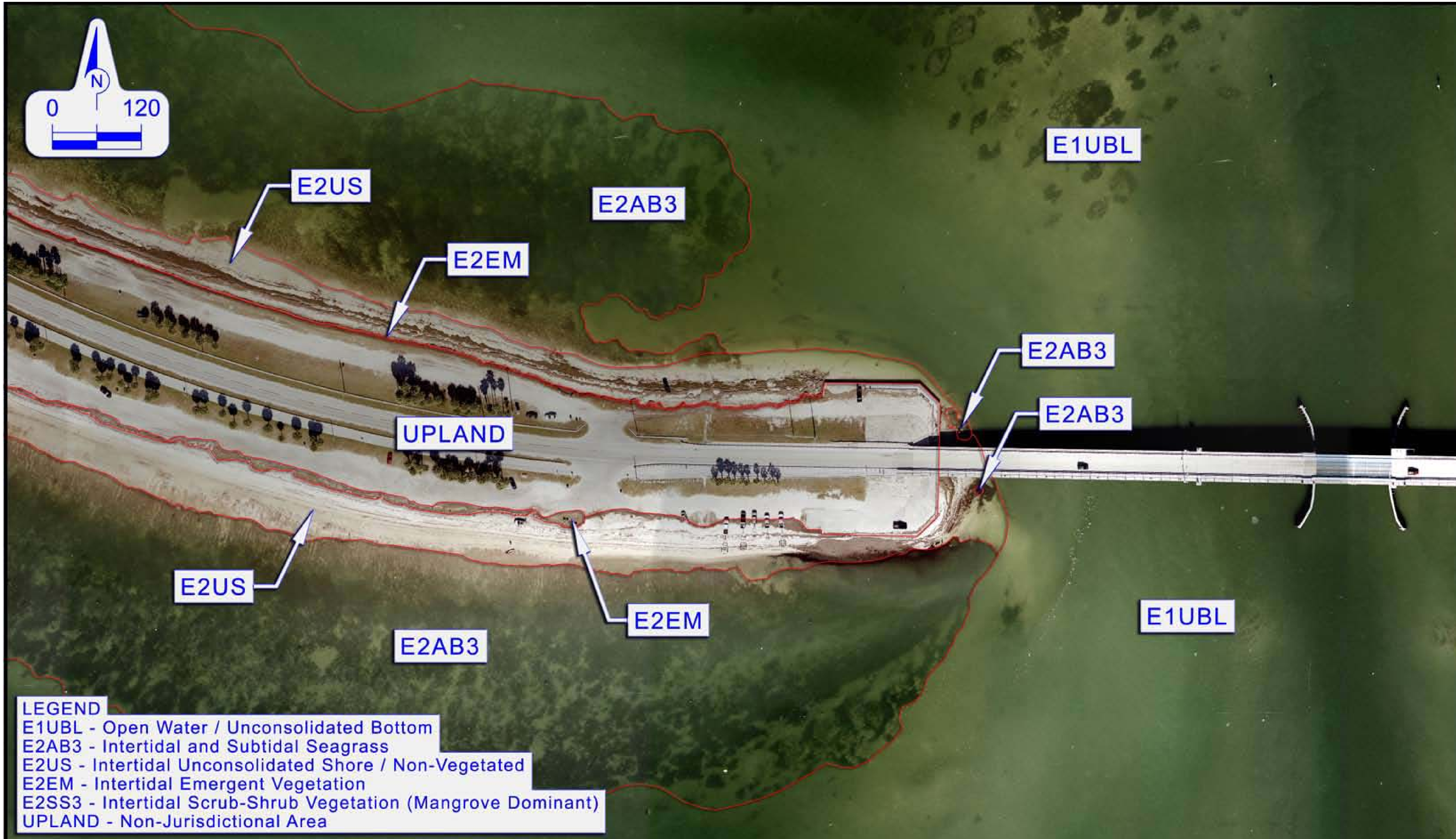


Pinellas County PUBLIC WORKS

Dunedin Causeway Bridge Replacement Feasibility Study

WETLAND & SEAGRASS DELINEATIONS

FIGURE 1 OF 3

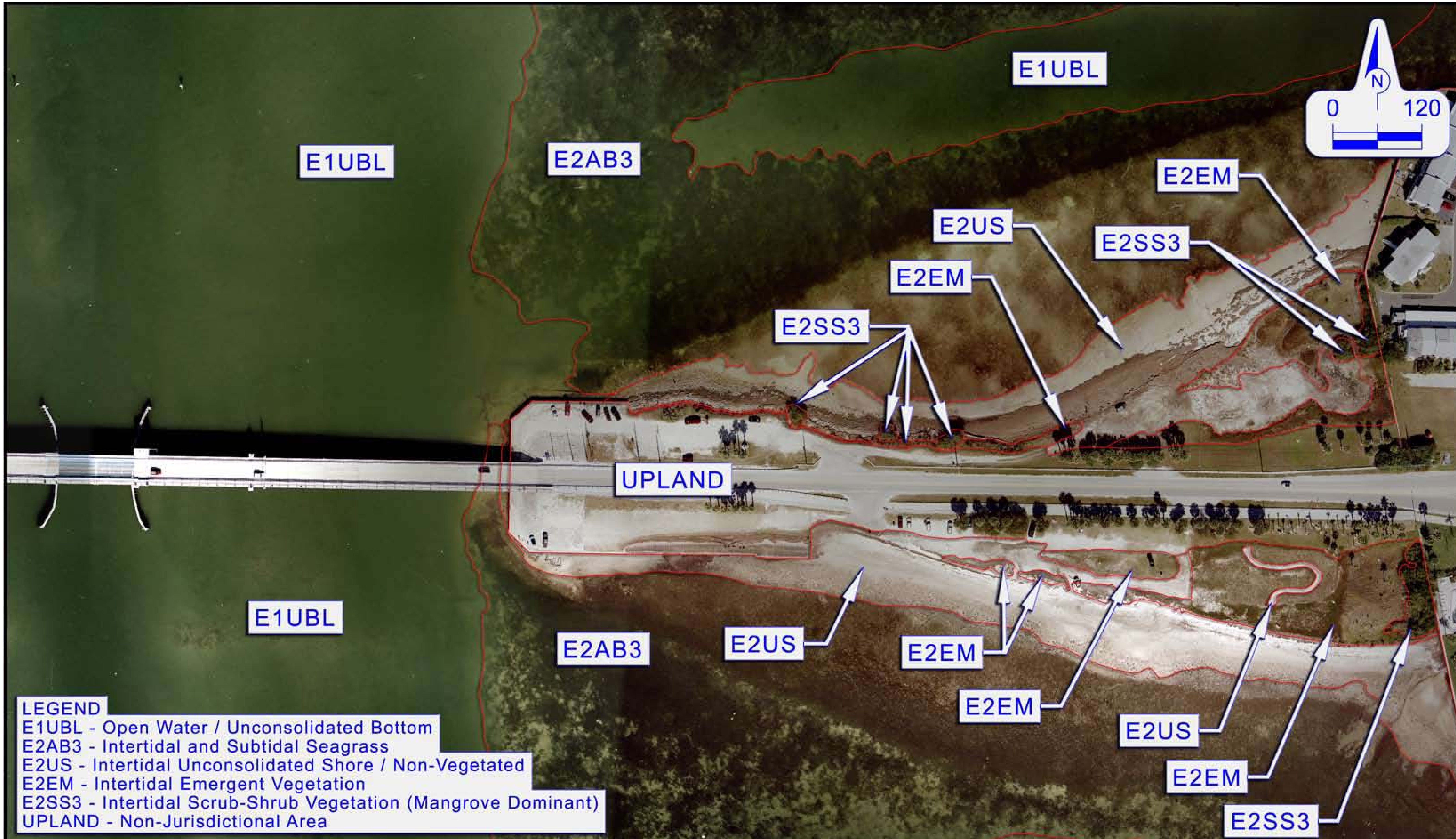


Pinellas County PUBLIC WORKS

Dunedin Causeway Bridge Replacement Feasibility Study

WETLAND & SEAGRASS DELINEATIONS

FIGURE 2 OF 3



Dunedin Causeway Bridge Replacement Feasibility Study

WETLAND & SEAGRASS DELINEATIONS

FIGURE 3 OF 3

Appendix B

Plan/Profile Sheets for Alternatives

CONTRACT NO. XXXXX

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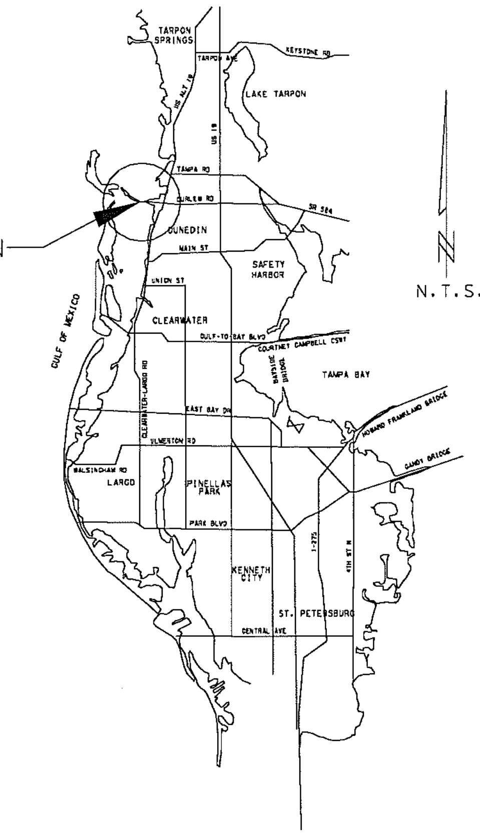
PINELLAS COUNTY GOVERNMENT IS COMMITTED TO PROGRESSIVE PUBLIC POLICY, SUPERIOR PUBLIC SERVICE, COURTEOUS PUBLIC CONTACT, JUDICIOUS EXERCISE OF AUTHORITY AND SOUND MANAGEMENT OF PUBLIC RESOURCES TO MEET THE NEEDS AND CONCERNS OF OUR CITIZENS TODAY AND TOMORROW.

PINELLAS COUNTY ENGINEERING DEPARTMENT
STATE OF FLORIDA

PLANS OF PROPOSED ALTERNATIVES

DUNEDIN CAUSEWAY
BRIDGE REPLACEMENTS

PROJECT LOCATION



N.T.S.

INDEX OF PLANS

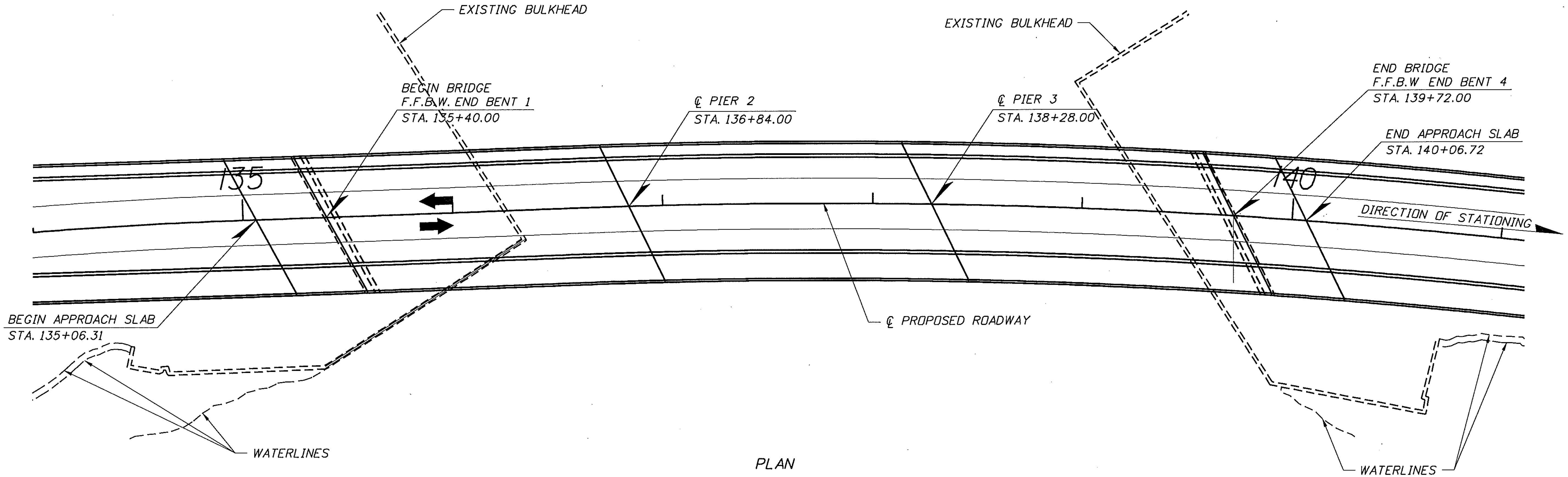
SHEET NO.	SHEET DESCRIPTION
1	TITLE SHEET
	RELIEF BRIDGE
B1-1	PLAN AND ELEVATION
B1-2	CONSTRUCTION SEQUENCE - SOUTH ALIGNMENT, TWO PHASE CONSTRUCTION (1 OF 2)
B1-3	CONSTRUCTION SEQUENCE - SOUTH ALIGNMENT, TWO PHASE CONSTRUCTION (2 OF 2)
B1-2N	CONSTRUCTION SEQUENCE - NORTH ALIGNMENT, TWO PHASE CONSTRUCTION (1 OF 2)
B1-3N	CONSTRUCTION SEQUENCE - NORTH ALIGNMENT, TWO PHASE CONSTRUCTION (2 OF 2)
	MAIN BRIDGE
B2-1	PROBABLE COSTS - LOW, MID AND HIGH LEVEL
B2-2	PLAN AND ELEVATION - LOW LEVEL
B2-3	PLAN AND ELEVATION CHANNEL SPAN - LOW LEVEL
B2-4	TYPICAL SECTIONS - LOW LEVEL
B2-5	PLAN AND ELEVATION - MID LEVEL
B2-6	PLAN AND ELEVATION CHANNEL SPAN - MID LEVEL
B2-7	TYPICAL SECTIONS - MID LEVEL
B2-8	PLAN AND ELEVATION - HIGH LEVEL
B2-9	TYPICAL SECTIONS - HIGH LEVEL

AUGUST 2009

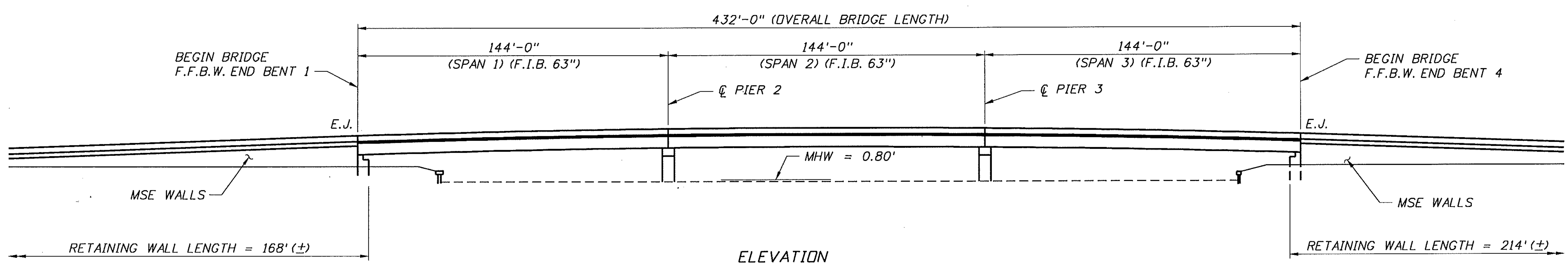
DATE

DATE

PETER J. YAUCH, P.E., DIRECTOR OF PUBLIC WORKS DATE



PLAN



ELEVATION

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DESIGNED BY	NEC	8/09
CHECKED BY	JS	8/09
APPROVED BY	NEC	

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Employee-owned
Nelson E. Canjura P.E. No. 43235

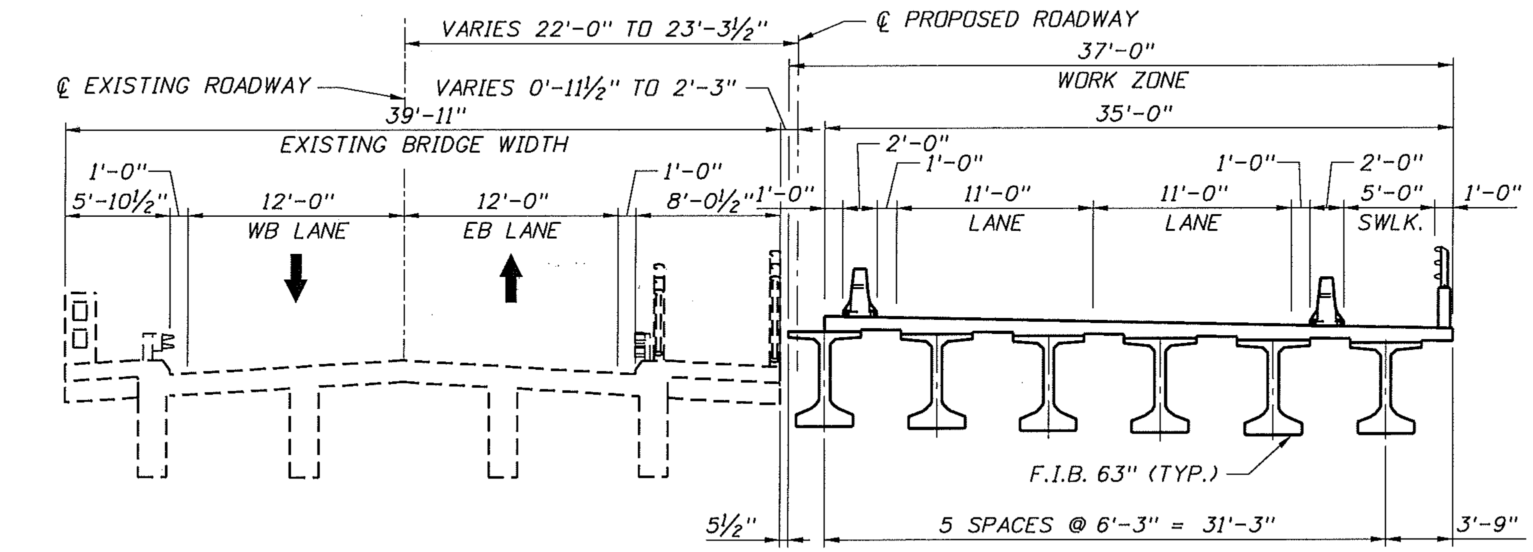
PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO. | FAP NO.

SHEET TITLE:
PLAN AND ELEVATION

PROJECT NAME:
DUNEDIN CAUSEWAY
RELIEF BRIDGE REPLACEMENT

SHEET NO.
BI-1



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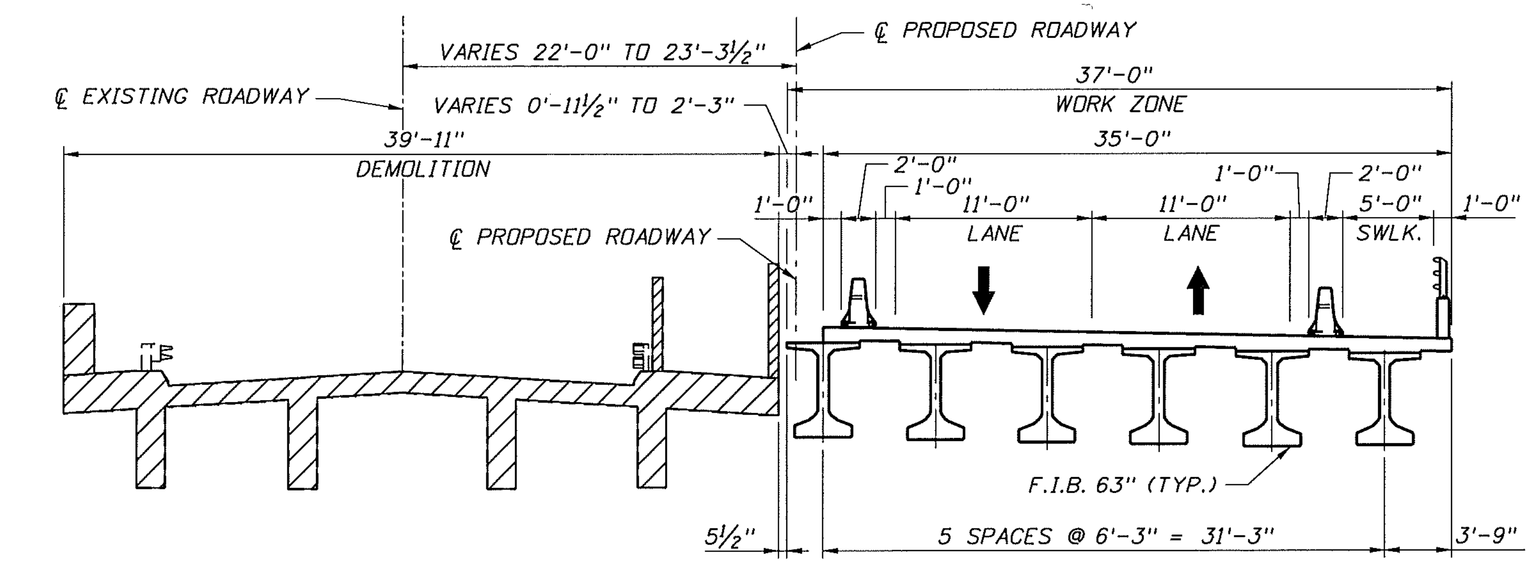
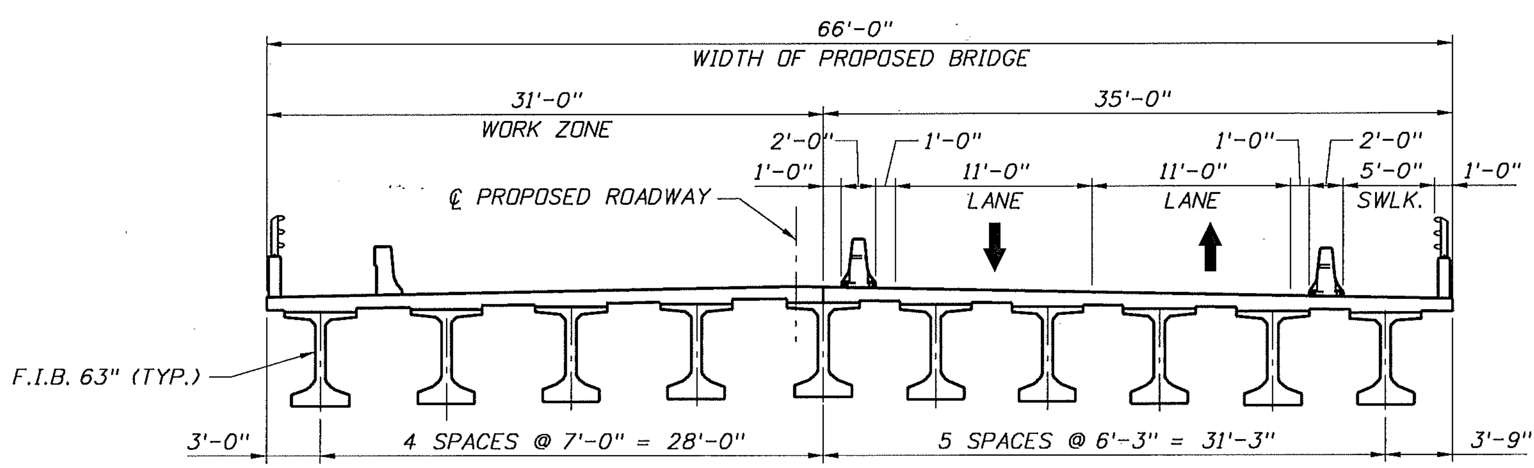


PHASE 2A



PHASE 2B-1

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BRIDGE REMOVAL LIMITS

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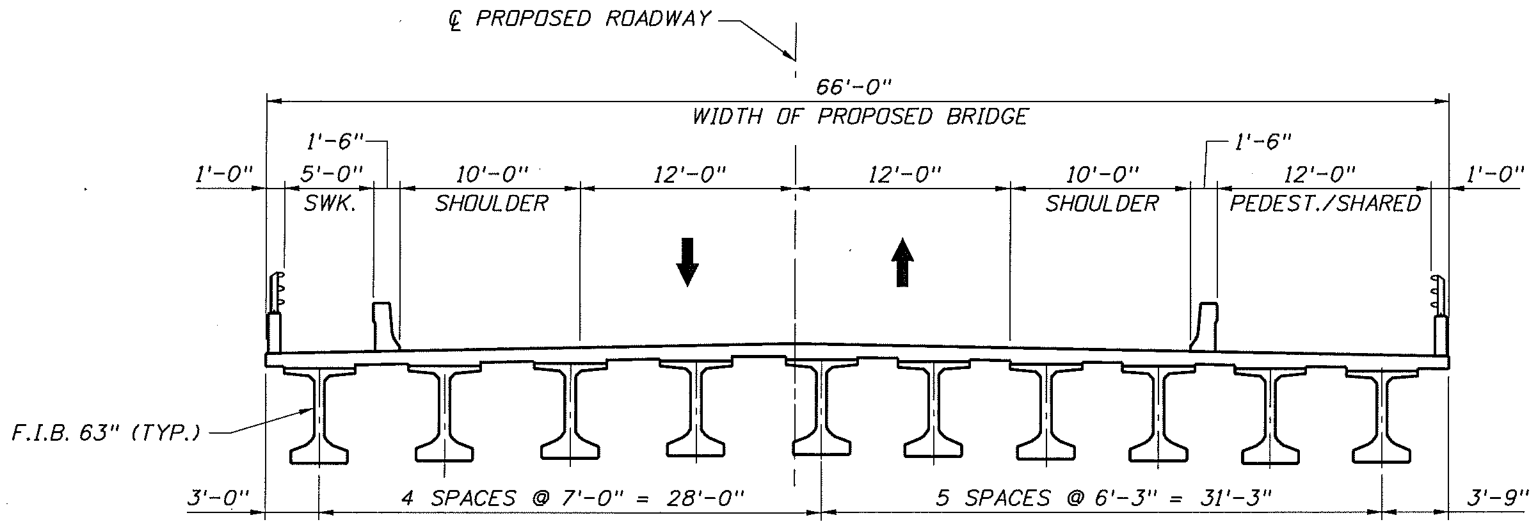
PROJECT ID NO. | FAP NO.

SHEET TITLE: CONSTRUCTION SEQUENCE - SOUTH ALIGNMENT
TWO PHASE CONSTRUCTION (1 OF 2)

PROJECT NAME: DUNEDIN CAUSEWAY
RELIEF BRIDGE REPLACEMENT

SHEET NO. BI-2



FINAL CONFIGURATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

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DESIGNED BY	NEC	8/09
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DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

SHEET TITLE:
CONSTRUCTION SEQUENCE - SOUTH ALIGNMENT
TWO PHASE CONSTRUCTION (2 OF 2)

PROJECT NAME:
DUNEDIN CAUSEWAY
RELIEF BRIDGE REPLACEMENT

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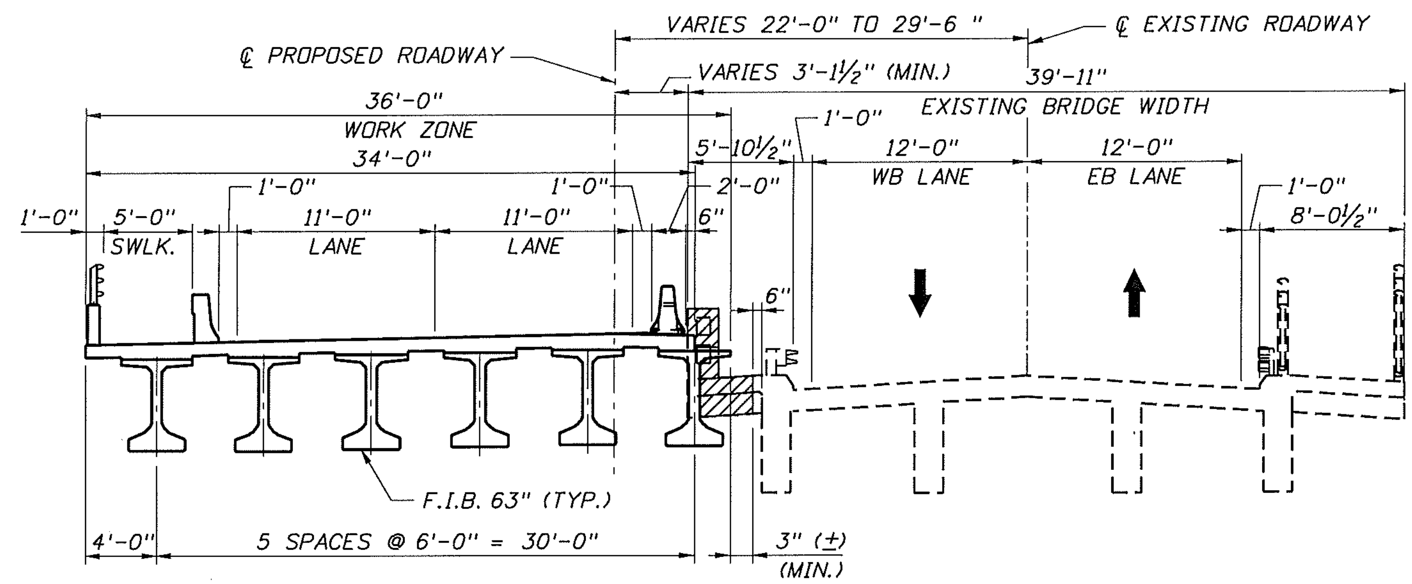

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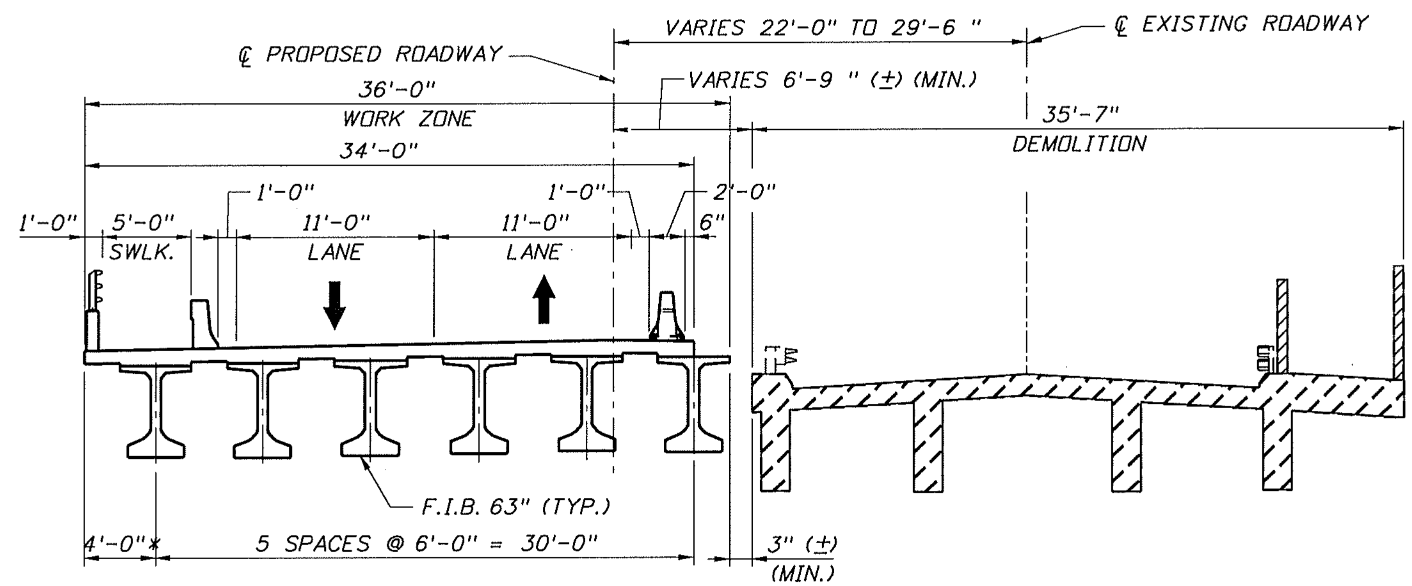

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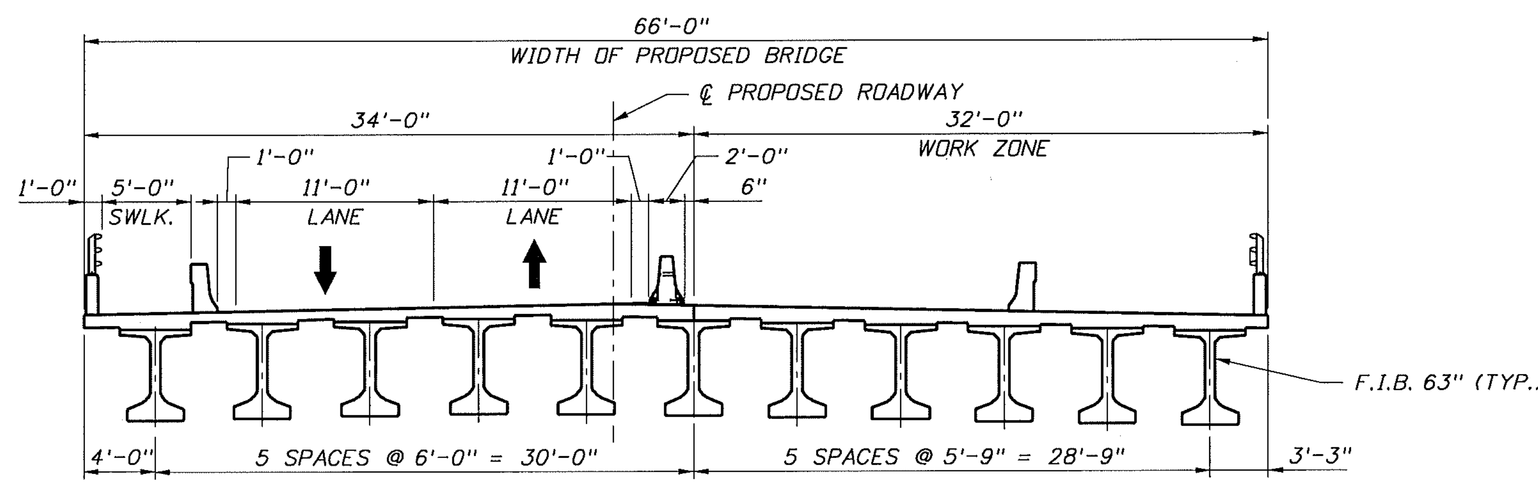

PHASE 2B-1

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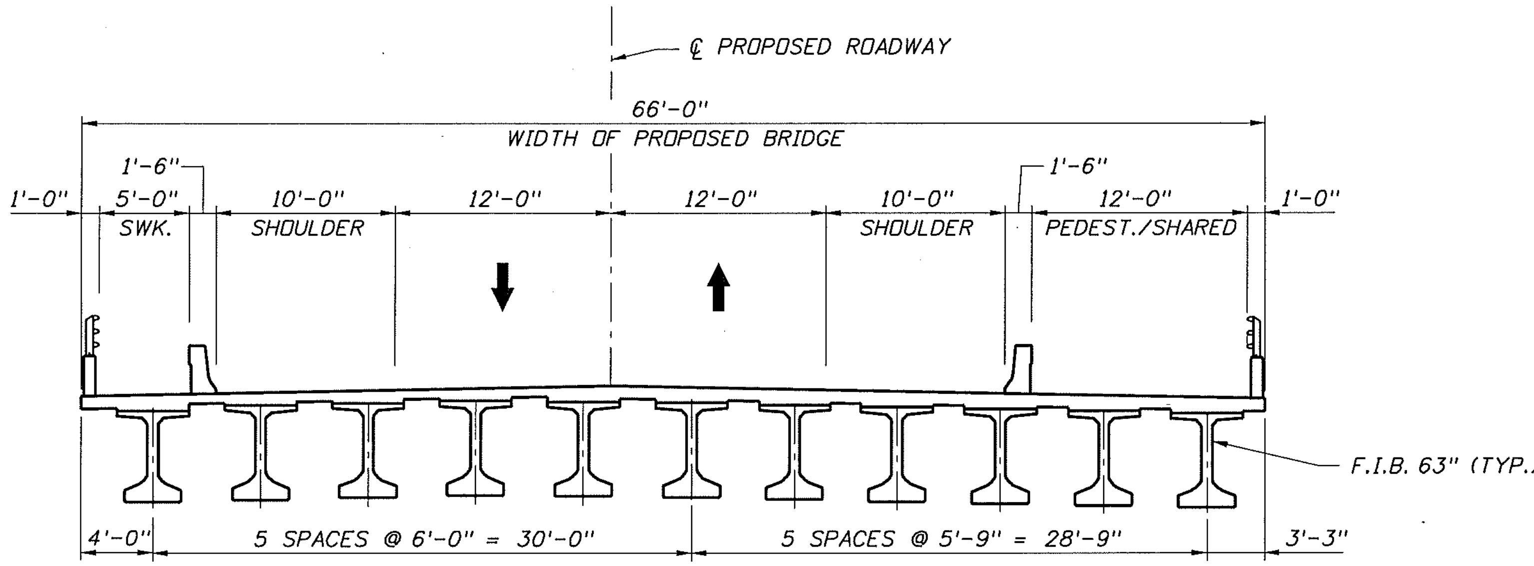
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

SHEET TITLE:
CONSTRUCTION SEQUENCE - NORTH ALIGMENT
TWO PHASE CONSTRUCTION (1 OF 2)

PROJECT NAME:
DUNEDIN CAUSEWAY
RELIEF BRIDGE REPLACEMENT

SHEET NO.
B1-2N



FINAL CONFIGURATION

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PROJECT ID NO. | FAP NO.

SHEET TITLE:
CONSTRUCTION SEQUENCE - NORTH ALIGNMENT
TWO PHASE CONSTRUCTION (2 OF 2)

PROJECT NAME:
DUNEDIN CAUSEWAY
RELIEF BRIDGE REPLACEMENT

SHEET NO.
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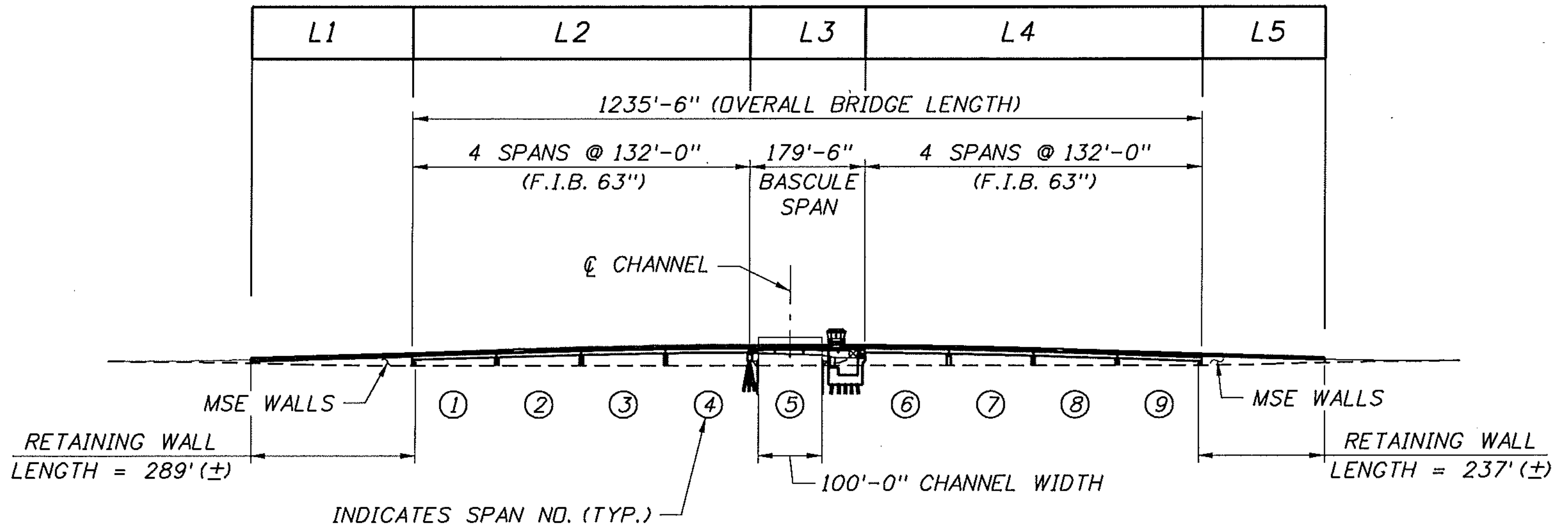
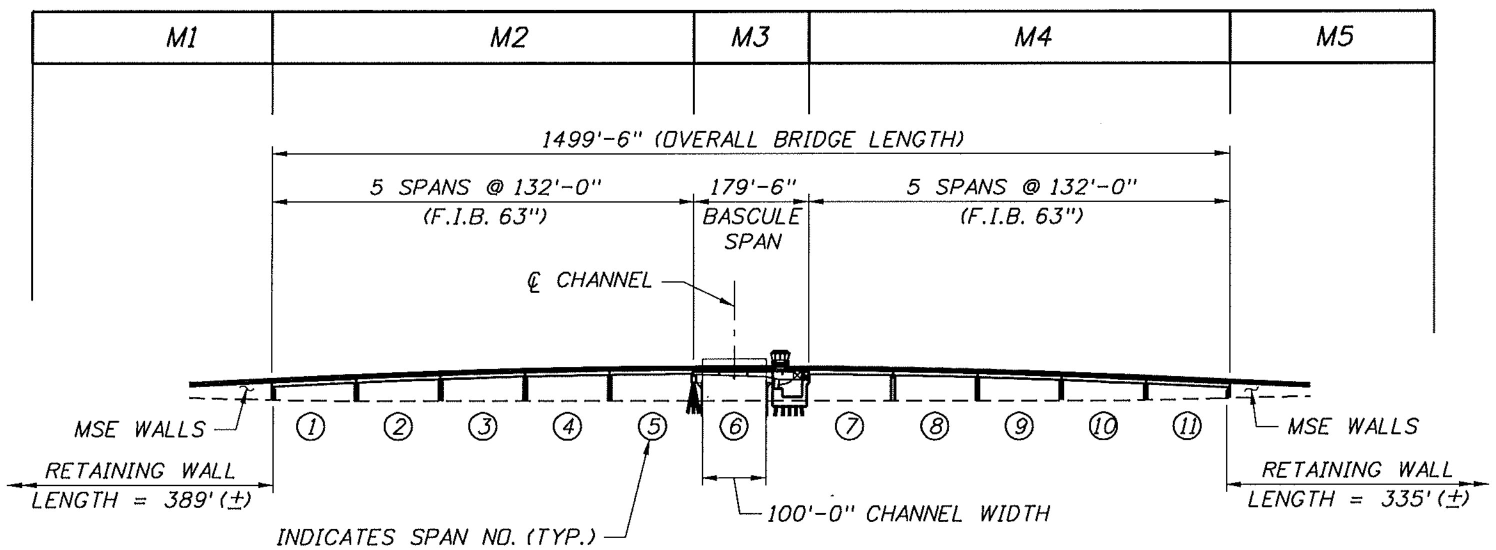
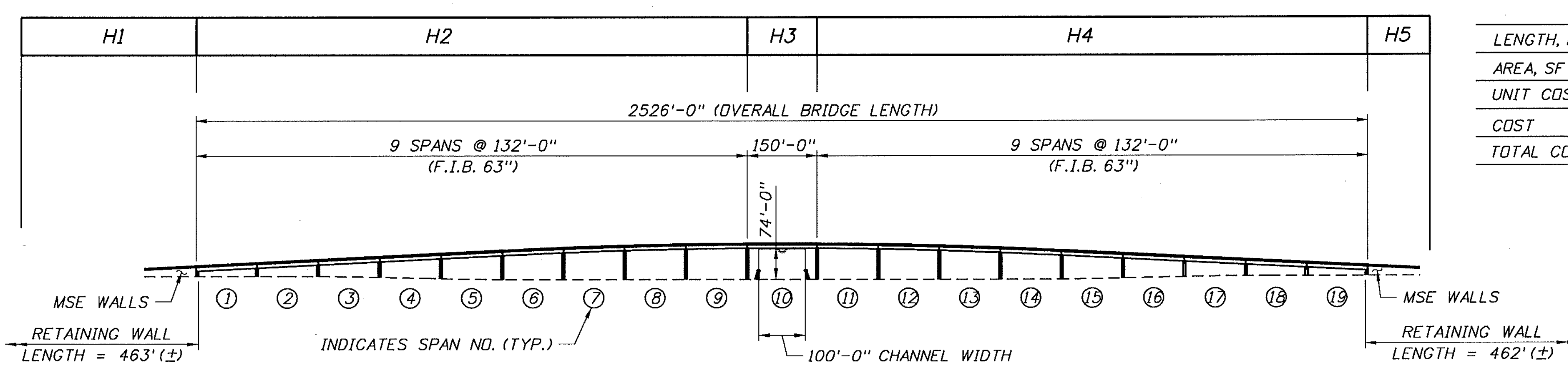


ELEVATION - LOW-LEVEL



ELEVATION - MID-LEVEL



ELEVATION - HIGH-LEVEL

LOW LEVEL ALTERNATIVE

	L1	L2	L3	L4	L5
LENGTH, FT	289	528	179.5	528	237
AREA, SF	6711	34848	11847	34848	5679
UNIT COST	$50/SF	$135/SF	$1626/SF	$135/SF	$50/SF
COST	$335,550	$4,704,480	$19,260,372	$4,704,480	$283,950
TOTAL COST					$29,288,832

MID LEVEL ALTERNATIVE

	M1	M2	M3	M4	M5
LENGTH, FT	389	660	179.5	660	335
AREA, SF	12788	43560	11847	43560	10164
UNIT COST	$50/SF	$155/SF	$1657/SF	$155/SF	$50/SF
COST	$639,400	$6,751,800	$19,634,372	$6,751,800	$508,200
TOTAL COST					$34,285,572

HIGH LEVEL ALTERNATIVE

	H1	H2	H3	H4	H5
LENGTH, FT	463	1188	150	1188	462
AREA, SF	14138	78408	9900	78408	14111
UNIT COST	$50/SF	$185/SF	$185/SF	$185/SF	$50/SF
COST	$706,900	$14,505,480	$1,831,500	$14,505,480	$705,550
TOTAL COST					$32,254,910

RELIEF BRIDGE

	WALL 1	WALL 2	W1+W2	BRIDGE L
LENGTH, FT	168	214	382	432
AREA, SF	3958	4906	8864	28512
UNIT COST	$50/SF			$135/SF
COST	$443,200			$3,849,120
TOTAL COST	$4,292,320			

NOTE:
FOR RELIEF BRIDGE DETAILS SEE B1-1.

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JSR	8/09
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DESIGNED BY	NEC	8/09
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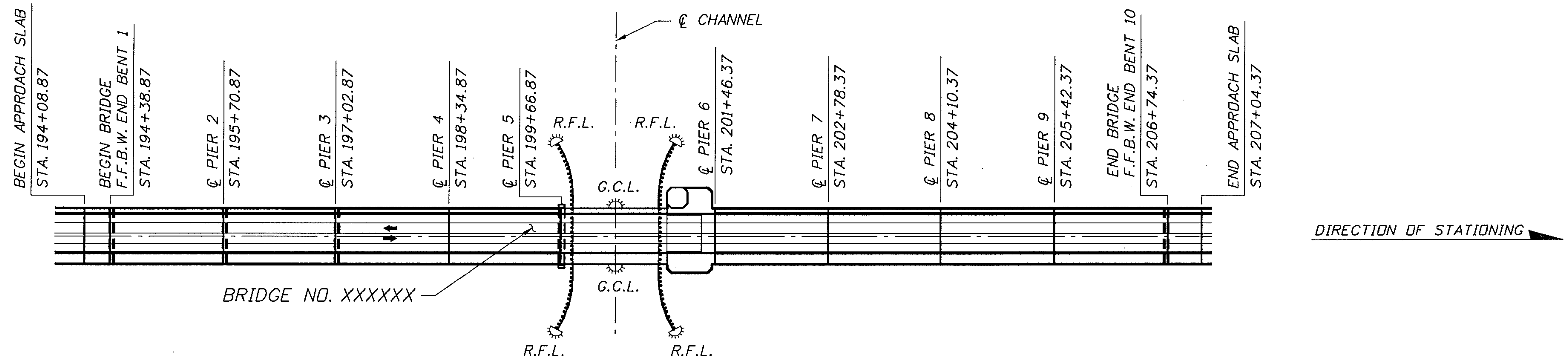
PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO. | FAP NO.

SHEET TITLE: PROBABLE COSTS - LOW, MID AND HIGH LEVEL

PROJECT NAME: DUNEDIN CAUSEWAY MAIN BRIDGE REPLACEMENT

SHEET NO. B2-1



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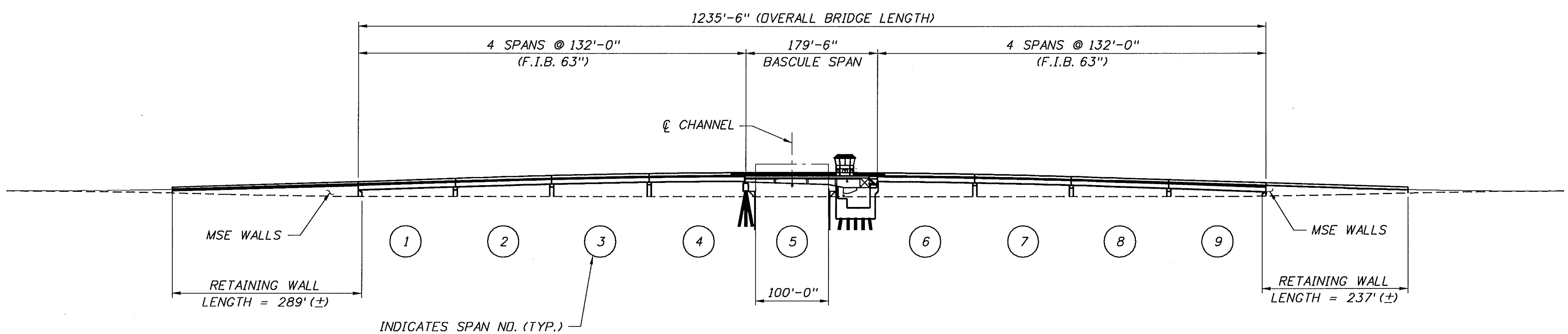

ELEVATION

REVISIONS					
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	NAMES	DATES
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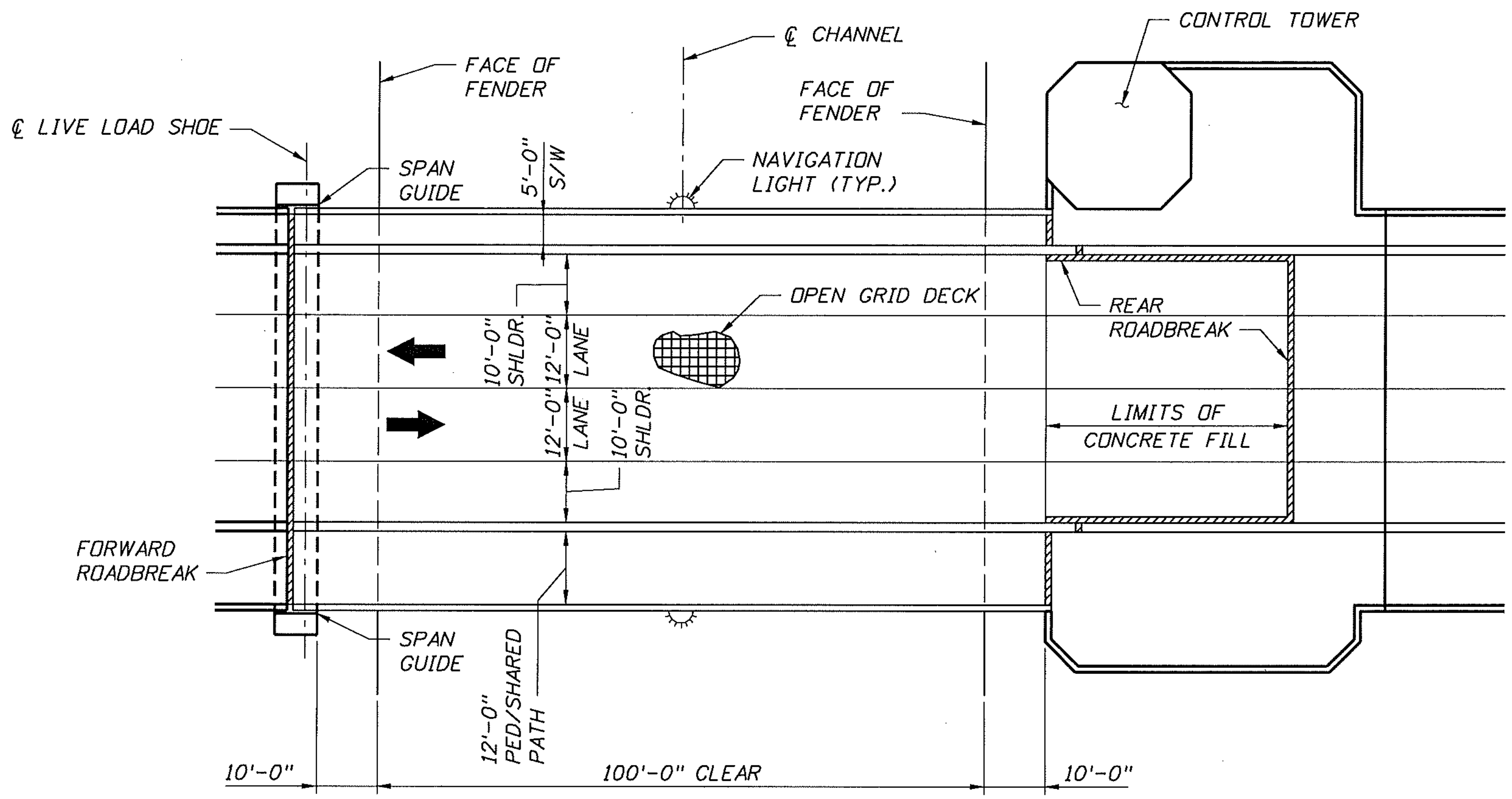
PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

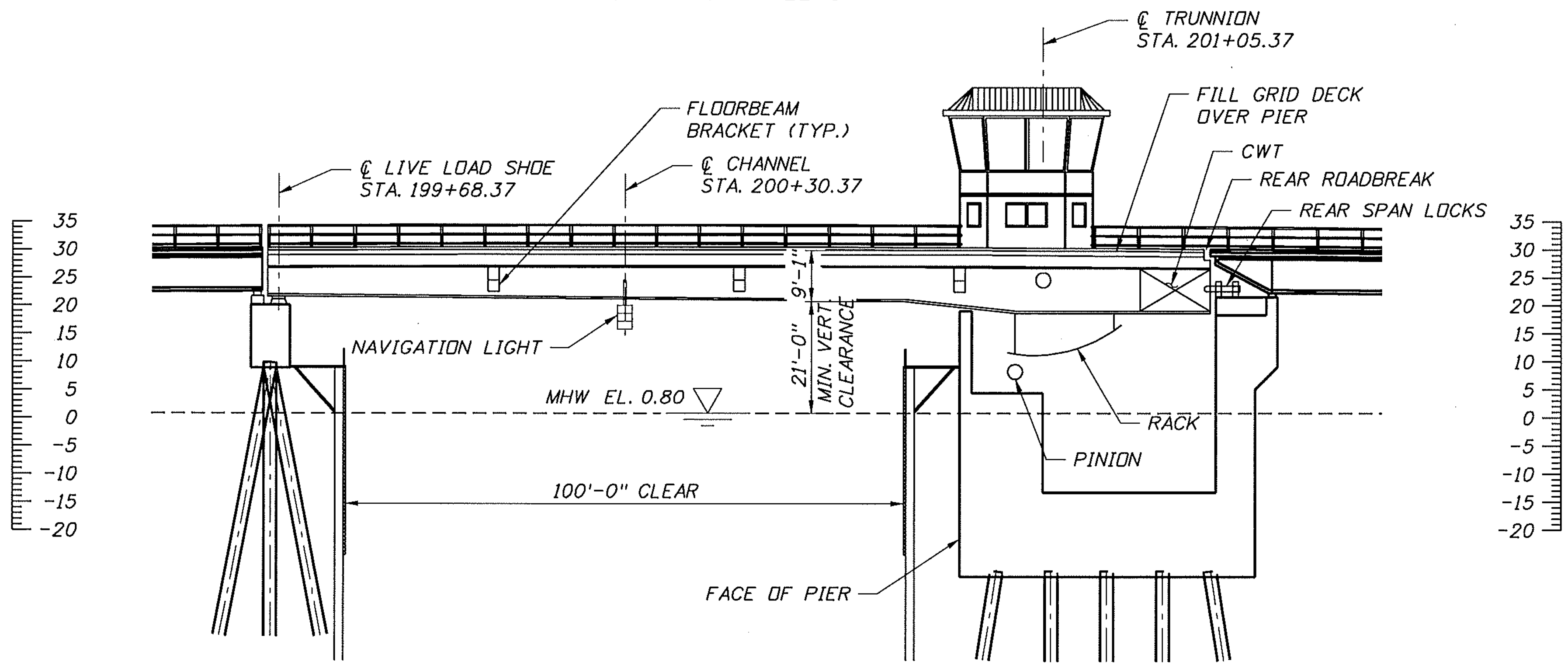
SHEET TITLE: PLAN AND ELEVATION - LOW LEVEL

PROJECT NAME: DUNEDIN CAUSEWAY MAIN BRIDGE REPLACEMENT

SHEET NO. B2-2



PLAN - CHANNEL SPAN



ELEVATION - CHANNEL SPAN

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
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CHECKED BY	RQ	8/09
DESIGNED BY	NEC	8/09
CHECKED BY	JS	8/09
APPROVED BY	NEC	

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Employee-owned
Nelson E. Canjura P.E. No. 43235

PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

SHEET TITLE: PLAN AND ELEVATION CHANNEL SPAN - LOW LEVEL

PROJECT NAME: DUNEDIN CAUSEWAY MAIN BRIDGE REPLACEMENT

SHEET NO. B2-3

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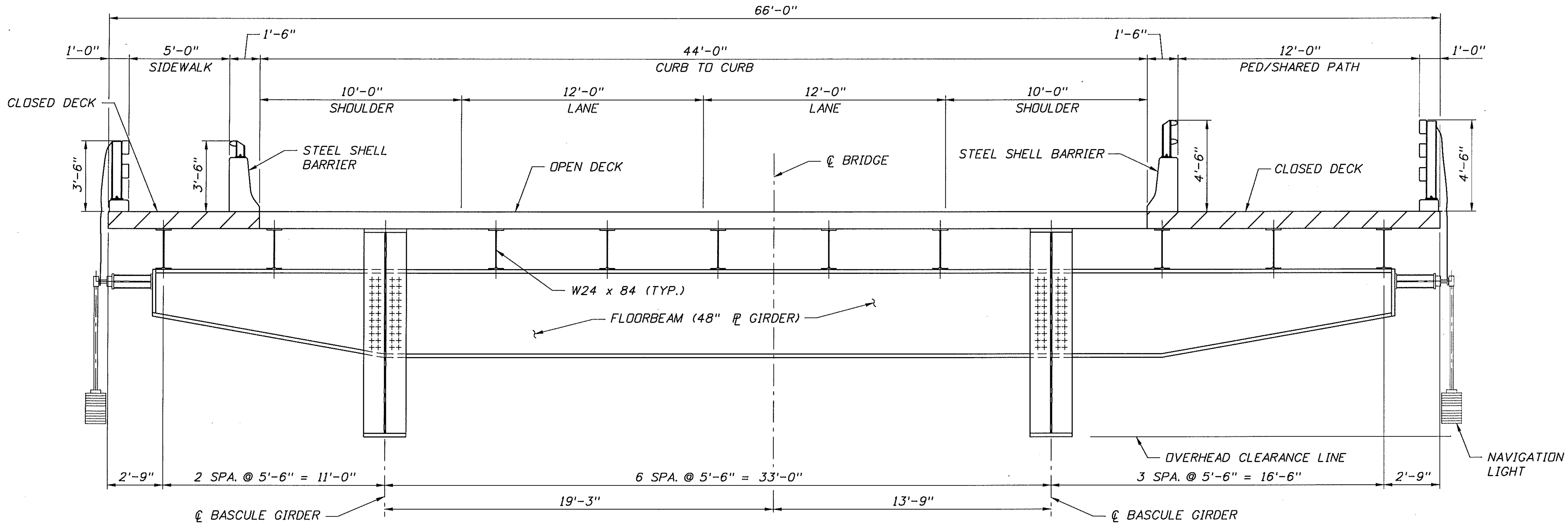
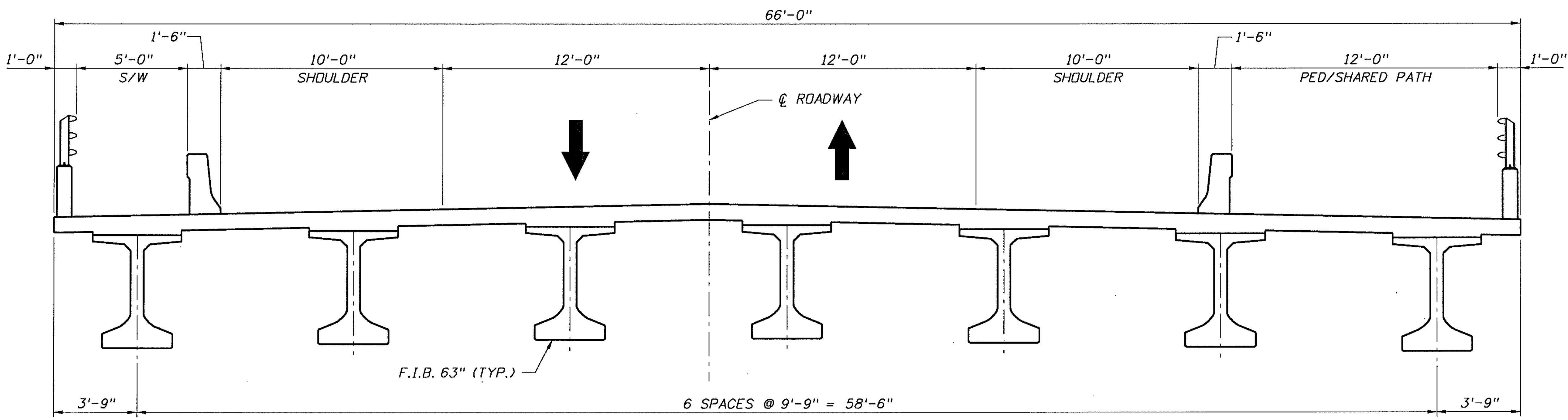
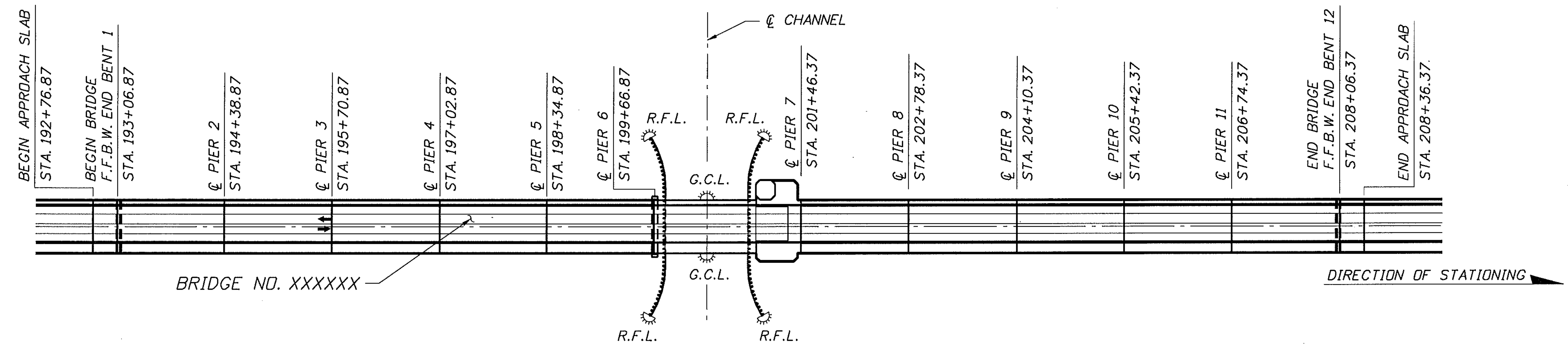


TYPICAL SECTION - CHANNEL SPAN

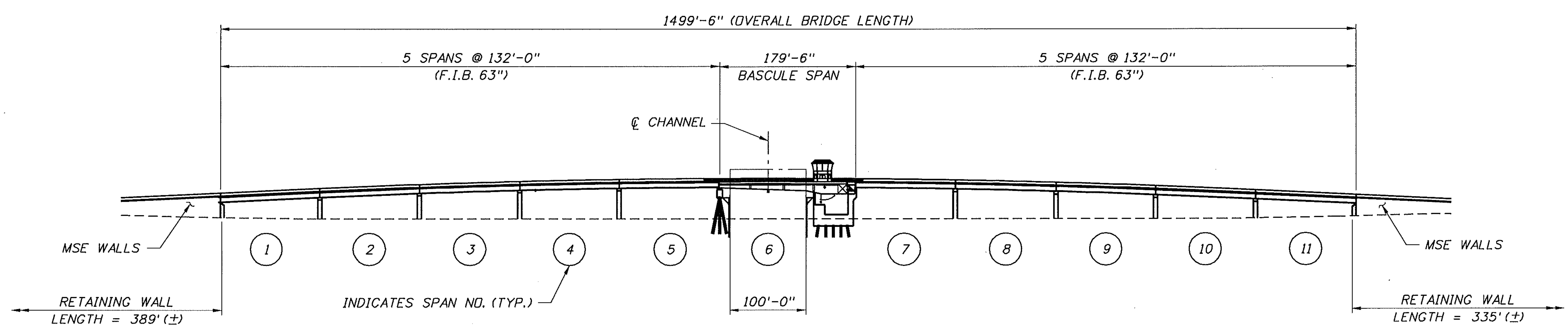


TYPICAL SECTION - APPROACH SPANS

REVISIONS							NAMES	DATES	ENGINEER OF RECORD:	PINELLAS COUNTY DEPARTMENT OF PUBLIC WORKS	SHEET TITLE:
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DRAWN BY	JSR	8/09	HDR Engineering, Inc. 5426 Bay Center Drive Suite 400 Tampa, FL 33609-3444 FBPR Certificate of Authorization No. 4213		TYPICAL SECTIONS - LOW LEVEL
						CHECKED BY	RQ	8/09		PROJECT ID NO. / FAP NO.	PROJECT NAME: DUNEDIN CAUSEWAY MAIN BRIDGE REPLACEMENT
						DESIGNED BY	NEC	8/09			SHEET NO. B2-4
						CHECKED BY	JS	8/09			
						APPROVED BY	NEC		Nelson E. Canjura P.E. No. 43235		



PLAN



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JSR	8/09
CHECKED BY	RQ	8/09
DESIGNED BY	NEC	8/09
CHECKED BY	JS	8/09
APPROVED BY	NEC	

ENGINEER OF RECORD:
HDR Engineering, Inc.
5426 Bay Center Drive
Suite 400
Tampa, FL 33609-3444
FBPR Certificate of
Authorization No. 4213
Employee-owned
Nelson E. Canjura P.E. No. 43235

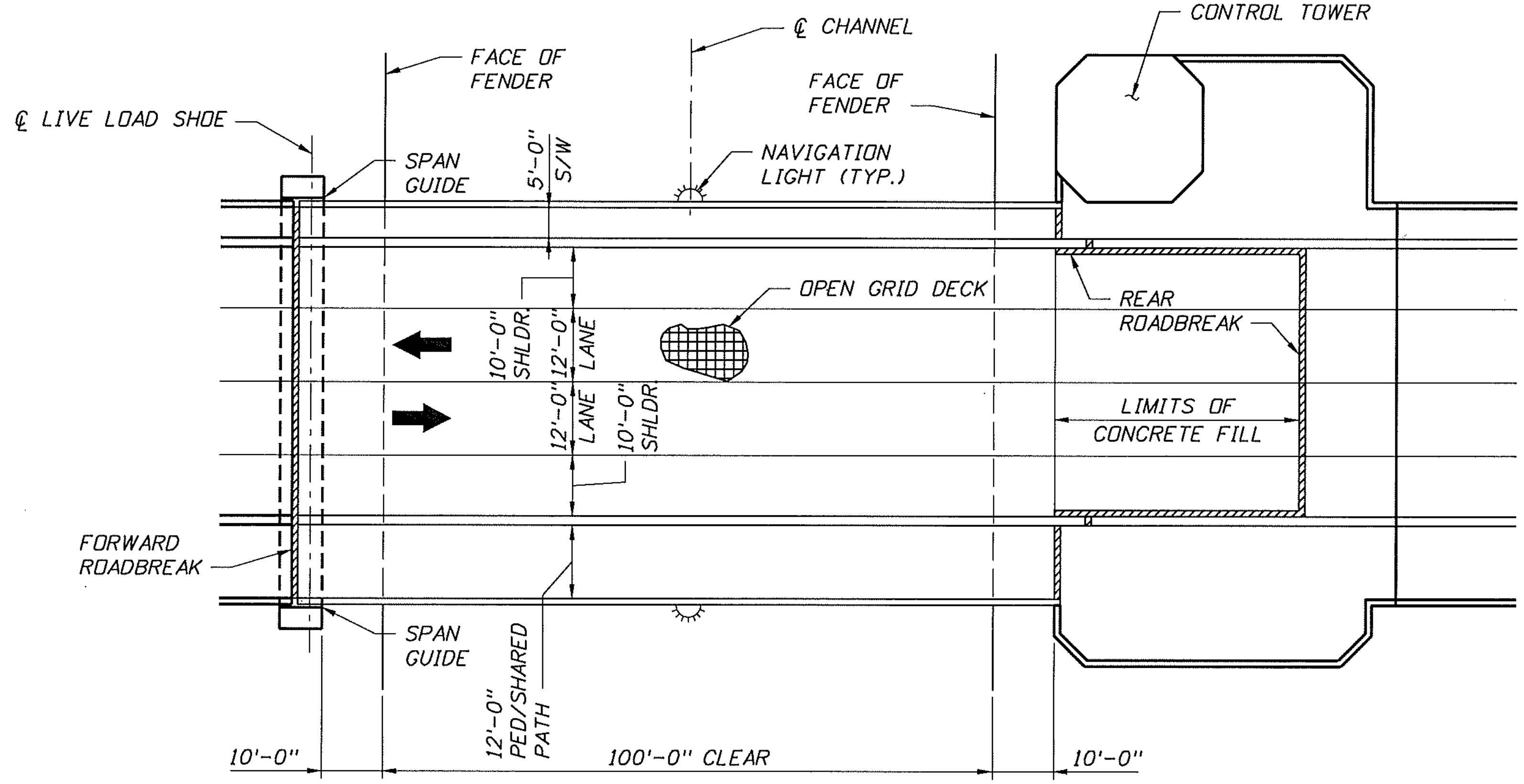
PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

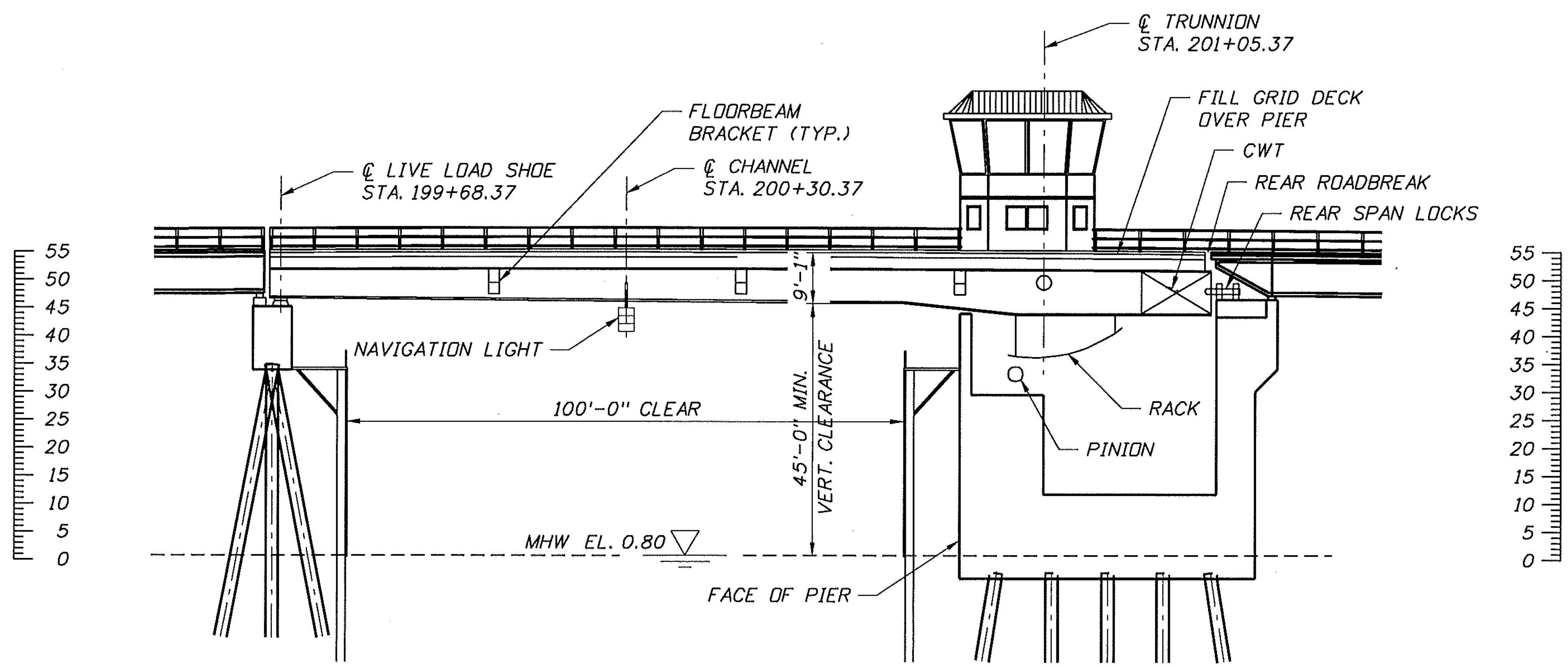
SHEET TITLE:
PLAN AND ELEVATION - MID LEVEL

PROJECT NAME:
DUNEDIN CAUSEWAY
MAIN BRIDGE REPLACEMENT

SHEET NO.
B2-5



PLAN - CHANNEL SPAN



ELEVATION - CHANNEL SPAN

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JSR	8/09
CHECKED BY	RQ	8/09
DESIGNED BY	NEC	8/09
CHECKED BY	JS	8/09
APPROVED BY	NEC	

ENGINEER OF RECORD:
HDR Engineering, Inc.
5426 Bay Center Drive
Suite 400
Tampa, FL 33609-3444
FBPR Certificate of Authorization No. 4213
Nelson E. Canjura P.E. No. 43235

PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

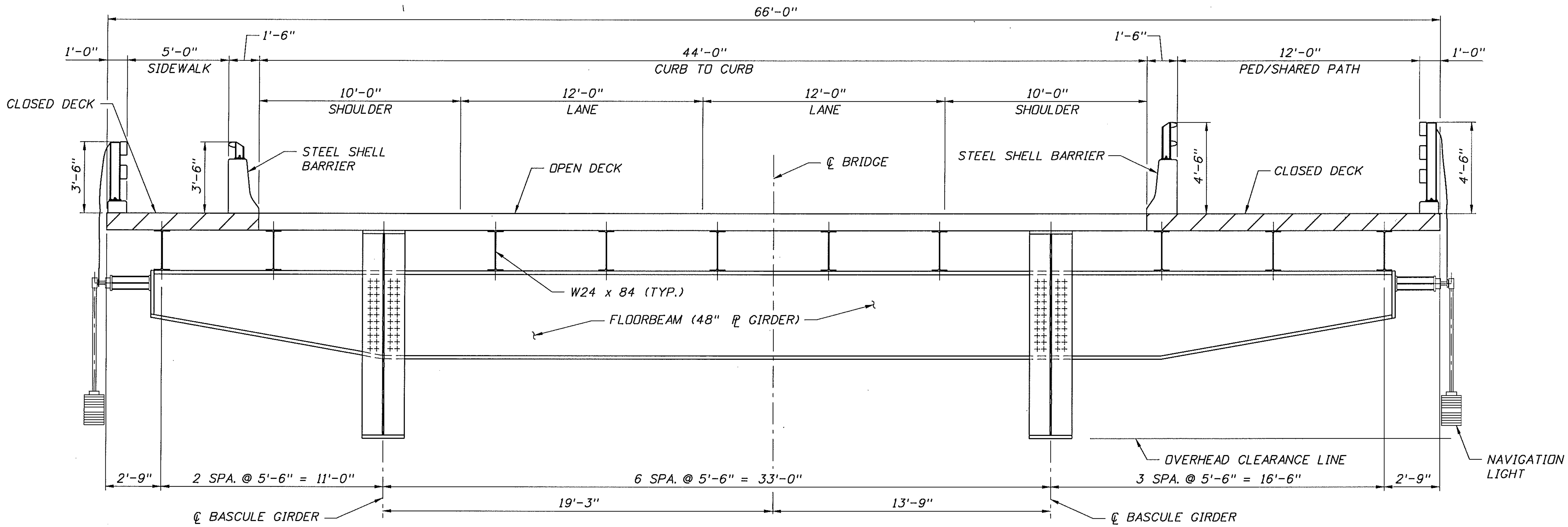
PROJECT ID NO. | FAP NO.

SHEET TITLE: PLAN AND ELEVATION CHANNEL SPAN - MID LEVEL

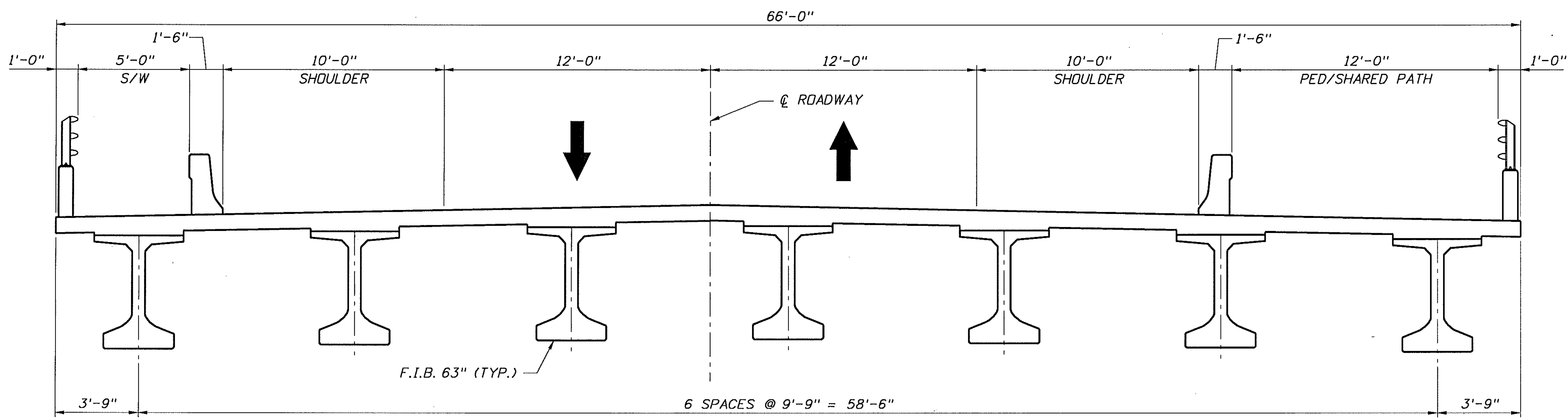
PROJECT NAME: DUNEDIN CAUSEWAY MAIN BRIDGE REPLACEMENT

SHEET NO. B2-6

$USERNAME$ $$$$$$$DGNSPECIFICATION$$$$$$ $$$$$SYTIME$$$$$9:23:20 AM



TYPICAL SECTION - CHANNEL SPAN



TYPICAL SECTION - APPROACH SPANS

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JSR	8/09
CHECKED BY	RQ	8/09
DESIGNED BY	NEC	8/09
CHECKED BY	JS	8/09
APPROVED BY	NEC	

ENGINEER OF RECORD:
HDR Employee-owned
HDR Engineering, Inc.
5426 Bay Center Drive
Suite 400
Tampa, FL 33609-3444
FBPR Certificate of
Authorization No. 4213
Nelson E. Canjura P.E. No. 43235

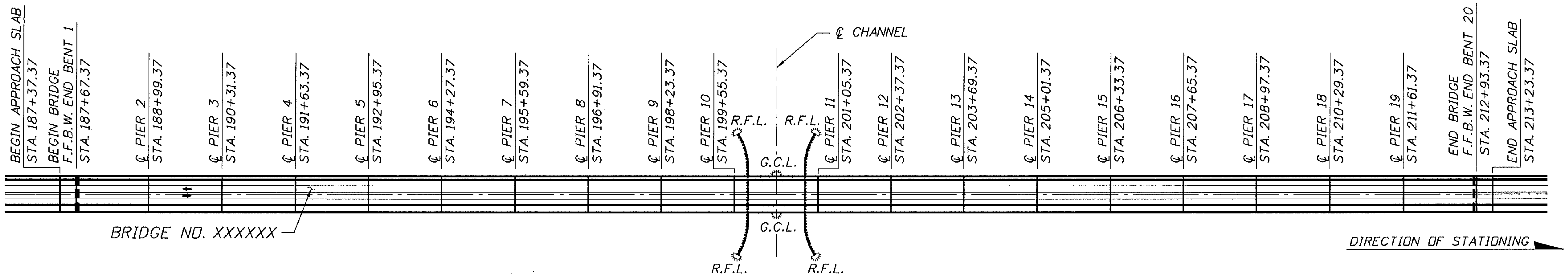
PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

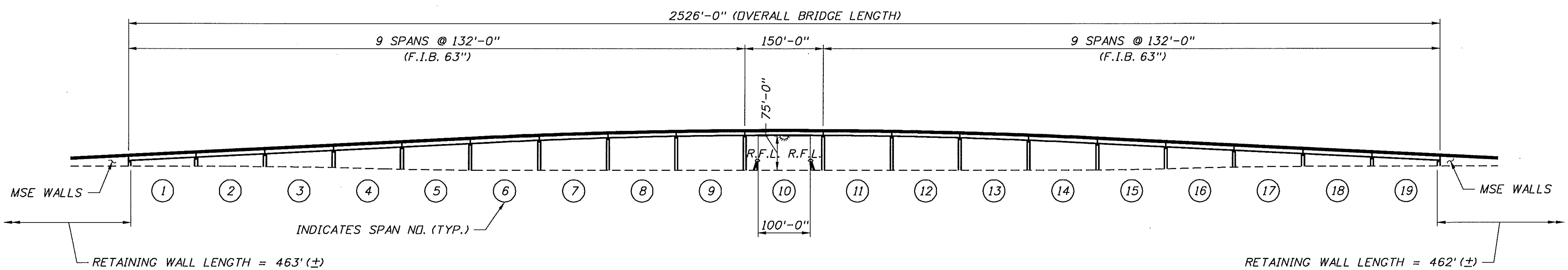
SHEET TITLE:
TYPICAL SECTIONS - MID LEVEL

PROJECT NAME:
DUNEDIN CAUSEWAY
MAIN BRIDGE REPLACEMENT

SHEET NO.
B2-7



PLAN



ELEVATION

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JSR	8/09
CHECKED BY	RQ	8/09
DESIGNED BY	NEC	8/09
CHECKED BY	JS	8/09
APPROVED BY	NEC	

ENGINEER OF RECORD:
HDR Engineering, Inc.
5426 Bay Center Drive
Suite 400
Tampa, FL 33609-3444
FBPR Certificate of Authorization No. 4213
Nelson E. Canjura P.E. No. 43235

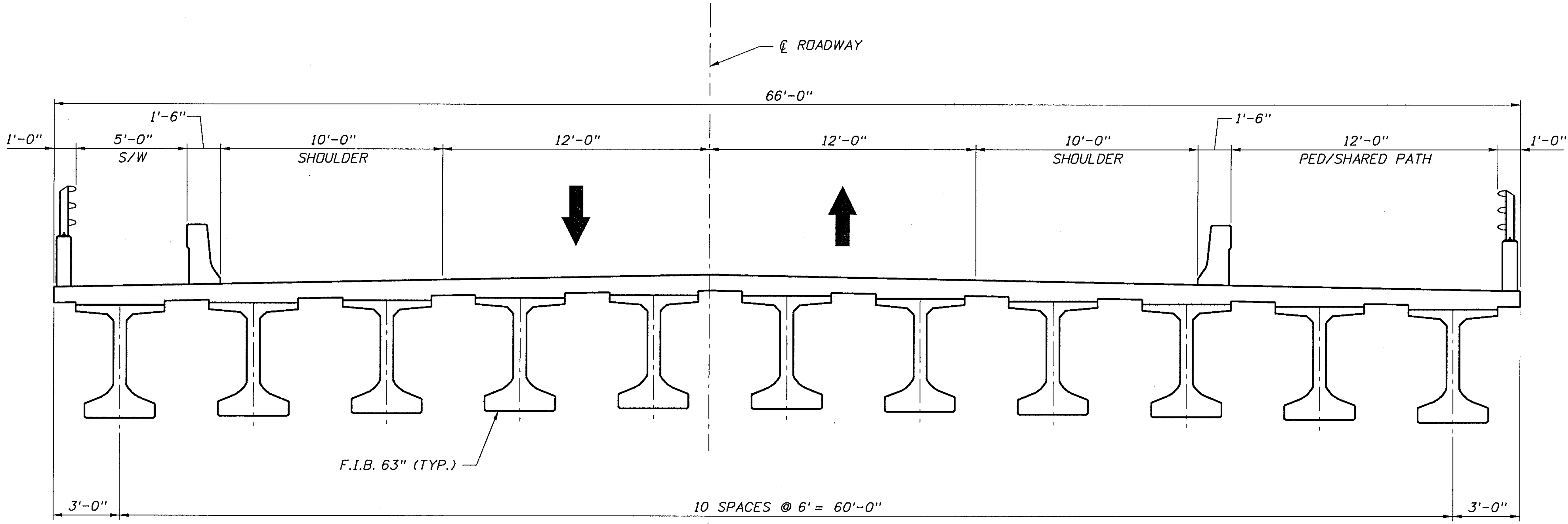
PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

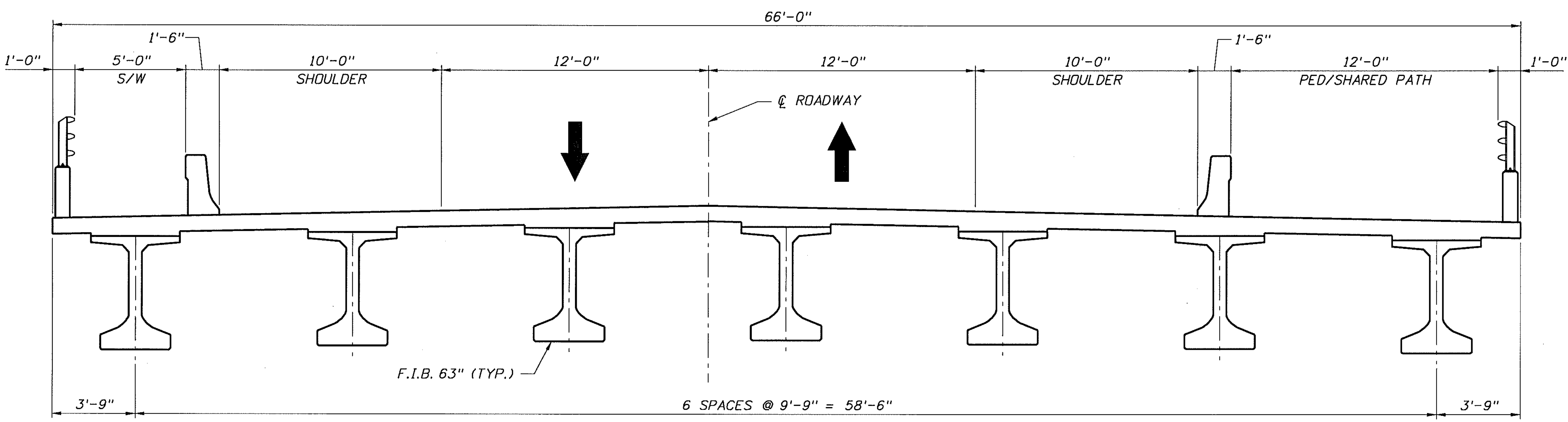
SHEET TITLE:
PLAN AND ELEVATION - HIGH LEVEL

PROJECT NAME:
DUNEDIN CAUSEWAY
MAIN BRIDGE REPLACEMENT

SHEET NO.
B2-8



TYPICAL SECTION - CHANNEL SPAN



TYPICAL SECTION - APPROACH SPANS

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JSR	8/09
CHECKED BY	RQ	8/09
DESIGNED BY	NEC	8/09
CHECKED BY	JS	8/09
APPROVED BY	NEC	

ENGINEER OF RECORD:
HDR Engineering, Inc.
5426 Bay Center Drive
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Tampa, FL 33609-3444
FBPR Certificate of
Authorization No. 4213
Nelson E. Canjura P.E. No. 43235

PINELLAS COUNTY
DEPARTMENT OF PUBLIC WORKS

PROJECT ID NO.	FAP NO.

SHEET TITLE:
TYPICAL SECTIONS - HIGH LEVEL

PROJECT NAME:
DUNEDIN CAUSEWAY
MAIN BRIDGE REPLACEMENT

SHEET NO.
B2-9

Appendix C

Environmental Data Report

ENVIRONMENTAL DATA REPORT

Standard 1/8 Mile Research

Duneding Causeway (Causeway Blvd) Corridor
Gary Place to Royal Stewart Parkway
Pinellas County, Florida

Prepared For:

HDR Engineering, Inc.
2202 N. Westshore Blvd.
Tampa, FL 33607

Prepared By:

ENVIRONMENTAL DATA MANAGEMENT, INC.
2840 West Bay Drive, Suite 208
Largo, Florida 33770

March 28, 2009

EDM

Environmental Data Management, Inc.
2840 West Bay Drive, Suite 208
Largo, Florida 33770
Tel. (727) 586-1700 Fax (727) 585-1701
http://www.edm-net.com

March 28, 2009

Chris Wilson
HDR Engineering, Inc.
2202 N. Westshore Blvd.
Tampa, FL 33607

Subject: **Standard 1/8 Mile Research - EDM Project #20123**

Dear Mr. Wilson

Thank you for using Environmental Data Management, Inc. The following report provides the results of our environmental data research that you requested for the following location:

Duneding Causeway (Causeway Blvd) Corridor
Gary Place to Royal Stewart Parkway
Pinellas County, Florida

The following is a summary of the components contained within this report:

- **Executive Summary –**lists the databases that were searched for this report, the search distance criteria and the number of sites identified for each database.
- **Map of Study Area**– street map showing the location of the Subject Property and any regulatory listed sites identified within the search criteria (*a non-mapped option is available)*.
- **Site Summary Table –**displays corresponding sites' Map ID numbers, Permit or Registration numbers, Name/Address and the Government Database(s) on which the site was listed.
- **Detail Reports** – data detail for each record identified.
- **Proximal Records Table** – a listing of potentially relevant sites identified just beyond the search criteria.
- **Non-Mapped Records Table -** lists those government records that do not contain sufficient address information to plot within our GIS system, but may still exist within your study area.
- **Agency List Descriptions –** defines the regulatory databases included in this report along with the dates that each database was last updated by the respective agency and EDM.
- **Physical Setting** – includes USGS Contour or Topographic map and a map of statewide American Indian Lands. Recent Aerial Photo, FEMA Flood Map and NWI Wetland Map included with Comprehensive Report. Water Well locations and detail well reports are included where this information is available.

At EDM we take great pride in our work, and continually strive to provide you with the most accurate and thorough research service available. We accomplish this by manually screening and researching your study area to identify and accurately locate any sites of environmental concern. This manual effort may add more time and effort to your report preparation, but we think a more thorough and accurate result is worth it.

Thank you again for selecting EDM as your data research provider. Should you have any questions regarding this report or our service, please feel free to contact us. We appreciate the opportunity to be of service to you and look forward to working with you in the future.

ENVIRONMENTAL DATA MANAGEMENT, INC.

Report Date: 3/28/2009

Executive Summary

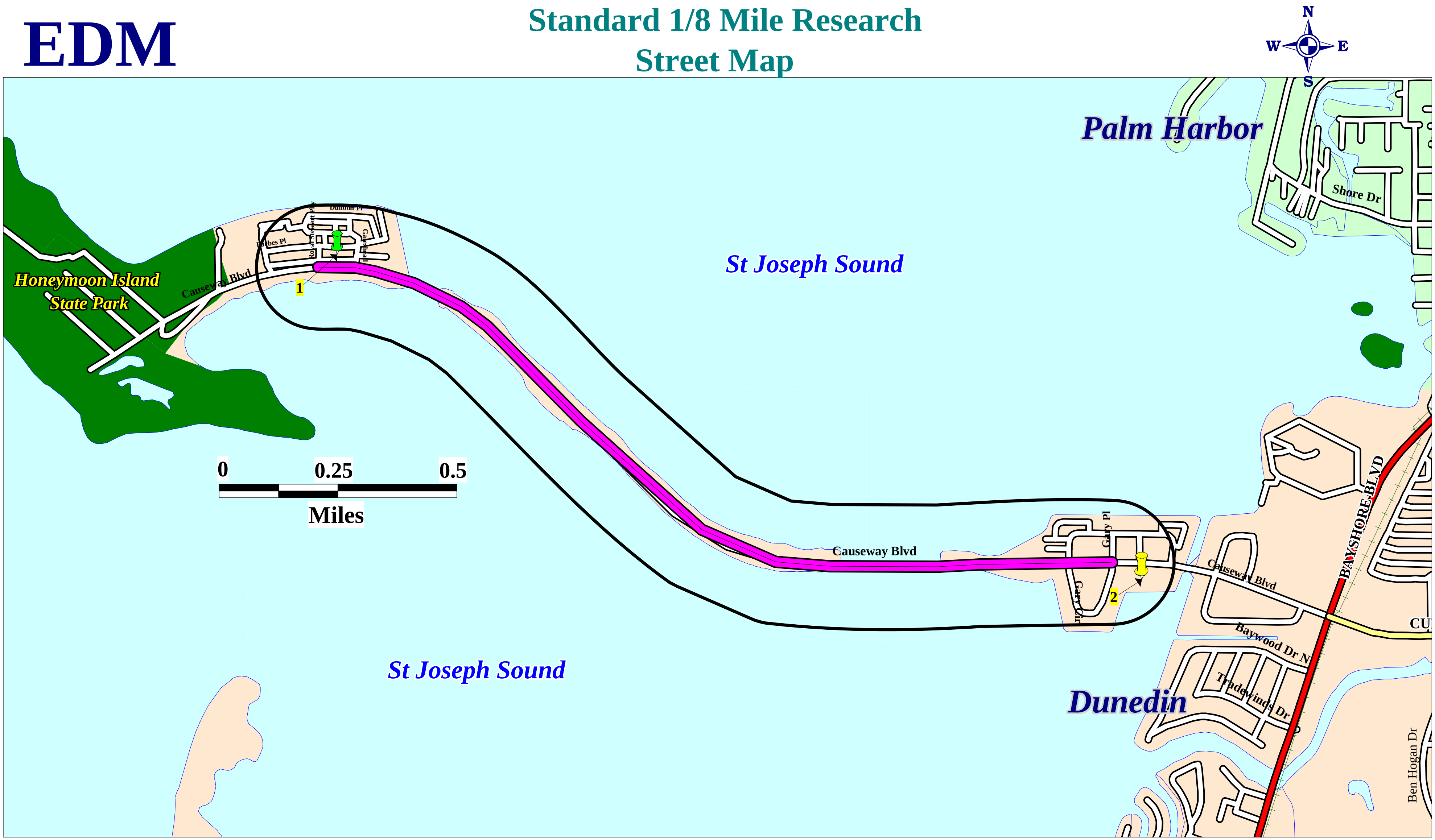
Client Information	Project Information
HDR Engineering, Inc. 2202 N. Westshore Blvd. Suite 250 Tampa FL 33607 Client Job No: Dunedin Causeway Client P.O. No:	Standard 1/8 Mile Research Duneding Causeway (Causeway Blvd) Corridor Gary Place to Royal Stewart Parkway Pinellas County, Florida EDM Job No# 20123

The following table displays the databases that were included in the research provided, the respective search distance for each database, and the number of records identified for each database. The absence of records in this table and the Site Summary Table indicates that no sites were found within the specified research area.

	# Found
EPA DATABASES	
National Priorities List(NPL)	0
Comprehensive Env Response, Compensation & Liability Information System List(CERCLIS)	0
Archived Cerclis Sites(NFRAP)	0
Emergency Response Notification System List(ERNS)	0
RCRIS Handlers with Corrective Action(CORRACTS)	0
RCRA-Treatment, Storage and/or Disposal Sites(TSD)	0
RCRA-LQG,SQG,CESQG and Transporters(NONTSD)	0
Tribal Tanks List(TRIBLTANKS)	0
Tribal Lust List(TRIBLLUST)	0
Brownfields Management System(USBRWNFLDS)	0
FDEP DATABASES	
State NPL Equivalent(STNPL)	0
State CERCLIS Equivalent(STCERC)	0
Solid Waste Facilities List(SLDWST)	0
Leaking Underground Storage Tanks List(LUST)	3
Underground/Aboveground Storage Tanks(TANKS)	4
State Designated Brownfields(BRWNFLDS)	0
State Voluntary Cleanup List(VOLCLNUP)	0
State Institutional and/or Engineering Controls(INSTENG)	0
State Dry Cleaners List(DRY)	0

EDM

Standard 1/8 Mile Research Street Map



Source: 2006 US Census Bureau TIGER Files

Map Scale and Site Locations are Approximate

Subject Property

Duneding Causeway (Causeway Blvd) Corrid
Gary Place to Royal Stewart Parkway
Pinellas County, Florida

EDM Job No: 20123
March 28, 2009

Subject Corridor

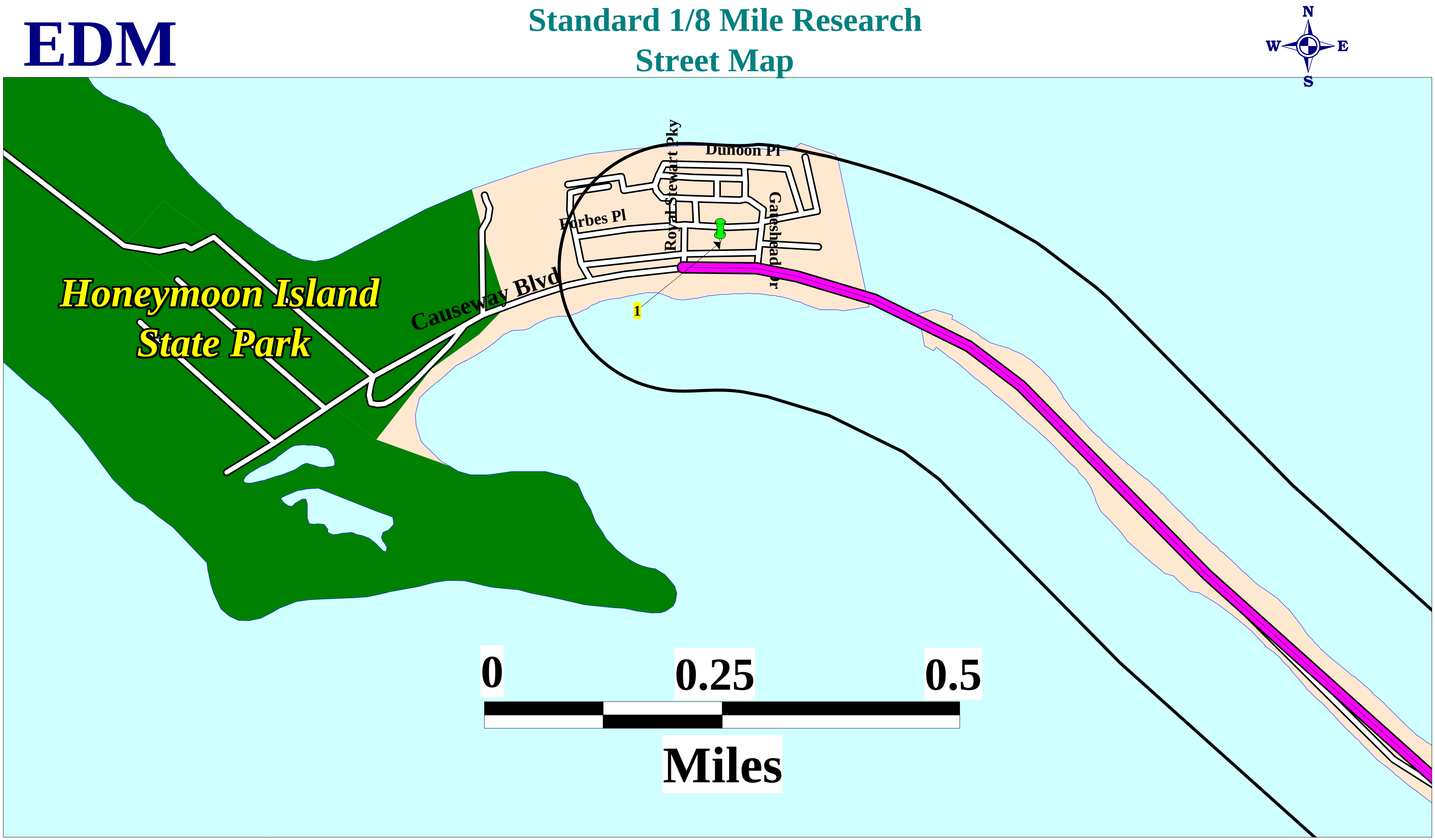
NPL, STNPL, CORRACTS & TSD sites

CERCLIS, STCERC, NFRAP, SLDWST, LUST, BRWNFLDS, VOLCLNUP & DRYsites

ERNS, NONTSD, TANKS & INSTENG sites

EDM

Standard 1/8 Mile Research Street Map



Source: 2006 US Census Bureau TIGER Files

Map Scale and Site Locations are Approximate

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Pinellas County, Florida

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March 28, 2009

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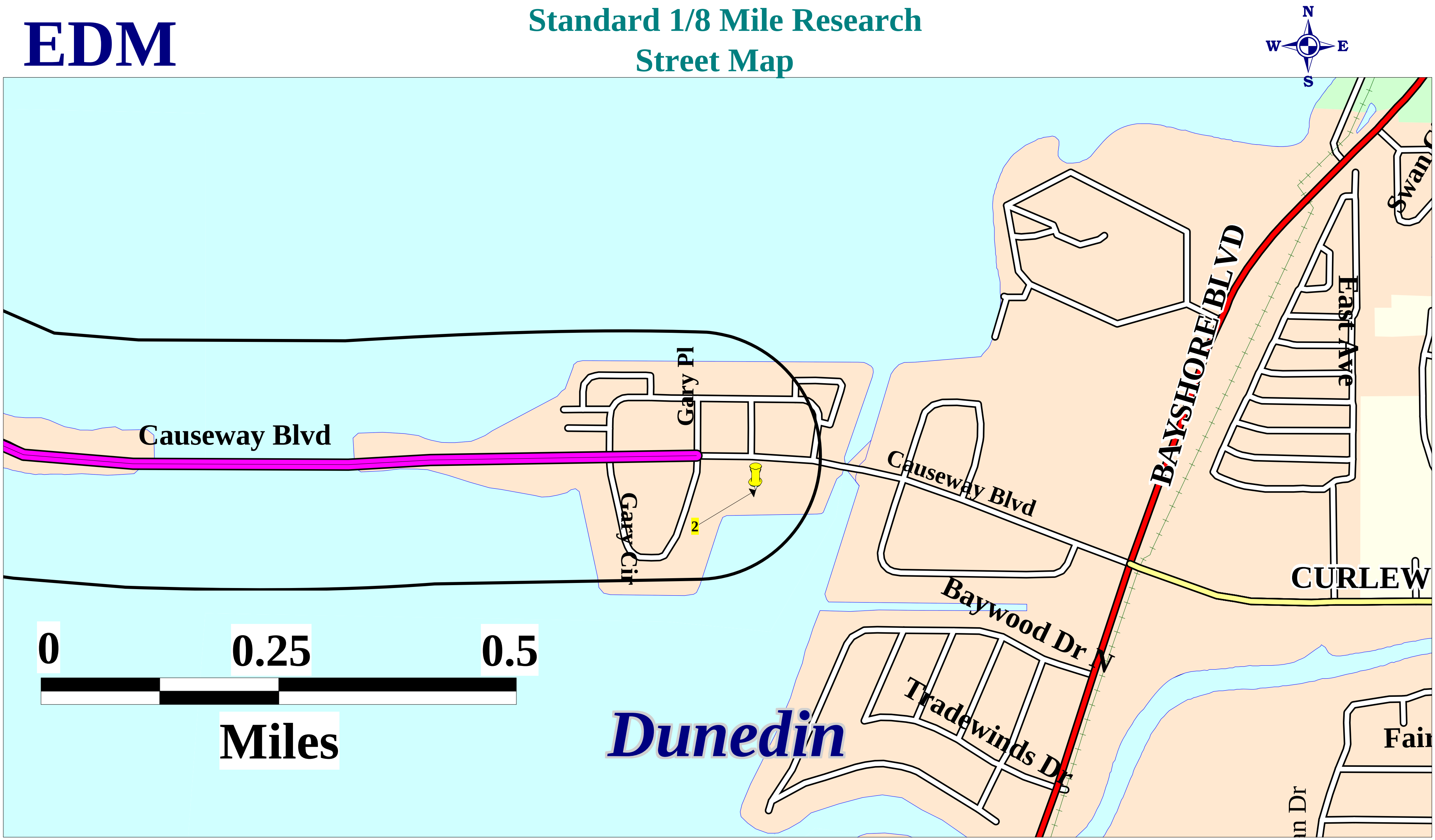
NPL, STNPL, CORRACTS & TSD sites

CERCLIS, STCERC, NFRAP, SLDWST, LUST, BRWNFLDS, VOLCLNUP & DRYsites

ERNS, NONTSD, TANKS & INSTENG sites

EDM

Standard 1/8 Mile Research Street Map



Source: 2006 US Census Bureau TIGER Files

Map Scale and Site Locations are Approximate

Subject Property

Duneding Causeway (Causeway Blvd) Corrid
Gary Place to Royal Stewart Parkway
Pinellas County, Florida

EDM Job No: 20123
March 28, 2009

Subject Corridor

NPL, STNPL, CORRACTS & TSD sites

CERCLIS, STCERC, NFRAP, SLDWST, LUST, BRWNFLDS, VOLCLNUP & DRYsites

ERNS, NONTSD, TANKS & INSTENG sites

ENVIRONMENTAL DATA MANAGEMENT

Standard 1/8 Mile Research

Report Date: 3/28/2009

SUMMARY TABLE

REGULATORY LISTS

MAPID#	FAC ID, NAME AND LOCATION	NPL	CERCLIS	NFRAP	ERNS	CORRACTS	TSD	NONTSD	TRIBLTANKS	TRIBLLUST	USBRWNFLDS	STNPL	STCERC	SLDWST	LUST	TANKS	BRWNFLDS	VOLCLNUP	INSTENG	DRY
1)	9202767 ROYAL STEWART ARMS 1 ROYAL STEWART PKWY DUNEDIN, FL. 34698															X				
2)	8624635 MARKER 1 MARINA 343 CAUSEWAY BLVD DUNEDIN, FL. 346981706														X	X				
2)	9103174 MARKER 1 MARINA-MAINTENANCE SHOP 343 CAUSEWAY BLVD DUNEDIN, FL.														X					
2)	9103174. MARKER 1 MARINA-MAINTENANCE SHOP 343 CAUSEWAY BLVD DUNEDIN, FL. 34698															X				
2)	9401002 MARKER 1 MARINA-MAINTENANCE SHOP 343 CAUSEWAY BLVD DUNEDIN, FL. 34698														X	X				

FDEP STORAGE TANKS REPORT

(TANKS)

FACILITY ID NUMBER, NAME AND LOCATION:

9202767
ROYAL STEWART ARMS
1 ROYAL STEWART PKWY
DUNEDIN, FL 34698

OWNERSHIP INFORMATION:

ROYAL STEWART ARMS
1 ROYAL STEWART PKWY
CLEARWATER, FL 34698
CONTACT TEL #: (813) 535-2424
CONTACT: DOUG BEYER
FACILTY TEL #: (813) 733-3151

MAP ID NUMBER: 1
Dist (Miles): 0.62
Direction: NW

TANKS

COUNTY ID: 52 **FAC TYPE:** Fuel user/Non-retail **FAC STATUS:** CLOSED

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
1	1000	01-Aug-1974	Leaded Gas	UNDERGROUND	REMOVED 31-Oct-1992

** **CONSTR TYPE:** D **PIPING TYPE:** Y **LEAK MONIT TYPE:** X

See "Agency List Descriptions" Ssection for Code Definitions

FDEP LEAKING UNDERGROUND STORAGE TANKS

FACILITY ID NUMBER, NAME AND LOCATION:

8624635
MARKER 1 MARINA
343 CAUSEWAY BLVD
DUNEDIN, FL 34698-1706

OWNERSHIP INFORMATION:

ACCOUNT OWNER
PINELLAS MARINA LLC
343 CAUSEWAY BLVD DBA/MARKER 1 MARINA
DUNEDIN, FL 34698-
(727) 733-9324
MICHAEL R SHEEKS OR BRUCE CLAVEAU

MAP ID NUMBER: 2

Dist (Miles): 1.22
Direction: E

LUST

COUNTY CODE: 52
FACILITY STATUS: OPEN
FACILITY TYPE: V - Marine/Coastal Fuel Storage -

FAC OPERATOR: MICHAEL R SHEEKS
FAC TEL #: (727) 733-9324

SCORE 11 **SCORE EFF DATE:** 1/15/2001 **RANK:** 8060 **SCORE WHEN RANKED:** 11

DISCHARGE INFORMATION

Mapid: 2

DISCHARGE DATE: 10/6/1989

INSPECTION DATE:
LEAD AGENCY: DISTRICT
TANK OFF:
CLEANUP REQUIRED: NEW C/U REQUIRED
CLEANUP WORK STATUS:
INFO SOURCE: ABANDONED TANK RESTORATIO
DISCH CLNUP STATUS:

CONTAMINATED MEDIA?: **SOIL:** N **SUR WATER:** N **GR WATER:** Y **MON WELL:** Y **# DW WELLS CONTAMINATED:**

POLLUTANT TYPE/ESTIMATED GALLONS (IF REPORTED):

POLLUTANT	GALLONS	OTHER

CLEANUP INFORMATION

(for specific discharge noted above)

Mapid: 2

CLNUP PROG:

APPL RCVD: **ELIG STATUS:** **ELIG STATUS DATE:** **ELIG REDETERMINED?:**

SITE ASSESSMENT

CLNP RESP:
FUND ELLIG:
ACTUAL COMPLETION DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION PLAN

CLEANUP RESP:
FUND ELLIG:
ORDER COMPL DATE:
ACTUAL COMPL DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION

CLEANUP RESP:
FUND ELLIG:
ACTUAL COST:
YEARS TO COMPL:

SITE REHABILITATION COMPLETION REPORT

ACTION TYPE:
SUBMIT DATE:
REVIEW DATE:
ISSUE DATE:
COMPL STATUS:
COMPL STATUS DT:
COMMENTS:

SOURCE REMOVAL

CLEANUP RESP:
FUND ELLIG:
ACTUAL COMPLETION DATE:
FREE PRODUCT REMOVAL?(Y/N):
SOIL REMOVAL? (Y/N):
SOIL TONNAGE REMOVED:
SOIL TREATMENT?(Y/N):
OTHER TREATMENT?:
ALT PROC STATUS:
ALT PROC STATUS DT:

FDEP LEAKING UNDERGROUND STORAGE TANKS

(LUST)

DISCHARGE INFORMATION

Mapid: 2

DISCHARGE DATE: 3/16/1990

INSPECTION DATE:
LEAD AGENCY: DISTRICT
TANK OFF:
CLEANUP REQUIRED: COMBINED C/U REQUIRED
CLEANUP WORK STATUS:
INFO SOURCE: DISCHARGE NOTIFICATION
DISCH CLNUP STATUS:

CONTAMINATED MEDIA?: **SOIL:** N **SUR WATER:** N **GR WATER:** Y **MON WELL:** Y **# DW WELLS CONTAMINATED:**

POLLUTANT TYPE/ESTIMATED GALLONS (IF REPORTED):

POLLUTANT	GALLONS	OTHER

CLEANUP INFORMATION

(for specific discharge noted above)

Mapid: 2

CLNUP PROG:

APPL RCVD:
ELIG STATUS:
ELIG STATUS DATE:
ELIG REDETERMINED?:

SITE ASSESSMENT

CLNP RESP:
FUND ELLIG:
ACTUAL COMPLETION DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION PLAN

CLEANUP RESP:
FUND ELLIG:
ORDER COMPL DATE:
ACTUAL COMPL DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION

CLEANUP RESP:
FUND ELLIG:
ACTUAL COST:
YEARS TO COMPL:

SITE REHABILITATION COMPLETION REPORT

ACTION TYPE:
SUBMIT DATE:
REVIEW DATE:
ISSUE DATE:
COMPL STATUS:
COMPL STATUS DT:
COMMENTS:

SOURCE REMOVAL

CLEANUP RESP:
FUND ELLIG:
ACTUAL COMPLETION DATE:
FREE PRODUCT REMOVAL?(Y/N):
SOIL REMOVAL? (Y/N):
SOIL TONNAGE REMOVED:
SOIL TREATMENT?(Y/N):
OTHER TREATMENT?:
ALT PROC STATUS:
ALT PROC STATUS DT:

DISCHARGE INFORMATION

Mapid: 2

DISCHARGE DATE: 2/8/1994

INSPECTION DATE:
LEAD AGENCY:
TANK OFF: -
CLEANUP REQUIRED: R - CLEANUP REQUIRED
CLEANUP WORK STATUS: ACTIVE
INFO SOURCE: D - DISCHARGE NOTIFICATION
DISCH CLNUP STATUS: 4/22/2004 SA - SA ONGOING

CONTAMINATED MEDIA?: **SOIL:** N **SUR WATER:** N **GR WATER:** Y **MON WELL:** Y **# DW WELLS CONTAMINATED:** 0

POLLUTANT TYPE/ESTIMATED GALLONS (IF REPORTED):

POLLUTANT	GALLONS	OTHER
M - FUEL OIL - ONSITE HEAT		

CLEANUP INFORMATION

(for specific discharge noted above)

Mapid: 2

CLNUP PROG: C - PETROLEUM CLEANUP PARTICIPATION PROGRAM
APPL RCVD: 11/27/2000 **ELIG STATUS:** ELIGIBLE **ELIG STATUS DATE:** 11/30/2000 **ELIG REDETERMINED?:** N

SITE ASSESSMENT

CLNP RESP: OTHER - OTHER
FUND ELLIG: -
ACTUAL COMPLETION DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION PLAN

CLEANUP RESP: -
FUND ELLIG: -
ORDER COMPL DATE:
ACTUAL COMPL DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION

CLEANUP RESP: -
FUND ELLIG: -
ACTUAL COST:
YEARS TO COMPL:

SITE REHABILITATION COMPLETION REPORT

ACTION TYPE: -
SUBMIT DATE:
REVIEW DATE:
ISSUE DATE:
COMPL STATUS: -
COMPL STATUS DT:
COMMENTS:

SOURCE REMOVAL

CLEANUP RESP: -
FUND ELLIG: -
ACTUAL COMPLETION DATE:
FREE PRODUCT REMOVAL?(Y/N):
SOIL REMOVAL? (Y/N):
SOIL TONNAGE REMOVED:
SOIL TREATMENT?(Y/N):
OTHER TREATMENT?:
ALT PROC STATUS:
ALT PROC STATUS DT:

FDEP LEAKING UNDERGROUND STORAGE TANKS

DISCHARGE INFORMATION

Mapid: 2

DISCHARGE DATE: 1/26/2000

INSPECTION DATE:
LEAD AGENCY:
TANK OFF: PCLP52 - Pinellas County
CLEANUP REQUIRED: R - CLEANUP REQUIRED
CLEANUP WORK STATUS: COMPLETED
INFO SOURCE: D - DISCHARGE NOTIFICATION
DISCH CLNUP STATUS: 8/29/2005 NFA - NFA COMPLETE

CONTAMINATED MEDIA?: **SOIL:** Y **SUR WATER:** **GR WATER:** Y **MON WELL:** Y **# DW WELLS CONTAMINATED:**

POLLUTANT TYPE/ESTIMATED GALLONS (IF REPORTED):

POLLUTANT	GALLONS	OTHER
B - UNLEADED GAS		

CLEANUP INFORMATION

(for specific discharge noted above)

Mapid: 2

CLNUP PROG:
APPL RCVD:
ELIG STATUS: INELIGIBLE
ELIG STATUS DATE:
ELIG REDETERMINED?:

SITE ASSESSMENT

CLNP RESP: -
FUND ELLIG: -
ACTUAL COMPLETION DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION PLAN

CLEANUP RESP: -
FUND ELLIG: -
ORDER COMPL DATE:
ACTUAL COMPL DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION

CLEANUP RESP: -
FUND ELLIG: -
ACTUAL COST:
YEARS TO COMPL: 0

SITE REHABILITATION COMPLETION REPORT

ACTION TYPE: NFA - NO FURTHER ACTION
SUBMIT DATE: 6/20/2005
REVIEW DATE: 8/15/2005
ISSUE DATE: 8/26/2005
COMPL STATUS: A - APPROVED
COMPL STATUS DT: 8/15/2005
COMMENTS:

SOURCE REMOVAL

CLEANUP RESP: -
FUND ELLIG: -
ACTUAL COMPLETION DATE:
FREE PRODUCT REMOVAL?(Y/N):
SOIL REMOVAL? (Y/N):
SOIL TONNAGE REMOVED:
SOIL TREATMENT?(Y/N):
OTHER TREATMENT?:
ALT PROC STATUS:
ALT PROC STATUS DT:

FDEP LEAKING UNDERGROUND STORAGE TANKS

(LUST)

FACILITY ID NUMBER, NAME AND LOCATION:

9103174 **--HISTORICAL ENTRY--**
MARKER 1 MARINA-MAINTENANCE SHOP
343 CAUSEWAY BLVD
DUNEDIN, FL

OWNERSHIP INFORMATION:

,

MAP ID NUMBER: 2

Dist (Miles): 1.22
Direction: E

L U S T

COUNTY CODE: 52
FACILITY STATUS:
FACILITY TYPE:
FAC OPERATOR:
FAC TEL #:

SCORE **SCORE EFF DATE:** **RANK:** **SCORE WHEN RANKED:**

DISCHARGE INFORMATION

Mapid: 2

DISCHARGE DATE:

INSPECTION DATE:
LEAD AGENCY:
TANK OFF:
CLEANUP REQUIRED:
CLEANUP WORK STATUS:
INFO SOURCE:
DISCH CLNUP STATUS:

CONTAMINATED MEDIA?: **SOIL:** **SUR WATER:** **GR WATER:** **MON WELL:** **# DW WELLS CONTAMINATED:**

POLLUTANT TYPE/ESTIMATED GALLONS (IF REPORTED):

POLLUTANT **GALLONS** **OTHER**

CLEANUP INFORMATION

(for specific discharge noted above)

Mapid: 2

CLNUP PROG:
APPL RCVD: **ELIG STATUS:** **ELIG STATUS DATE:** **ELIG REDETERMINED?:**

SITE ASSESSMENT

CLNP RESP:
FUND ELLIG:
ACTUAL COMPLETION DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION PLAN

CLEANUP RESP:
FUND ELLIG:
ORDER COMPL DATE:
ACTUAL COMPL DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION

CLEANUP RESP:
FUND ELLIG:
ACTUAL COST:
YEARS TO COMPL:

SITE REHABILITATION COMPLETION REPORT

ACTION TYPE:
SUBMIT DATE:
REVIEW DATE:
ISSUE DATE:
COMPL STATUS:
COMPL STATUS DT:
COMMENTS:

SOURCE REMOVAL

CLEANUP RESP:
FUND ELLIG:
ACTUAL COMPLETION DATE:
FREE PRODUCT REMOVAL?(Y/N):
SOIL REMOVAL? (Y/N):
SOIL TONNAGE REMOVED:
SOIL TREATMENT?(Y/N):
OTHER TREATMENT?:
ALT PROC STATUS:
ALT PROC STATUS DT:

FDEP LEAKING UNDERGROUND STORAGE TANKS

(LUST)

FACILITY ID NUMBER, NAME AND LOCATION:

9401002
MARKER 1 MARINA-MAINTENANCE SHOP
343 CAUSEWAY BLVD
DUNEDIN, FL 34698-

OWNERSHIP INFORMATION:

ACCOUNT OWNER
PROEFKE ENTERPRISES INC
343 CAUSEWAY BLVD
DUNEDIN, FL 34698-
(813) 733-9324
JUDY VIOLA

MAP ID NUMBER: 2

Dist (Miles): 1.22
Direction: E

LUST

COUNTY CODE: 52
FACILITY STATUS: CLOSED
FACILITY TYPE: V - Marine/Coastal Fuel Storage -

FAC OPERATOR: PROEFKE ENTERPRISES
FAC TEL #: (813) 733-1785

SCORE 32 **SCORE EFF DATE:** 9/6/2006 **RANK:** 12568 **SCORE WHEN RANKED:** 7

DISCHARGE INFORMATION

Mapid: 2

DISCHARGE DATE: 10/6/1989

INSPECTION DATE: 12/13/1989 **LEAD AGENCY:**
CLEANUP REQUIRED: R - CLEANUP REQUIRED
INFO SOURCE: D - DISCHARGE NOTIFICATION
DISCH CLNUP STATUS: 10/9/2000 RA - RA ONGOING

TANK OFF: -
CLEANUP WORK STATUS: ACTIVE

CONTAMINATED MEDIA?: **SOIL:** Y **SUR WATER:** N **GR WATER:** N **MON WELL:** Y **# DW WELLS CONTAMINATED:** 0

POLLUTANT TYPE/ESTIMATED GALLONS (IF REPORTED):

POLLUTANT	GALLONS	OTHER
D - VEHICULAR DIESEL		
P - GENERIC GASOLINE		

CLEANUP INFORMATION

(for specific discharge noted above)

Mapid: 2

CLNUP PROG: A - ABANDONED TANK RESTORATION PROGRAM
APPL RCVD: 3/31/1991 **ELIG STATUS:** ELIGIBLE **ELIG STATUS DATE:** 4/26/1994 **ELIG REDETERMINED?:** N

SITE ASSESSMENT

CLNP RESP: RP - RESPONSIBLE PARTY
FUND ELLIG: -
ACTUAL COMPLETION DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION PLAN

CLEANUP RESP: -
FUND ELLIG: -
ORDER COMPL DATE:
ACTUAL COMPL DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION

CLEANUP RESP: RP - RESPONSIBLE PARTY
FUND ELLIG: -
ACTUAL COST:
YEARS TO COMPL:

SITE REHABILITATION COMPLETION REPORT

ACTION TYPE: -
SUBMIT DATE:
REVIEW DATE:
ISSUE DATE:
COMPL STATUS: -
COMPL STATUS DT:
COMMENTS:

SOURCE REMOVAL

CLEANUP RESP: -
FUND ELLIG: -
ACTUAL COMPLETION DATE:
FREE PRODUCT REMOVAL?(Y/N):
SOIL REMOVAL? (Y/N):
SOIL TONNAGE REMOVED:
SOIL TREATMENT?(Y/N):
OTHER TREATMENT?:
ALT PROC STATUS:
ALT PROC STATUS DT:

FDEP LEAKING UNDERGROUND STORAGE TANKS

(LUST)

DISCHARGE INFORMATION

Mapid: 2

DISCHARGE DATE: 3/15/1990

INSPECTION DATE:
LEAD AGENCY:
TANK OFF: -
CLEANUP REQUIRED: C - COMBINED CLEANUP REQUIRED
CLEANUP WORK STATUS: COMBINED
INFO SOURCE: D - DISCHARGE NOTIFICATION
DISCH CLNUP STATUS: 3/4/2001 DNR - DISCHARGE NOTIFICATION RECEIVED

CONTAMINATED MEDIA?: **SOIL:** **SUR WATER:** **GR WATER:** **MON WELL:** **# DW WELLS CONTAMINATED:**

POLLUTANT TYPE/ESTIMATED GALLONS (IF REPORTED):

POLLUTANT	GALLONS	OTHER
P - GENERIC GASOLINE		

CLEANUP INFORMATION

(for specific discharge noted above)

Mapid: 2

CLNUP PROG:
APPL RCVD:
ELIG STATUS: INELIGIBLE
ELIG STATUS DATE:
ELIG REDETERMINED?:

SITE ASSESSMENT

CLNP RESP: -
FUND ELLIG: -
ACTUAL COMPLETION DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION PLAN

CLEANUP RESP: -
FUND ELLIG: -
ORDER COMPL DATE:
ACTUAL COMPL DATE:
PAYMENT DATE:
ACTUAL COST:

REMEDIAL ACTION

CLEANUP RESP: -
FUND ELLIG: -
ACTUAL COST:
YEARS TO COMPL:

SITE REHABILITATION COMPLETION REPORT

ACTION TYPE: -
SUBMIT DATE:
REVIEW DATE:
ISSUE DATE:
COMPL STATUS: -
COMPL STATUS DT:
COMMENTS:

SOURCE REMOVAL

CLEANUP RESP: -
FUND ELLIG: -
ACTUAL COMPLETION DATE:
FREE PRODUCT REMOVAL?(Y/N):
SOIL REMOVAL? (Y/N):
SOIL TONNAGE REMOVED:
SOIL TREATMENT?(Y/N):
OTHER TREATMENT?:
ALT PROC STATUS:
ALT PROC STATUS DT:

FDEP STORAGE TANKS REPORT

Report Date: 3/28/2009

(TANKS)

FACILITY ID NUMBER, NAME AND LOCATION:

8624635
MARKER 1 MARINA
343 CAUSEWAY BLVD
DUNEDIN, FL 34698

OWNERSHIP INFORMATION:

PINELLAS MARINA LLC
343 CAUSEWAY BLVD DBA/MARKER 1
DUNEDIN, FL 34698
CONTACT TEL #: (727) 733-9324
CONTACT: MICHAEL R SHEEKS OR BRUCE
FACILTY TEL #: (727) 733-9324

MAP ID NUMBER: 2
Dist (Miles): 1.22
Direction: E

T A N K S

COUNTY ID: 52 **FAC TYPE:** Marine/Coastal Fuel Storage **FAC STATUS:** OPEN

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
3	10000	01-Feb-1986	Unleaded Gas	UNDERGROUND	REMOVED 01-Jan-2008

** **CONSTR TYPE:** FMNO **PIPING TYPE:** CJK **LEAK MONIT TYPE:** 24HS

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
4	10000	01-Feb-1986	Vehicular Diesel	UNDERGROUND	REMOVED 01-Jan-2008

** **CONSTR TYPE:** FMNO **PIPING TYPE:** CJ **LEAK MONIT TYPE:** 24HS

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
5	18000	01-Jan-2008	Unleaded Gas	UNDERGROUND	IN SERVICE 01-Jan-2008

** **CONSTR TYPE:** FILMN **PIPING TYPE:** CFJK **LEAK MONIT TYPE:** 34FHK

See "Agency List Descriptions" Ssection for Code Definitions

EDM

FDEP STORAGE TANKS REPORT

(TANKS)

FACILITY ID NUMBER, NAME AND LOCATION:

9103174. **--HISTORICAL ENTRY--**
MARKER 1 MARINA-MAINTENANCE SHOP
343 CAUSEWAY BLVD
DUNEDIN, FL 34698

OWNERSHIP INFORMATION:

,
CONTACT TEL #:
CONTACT:
FACILTY TEL #: 8137331785

MAP ID NUMBER: 2
Dist (Miles): 1.22
Direction: E

TANKS

COUNTY ID: 52 **FAC TYPE:** V / Marine Fueling Facility **FAC STATUS:** CLOSED

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
NONE	00000450		WASTE OIL	ABOVEGROUND	In Service

** **CONSTR TYPE:** C **PIPING TYPE:** Y **LEAK MONIT TYPE:** Y

See "Agency List Descriptions" Ssection for Code Definitions

FDEP STORAGE TANKS REPORT

FACILITY ID NUMBER, NAME AND LOCATION:

9401002
MARKER 1 MARINA-MAINTENANCE SHOP
343 CAUSEWAY BLVD
DUNEDIN, FL 34698

OWNERSHIP INFORMATION:

PROEFKE ENTERPRISES INC
343 CAUSEWAY BLVD
DUNEDIN, FL 34698
CONTACT TEL #: (813) 733-9324
CONTACT: JUDY VIOLA
FACILTY TEL #: (813) 733-1785

MAP ID NUMBER: 2
Dist (Miles): 1.22
Direction: E

TANKS

COUNTY ID: 52 **FAC TYPE:** Marine/Coastal Fuel Storage **FAC STATUS:** CLOSED

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
1	3000		Leaded Gas	UNDERGROUND	REMOVED 31-Oct-1989

** **CONSTR TYPE:** C **PIPING TYPE:** B **LEAK MONIT TYPE:** 8

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
2	3000		Leaded Gas	UNDERGROUND	REMOVED 31-Oct-1989

** **CONSTR TYPE:** C **PIPING TYPE:** B **LEAK MONIT TYPE:** 8

TANK #:	TANK VOL(GALS):	INST.DATE:	TANK CONTENTS:	TANK POSITION:	TANK STATUS (as of...):
3	4000		Vehicular Diesel	UNDERGROUND	REMOVED 31-Oct-1989

** **CONSTR TYPE:** C **PIPING TYPE:** B **LEAK MONIT TYPE:** 8

See "Agency List Descriptions" Ssection for Code Definitions

LUST ADDENDUM REPORT -- TANK DATA DETAIL
FROM THE FDEP STORAGE TANKS REPORT
(TANKS)

The following reports are the TANKS data associated with LUST sites, identified **outside** of the ¼ mile TANKS query criteria. Please see the “Florida Tanks Codes” page of this report for an explanation of the tank construction, monitoring and piping codes used in reporting this data.

NO DATA FOUND FOR STUDY AREA

PROXIMAL RECORDS TABLE

Report Date: 3/28/2009

The Proximal Records Table includes mapped facilities that appear outside of the study area, but in the proximity of the research boundary. They are provided in a summary fashion to allow one to determine potential interest.

Generally, these sites may be of potential interest for three reasons:

1.) The location occurs so close to the research boundary that it merits inclusion in the evaluation.

2.) The site may be expansive with regard to the property boundary. The physical address of a landfill for example may occur outside of the research boundary, but the landfill boundary may extend into the research area. Large industrial complexes may also fall into this category.

3.) The U.S. Census Bureau data, from which our maps are created, is not always precise with regard to address information. A facility may therefore appear on the map outside of the research area, but actually fall within the research area. These inaccuracies are typically less than 500 feet. If you observe any such inaccuracies, we ask that you please notify us of the more precise location and we will use this information to improve our product.

If more specific information relative to one or more locations included in the Proximal Records Table is desired, please feel free to contact us and we will send you this information as an addendum to this report.

ENVIRONMENTAL DATA MANAGEMENT

Standard 1/8 Mile Research

PROXIMAL RECORDS TABLE

		REGULATORY LISTS																		
MAPID#	FAC ID, NAME AND LOCATION	NPL	CERCLIS	NFRAP	ERNS	CORRACTS	TSD	NONTSD	TRIBLTANKS	TRIBLLUST	USBRWNFLDS	STNPL	STCERC	SLDWST	LUST	TANKS	BRWNFLDS	VOLCLNUP	INSTENG	DRY
	No Data Found																			

EDM

NONMAPPED RECORDS TABLE

Report Date: 3/28/2009

The Non-Mapped Records Table is a listing of database records that lack sufficient address information to be placed within our mapping system, but may exist within your study area. These records have been manually screened to determine whether they could likely fall within the study area or can be conclusively identified as existing outside of the study area. Those records that could be located within the study area, but cannot be plotted within our GIS, are displayed in the Non-Mapped Records Table within this report.

If more specific information relative to one or more locations included in the Non-Mapped Records Table is desired, please feel free to contact us and we will send you this information as an addendum to this report.

ENVIRONMENTAL DATA MANAGEMENT

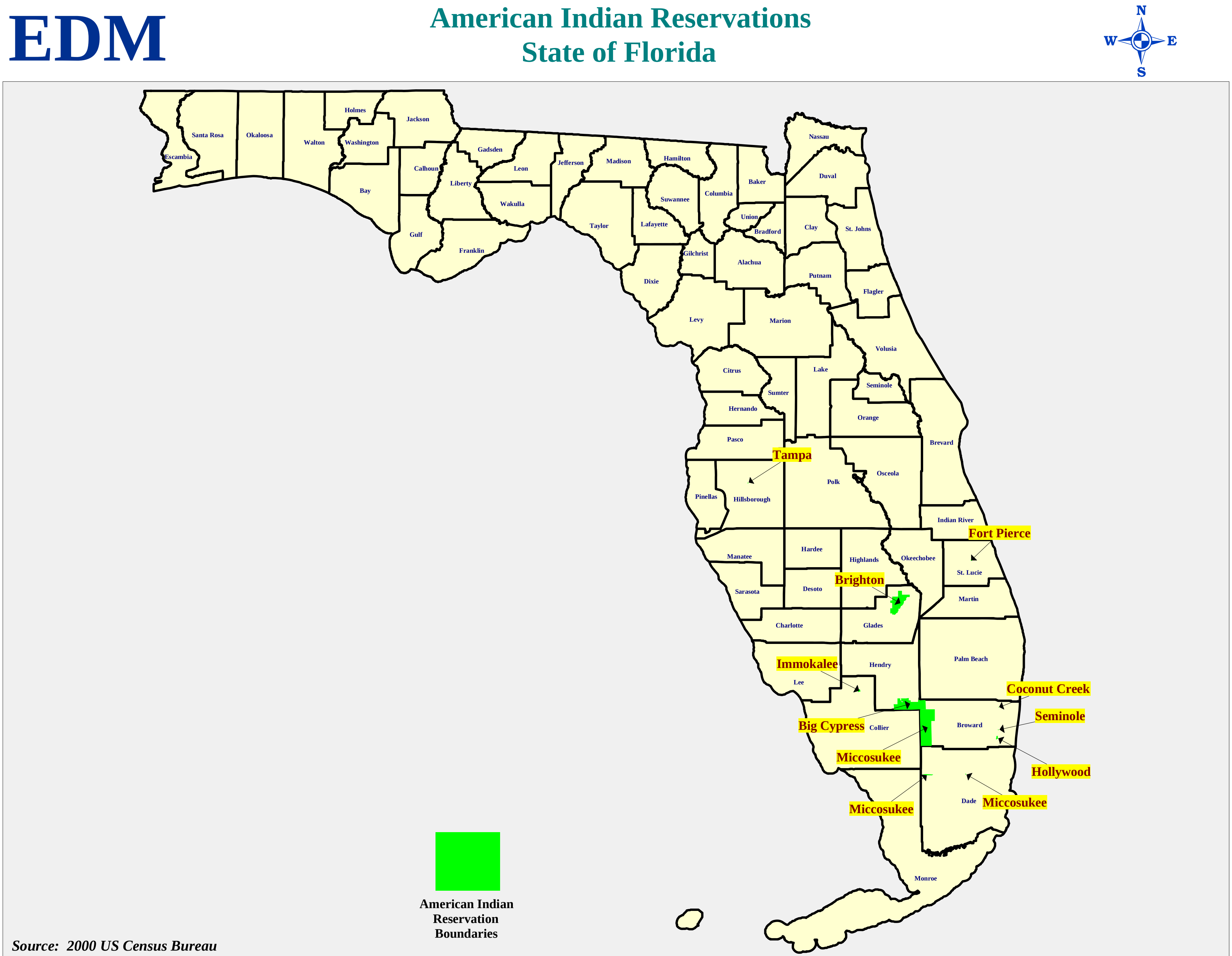
Standard 1/8 Mile Research

NON-MAPPED RECORDS TABLE

	REGULATORY LISTS																		
MAPID# FAC ID, NAME AND LOCATION	NPL	CERCLIS	NFRAP	ERNS	CORRACTS	TSD	NONTSD	TRIBLTANKS	TRIBLLUST	USBRWNFLDS	STNPL	STCERC	SLDWST	LUST	TANKS	BRWNFLDS	VOLCLNUP	INSTENG	DRY

EDM

American Indian Reservations
State of Florida



Source: 2000 US Census Bureau

American Indian Lands in Florida

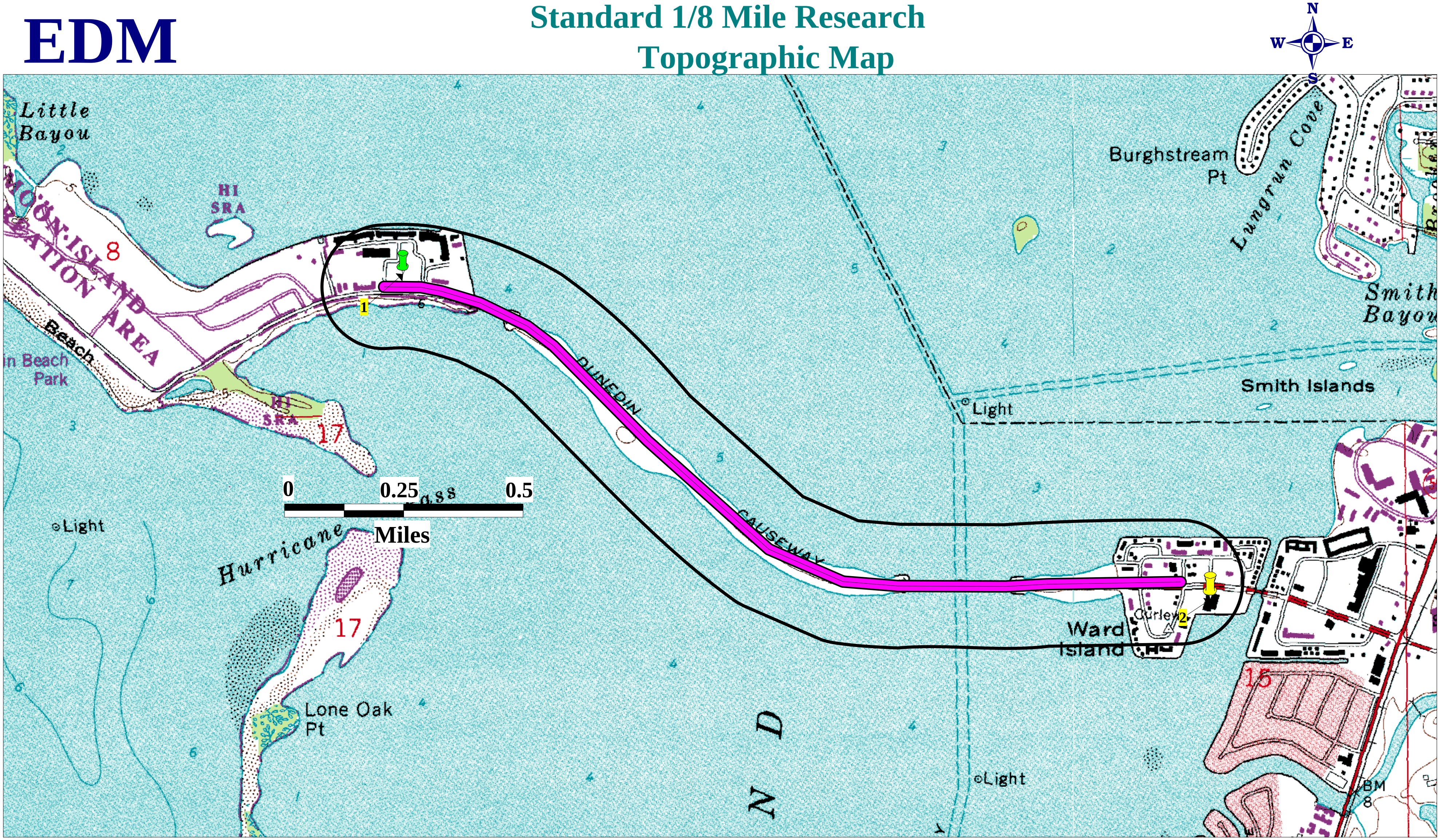
Name	Entity	County	General Location Information	Approx. Area (Acres)
Tampa Reservation	Seminole Tribe of Florida	Hillsborough	I-4 & Hillsborough Avenue	42
Fort Pierce Reservation	Seminole Tribe of Florida	Saint Lucie	Okeechobee Rd & Eleven Mile Rd	54
Brighton Reservation	Seminole Tribe of Florida	Glades	N of CR 721 & SR 78	36,630
Immokalee Reservation	Seminole Tribe of Florida	Collier	N of CR 846 & Stockade Rd	660
Big Cypress Reservation	Seminole Tribe of Florida	Hendry/Broward	CR 833 & BIA Hwy 182	52,750
Miccosukee Reservation	Miccosukee Tribe of Florida	Broward	I-75 & Government Rd	81,440
Miccosukee Reservation	Miccosukee Tribe of Florida	Dade	SW 8th St & Loop Rd	750
Miccosukee Reservation	Miccosukee Tribe of Florida	Dade	SW 177th Ave & SW 8th St	56
Holly (Dania) Reservation	Seminole Tribe of Florida	Broward	Stirling Rd & Florida's turnpike	560
Coconut Creek Reservation	Seminole Tribe of Florida	Broward	US 441 & NW 40th St	6
Seminole Trust Land	Seminole Tribe of Florida	Broward	US 441 & Davie Blvd	1

Florida Tribal Contacts

Entity	Contact	Tel/Fac	Source
Miccosukee Tribe of Florida	**Billy Cypress** Tribal Chairman Miccosukee Tribe of Indians of Florida iPost Office Box 440021 Miami, Florida 33144 County: Dade	Phone: (305) 223-8380 Facsimile: (305) 223-1011	EPA Reg IV Tribal Contacts
Miccosukee Tribe of Florida	**Steve Terry** Land Resources Manager Miccosukee Tribe of Indians of Florida Post Office Box 440021 Miami, Florida 33144 E-Mail:esoterry@shadow.net	Phone:(305) 223-8380 Facsimile: (305) 223-1011	EPA Reg IV Tribal Contacts
Miccosukee Tribe of Florida	**Billy Cypress** Chairman Miccosukee Indian Tribe Tamiami Station PO Box 440021 Miami, Florida 33144	Phone: (305) 223-8380 Facsimile: (305) 223-1011	US DOI - BIA Tribal Leaders Directory
Seminole Tribe of Florida	**Mitchell Cypress** Tribal Chairman Seminole Tribe of Florida 6300 Stirling Road Hollywood, Florida 33024 County: Broward	Phone: (954) 967-3900 Facsimile: (954) 967-3486	EPA Reg IV Tribal Contacts
Seminole Tribe of Florida	**Craig T. Tepper**, Director Water Resource Management Department Seminole Tribe of Florida 6300 Stirling Road Hollywood, Florida 33024 County: Broward E-Mail:water@gate.net	Phone: (954) 966-6300, extension 1120 Facsimile: (954) 967-3489	EPA Reg IV Tribal Contacts
Seminole Tribe of Florida	**Susie Kippenberger**, Director Utilities Department Seminole Tribe of Florida 6300 Stirling Road Hollywood, Florida 33024 County: Broward E-Mail:susiek@semtribe.com	Phone: (954) 966-3475 Facsimile: (954) 967-3475	EPA Reg IV Tribal Contacts
Seminole Tribe of Florida	**Mitchell Cypress** Chairman Seminole Indian Tribe 6300 Stirling Road Hollywood, Florida 33024 http://www.seminoletribe.com/	Phone: (954) 966-6300 Facsimile: (954) 967-3463	US DOI - BIA Tribal Leaders Directory
Seminole Tribe of Florida	**Joe Frank, Acting Superintendent** Seminole Agency Bureau of Indian Affairs 6100 Hollywood Blvd, Suite 206 Hollywood, FL 33024	Phone: (954) 983-1537 Facsimile: (954) 983-5018	US DOI - BIA Tribal Leaders Directory

EDM

Standard 1/8 Mile Research Topographic Map



Source: USGS Digital Raster Graphic

Map Scale and Site Locations are Approximate

Subject Property

Duneding Causeway (Causeway Blvd) Corrid
Gary Place to Royal Stewart Parkway
Pinellas County, Florida

EDM Job No: 20123
March 28, 2009

Subject Corridor

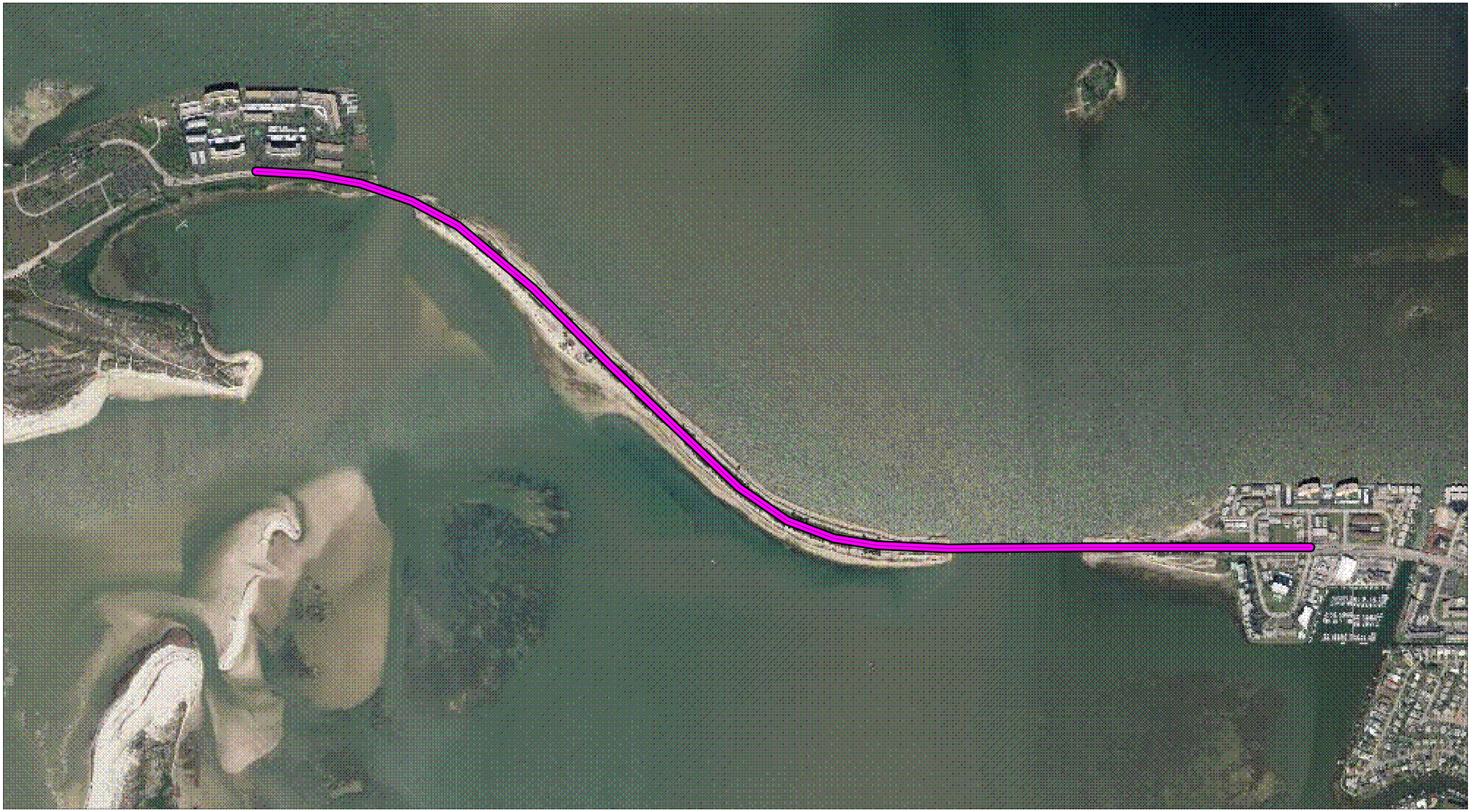
NPL, STNPL, CORRACTS & TSD sites

CERCLIS, STCERC, NFRAP, SLDWST, LUST, BRWNFLDS, VOLCLNUP & DRYsites

ERNS, NONTSD, TANKS & INSTENG sites

EDM

Aerial Photo Image
2007



Source: Florida Department of Environmental Protection

Map Scale and Site Locations are Approximate

Subject Property

Duneding Causeway (Causeway Blvd) Corrid
Gary Place to Royal Stewart Parkway
Pinellas County, Florida

EDM Job No: 20123
March 28, 2009

Subject Corridor

Agency List Descriptions

US Environmental Protection Agency (USEPA)

Comprehensive Env Response, Compensation & Liability Information System List(CERCLIS)

The US EPA Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) is the Superfund database used to track facilities and/or locations that the USEPA is investigating to determine if an existing or threatened release of hazardous substances is present.

Agency File Date: 1/9/2009 **Received by EDM:** 1/30/2009 **EDM Database Updated:** 2/2/2009

RCRIS Handlers with Corrective Action(CORRACTS)

The US EPA Corrective Action Sites (CORRACTS) database is a listing of hazardous waste handlers that have undergone RCRA corrective action activity. This information is compiled by the EPA Regional and State RCRA program personnel, as well as the RCRA facilities themselves.

Agency File Date: 11/10/2008 **Received by EDM:** 2/4/2009 **EDM Database Updated:** 2/4/2009

Emergency Response Notification System List(ERNS)

The Emergency Response Notification System (ERNS) database stores information on the notification of oil discharges and hazardous substance releases. The ERNS program is a cooperative data sharing effort among the EPA, DOT and the National Response Center (NRC), which currently provides access to this data.

Agency File Date: 1/26/2009 **Received by EDM:** 2/2/2009 **EDM Database Updated:** 2/4/2009

Archived Cerclis Sites(NFRAP)

The US EPA NFRAP list contains archived data of CERCLIS records where the EPA has completed assessment activities and determined that no further steps to list the site on the NPL will be taken. NFRAP sites may be reviewed in the future to determine if they should be returned to CERCLIS based upon newly identified contamination problems at the site. Note: Archived CERCLIS records are now stored in the EPA List 8T database.

Agency File Date: 3/10/2009 **Received by EDM:** 3/10/2009 **EDM Database Updated:** 3/10/2009

RCRA-LQG,SQG,CESQG and Transporters(NONTSD)

The EDM NONTSD list is a subset of the US EPA RCRAInfo System and identifies facilities that generate and transport hazardous wastes. These facilities may be Large Quantity Generators (LQG), Small Quantity Generators (SQG), Conditionally Exempt SQG's (CESQG) as well as" Non-Notifiers" and "Non-Handlers".

Agency File Date: 11/12/2008 **Received by EDM:** 1/9/2009 **EDM Database Updated:** 1/15/2009

National Priorities List(NPL)

The US EPA National Priorities List (NPL) contains facilities and/or locations where environmental contamination has been confirmed and prioritized for cleanup activities. In addition to sites that are currently on the EPA NPL, the EDM database contatains sites that have been Proposed for and Deleted from the list.

Agency File Date: 1/9/2009 **Received by EDM:** 1/30/2009 **EDM Database Updated:** 2/2/2009

Tribal Lust List(TRIBLLUST)

The USEPA Region IV Tribal Tanks database lists Active and Closed storage tank facilities on Native American lands. The EDM Tribal Lust report is created by extracting those records from the storage tank database that have indicated current or past releases.

Agency File Date: 6/6/2008 **Received by EDM:** 10/14/2008 **EDM Database Updated:** 10/27/2008

Tribal Tanks List(TRIBLTANKS)

The USEPA Region IV Tribal Tanks database lists Active and Closed storage tank facilities on Native American lands.

Agency File Date: 6/6/2008 **Received by EDM:** 10/14/2008 **EDM Database Updated:** 10/27/2008

RCRA-Treatment, Storage and/or Disposal Sites(TSD)

The EDM TSD list is a subset of the US EPA RCRAInfo system and identifies facilities that Treat, Store and/or Dispose of hazardous waste.

Agency File Date: 11/12/2008 **Received by EDM:** 1/9/2009 **EDM Database Updated:** 1/15/2009

Brownfields Management System(USBRWNFLDS)

The US EPA Brownfields program contains information on Brownfields properties reported to be addressed by Brownfields Grantees or by EPA with Targeted Brownfields Assessment funding. EDM has included Tribal Brownfield sites in it's USBRWNFLDS database.

Agency File Date: 1/1/2009 **Received by EDM:** 2/16/2009 **EDM Database Updated:** 2/16/2009

Florida Department of Environmental Protection (FDEP)

State Designated Brownfields(BRWNFLDS)

The FDEP Brownfields database contains a listing of State Designated Brownfield Areas. Brownfields areas are typically abandoned, idled or underused industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination.

Agency File Date: 2/6/2009 **Received by EDM:** 2/6/2009 **EDM Database Updated:** 2/6/2009

State Dry Cleaners List(DRY)

The Florida Dry Cleaners List is comprised of data from the FDEP Storage Tank and Contamination Monitoring (STCM) database and the Drycleaning Solvent Cleanup Program- Priority Ranking List. It contains a listing of those Dry Cleaner sites (and suspected historical Dry Cleaning sites) who have registered with the FDEP for the Dry Cleaning Solvent Cleanup Program.

Agency File Date: 12/1/2008 **Received by EDM:** 12/15/2008 **EDM Database Updated:** 12/15/2008

State Institutional and/or Engineering Controls(INSTENG)

The FDEP INSTENG list contains sites that have had Institutional and/or Engineering Controls implemented to regulate exposure to environmental hazards

Agency File Date: 1/5/2009 **Received by EDM:** 1/5/2009 **EDM Database Updated:** 1/6/2009

Leaking Underground Storage Tanks List(LUST)

The FDEP LUST list identifies facilities and/or locations that have notified the FDEP of a possible release of contaminants from petroleum storage systems. This Report is generated from the FDEP Storage Tank and Contamination Monitoring Database (STCM).

Agency File Date: 1/7/2009 **Received by EDM:** 2/5/2009 **EDM Database Updated:** 2/5/2009

Solid Waste Facilities List(SLDWST)

The FDEP SLDWST identifies locations that have been permitted to conduct solid waste handling activities including Landfills, Transfer Stations and sites handling Bio-Hazardous wastes. Sites listed with "##" after the Facility ID Number are historical locations, obtained from documents on record at local agencies.

Agency File Date: 3/26/2009 **Received by EDM:** 3/26/2009 **EDM Database Updated:** 3/26/2009

State CERCLIS Equivalent(STCERC)

The STCERC is a historical listing of sites that the Florida Department of Environmental Regulation (FDER) compiled to track suspect contamination sites. This list was known as the Florida SITES list and was last updated by the FDER in 1989.

Agency File Date: 12/1/1989 **Received by EDM:** 4/1/1995 **EDM Database Updated:** 4/25/1995

State NPL Equivalent(STNPL)

The FDEP State Funded Action Sites (SFAS) list contains facilities and/or locations that have been identified by the FDEP as having known environmental contamination and are currently being addressed through State funded cleanup action.

Agency File Date: 9/5/2008 **Received by EDM:** 3/26/2009 **EDM Database Updated:** 3/26/2009

Underground/Aboveground Storage Tanks(TANKS)

The FDEP TANKS list contains sites with registered aboveground and/or underground storage tanks containing regulated petroleum products. Please refer to the "Explanation of Florida Tank Codes" insert to interpret tank construction, monitoring and piping codes.

Agency File Date: 12/2/2008 **Received by EDM:** 12/26/2008 **EDM Database Updated:** 12/30/2008

State Voluntary Cleanup List(VOLCLNUP)

The FDEP VOLCLNUP List is derived from the FDEP Brownfields Site Rehabilitation Agreement (BSRA) database. This database identifies those sites that have signed an agreement to Voluntarily cleanup a Brownfields site in accordance with the FDEP's requirements.

Agency File Date: 1/26/2009 **Received by EDM:** 2/6/2009 **EDM Database Updated:** 2/10/2009

EXPLANATION OF FLORIDA TANK CODES

CONSTRUCTION TYPE CODES

A = BALL CHECK VALVE
B = INTERNAL LINING
C = STEEL
D = UNKNOWN
E = FIBERGLASS
F = FIBERGLASS-CLAD STEEL
G = CATHODIC PROTECTION-SACRIFICIAL ANODE
H = CATHODIC PROTECTION -IMPRESSED CURRENT
I = DBL WALL/SINGLE MATERIAL
J = SYNTHETIC LINER IN TANK EXCAVATION
K = AST CONTAINMENT: CONCRETE /SYNTHETIC MATERIAL AREA
L = COMPARTMENTED
M = SPILL CONTAINMENT BUCKET
N = FLOW SHUT OFF
O = TIGHT FILL
P = LEVEL GAUGES, HI LEVEL ALARMS
Q = OTHER DER APPROVED PROTECTION METHOD
R = DBL WALL/DUAL MATERIAL/ (TANK "JACKET")
S = OTHER DEP APPROVED SECONDARY CONTAINTMENT SYSTEM
T = SMALL USE TANK
U = FIELD ERECTED TANK
V = PIPELESS UST W/SECONDARY CONTAINMENT
W = BUILT ON SUPPORTS
X = CONCRETE
Y = POLYETHYLENE
Z = OTHER DEP APPROVED TANK MATERIAL

PIPING TYPE CODES

A = ABOVE GROUND-NO CONTACT W/SOIL
B = STEEL OR GALVANIZED METAL
C = FIBERGLASS
D = EXTERNAL PROTECTIVE COATING
E = CATHODIC PROTECTION (SACRIFICIAL ANODE/IMPRESSED CURRENT)
F = DBLWALL/SINGLE MATERIAL
G = SYNTHETIC OR BOX/TRENCH LINER
H = AIRPORT/SEAPORT HYDRANT SYSTEM
I = SUCTION PIPING SYSTEM
J = PRESSURIZED PIPING SYSTEM
K = DISPENSER LINERS
L = BULK PRODUCT SYSTEM
M = DOUBLE WALL / DUAL MATERIAL (PIPE "JACKET")
N = APPROVED SYNTHETIC MATERIAL
O = SEVERE VIOLATION
P = INTERNAL PIPING WITHIN INTERNAL SUMP RISER
V = VIOLATION
X = NO PIPING ASOCIATED WITH TANK
Y = UNKNOWN
Z = OTHER DEP APPROVED PIPING MATERIAL

LEAK MONITORING CODES

1 = CONTINUOUS ELECTRONIC SENSING EQUIPMENT
2 = VISUAL INSPECTIONS OF PIPING SUMPS
3 = ELECTRONIC MONITORING OF PIPING SUMPS
4 = VISUAL INSPECTIONS OF DISPENSING LINERS
5 = ELECTRONIC MONITORING OF DISPENSER LINERS
6 = EXTERNAL PIPING MONITORING
7 = AUTOMATICALLY SAMPLED WELLS
8 = MANUALLY SAMPLED WELLS
A = SITE SUITABILITY PLAN
B = SITE SUITABILITY PLAN EXEMPTION
C = GROUNDWATER MONITOR PLAN
D = SPCC PLAN
E = INTERSTITIAL MONITORING UST LINERS
F = INTERSTITIAL SPACE-DOUBLE WALL TANK
G = ELECTRONIC LINE LEAK DETECTOR W/FLOW SHUTOFF
H = MECHANICAL LINE LEAK DETECTOR
I = NOT REQUIRED-SEE RULE FOR EXEMPTIONS
J = INTERSTITIAL MONITORING-PIPING LINER
K = INTERSTITIAL MONITORING- DOUBLE WALL PIPING
L = AUTOMATIC TANK GAUGING SYSTEM (USTS)
M = MANUAL TANK GAUGING SYSTEM (USTS)
N = GROUNDWATER MONITORING SYSTEM
O = VAPOR MONITORING SYSTEM
P = VAPOR MONITORING W/DILUTION PROCEDURES
Q = VISUAL INSPECTION OF AST SYSTEMS
R = INTERSTITIAL MONITORING OF TANK BOTTOM
S = STATISTICAL INVENTORY RECONCILIATION (SIR/USTS)
T = ANNUAL TIGHTNESS TEST WITH INVENTORY (UST)
U = BULK PIPING PRESSURE TEST
V = SUCTION PUMP CHECK VALVE
W = FIBER-OPTIC TECHNOLOGIES
X = NONE
Y = UNKNOWN
Z = OTHER DEP APPROVED MONITORING METHOD

Map Descriptions

Brownfields and Contaminated Areas Map

EDM's Brownfields and Contaminated Areas map displays the areial extent and location of State Designated Brownfields, USEPA National Priorities List (Superfund) sites, State Funded Action Sites (State NPL equivalent) and FDEP Contaminated Groundwater Delineation areas.

The FDEP Groundwater Delineation Program was developed after studies conducted in 1983, showed the presence of ethylene dibromide (EDB) in drinking water wells at various locations throughout the state. From 1962 to mid 1983 the Florida Department of Agriculture and Consumer Services conducted widespread field application of this soil fumigant (EDB) to control nematodes in citrus groves. EDB was also used by private citizens on golf courses and on crops such as peanuts and soybeans. Because of the EDB in drinking water wells, the 1988 Legislature directed the Department of Environmental Protection to implement water well construction and water testing standards within areas of known ground water contamination.

Well Location Map

EDM's Well Location Map displays the location of Public Water Supply and consumptive use water wells in the area surrounding the subject property. Data details regarding these water wells is provided for those wells that fall within a 1/2 Mile radius of the subject property.

This information is derived from integrating map data from the US Census Bureau and the USGS along with well location data from the FEDP and various water management districts throughout the State of Florida. In addition to the well location information displayed, this map also includes Section, Township and Range info, USGS Quad Names and the Latitude and Longitude of the subject property (Deg-Min-Sec).

American Indian Lands

EDM has obtained American Indian Reservation boundary files from the US Census Bureau and has presented them in a statewide reference map. General location and contact information is also presented in the Table accompanying this map.

Topographic Map

EDM's Topographic Map is derived from Digital Raster Graphic (DRG) data obtained from the US Geological Survey (USGS). A DRG is a raster image created by scanning published paper maps on high-resolution scanners. To display these DRGs within our Geographic Information System (GIS), EDM strips the collar information from each image and assigns control points for matching the image to ground control coordinate values associated with our vector based Street Map data.

FEMA Flood Map

EDM's FEMA Flood Map is a representation of 100-Year and 500-Year floodplain areas as derived from Digital Q3 Flood Data obtained from the Federal Emergency Management Agency (FEMA). The Q3 Flood Data are developed by scanning and vectorizing existing hardcopy Flood Insurance Rate Maps (FIRMs) to create 1) a raster product suitable for viewing or printing and 2) a thematic vector overlay of flood risk areas. The Q3 Flood Data are intended to capture all FIRM data in the raster file, but only certain features in the vector file. EDM uses the vector file to provide a graphic display of the 100-year and 500-year floodplain areas.

Definitions: SFHA-Special Flood Hazard Area   COBRA-Coastal Barrier Resources Act

NWI Wetlands Map

EDM's NWI Wetlands Map is a representation of wetland areas as derived from Digital Line Graph (DLG) data obtained from the US Fish and Wildlife Service (FWS) National Wetlands Inventory (NWI) program. The FWS/NWI has the primary responsibility for the mapping and inventory of wetlands within the United States. The NWI produces wetland maps by initially employing photo-interpretation of color-infrared photographs. These photographs often provide distinctive color, texture and pattern features that are characteristic of wetland vegetation and background soils. The mapping process may be further checked and validated through analysis of US Geological Survey (USGS) Topographic maps and Natural Resources Conservation Service (NRCS) Soil Survey maps. In some instances, field reconnaissance may also be an option during the validation process.

Appendix D

Coast Guard Coordination

U.S. Department of Homeland Security
United States Coast Guard

Bridge Guide Clearances

INFORMATION: Guide Clearances are defined as the navigational clearances established by the Coast Guard for a particular navigable water of the United States which will ordinarily receive favorable consideration under the bridge permitting process (33 CFR Chapter 1, Subchapter J - Bridges) as providing for the reasonable needs of navigation. They are not intended to be regulatory in nature or to form a legal basis for approving or denying a bridge permit application. Under the circumstances of a particular case, greater or lesser clearances for a proposed bridge may be required or approved as meeting the reasonable needs of navigation for that particular location. For example, the particular character of the waterway and topography at the proposed location may justify a departure from the clearances specified for the waterway in the list of Guide Clearances.

NOTE: ***Guide Clearances have not been established for all navigable waters of the United States.*** Where they do not exist, the horizontal and vertical clearances of proposed bridge projects necessary to meet the reasonable needs of the navigation are determined on a case by case basis.

Clearance Guide

Waterways are listed in alphabetical order in the Table of Contents. To aid you in finding what you are looking for, we have included bookmarks to the first letter in the name of the body of water as listed in the table of contents.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Table of Contents

		Swing or bascule	90 ft.	21 feet (closed)	MHW
	Moore Haven to St. Lucie Lock	Fixed or vertical lift. Swing or bascule	100 ft. 90 ft.	55 feet 21 feet (closed)	MHW MHW
	St. Lucie Lock to AIWW	Fixed or vertical lift. Swing or bascule	90 ft. 90 ft.	55 feet 21 feet (closed)	MHW MHW
43	Miami River, FL:				
	Mouth to mile 5.5	Fixed or vertical lift Swing or bascule	90 ft. 90 ft.	75 ft. 25 ft. (closed)	MHW MHW
44	Escambia River, FL	Fixed or vertical lift	90 ft.	40.0 ft	OHW.
45	Apalachicola River, FL, GA	Fixed or vertical lift	150 ft.	35.6 ft.	OHW.
46	Chattahoochee River, AL, GA, FL	Fixed or vertical lift	150 ft.	35.6 ft.	OHW
47	Coosa River, AL, GA	Fixed or vertical lift	150 ft.	42.5 ft.	OHW

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No.	Waterway	Bridge Type	Horizontal. Clearance	Vertical Clearance	Reference Plane
48	Flint River, GA	Fixed or vertical lift	150 ft.	35.6 ft.	OHW.
49	Alabama River, AL	Fixed or vertical lift	250 ft.	42.5 ft.	OHW

50	Mobile River, AL				
	Mouth to Mile 13.3	Fixed or vertical lift	300 ft.	125 ft	OHW
	Above Mile 13.3	Fixed or vertical lift	300 ft.	55 ft.	OHW
51	Black Warrior River, AL	Fixed or vertical lift	200 ft.	52.0 ft.	OHW
52	Locust Fork of the Black Warrior	Fixed or vertical lift	200 ft.	52.0 ft.	OHW
53	Mulberry Fork of the Black Warrior River, AL	Fixed or vertical lift	200 ft.	52.0 ft.	OHW
54	Tennessee-Tombigbee Waterway;				
	Tombigbee River AL	Fixed or vertical lift	300 ft.	52.0 ft. 40.0 ft.	Normal pool 1 pct flowline.
	Tombigbee River MS.	Fixed or vertical lift		52.0 ft. 40.0 ft.	Normal pool 1 pct flowline.
55	West Pearl River, MS	Fixed or vertical lift	125 ft.	35.0 ft.	OHW
56	East Pearl River, MS	Fixed or vertical lift	125 ft.	35.0 ft.	OHW
57	Jefferson-Shreveport TX, LA	Fixed or vertical lift	240 ft.	52.0 ft.	2 pct flowline
58	Calcasieu River Ship Channel, LA:				
	Mile 4.3 to mile 29.7	Fixed	500 ft.	175ft.	MHW

	Mile 29.7 to mile 36.3	Fixed	400 ft.	135ft.	MHW
59	Atchafalaya River, LA:				
	Berwick Bay	Fixed or vertical lift	525 ft.	73.0 ft.	MHW
	Above Berwick Bay	Fixed or vertical lift	180ft.	50.0 ft.	MHW
60	Houston Ship Channel, TX:				
	Up to mile 47.2	Fixed or vertical lift	500 ft.	175ft.	2 pct flowline.
	Above mile 47.2	Fixed or vertical lift	400 ft.	135ft	2 pct flowline.
61	Trinity River, TX	Fixed or vertical lift	300 ft. between pier faces 250 ft. between fenders	52ft.	2 pct flowline or top of conservation pools in reservoirs.
62	Sabine Neches Waterway,				
	Sabine River and Neches River, TX.	Fixed	600 ft.	155ft.	MHW
63	Lower Neches River, TX	Fixed	400 ft.	143ft.	MHW
64	Gulf Intracoastal WW, FL to TX:				
	Caloosahatches River to Tampa Bay	Swing or bascule Fixed or vertical lift	90 ft. 90 ft.	21 ft. (closed) 65.0 ft.	MHW MHW
	Tampa Bay to Apalachee Bay	Fixed or vertical lift	90 ft.	65.0 ft.	MHW

	Apalachee Bay to Pensacola Bay	Fixed or vertical lift	150 ft.	65.0 ft.	MHW
	Pensacola Bay to Brownsville, TX, (except Port of New Orleans, LA.)	Fixed or vertical lift	125 ft.	73.0 ft.	MHW
65	Gulf Intracoastal WW, Port of New Orleans, LA:				
	Mississippi River Gulf Outlet Portion to inner Harbor Navigation Canal.	Fixed	500 ft.	155 ft.	MHW
	Inner Harbor Navigation Canal Portion to Mississippi River.	Fixed or vertical lift	300 ft.	155 ft.	MHW
	Harvey Canal	Fixed or vertical lift	125 ft.	100 ft.	MHW
	Algiers Canal	Fixed or vertical lift	125 ft.	100 ft.	MHW

Back to Table of Contents

No.	Waterway	Bridge Type	Horizontal. Clearance	Vertical Clearance	Reference Plane
66	Mississippi River:				
	Upper limits New Orleans to Baton Rouge Harbor, LA	Fixed	750 ft. main span 500 ft. auxiliary span*	133 ft.	Maximum river level. *2 auxiliary spans required
	Baton Rouge Harbor to Vicksburg, MS	Fixed		64 ft.	Maximum river level.

Canjura, Nelson

From: Messenkopf, Chip
Sent: Tuesday, April 28, 2009 3:09 PM
To: Register, Marlin
Cc: Canjura, Nelson
Subject: Dunedin Cswy. Bridge / Coast Guard Min. Height

Marlin,

Via email and phone contact with Randy Overton (USCG – Miami) I have the following information to share regarding the County's interest in pursuing a 40-foot fixed-span bridge for the Dunedin Bridge bascule replacement.

According to Randy:

1. Pursuant to federal law (Title 33) the minimum clearance for a fixed-span structure in the Gulf Intracoastal Waterway (GICW) is 65'.
2. The minimum clearance may actually need to be higher if it is shown that 65' would disrupt navigation to local mariners (based on future boat surveys).
3. The County has the right to submit a Bridge Application requesting a fixed-span bridge lower than 65', make their case and attempt to justify the lower vertical clearance, but according to Randy, "...it's not possible and it isn't going to happen." (direct quote).

Let me know if you need any additional information.

Chip Messenkopf, P.A., P.W.S.
Senior Environmental Scientist

HDR - ONE COMPANY \ *Many Solutions*

HDR Engineering, Inc.
5426 Bay Center Drive, Suite 400
Tampa, FL 33609-3444
813/ 282-2356
813/ 282-2440 (fax)

Canjura, Nelson

From: Messenkopf, Chip
Sent: Monday, December 08, 2008 2:51 PM
To: Xie, Xiangli
Cc: Register, Marlin; Canjura, Nelson
Subject: RE: Dunedin Causeway _ Clearance at Navigational Channel

Charly...here's a letter I received from the Coast Guard in 2005, which references the minimum horizontal and vertical clearances required for the Gulf Intracoastal Waterway....highlighted in red below.

-----Original Message-----

From: Tompkins, Darayl [mailto:DTompkins@d7.uscg.mil]

Sent: Wednesday, May 25, 2005 9:39 AM

To: Messenkopf, Chip

Subject: Belleair Beach Causeway Bridge Replacement

Good morning Mr. Messenkopf

I am working on the Public Notice for Belleair Bch Bridge replacement and I noticed on elevation (sheet 5 of 9) the plans read Actual minimum vertical clearance is 70' 9" ft. All through the correspondence I read minimum vertical clearance will be 74-ft. MHW. Is there a problem with the plans or the correspondence?

Also the plans read 1 thru 3 for the relief structure and thru 9 for the Intracoastal waterway and there is no Location Map included.

We need the plans to start with the Intracoastal waterway and include the relief structure along with a location map numbered all together. Example 1 thru 14 (both structures & location map) Please also be aware the navigational clearances for the GICW are: 65 ft vertical and 100 ft horizontal. I have a copy of our letter to Mr. Hornik, Pinellas County Public Works dated April 5, 2001 with this information if you need a copy.

Please feel free to contact me with any questions you may have regarding this matter and thank you for your assistance with this matter.

DARAYL TOMPKINS

Department of Homeland Security

Bridge Management Specialist

Federal Permitting Agent

U.S. Coast Guard District 7(obr)

Phone: (305) 415-6766

Fax: (305) 415-6763

Chip Messenkopf, P.A., P.W.S.
Senior Environmental Scientist

HDR - ONE COMPANY \ *Many Solutions*

HDR Engineering, Inc.
5426 Bay Center Drive, Suite 400
Tampa, FL 33609-3444
813/ 282-2356
813/ 282-2440 (fax)

From: Xie, Xiangli
Sent: Thursday, December 04, 2008 1:17 PM
To: Messenkopf, Chip
Cc: Canjura, Nelson; Lopez, Carlos J.; Register, Marlin
Subject: Dunedin Causeway _ Clearance at Navigational Channel

Chip,

I need your input on setting the clearance requirement over the navigational channel at the main bridge.

1. What is the preferred minimum horizontal clearance required by the Coast Guard? The existing is 90', fender to fender.
2. What would be the appropriate vertical clearance for low-level alternative required by the Coast Guard? The existing vertical clearance is 19.5' from MSL at the edge of the channel. I feel it would be appropriate to maintain the existing vertical clearance for low-level.
3. What would the Coast Guard recommend for the vertical clearance for the high-level?
4. Does the Coast Guard have any publications governing this, according to your experience?

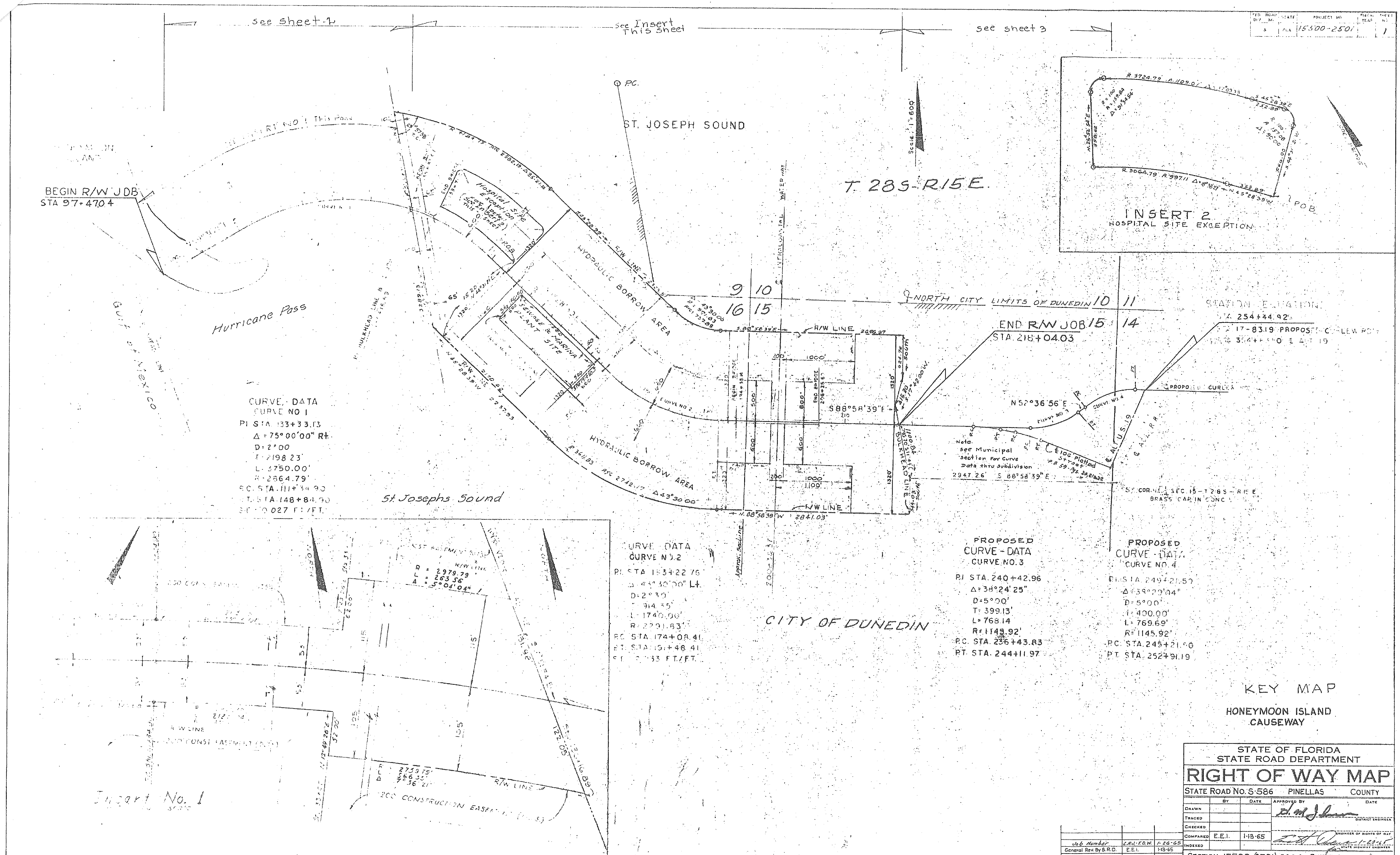
Thanks.

Xiangli "Charlie" Xie, P.E.

HDR | ONE COMPANY | *Many Solutions*
5426 Bay Center Drive, Suite 400 | Tampa, FL | 33609-3444
Phone: 813.282.2301 | Email: xiangli.xie@hdrinc.com

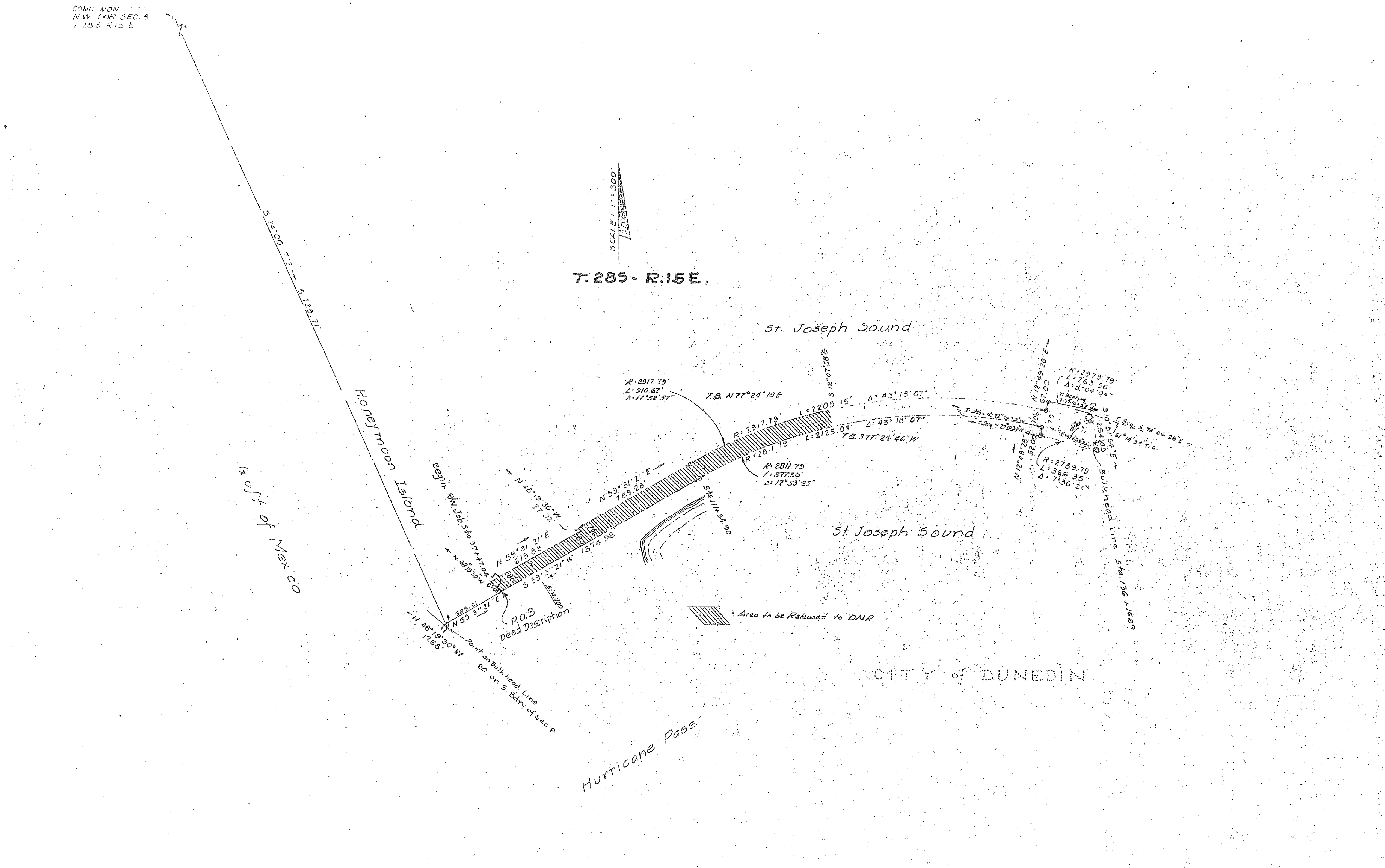
Appendix E

FDOT Right of Way Maps



See Sheet 1
See Insert This Sheet
See sheet 3
15500-2501
ST. JOSEPH SOUND
T. 28S-R15E.
INSERT 2
HOSPITAL SITE EXCEPTION
BEGIN R/W JOB
STA 97+47.04
HYDRAULIC BORROW AREA
Hurricane Pass
Gulf of Mexico
NORTH CITY LIMITS OF DUNEDIN
END R/W JOB
STA. 218+04.03
N52°36'56"E
S88°58'39"E
R/W LINE
CURVE - DATA
CURVE NO. 1
PI STA. 133+33.13
Δ = 75°00'00" Rt.
D = 2°00'
T = 2198.23'
L = 3750.00'
R = 2864.79'
St. Josephs Sound
CURVE DATA
CURVE NO. 2
CITY OF DUNEDIN
PROPOSED
CURVE - DATA
CURVE NO. 3
P.I. STA. 240+42.96
Δ = 38°24'25"
D = 5°00'
T = 399.13'
L = 768.14
R = 1145.92'
P.C. STA. 236+43.83
P.T. STA. 244+11.97
PROPOSED
CURVE - DATA
CURVE NO. 4
D = 5°00'
T = 400.00'
L = 769.69'
R = 1145.92'
P.C. STA. 245+21.50
P.T. STA. 252+91.19
Insert No. 1
KEY MAP
HONEYMOON ISLAND
CAUSEWAY
STATE OF FLORIDA
STATE ROAD DEPARTMENT
RIGHT OF WAY MAP
STATE ROAD NO. S-586
PINELLAS
COUNTY
SECTION 15500-(2501) 2604
SHEET 1 OF 3

FED ROAD DIV. NO.	STATE	PROJECT NO	FISCAL YEAR	SHEET NO
3	FLA.	15500-2501		2



HONEYMOON ISLAND
CAUSEWAY

Revision	By	Date
Added info to be Ruling	JAD-MLH	5-11-81
Job Number	L.R.J.-T.D.W.	1-26-65
Added general information	E.E.I.	1-13-65

STATE OF FLORIDA
STATE ROAD DEPARTMENT

RIGHT OF WAY MAP

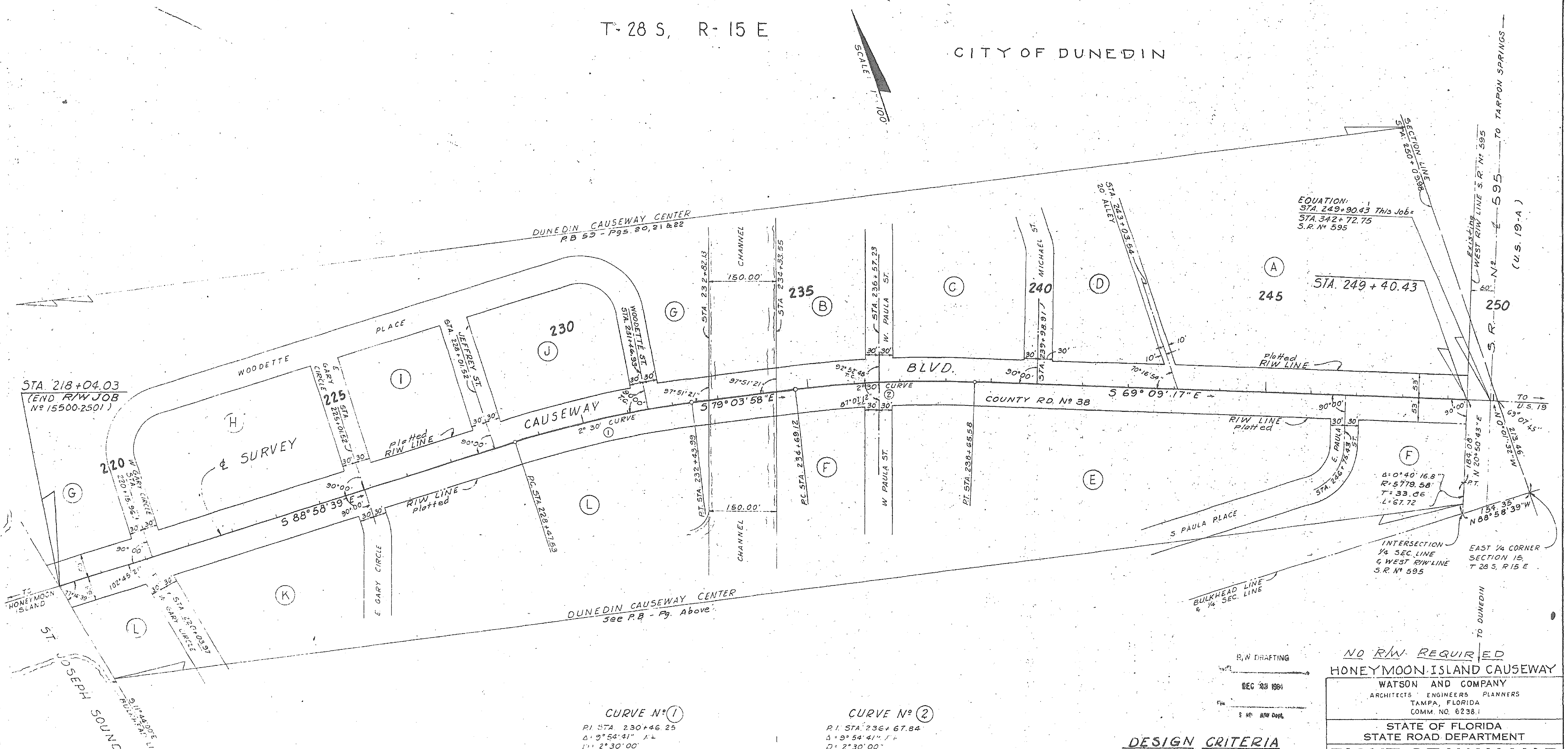
STATE ROAD NO. 5-586 PINELLAS COUNTY

	By	Date
Drawn		
Traced		
Checked		
Compared	E.E.I.	1-13-65
Indexed		

Approved By — Date
District Engineer
Engineer of Rights of Way
State Highway Engineer 1-18-65

SECTION 15500-(2501) 2604 SHEET 2 OF 3

FED. ROAD DIV. No.	STATE	PROJECT No.	FISCAL YEAR	SHEET No.
3	FLA.	15500-2501		3



CURVE Nº 1

P.I. STA. 230+46.25
Δ: 9°54'41" Rt.
D: 2°30'00"
T: 198.72'
R: 2291.83'
L: 396.46'
P.C. STA. 228+47.53
P.T. STA. 232+43.99

CURVE Nº 2

P.I. STA. 236+67.84
Δ: 9°54'41" Lt.
D: 2°30'00"
T: 198.72
R: 2291.83'
L: 396.46'
P.C. STA. 234+69.12
P.T. STA. 238+65.58

DESIGN CRITERIA

Municipal Section
Design Speed 35 M.P.H.

R/W DRAFTING
DEC 28 1964
S. Rd. R/W Dept.

NO R/W REQUIRED

HONEYMOON ISLAND CAUSEWAY

WATSON AND COMPANY
ARCHITECTS ENGINEERS PLANNERS
TAMPA, FLORIDA
COMM. NO. 6238.1

STATE OF FLORIDA
STATE ROAD DEPARTMENT

RIGHT OF WAY MAP

STATE ROAD NO. 5-586 PINELLAS COUNTY

	BY	DATE	APPROVED BY	DATE
DRAWN	J.D.	11-8-62	H. M. Johnson, DISTRICT ENGINEER	
TRACED	J.D.	11-13-62		
CHECKED	W.B.W.	11-21-62	ENGINEER OF RIGHTS OF WAY	
COMPARED				
INDEXED			Gay W. Brown, STATE HIGHWAY ENGINEER	

REVISION	BY	DATE
Job Number	L.R.J.-T.O.W.	1-26-65
Revised	E.E.I.	1-13-65
Rev. Angle & Sta. of Channel Xing	W.B.W.	1-30-63

SECTION 15500-(2501) 2604 SHEET 3 OF 3

Appendix F

Estimates

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The North Alignment (LOW LEVEL)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$31,849,101.00
200 - ROADWAY			$1,754,604.10
300 - SIGNING & PAVEMENT MARKINGS			$24,890.84
400 - LIGHTING			$483,250.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION			$35,009.00
	COMPONENT SUB-TOTAL		$34,111,845.94
(102-1) MOT (Maintenance of Traffic)		10%	$3,411,184.59
	SUB-TOTAL		$37,523,030.53
(101-1) MOB (Mobilization)		10%	$3,752,303.05
	SUB-TOTAL		$41,275,333.59
PU (Project Unknowns)		25%	$10,318,833.40
	SUB-TOTAL		$51,594,166.98
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$51,594,166.98**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

BRIDGE NUMBER: 100101

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	BRIDGE - SIMPLE SPANS LOW LEVEL	SF	69696	$135.00	$9,408,960.00
	BRIDGE - BASCULE SPANS LOW LEVEL	SF	11847	$1,625.76	$19,260,372.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	12390	$50.00	$619,500.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$2,560,269.00	$2,560,269.00
100-Structures			**COMPONENT TOTAL**		**$31,849,101.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	North Alignment (Low Level)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	8338	$5.03	$41,940.14
0120 6	EMBANKMENT	CY	12502	$10.00	$125,020.00
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	13579	$3.50	$47,526.50
0285706	OPTIONAL BASE, BASE GROUP 06	SY	12812	$12.00	$153,744.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	2114	$95.70	$202,309.80
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	705	$116.00	$81,780.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	800	$62.70	$50,160.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	4605	$16.50	$75,982.50
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	4270	$30.00	$128,100.00
0536 1 1	GUARDRAIL -ROADWAY	LF	600	$17.60	$10,560.00
0570 1 2	PERFORMANCE TURF, SOD	SY	5980	$1.70	$10,166.00
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	26	$3,299.03	$85,774.78
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	3650	$65.79	$240,133.50
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	1938	$90.00	$174,420.00
0104 11	FLOATING TURBIDITY BARRIER	LF	4820	$12.00	$57,840.00
0104 12	STAKED TURBIDITY BARRIER	LF	300	$3.00	$900.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	1400	$1.00	$1,400.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	8	$3,700.00	$29,600.00
0110 1 1	CLEARING & GRUBBING	LS	1	$150,000.00	$150,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,754,604.10**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	2.93	$2,748.00	$8,051.64
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	2.93	$2,764.45	$8,099.84
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	192	$3.75	$720.00
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	32	$33.68	$1,077.76
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	24	$257.60	$6,182.40
300-Signing & Pavement Markings			**COMPONENT TOTAL**		**$24,890.84**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	8	$585.00	$4,680.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	350	$18.00	$6,300.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	23400	$1.00	$23,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	7800	$2.50	$19,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	3900	$4.30	$16,770.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	20	$330.00	$6,600.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	20	$13,500.00	$270,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	20	$6,800.00	$136,000.00
400-Lighting			**COMPONENT TOTAL**		**$483,250.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	6

1000-Environmental & Mitigation

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0120 1	REGULAR EXCAVATION	CY	1613	$5.00	$8,065.00
0580 1	HERBACEOUS GROUNDCOVER	EA	5445	$2.00	$10,890.00
0580 1	SHRUBS	EA	871	$10.00	$8,710.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	500	$1.00	$500.00
0570 1 2	PERFORMANCE TURF, SOD	SY	222	$2.00	$444.00
	PROP SCAR SEDIMENT TUBE INSTALLATION	EA	2	$3,200.00	$6,400.00
1000-Environmental & Mitigation			COMPONENT TOTAL		$35,009.00

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The North Alignment (MID LEVEL)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$36,845,841.00
200 - ROADWAY			$1,870,208.81
300 - SIGNING & PAVEMENT MARKINGS			$24,890.84
400 - LIGHTING			$483,250.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION			$35,009.00
	COMPONENT SUB-TOTAL		$39,224,190.65
(102-1) MOT (Maintenance of Traffic)		10%	$3,922,419.06
	SUB-TOTAL		$43,146,609.71
(101-1) MOB (Mobilization)		10%	$4,314,660.97
	SUB-TOTAL		$47,461,270.68
PU (Project Unknowns)		25%	$11,865,317.67
	SUB-TOTAL		$59,326,588.36
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$59,326,588.36**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

BRIDGE NUMBER: 100101

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	BRIDGE - SIMPLE SPANS MID LEVEL	SF	87120	$155.00	$13,503,600.00
	BRIDGE - BASCULE SPANS MID LEVEL	SF	11847	$1,657.33	$19,634,372.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	22952	$50.00	$1,147,600.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$2,560,269.00	$2,560,269.00
100-Structures			**COMPONENT TOTAL**		**$36,845,841.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	North Alignment (Mid Level)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	8067	$5.03	$40,575.35
0120 6	EMBANKMENT	CY	29472	$10.00	$294,720.00
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	13167	$3.50	$46,084.50
0285706	OPTIONAL BASE, BASE GROUP 06	SY	12508	$12.00	$150,096.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	2064	$95.70	$197,524.80
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	688	$116.00	$79,808.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	800	$62.70	$50,160.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	3566	$16.50	$58,839.00
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	3296	$30.00	$98,880.00
0536 1 1	GUARDRAIL -ROADWAY	LF	600	$17.60	$10,560.00
0570 1 2	PERFORMANCE TURF, SOD	SY	5980	$1.70	$10,166.00
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	26	$3,299.03	$85,774.78
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	3650	$65.79	$240,133.50
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	1938	$90.00	$174,420.00
0104 11	FLOATING TURBIDITY BARRIER	LF	4660	$12.00	$55,920.00
0104 12	STAKED TURBIDITY BARRIER	LF	300	$3.00	$900.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	1400	$1.00	$1,400.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	10	$3,700.00	$37,000.00
0110 1 1	CLEARING & GRUBBING	LS	1	$150,000.00	$150,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,870,208.81**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	2.93	$2,748.00	$8,051.64
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	2.93	$2,764.45	$8,099.84
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	192	$3.75	$720.00
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	32	$33.68	$1,077.76
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	24	$257.60	$6,182.40
300-Signing & Pavement Markings			**COMPONENT TOTAL**		**$24,890.84**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	8	$585.00	$4,680.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	350	$18.00	$6,300.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	23400	$1.00	$23,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	7800	$2.50	$19,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	3900	$4.30	$16,770.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	20	$330.00	$6,600.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	20	$13,500.00	$270,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	20	$6,800.00	$136,000.00
400-Lighting		COMPONENT TOTAL			**$483,250.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	6

1000-Environmental & Mitigation

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0120 1	REGULAR EXCAVATION	CY	1613	$5.00	$8,065.00
0580 1	HERBACEOUS GROUNDCOVER	EA	5445	$2.00	$10,890.00
0580 1	SHRUBS	EA	871	$10.00	$8,710.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	500	$1.00	$500.00
0570 1 2	PERFORMANCE TURF, SOD	SY	222	$2.00	$444.00
	PROP SCAR SEDIMENT TUBE INSTALLATION	EA	2	$3,200.00	$6,400.00
1000-Environmental & Mitigation			**COMPONENT TOTAL**		**$35,009.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The North Alignment (HIGH LEVEL)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$34,815,179.00
200 - ROADWAY			$1,669,092.45
300 - SIGNING & PAVEMENT MARKINGS			$24,890.84
400 - LIGHTING			$483,250.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION			$35,009.00
	COMPONENT SUB-TOTAL		$36,992,412.29
(102-1) MOT (Maintenance of Traffic)		10%	$3,699,241.23
	SUB-TOTAL		$40,691,653.51
(101-1) MOB (Mobilization)		10%	$4,069,165.35
	SUB-TOTAL		$44,760,818.87
PU (Project Unknowns)		25%	$11,190,204.72
	SUB-TOTAL		$55,951,023.58
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$55,951,023.58**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

BRIDGE NUMBER: **100101**

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	BRIDGE - HIGH LEVEL	SF	166716	$185.00	$30,842,460.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	28249	$50.00	$1,412,450.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$2,560,269.00	$2,560,269.00
100-Structures			**COMPONENT TOTAL**		**$34,815,179.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	North Alignment (High Level)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	7398	$5.03	$37,211.39
0120 6	EMBANKMENT	CY	39063	$10.00	$390,632.90
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	8111	$3.50	$28,388.50
0285706	OPTIONAL BASE, BASE GROUP 06	SY	7845	$12.00	$94,140.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	1295	$95.70	$123,931.50
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	431	$116.00	$49,996.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	800	$62.70	$50,160.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	1194	$16.50	$19,701.00
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	1051	$30.00	$31,530.00
0536 1 1	GUARDRAIL -ROADWAY	LF	600	$17.60	$10,560.00
0570 1 2	PERFORMANCE TURF, SOD	SY	5980	$1.70	$10,166.00
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	26	$3,299.03	$85,774.78
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	3650	$65.79	$240,133.50
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	1938	$90.00	$174,420.00
0104 11	FLOATING TURBIDITY BARRIER	LF	4450	$12.00	$53,400.00
0104 12	STAKED TURBIDITY BARRIER	LF	300	$3.00	$900.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	1200	$1.00	$1,200.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	8	$3,700.00	$29,600.00
0110 1 1	CLEARING & GRUBBING	LS	1	$150,000.00	$150,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,669,092.45**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	2.93	$2,748.00	$8,051.64
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	2.93	$2,764.45	$8,099.84
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	192	$3.75	$720.00
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	32	$33.68	$1,077.76
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	24	$257.60	$6,182.40
300-Signing & Pavement Markings			**COMPONENT TOTAL**		**$24,890.84**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	8	$585.00	$4,680.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	350	$18.00	$6,300.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	23400	$1.00	$23,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	7800	$2.50	$19,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	3900	$4.30	$16,770.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	20	$330.00	$6,600.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	20	$13,500.00	$270,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	20	$6,800.00	$136,000.00
400-Lighting		COMPONENT TOTAL			**$483,250.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	6

1000-Environmental & Mitigation

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0120 1	REGULAR EXCAVATION	CY	1613	$5.00	$8,065.00
0580 1	HERBACEOUS GROUNDCOVER	EA	5445	$2.00	$10,890.00
0580 1	SHRUBS	EA	871	$10.00	$8,710.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	500	$1.00	$500.00
0570 1 2	PERFORMANCE TURF, SOD	SY	222	$2.00	$444.00
	PROP SCAR SEDIMENT TUBE INSTALLATION	EA	2	$3,200.00	$6,400.00
1000-Environmental & Mitigation			**COMPONENT TOTAL**		**$35,009.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The North Alignment (RELIEF BRIDGE)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAY NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$5,058,784.00
200 - ROADWAY			$1,049,775.45
300 - SIGNING & PAVEMENT MARKINGS			$12,632.08
400 - LIGHTING			$241,310.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION	*NOT USED*		
	COMPONENT SUB-TOTAL		$6,362,501.54
(102-1) MOT (Maintenance of Traffic)		10%	$636,250.15
	SUB-TOTAL		$6,998,751.69
(101-1) MOB (Mobilization)		10%	$699,875.17
	SUB-TOTAL		$7,698,626.86
PU (Project Unknowns)		25%	$1,924,656.72
	SUB-TOTAL		$9,623,283.58
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$9,623,283.58**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

BRIDGE NUMBER: **100101**

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	RELIEF BRIDGE	SF	28512	$135.00	$3,849,120.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	8864	$50.00	$443,200.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$766,464.00	$766,464.00
100-Structures		**COMPONENT TOTAL**			**$5,058,784.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	North Alignment (Relief BR)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	8229	$5.03	$41,391.01
0120 6	EMBANKMENT	CY	13513	$10.00	$135,125.40
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	6097	$3.50	$21,339.50
0285706	OPTIONAL BASE, BASE GROUP 06	SY	5426	$12.00	$65,112.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	896	$95.70	$85,747.20
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	298	$116.00	$34,568.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	400	$62.70	$25,080.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	3018	$16.50	$49,797.00
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	2827	$30.00	$84,810.00
0536 1 1	GUARDRAIL -ROADWAY	LF	375	$17.60	$6,600.00
0570 1 2	PERFORMANCE TURF, SOD	SY	7153	$1.70	$12,160.10
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	12	$3,299.03	$39,588.36
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	2000	$65.79	$131,580.00
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	969	$90.00	$87,210.00
0104 11	FLOATING TURBIDITY BARRIER	LF	1600	$12.00	$19,200.00
0104 12	STAKED TURBIDITY BARRIER	LF	140	$3.00	$420.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	600	$1.00	$600.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	6	$3,700.00	$22,200.00
0110 1 1	CLEARING & GRUBBING	LS	1	$100,000.00	$100,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,049,775.45**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	1.43	$2,748.00	$3,929.64
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	1.43	$2,764.45	$3,953.16
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	96	$3.75	$360.00
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	16	$33.68	$538.88
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	12	$257.60	$3,091.20
300-Signing & Pavement Markings		**COMPONENT TOTAL**			**$12,632.08**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	4	$585.00	$2,340.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	200	$18.00	$3,600.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	11400	$1.00	$11,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	3800	$2.50	$9,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	1900	$4.30	$8,170.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	10	$330.00	$3,300.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	10	$13,500.00	$135,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	10	$6,800.00	$68,000.00
400-Lighting			**COMPONENT TOTAL**		**$241,310.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The South Alignment (LOW LEVEL)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$31,849,101.00
200 - ROADWAY			$1,777,759.39
300 - SIGNING & PAVEMENT MARKINGS			$24,840.11
400 - LIGHTING			$483,250.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION			$35,009.00
	COMPONENT SUB-TOTAL		$34,134,950.50
(102-1) MOT (Maintenance of Traffic)		10%	$3,413,495.05
	SUB-TOTAL		$37,548,445.55
(101-1) MOB (Mobilization)		10%	$3,754,844.55
	SUB-TOTAL		$41,303,290.10
PU (Project Unknowns)		25%	$10,325,822.53
	SUB-TOTAL		$51,629,112.63
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$51,629,112.63**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

BRIDGE NUMBER: 100101

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	BRIDGE - SIMPLE SPANS LOW LEVEL	SF	69696	$135.00	$9,408,960.00
	BRIDGE - BASCULE SPANS LOW LEVEL	SF	11847	$1,625.76	$19,260,372.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	12390	$50.00	$619,500.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$2,560,269.00	$2,560,269.00
100-Structures		**COMPONENT TOTAL**			**$31,849,101.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	South Alignment (Low Level)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	8378	$5.03	$42,139.43
0120 6	EMBANKMENT	CY	13280	$10.00	$132,803.50
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	13903	$3.50	$48,660.50
0285706	OPTIONAL BASE, BASE GROUP 06	SY	13208	$12.00	$158,496.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	2180	$95.70	$208,626.00
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	726	$116.00	$84,216.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	800	$62.70	$50,160.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	4362	$16.50	$71,973.00
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	4389	$30.00	$131,670.00
0536 1 1	GUARDRAIL -ROADWAY	LF	600	$17.60	$10,560.00
0570 1 2	PERFORMANCE TURF, SOD	SY	5894	$1.70	$10,019.80
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	26	$3,299.03	$85,774.78
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	3650	$65.79	$240,133.50
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	1938	$90.00	$174,420.00
0104 11	FLOATING TURBIDITY BARRIER	LF	4930	$12.00	$59,160.00
0104 12	STAKED TURBIDITY BARRIER	LF	300	$3.00	$900.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	1200	$1.00	$1,200.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	8	$3,700.00	$29,600.00
0110 1 1	CLEARING & GRUBBING	LS	1	$150,000.00	$150,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,777,759.39**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	2.91	$2,748.00	$7,996.68
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24"	LF	24	$2.48	$59.52
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	2.91	$2,764.45	$8,044.55
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	192	$3.75	$720.00
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	32	$33.68	$1,077.76
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	24	$257.60	$6,182.40
300-Signing & Pavement Markings			**COMPONENT TOTAL**		**$24,840.11**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	8	$585.00	$4,680.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	350	$18.00	$6,300.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	23400	$1.00	$23,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	7800	$2.50	$19,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	3900	$4.30	$16,770.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	20	$330.00	$6,600.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	20	$13,500.00	$270,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	20	$6,800.00	$136,000.00
400-Lighting		**COMPONENT TOTAL**			**$483,250.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	6

1000-Environmental & Mitigation

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0120 1	REGULAR EXCAVATION	CY	1613	$5.00	$8,065.00
0580 1	HERBACEOUS GROUNDCOVER	EA	5445	$2.00	$10,890.00
0580 1	SHRUBS	EA	871	$10.00	$8,710.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	500	$1.00	$500.00
0570 1 2	PERFORMANCE TURF, SOD	SY	222	$2.00	$444.00
	PROP SCAR SEDIMENT TUBE INSTALLATION	EA	2	$3,200.00	$6,400.00
1000-Environmental & Mitigation			**COMPONENT TOTAL**		**$35,009.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The South Alignment (MID LEVEL)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$36,845,841.00
200 - ROADWAY			$1,870,197.21
300 - SIGNING & PAVEMENT MARKINGS			$24,840.11
400 - LIGHTING			$483,250.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION			$35,009.00
	COMPONENT SUB-TOTAL		$39,224,128.32
(102-1) MOT (Maintenance of Traffic)		10%	$3,922,412.83
	SUB-TOTAL		$43,146,541.15
(101-1) MOB (Mobilization)		10%	$4,314,654.11
	SUB-TOTAL		$47,461,195.26
PU (Project Unknowns)		25%	$11,865,298.82
	SUB-TOTAL		$59,326,494.08
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$59,326,494.08**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

BRIDGE NUMBER: 100101

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	BRIDGE - SIMPLE SPANS MID LEVEL	SF	87120	$155.00	$13,503,600.00
	BRIDGE - BASCULE SPANS MID LEVEL	SF	11847	$1,657.33	$19,634,372.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	22952	$50.00	$1,147,600.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$2,560,269.00	$2,560,269.00
100-Structures			COMPONENT TOTAL		**$36,845,841.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	South Alignment (Mid Level)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	7880	$5.03	$39,635.85
0120 6	EMBANKMENT	CY	28491	$10.00	$284,914.70
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	13434	$3.50	$47,019.00
0285706	OPTIONAL BASE, BASE GROUP 06	SY	12821	$12.00	$153,852.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	2116	$95.70	$202,501.20
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	705	$116.00	$81,780.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	800	$62.70	$50,160.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	3323	$16.50	$54,829.50
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	3405	$30.00	$102,150.00
0536 1 1	GUARDRAIL -ROADWAY	LF	600	$17.60	$10,560.00
0570 1 2	PERFORMANCE TURF, SOD	SY	5894	$1.70	$10,019.80
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	26	$3,299.03	$85,774.78
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	3650	$65.79	$240,133.50
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	1938	$90.00	$174,420.00
0104 11	FLOATING TURBIDITY BARRIER	LF	4650	$12.00	$55,800.00
0104 12	STAKED TURBIDITY BARRIER	LF	300	$3.00	$900.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	1500	$1.00	$1,500.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	10	$3,700.00	$37,000.00
0110 1 1	CLEARING & GRUBBING	LS	1	$150,000.00	$150,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,870,197.21**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	2.91	$2,748.00	$7,996.68
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24"	LF	24	$2.48	$59.52
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	2.91	$2,764.45	$8,044.55
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	192	$3.75	$720.00
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	32	$33.68	$1,077.76
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	24	$257.60	$6,182.40
300-Signing & Pavement Markings		**COMPONENT TOTAL**			**$24,840.11**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	8	$585.00	$4,680.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	350	$18.00	$6,300.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	23400	$1.00	$23,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	7800	$2.50	$19,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	3900	$4.30	$16,770.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	20	$330.00	$6,600.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	20	$13,500.00	$270,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	20	$6,800.00	$136,000.00
400-Lighting		COMPONENT TOTAL			$483,250.00

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	6

1000-Environmental & Mitigation

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0120 1	REGULAR EXCAVATION	CY	1613	$5.00	$8,065.00
0580 1	HERBACEOUS GROUNDCOVER	EA	5445	$2.00	$10,890.00
0580 1	SHRUBS	EA	871	$10.00	$8,710.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	500	$1.00	$500.00
0570 1 2	PERFORMANCE TURF, SOD	SY	222	$2.00	$444.00
	PROP SCAR SEDIMENT TUBE INSTALLATION	EA	2	$3,200.00	$6,400.00
1000-Environmental & Mitigation			COMPONENT TOTAL		$35,009.00

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The South Alignment (HIGH LEVEL)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$34,815,179.00
200 - ROADWAY			$1,681,005.04
300 - SIGNING & PAVEMENT MARKINGS			$24,840.11
400 - LIGHTING			$483,250.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION			$35,009.00
	COMPONENT SUB-TOTAL		$37,004,274.15
(102-1) MOT (Maintenance of Traffic)		10%	$3,700,427.41
	SUB-TOTAL		$40,704,701.56
(101-1) MOB (Mobilization)		10%	$4,070,470.16
	SUB-TOTAL		$44,775,171.72
PU (Project Unknowns)		25%	$11,193,792.93
	SUB-TOTAL		$55,968,964.65
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$55,968,964.65**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

				BRIDGE NUMBER:	100101
PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	BRIDGE - HIGH LEVEL	SF	166716	$185.00	$30,842,460.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	28249	$50.00	$1,412,450.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$2,560,269.00	$2,560,269.00
100-Structures			**COMPONENT TOTAL**		**$34,815,179.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	South Alignment (High Level)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	7398	$5.03	$37,210.28
0120 6	EMBANKMENT	CY	39492	$10.00	$394,920.00
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	8292	$3.50	$29,022.00
0285706	OPTIONAL BASE, BASE GROUP 06	SY	8082	$12.00	$96,984.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	1334	$95.70	$127,663.80
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	445	$116.00	$51,620.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	800	$62.70	$50,160.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	920	$16.50	$15,180.00
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	1133	$30.00	$33,990.00
0536 1 1	GUARDRAIL -ROADWAY	LF	600	$17.60	$10,560.00
0570 1 2	PERFORMANCE TURF, SOD	SY	5894	$1.70	$10,019.80
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	26	$3,299.03	$85,774.78
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	3650	$65.79	$240,133.50
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	1938	$90.00	$174,420.00
0104 11	FLOATING TURBIDITY BARRIER	LF	4550	$12.00	$54,600.00
0104 12	STAKED TURBIDITY BARRIER	LF	300	$3.00	$900.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	1000	$1.00	$1,000.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	8	$3,700.00	$29,600.00
0110 1 1	CLEARING & GRUBBING	LS	1	$150,000.00	$150,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,681,005.04**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	2.91	$2,748.00	$7,996.68
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24"	LF	24	$2.48	$59.52
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	2.91	$2,764.45	$8,044.55
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	192	$3.75	$720.00
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	32	$33.68	$1,077.76
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	24	$257.60	$6,182.40
300-Signing & Pavement Markings			**COMPONENT TOTAL**		**$24,840.11**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	8	$585.00	$4,680.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	350	$18.00	$6,300.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	23400	$1.00	$23,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	7800	$2.50	$19,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	3900	$4.30	$16,770.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	20	$330.00	$6,600.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	20	$13,500.00	$270,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	20	$6,800.00	$136,000.00
400-Lighting		**COMPONENT TOTAL**			**$483,250.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	6

1000-Environmental & Mitigation

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0120 1	REGULAR EXCAVATION	CY	1613	$5.00	$8,065.00
0580 1	HERBACEOUS GROUNDCOVER	EA	5445	$2.00	$10,890.00
0580 1	SHRUBS	EA	871	$10.00	$8,710.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	500	$1.00	$500.00
0570 1 2	PERFORMANCE TURF, SOD	SY	222	$2.00	$444.00
	PROP SCAR SEDIMENT TUBE INSTALLATION	EA	2	$3,200.00	$6,400.00
1000-Environmental & Mitigation			**COMPONENT TOTAL**		**$35,009.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID # :	123456-1-52-01
PROJECT DESCRIPTION:	Dunedin Causeway Study Quanitity for The South Alignment (RELIEF BRIDGE)
PAY ITEM SPEC YEAR:	2007
SUBMITTAL TYPE:	EE_03-09_Rev6
COUNTY:	Pinellas
DATE:	August 21, 2009
ENGINEERING CONSULTANT FIRM:	HDR Engineering, Inc.
DONE BY:	Vinnie Hoang
CHECKED BY:	Marlin Register II
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	1

COMPONENT GROUPS

100 - STRUCTURES			$5,058,784.00
200 - ROADWAY			$1,246,800.19
300 - SIGNING & PAVEMENT MARKINGS			$16,208.93
400 - LIGHTING			$241,310.00
500 - SIGNALIZATION	*NOT USED*		
550 - ITS	*NOT USED*		
600 - LANDSCAPE / PERIPHERALS	*NOT USED*		
700 - UTILITIES	*NOT USED*		
800 - ARCHITECTURAL	*NOT USED*		
900 - MASS TRANSIT	*NOT USED*		
1000-ENVIRONMENTAL & MITIGATION	*NOT USED*		
	COMPONENT SUB-TOTAL		$6,563,103.13
(102-1) MOT (Maintenance of Traffic)		10%	$656,310.31
	SUB-TOTAL		$7,219,413.44
(101-1) MOB (Mobilization)		10%	$721,941.34
	SUB-TOTAL		$7,941,354.78
PU (Project Unknowns)		25%	$1,985,338.70
	SUB-TOTAL		$9,926,693.48
(999-25) Initial Contingency (Do Not Bid)			
	PROJECT GRAND TOTAL		**$9,926,693.48**

NOTES:

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	
PAGE NUMBER:	2

100-Structures

BRIDGE NUMBER: **100101**

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
	RELIEF BRIDGE	SF	28512	$135.00	$3,849,120.00
0548 12	RETAINING WALL SYSTEM, PERMANENT, EXCLUDING BARRIER	SF	8864	$50.00	$443,200.00
0110 3	REMOVAL OF EXISTING STRUCTURE	LS	1	$766,464.00	$766,464.00
100-Structures			**COMPONENT TOTAL**		**$5,058,784.00**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	South Alignment (Relief BR)
PAGE NUMBER:	3

200-Roadway

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0101 1	MOBILIZATION	LS	10%	See Summary Sheet	
0102 1	MAINTENANCE OF TRAFFIC	LS	10%	See Summary Sheet	
0120 1	REGULAR EXCAVATION	CY	8008	$5.03	$40,282.25
0120 6	EMBANKMENT	CY	13696	$10.00	$136,960.00
0999 25	INITIAL CONTINGENCY AMOUNT, DO NOT BID	LS			
0160 4	STABILIZATION TYPE B	SY	10381	$3.50	$36,333.50
0285706	OPTIONAL BASE, BASE GROUP 06	SY	9105	$12.00	$109,260.00
0334 1 13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	TN	1534	$95.70	$146,803.80
0337 7 32	ASPHALT CONCRETE FRICTION COURSE,TRAFFIC C, FC-9.5,	TN	532	$116.00	$61,712.00
0400 1 11	CONCRETE CLASS I, RETAINING WALLS	CY	130	$590.00	$76,700.00
0415 1 3	REINFORCING STEEL- RETAINING WALL	LB	1400	$1.00	$1,400.00
0515 1 2	PIPE HANDRAIL - GUIDERAIL, ALUMINUM	LF	400	$62.70	$25,080.00
0520 1 10	CONCRETE CURB & GUTTER, TYPE F	LF	3272	$16.50	$53,988.00
0522 1	SIDEWALK CONCRETE, 4" THICK	SY	3972	$30.00	$119,160.00
0536 1 1	GUARDRAIL -ROADWAY	LF	375	$17.60	$6,600.00
0570 1 2	PERFORMANCE TURF, SOD	SY	7762	$1.70	$13,195.40
0425 1351	INLETS, CURB, TYPE P-5, <10'	EA	12	$3,299.03	$39,588.36
0425 1549	INLETS, DT BOT, TYPE D, MODIFY	EA	2	$2,157.62	$4,315.24
0430982129	MITERED END SECTION, OPTIONAL ROUND, 24" CD	EA	4	$1,207.91	$4,831.64
0430175102	PIPE CULVERT, OPT MATERIAL, ROUND, 25-36"S/CD	LF	2000	$65.79	$131,580.00
0530 3 3	RIPRAP, RUBBLE, BANK AND SHORE	TN	969	$90.00	$87,210.00
0104 11	FLOATING TURBIDITY BARRIER	LF	2330	$12.00	$27,960.00
0104 12	STAKED TURBIDITY BARRIER	LF	280	$3.00	$840.00
0104 13 1	STAKED SILT FENCE, TYPE III	LF	800	$1.00	$800.00
0104 15	SOIL TRACKING PREVENTION DEVICE	EA	6	$3,700.00	$22,200.00
0110 1 1	CLEARING & GRUBBING	LS	1	$100,000.00	$100,000.00
200-Roadway			**COMPONENT TOTAL**		**$1,246,800.19**

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	4

300-Signing & Pavement Markings

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0711 11111	THERMOPLASTIC, STANDARD, WHITE, SOLID, 6"	NM	2.03	$2,748.00	$5,578.44
0711 11122	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	LF	400	$0.74	$296.00
0711 11124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18"	LF	240	$1.93	$463.20
0711 11211	THERMOPLASTIC, STANDARD,YELLOW, SOLID, 6"	NM	2.03	$2,764.45	$5,611.83
0706 3	RETRO-REFLECTIVE PAVEMENT MARKERS	EA	134	$3.75	$502.50
0711 11170	THERMOPLASTIC, STANDARD, WHITE, ARROW	EA	18	$33.68	$606.24
0700 20 11	SINGLE POST SIGN, F&I, LESS THAN 12 SF	AS	12	$257.60	$3,091.20
0711 11125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24"	LF	24	$2.48	$59.52
300-Signing & Pavement Markings			COMPONENT TOTAL		$16,208.93

ENGINEER'S ESTIMATE

FINANCIAL PROJECT ID:	123456-1-52-01
FILE VERSION:	EE_03-09_Rev6
PAGE NUMBER:	5

400-Lighting

PAY ITEM #	ITEM DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL COST
0400 1 5	CONCRETE CLASS I, SUBSTRUCTURE	CY	4	$585.00	$2,340.00
0555 1 1	DIRECTIONAL BORE, LESS THAN 6"	LF	200	$18.00	$3,600.00
0715 1 12	LIGHTING CONDUCTORS, F&I, INSULATED, NO.8 - 6	LF	11400	$1.00	$11,400.00
0715 1 15	LIGHTING CONDUCTORS, F&I, NO.1/0 - 3/0	LF	3800	$2.50	$9,500.00
0715 2 11	LIGHTING - CONDUIT, F&I, UNDERGROUND	LF	1900	$4.30	$8,170.00
0715 14 11	LIGHTING - PULL BOX, F&I, ROADSIDE-MOULDED	EA	10	$330.00	$3,300.00
0715 7 11	LOAD CENTER, F&I, SECONDARY VOLTAGE	EA	10	$13,500.00	$135,000.00
0715511140	LIGHT POLE COMPLETE, F&I, SINGLE ARM SHOULDER MOUNT,	EA	10	$6,800.00	$68,000.00
400-Lighting			**COMPONENT TOTAL**		**$241,310.00**

Fixed Span and Movable Quantity Estimates

Process for Approximating Superstructure Cost For Fixed Concrete Bridges

During this investigation it was noticed that the proposed typical section for Dunedin Causeway project was very similar to sections constructed for segments C1 and C2 for the Belleair Causeway Bridge. Due to this fact, a multistep process was followed to convert the bids associated with the Belleair Bridge to accurately approximate the cost of the Dunedin Causeway Bridge:

1. Use the Belleair Comp Book calculated by HDR Inc. to approximate the material quantities associated with constructing segments C1 and C2 for the Belleair High Level Bridge (Excluding pre-stressed AASHTO Beams).
2. Use the bid prices for the Belleair Causeway to calculate the cost of the aforementioned quantities.
3. Average the bid costs from HDR Inc., Johnson Bros., and PCL Civil Constructions to create a single cost
4. Use the total costs and deck area for segments C1 and C2 to calculate a cost per sq. ft price.
5. Multiply the cost per square price, by the proposed fixed deck areas to approximate the deck and miscellaneous costs for the Dunedin Causeway Bridges.
6. Calculate the total length of FIB 63 pre-stressed beams necessary to match the typical sections for all fixed bridge locations discussed in this report.
7. The total approximated cost for the superstructure of the fixed concrete bridge is the sum of the FIB 63 cost and the deck/miscellaneous costs.

The following pages show the values used to compute the total superstructure cost using the aforementioned process.

Process for Approximating Substructure Cost For Fixed Concrete Bridges

The Belleair Causeway can not be directly used to approximate the total cost of the substructure used for the Dunedin Causeway. After comparing the two bridges side-by-side, it was noticed that the simple spans utilized for the Belleair Causeway are longer than the proposed spans for the Dunedin Causeway. Therefore, it is safe to assume that the multi-column pier system used at Belleair will be adequate for the substructure for the Dunedin Causeway. Using the same logic it was also assumed that the end bents used for the Belleair Causeway would also be an accurate representation for the Dunedin Causeway Bridge. The following process was used to calculate an approximate cost for substructure for the Dunedin Causeway Bridge:

1. Select a pier layout that supports simple span AASHTO Girders and are spaced further than 132 ft. In this instance, the two-column piers used for piers 11 thru 22 for the Belleair Causeway were selected.
2. Select a typical footing that can support the loading applied to the piers. For the Dunedin Causeway 36 ft x 24ft x 6 ft footings utilizing 60 in diameter drilled shafts were selected to support the piers adjacent to the channel. 36 ft x 20 ft x 5 ft footings utilizing 48 in diameter drilled shafts were used at the remainding pier locations. The larger piers were selected along the channel to ensure the structure could support vessel collisions.
3. After selecting the substructure system, the column heights for the piers were calculated using the roadway profile.
4. Use the column heights, pier layouts and footing layouts to calculate quantities of concrete and reinforcing steel needed for Dunedin Causeway.
5. Use the Belleair Comp Book to find the average quantities for other substructure essentials on a per pier basis. Apply average costs per pier to the number of piers utilized for the substructure for each bridge alternative.
6. Use the bid costs from HDR Inc., Johnson Bros., and PCL Civil Construction to calculate the cost of the aforementioned quantities.
7. Average the bid costs to create a single cost

The following pages show the values used to compute the total superstructure cost using the aforementioned process.

PINELLAS COUNTY ENGINEERING DEPARTMENT TABULATION OF BIDS
PID NO.: 922142 1212, BID NO.: 056-0791-C,
BELLEAIR BEACH CAUSEWAY BRIDGE REPLACEMENTS

DATE:	October 19, 2006		(Engineer's Estimate)		(1st Low Bid)		(2nd Low Bid)		
		HIGH LEVEL BRIDGE ALTERNATIVE	HDR Engineering, Inc.		Johnson Bros., LLC Misener Marine Construction Inc.		PCL Civil Constructors, Inc.		
QUANTITY	UNIT	ITEM DESCRIPTION	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	
170.50	CY	CONC CLASS II (APPROACH SLABS)	$ 287.19	$48,966	$ 320.00	$54,560	250.00	$42,625	
1517.67	CY	CONC CLASS IV (SUPERSTRUCTURE)	$ 847.21	$1,285,785	$ 885.00	$1,343,138	1,000.00	$1,517,670	
3686.22	SY	BRIDGE FLOOR GROOVING	$ 5.54	$20,422	$ 5.59	$20,606	2.50	$9,216	
280196.00	LB	REINF STEEL (SUPERSTRUCTURE)	$ 1.03	$288,602	$ 1.15	$322,225	1.00	$280,196	
30641.00	LB	REINF STEEL (APPROACH SLABS)	$ 1.03	$31,560	$ 1.00	$30,641	1.00	$30,641	
122.00	LF	EXPANSION JOINT SEAL (STRIP ELASTOMERIC)	$ 150.00	$18,300	$ 305.00	$37,210	450.00	$54,900	
1505.00	LF	ALUMINUM RAILINGS (TRIPLE RAIL)	$ 48.95	$73,670	$ 35.00	$52,675	55.00	$82,775	
1310.00	LF	BRIDGE DRAINAGE PIPING	$ 204.43	$267,803	$ 60.00	$78,600	40.00	$52,400	
4.00	EA	BRIDGE DRAINS	$ 861.01	$3,444	$ 2,700.00	$10,800	2,700.00	$10,800	
1500.00	LF	CONCRETE TRAFFIC RAILING BARRIER BRIDGE (32" F-SHAPE)	$ 100.71	$151,065	$ 75.00	$112,500	65.00	$97,500	
1505.00	LF	CONCRETE PARAPET (PEDEST/BICYCLE W/ SIDEWALK)	$ 206.00	$310,030	$ 35.00	$52,675	80.00	$120,400	
		SUPERSTRUCTURE SUBTOTAL	$2,499,647		$2,115,630		$2,299,123		
750		Bridge length evaluated (ft)							
65		Bridge width evaluated (ft)							
48750		Bridge area evaluated (ft^2)							
		Cost per sq ft of deck:	$51.27		$43.40		$47.16		
2526		Bridge length proposed (ft)							
66		Bridge width proposed (ft)							
166716		Bridge area proposed (ft^2)							
		Superstructure Subtotal w/o Beams:	$8,548,331		$7,235,065		$7,862,575		
15756.00	LF	PRESTRESSED BEAM (NEW FIB 63" Beams)	$ 226.00	$3,560,856		$3,560,856		$3,560,856	
		Superstructure Subtotal w/ Beams:	$12,109,187		$10,795,921		$11,423,431		$11,442,846
									$69
486.00	CY	CLASS III CONCRETE (SEAL)	$ 400.00	$ 194,400.00	$ 286.65	$ 139,311.90	3,000.00	$ 1,458,000.00	
58.95	CY	CONC CLASS IV (SUBSTRUCTURE)	$ 737.95	$ 43,502.15	$ 1,778.00	$ 104,813.10	1,500.00	$ 88,425.00	
6228.40	CY	CONC CLASS IV (MASS)(SUBSTRUCTURE)	$ 1,072.00	$ 6,676,844.80	$ 1,362.12	$ 8,483,828.21	1,350.00	$ 8,408,340.00	
133.00	CF	COMPOSITE NEOPRENE PADS	$ 863.13	$ 114,796.29	$ 1,000.00	$ 133,000.00	900.00	$ 119,700.00	
1106152.10	LB	REINF STEEL (SUBSTRUCTURE)	$ 1.01	$ 1,117,213.62	$ 0.95	$ 1,050,844.50	1.00	$ 1,106,152.10	
4382.00	LF	DRILLED SHAFT (48" DIA)	$ 380.15	$ 1,665,817.30	$ 267.11	$ 1,170,476.02	400.00	$ 1,752,800.00	
574.00	LF	DRILLED SHAFT (60" DIA)	$ 482.00	$ 276,668.00	$ 404.65	$ 232,269.10	800.00	$ 459,200.00	
4382.00	LF	DRILLED SHAFT CASING (48" DIA)	$ 146.67	$ 642,707.94	$ 120.12	$ 526,365.84	175.00	$ 766,850.00	
574.00	LF	DRILLED SHAFT CASING (60" DIA)	$ 375.00	$ 215,250.00	$ 150.00	$ 86,100.00	200.00	$ 114,800.00	
1430.00	LF	CORE (SHAFT EXCAVATION)	$ 50.00	$ 71,500.00	$ 166.57	$ 238,195.10	55.00	$ 78,650.00	
4382.00	LF	EXCAVATION UNCLASSIFIED SHAFT (48" DIA)	$ 175.00	$ 766,850.00	$ 212.73	$ 932,182.86	275.00	$ 1,205,050.00	
574.00	LF	EXCAVATION UNCLASSIFIED SHAFT (60" DIA)	$ 332.18	$ 190,671.32	$ 213.44	$ 122,514.56	350.00	$ 200,900.00	
10.00	EA	CROSSHOLE SONIC LOGGING	$ 5,302.12	$ 53,021.20	$ 2,452.45	$ 24,524.50	1,000.00	$ 10,000.00	
108.00	SY	POLYETHENE SHEETING	$ 2.21	$ 238.68	$ 35.58	$ 3,842.64	15.00	$ 1,620.00	
		SUBSTRUCTURE SUBTOTAL	$12,029,481.30		$13,248,268.32		$15,770,487.10		$13,682,746
									$82
		HIGH LEVEL BRIDGE TOTAL	$24,138,668.40		$24,044,189.44		$27,193,917.77		$25,125,592
		Cost per sq ft of deck:	$144.79		$144.22		$163.12		
		AVERAGE Cost per sq ft of deck:			$151				

PINELLAS COUNTY ENGINEERING DEPARTMENT TABULATION OF BIDS
PID NO.: 922142 1212, BID NO.: 056-0791-C,
BELLEAIR BEACH CAUSEWAY BRIDGE REPLACEMENTS

BID OPENING DATE:	October 19, 2006			(Engineer's Estimate)		(1st Low Bid)		(2nd Low Bid)		
			MID LEVEL BRIDGE ALTERNATIVE - FIXED SPANS ONLY	HDR Engineering, Inc.		Johnson Bros., LLC Misener Marine Construction Inc.		PCL Civil Constructors, Inc.		
ITEM NO.	**QUANTITY**	**UNIT**	**ITEM DESCRIPTION**	**Unit Price**	**Amount**	**Unit Price**	**Amount**	**Unit Price**	**Amount**	
F0400-2-10	170.50	CY	CONC CLASS II (APPROACH SLABS)	$ 334.12	$ 56,967.46	$ 320.00	$ 54,560.00	250.00	$ 42,625.00	
F0400-4-4	1517.67	CY	CONC CLASS IV (SUPERSTRUCTURE)	$ 1,161.11	$ 1,762,181.81	$ 885.00	$ 1,343,137.95	1,000.00	$ 1,517,670.00	
F0400-9	3686.22	SY	BRIDGE FLOOR GROOVING	$ 5.56	$ 20,495.38	$ 5.59	$ 20,605.97	2.50	$ 9,215.55	
F0415-1-4	280196.00	LB	REINF STEEL (SUPERSTRUCTURE)	$ 1.04	$ 291,403.84	$ 1.15	$ 322,225.40	1.00	$ 280,196.00	
F0415-1-9	30641.00	LB	REINF STEEL (APPROACH SLABS)	$ 1.00	$ 30,641.00	$ 1.00	$ 30,641.00	1.00	$ 30,641.00	
F0458-1-22	122.00	LF	EXPANSION JOINT SEAL (STRIP ELASTOMERIC)	$ 226.53	$ 27,636.66	$ 305.00	$ 37,210.00	450.00	$ 54,900.00	
F0460-70-3	1505.00	LF	ALUMINUM RAILINGS (TRIPLE RAIL)	$ 48.64	$ 73,203.20	$ 35.00	$ 52,675.00	55.00	$ 82,775.00	
F0506-2	1310.00	LF	BRIDGE DRAINAGE PIPING	$ 146.00	$ 191,260.00	$ 60.00	$ 78,600.00	40.00	$ 52,400.00	
F0506-3	4.00	EA	BRIDGE DRAINS	$ 144.71	$ 578.84	$ 2,700.00	$ 10,800.00	2,700.00	$ 10,800.00	
F0521-5-1	1500.00	LF	CONCRETE TRAFFIC RAILING BARRIER BRIDGE (32" F-SHAPE)	$ 101.81	$ 152,715.00	$ 75.00	$ 112,500.00	65.00	$ 97,500.00	
F0521-6-3	1505.00	LF	CONCRETE PARAPET (PEDEST/BICYCLE W/ SIDEWALK)	$ 81.54	$ 122,717.70	$ 35.00	$ 52,675.00	80.00	$ 120,400.00	
			SUPERSTRUCTURE SUBTOTAL	**$2,729,801**		**$2,115,630**		**$2,299,123**		
	750		Bridge length evaluated (ft)							
	65		Bridge width evaluated (ft)							
	48750		Bridge area evaluated (ft^2)							
			Cost per sq ft of deck:	$56.00		$43.40		$47.16		
	1320		Bridge length proposed (ft)							
	66		Bridge width proposed (ft)							
	87120		Bridge area proposed (ft^2)							
			Superstructure Subtotal w/o Beams:	**$4,878,364**		**$3,780,794**		**$4,108,709**		
	7920.00	LF	PRESTRESSED BEAM (NEW FIB 63" Beams)	$ 226.00	$1,789,920		$1,789,920		$1,789,920	
	1.00	LS	Mid Level Single Leaf Bascule Bridge (shown, but not included in totals)		$19,634,372		$19,634,372		$19,634,372	
			Superstructure Subtotal w/ Beams:	**$6,668,284**		**$5,570,714**		**$5,898,629**		$6,045,876
										$69
F0400-4-5	36.45	CY	CONC CLASS IV (SUBSTRUCTURE)	$ 737.95	$ 26,898.28	$ 1,778.00	$ 64,808.10	1,500.00	$ 54,675.00	
F0400-4-25	2734.70	CY	CONC CLASS IV (MASS)(SUBSTRUCTURE)	$ 1,072.00	$ 2,931,598.40	$ 1,362.12	$ 3,724,989.56	1,350.00	$ 3,691,845.00	
F0400-147	63.00	CF	COMPOSITE NEOPRENE PADS	$ 863.13	$ 54,377.19	$ 1,000.00	$ 63,000.00	900.00	$ 56,700.00	
F0415-1-5	556530.00	LB	REINF STEEL (SUBSTRUCTURE)	$ 1.01	$ 562,095.30	$ 0.95	$ 528,703.50	1.00	$ 556,530.00	
F0455-88-5	2406.00	LF	DRILLED SHAFT (48" DIA)	$ 380.15	$ 914,640.90	$ 267.11	$ 642,666.66	400.00	$ 962,400.00	
F0455-107-5	2406.00	LF	DRILLED SHAFT CASING (48" DIA)	$ 146.67	$ 352,888.02	$ 120.12	$ 289,008.72	175.00	$ 421,050.00	
F0455-111	714.00	LF	CORE (SHAFT EXCAVATION)	$ 50.00	$ 35,700.00	$ 166.57	$ 118,930.98	55.00	$ 39,270.00	
F0455-122-5	2406.00	LF	EXCAVATION UNCLASSIFIED SHAFT (48" DIA)	$ 175.00	$ 421,050.00	$ 212.73	$ 511,828.38	275.00	$ 661,650.00	
F0455-142	6.00	EA	CROSSHOLE SONIC LOGGING	$ 5,302.12	$ 31,812.72	$ 2,452.45	$ 14,714.70	1,000.00	$ 6,000.00	
F0459-71	108.00	SY	POLYETHENE SHEETING	$ 2.21	$ 238.68	$ 35.58	$ 3,842.64	15.00	$ 1,620.00	
			SUBSTRUCTURE SUBTOTAL	**$5,417,699.49**		**$6,024,409.64**		**$6,451,740.00**		$5,964,616
										$68
			MID LEVEL FIXED BRIDGE TOTAL	**$12,085,983.68**		**$11,595,123.76**		**$12,350,368.85**		$12,010,492
			Cost per sq ft of deck:	$138.73		$133.09		$141.76		
			AVERAGE Cost per sq ft of deck:			**$138**				

PINELLAS COUNTY ENGINEERING DEPARTMENT TABULATION OF BIDS
PID NO.: 922142 1212, BID NO.: 056-0791-C,
BELLEAIR BEACH CAUSEWAY BRIDGE REPLACEMENTS

BID OPENING DATE:	October 19, 2006			(Engineer's Estimate)		(1st Low Bid)		(2nd Low Bid)		
			LOW LEVEL BRIDGE ALTERNATIVE - FIXED SPANS ONLY	HDR Engineering, Inc.		Johnson Bros., LLC Misener Marine Construction Inc.		PCL Civil Constructors, Inc.		
ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	
F0400-2-10	170.50	CY	CONC CLASS II (APPROACH SLABS)	$ 334.12	$ 56,967.46	$ 320.00	$ 54,560.00	250.00	$ 42,625.00	
F0400-4-4	1517.67	CY	CONC CLASS IV (SUPERSTRUCTURE)	$ 1,161.11	$ 1,762,181.81	$ 885.00	$ 1,343,137.95	1,000.00	$ 1,517,670.00	
F0400-9	3686.22	SY	BRIDGE FLOOR GROOVING	$ 5.56	$ 20,495.38	$ 5.59	$ 20,605.97	2.50	$ 9,215.55	
F0415-1-4	280196.00	LB	REINF STEEL (SUPERSTRUCTURE)	$ 1.04	$ 291,403.84	$ 1.15	$ 322,225.40	1.00	$ 280,196.00	
F0415-1-9	30641.00	LB	REINF STEEL (APPROACH SLABS)	$ 1.00	$ 30,641.00	$ 1.00	$ 30,641.00	1.00	$ 30,641.00	
F0458-1-22	122.00	LF	EXPANSION JOINT SEAL (STRIP ELASTOMERIC)	$ 226.53	$ 27,636.66	$ 305.00	$ 37,210.00	450.00	$ 54,900.00	
F0460-70-3	1505.00	LF	ALUMINUM RAILINGS (TRIPLE RAIL)	$ 48.64	$ 73,203.20	$ 35.00	$ 52,675.00	55.00	$ 82,775.00	
F0506-2	1310.00	LF	BRIDGE DRAINAGE PIPING	$ 146.00	$ 191,260.00	$ 60.00	$ 78,600.00	40.00	$ 52,400.00	
F0506-3	4.00	EA	BRIDGE DRAINS	$ 144.71	$ 578.84	$ 2,700.00	$ 10,800.00	2,700.00	$ 10,800.00	
F0521-5-1	1500.00	LF	CONCRETE TRAFFIC RAILING BARRIER BRIDGE (32" F-SHAPE)	$ 101.81	$ 152,715.00	$ 75.00	$ 112,500.00	65.00	$ 97,500.00	
F0521-6-3	1505.00	LF	CONCRETE PARAPET (PEDEST/BICYCLE W/ SIDEWALK)	$ 81.54	$ 122,717.70	$ 35.00	$ 52,675.00	80.00	$ 120,400.00	
			SUPERSTRUCTURE SUBTOTAL	$2,729,801		$2,115,630		$2,299,123		
			750 Bridge length evaluated (ft)							
			65 Bridge width evaluated (ft)							
			48750 Bridge area evaluated (ft^2)							
			Cost per sq ft of deck:	$56.00		$43.40		$47.16		
			1056 Bridge length proposed (ft)							
			66 Bridge width proposed (ft)							
			69696 Bridge area proposed (ft^2)							
			Superstructure Subtotal w/o Beams:	$3,902,691		$3,024,635		$3,286,967		
	6336.00	LF	PRESTRESSED BEAM (NEW FIB 63" Beams)	$ 226.00	$1,431,936		$1,431,936		$1,431,936	
	1.00	LS	Mid Level Single Leaf Bascule Bridge (shown, but not included in totals)		$19,260,372		$19,260,372		$19,260,372	
			Superstructure Subtotal w/ Beams:	$5,334,627		$4,456,571		$4,718,903		$4,836,701 $69
F0400-3-20	162.00	CY	CLASS III CONCRETE (SEAL)	$ 835.00	$ 135,270.00	$ 286.65	$ 46,437.30	3,000.00	$ 486,000.00	
F0400-4-5	31.95	CY	CONC CLASS IV (SUBSTRUCTURE)	$ 778.12	$ 24,860.93	$ 1,778.00	$ 56,807.10	1,500.00	$ 47,925.00	
F0400-4-25	1718.10	CY	CONC CLASS IV (MASS)(SUBSTRUCTURE)	$ 764.34	$ 1,313,212.55	$ 1,362.12	$ 2,340,258.37	1,350.00	$ 2,319,435.00	
F0400-147	49.00	CF	COMPOSITE NEOPRENE PADS	$ 982.84	$ 48,159.16	$ 1,000.00	$ 49,000.00	900.00	$ 44,100.00	
F0415-1-5	352054.70	LB	REINF STEEL (SUBSTRUCTURE)	$ 1.01	$ 355,575.25	$ 0.95	$ 334,451.97	1.00	$ 352,054.70	
F0455-88-5	1912.00	LF	DRILLED SHAFT (48" DIA)	$ 380.15	$ 726,846.80	$ 267.11	$ 510,714.32	400.00	$ 764,800.00	
F0455-107-5	1912.00	LF	DRILLED SHAFT CASING (48" DIA)	$ 146.67	$ 280,433.04	$ 120.12	$ 229,669.44	175.00	$ 334,600.00	
F0455-111	570.80	LF	CORE (SHAFT EXCAVATION)	$ 27.29	$ 15,577.13	$ 166.57	$ 95,078.16	55.00	$ 31,394.00	
F0455-122-5	1912.00	LF	EXCAVATION UNCLASSIFIED SHAFT (48" DIA)	$ 215.71	$ 412,437.52	$ 212.73	$ 406,739.76	275.00	$ 525,800.00	
F0455-142	5.00	EA	CROSSHOLE SONIC LOGGING	$ 5,116.84	$ 25,584.20	$ 2,452.45	$ 12,262.25	1,000.00	$ 5,000.00	
F0459-71	108.00	SY	POLYETHENE SHEETING	$ 3.30	$ 356.40	$ 35.58	$ 3,842.64	15.00	$ 1,620.00	
			SUBSTRUCTURE SUBTOTAL	$3,338,312.99		$4,085,261.30		$4,912,728.70		$4,112,101 $59
			LOW LEVEL FIXED BRIDGE TOTAL	$8,672,940.34		$8,541,832.60		$9,631,631.78		$8,948,802
			Cost per sq ft of deck:	$124.44		$122.56		$138.19		
			AVERAGE Cost per sq ft of deck:			$128				

BID OPENING DATE:	October 19, 2006			(Engineer's Estimate)		(1st Low Bid)		(2nd Low Bid)		(Engineer's Estimate)	
			WALL 5b	2006 HDR Engineering, Inc.		Johnson Bros., LLC Misener Marine Construction Inc.		PCL Civil Constructors, Inc.		2009 HDR Engineering, Inc.	
ITEM NO.	**QUANTITY**	**UNIT**	**ITEM DESCRIPTION**	**Unit Price**	**Amount**	**Unit Price**	**Amount**	**Unit Price**	**Amount**	**Unit Price**	**Amount**
F0548-12	436.00	SF	RETAINING WALL SYSTEM (PERMANENT)	$ 25.97	$ 11,322.92	$ 65.00	$ 28,340.00	40.00	$ 17,440.00	$ 27.00	$ 11,772.00
F0563-3	316.00	SY	ANTI-GRAFFITI COATING	$ 0.70	$ 221.20	$ 2.00	$ 632.00	6.00	$ 1,896.00	$ 0.40	$ 126.40
			Wall SUBTOTAL	**$11,544**		**$28,972**		**$19,336**		**$11,898**	
		436.4	Area Ret Wall (sf)								
			Cost per sq ft of wall:	$26		$66		$44		$27	
			AVERAGE Cost per sq ft of wall 5b:			**$46**				**$41**	

			WALL 5c	**Unit Price**	**Amount**	**Unit Price**	**Amount**	**Unit Price**	**Amount**	**Unit Price**	**Amount**
F0521-6-3	198.00	LF	CONCRETE PARAPET (PEDEST/BICYCLE W/ SIDEWALK)	$ 152.78	$ 30,250.44	$ 35.00	$ 6,930.00	80.00	$ 15,840.00	$ 152.78	$ 30,250.44
F0548-12	1916.00	SF	RETAINING WALL SYSTEM (PERMANENT)	$ 25.97	$ 49,758.52	$ 65.00	$ 124,540.00	40.00	$ 76,640.00	$ 27.00	$ 51,732.00
F0563-3	1698.00	SY	ANTI-GRAFFITI COATING	$ 0.70	$ 1,188.60	$ 2.00	$ 3,396.00	6.00	$ 10,188.00	$ 0.40	$ 679.20
			STRUCTURE SUBTOTAL	**$81,198**		**$134,866**		**$102,668**		**$52,411**	
		1916	Area Ret Wall (sf)								
			Cost per sq ft of wall:	$42		$70		$54		$27	
			AVERAGE Cost per sq ft of wall 5c:			**$55**				**$48**	

WEIGHTED AVERAGE Cost per sq ft of wall: **$54**

WEIGHTED AVERAGE Cost per sq ft of wall INCLUDING 2009 Unit Costs: **$47**

	Low Level Alternative						
	Walls			Approaches			Main Span
	L1	L5	L1+L5	L2	L4	L1+L4	L3
Length, FT	289	237	526	528	528	1056	179.5
Area, SF	6711	5679	12390	34848	34848	69696	11847
Unit Cost, $/SF	$50			$135			$1,626
Cost	$619,500			$9,408,960			$19,260,372
Total Cost	**$29,288,832**						

1235.5

	Mid Level Alternative						
	Walls			Approaches			Main Span
	M1	M5	M1+M5	M2	M4	M1+M4	M3
Length, FT	389	335	724	660	660	1320	179.5
Area, SF	12788	10164	22952	43560	43560	87120	11847
Unit Cost, $/SF	$50			$155			$1,657
Cost	$1,147,600			$13,503,600			$19,634,372
Total Cost	**$34,285,572**						

1499.5

	High Level Alternative						
	Walls			Approaches			Main Span
	H1	H5	H1+H5	H2	H4	H1+H4	H3
Length, FT	463	462	925	1188	1188	2376	150
Area, SF	14138	14111	28249	78408	78408	156816	9900
Unit Cost, $/SF	$50			$185			$185
Cost	$1,412,450			$29,010,960			$1,831,500
Total Cost	**$32,254,910**						

2526

	Relief Bridge			
	Walls			Bridge
	Wall 1	Wall 2	W1+W2	L
Length, FT	168	214	382	432
Area, SF	3958	4906	8864	28512
Unit Cost, $/SF	$50			$135
Cost	$443,200			$3,849,120
Total Cost	**$4,292,320**			

Rehabilitation of Existing Structure
75 Year Life

Cost Item	Work Task	Units	Quantity	Unit Cost	Cost
Foundation					
Piles - bascule Pier	Repairs	lot	1	$2,000,000	$2,000,000
Pier Cap	Misc concrete repairs	cu yds	20	$3,500	$70,000
Piles - rest pier	Repairs	lot	1	$750,000	$750,000
Pier Cap (rest Pier)	Misc concrete repairs	cu yds	10	$3,500	$35,000
Bascule Piers	Misc concrete repairs	cu yds	50	$3,500	$175,000
Fender System	Replace	lot	1	$1,750,000	$1,750,000
Bacule Leaves	Remove and rehabilitate	lot	2	$2,000,000	$4,000,000
Girders					$0
Stringers					$0
Floor beams					$0
Counterweights	Misc concrete repairs	cu yds	10	$3,500	$35,000
Deck - Open grid	Replace	sq yds	380	$400	$152,000
Deck - Filled grid	N/A	sq yds	260	$450	$117,000
Side walk	Rehabilitate	sq yds	200	$200	$40,000
Bike Path	N/A	sq yds	0		$0
Railing	Replace	lin ft	101	$150	$15,150
Barrier Curb	N/A	lin ft	0		$0
Trunions/Bearings	Rehabilitate	each	4	$100,000	$400,000
Operator House	Rehabilitate	lot	1	$250,000	$250,000
Span/Tail Locks	Replace	each	2	$250,000	$500,000
Operating Machinery	Replace	each	2	$3,000,000	$6,000,000
Electrical Power feed	Replace	lot	1	$750,000	$750,000
Bridge Control System	Replace	lot	1	$750,000	$750,000
Traffic Gates and Signals	Replace	each	4	$100,000	$400,000
Bridge Lighting	Rehabilitate	lot	1	$75,000	$75,000
Submarine Cable	Replace	lot	1	$500,000	$500,000
Standby Generator	Replace	lot	1	$175,000	$175,000
					$18,939,150

Low level Bascule Bridge 21 feet underclearance
100 foot navigation channel

Cost Item	Quantity	Units	Unit Cost	Cost	Cost Basis	Comments	
Foundation							
Bascule Pier Piles	3600	LF	$625.00	$2,250,000.00			
Bascule Pier Footing	1800	CY	$600.00	$1,080,000.00			
Rest Pier Piles	300	LF	$625.00	$187,500.00			
Pile Cap (rest pier)	200	CY	$600.00	$120,000.00			
Bascule Piers	2820	CY	$800.00	$2,256,000.00			
Fender System	1	lot	$800,000.00	$800,000.00			
Bacule Leaves				$0.00			
Girders	435000	lbs	$2.25	$978,750.00			
Stringers	107640	lbs	$1.75	$188,370.00			
Floor Beams	37360	lbs	$1.95	$72,852.00			
Counterweights	765	CY	$1,000.00	$765,000.00			
Deck - open grid	8580	SF	$40.00	$343,200.00			
Deck - Filled grid	1520	SF	$80.00	$121,600.00			
Sidewalk (FRP PL)	780	SF	$15.00	$11,700.00			
Bike Path (FRP PL)	1560	SF	$15.00	$23,400.00			
Seal Concrete		sq yd					
Railing	370	lin ft	$100.00	$37,000.00			
Barrier Curb	340	lin ft	$250.00	$85,000.00			
Trunions/Bearings	2	lot	$500,000.00	$1,000,000.00			
Operator House	100	cu yd	$1,750.00	$175,000.00			
Operator House Architectural	1	lot	$350,000.00	$350,000.00			
Span/Tail Locks	2	lot	$250,000.00	$500,000.00			
Operating Machinery	1	lot	$3,500,000.00	$3,500,000.00			
Electrical Power feed	1	lot	$750,000.00	$750,000.00			
Bridge Control System	1	lot	$750,000.00	$750,000.00			
Traffic Gates and Signals	6	lot	$50,000.00	$300,000.00			
Bridge Lighting	1	lot	$15,000.00	$15,000.00			
Submarine cable (lights only)	1	lot	$350,000.00	$350,000.00			
Standby Generator	1	lot	$250,000.00	$250,000.00			
Surveying & Permitting	1	lot	$0.00	$0.00			
Cofferdams(for Construction)	1	lot	$1,250,000.00	$1,250,000.00			
Dewatering	1	lot	$750,000.00	$750,000.00			
Demolition of Existing Span	1	lot	$0.00	$0.00			
				$19,260,372.00		Cost per SF	**$ 1,716.61**

Mid Level Bascule Bridge 40 feet Underclearance
100 foot navigation channel

Cost Item	Quantity	Units	Unit Cost	Cost
Foundation				
Bascule Pier Piles -	3600	LF	$625.00	$2,250,000.00
Bascule Pier Footing	1800	CY	$600.00	$1,080,000.00
Piles - rest pier	300	LF	$625.00	$187,500.00
Pier Cap (rest Pier)	200	CY	$600.00	$120,000.00
Bascule Piers	3600	cu yd	$800.00	$2,880,000.00
Fender System	1	lot	$800,000.00	$800,000.00
Bacule Leaves		lot		$0.00
Girders	435000	lbs	$2.25	$978,750.00
Stringers	107640	lbs	$1.75	$188,370.00
Floor beams	37360	lbs	$1.95	$72,852.00
Counterweights	765	CY	$1,000.00	$765,000.00
Deck - open grid	8580	SF	$40.00	$343,200.00
Deck - Filled grid	1520	SF	$80.00	$121,600.00
Sidewalk (FRP PL)	780	SF	$15.00	$11,700.00
Bike Path (FRP PL)	1560	SF	$15.00	$23,400.00
Railing	370	lin ft	$100.00	$37,000.00
Barrier Curb	340	lin ft	$250.00	$85,000.00
Seal Concrete				
Trunions/Bearings	2	lot	$500,000.00	$1,000,000.00
Operator House	100	cu yd	$1,750.00	$175,000.00
Operator House Architectural	1	lot	$350,000.00	$350,000.00
Span/Tail Locks	2	lot	$250,000.00	$500,000.00
Operating Machinery	1	lot	$3,500,000.00	$3,500,000.00
Electrical Power feed	1	lot	$750,000.00	$750,000.00
Bridge Control System	1	lot	$750,000.00	$750,000.00
Traffic Gates and Signals	6	lot	$50,000.00	$300,000.00
Bridge Lighting	1	lot	$15,000.00	$15,000.00
Submarine Cable (lights only)	1	lot	$350,000.00	$350,000.00
Standby Generator	1	lot	$250,000.00	$250,000.00
Surveying & Permitting	1	lot	$0.00	$0.00
Cofferdams(for Construction)	1	lot	$1,000,000.00	$1,000,000.00
Dewatering	1	lot	$750,000.00	$750,000.00
Demolition of Existing Span	1	lot	$0.00	$0.00
				$19,634,372.00

Cost per SF	**$ 1,749.94**

Bridge Operating Costs
Base Year

Cost Item (annual)	Existing Bridge	Low Level Bascule	Mid Level Bascule	Comments
Operating Cost				
Bridge Operators	$150,000	$150,000	$150,000	County Contract
Electrical Power	$1,695	$1,946	$1,781	
Fuel	$507	$1,350	$1,350	
Total Operating Costs	$152,202	$153,296	$153,131	
Maintenance Costs				
Routine Maintenance (lubrication, etc)	$11,400	$11,400	$11,400	
Routine Repairs				
Traffic Gates	$11,200	$11,200	$11,200	
Lamps	$5,200	$5,200	$5,200	
Limit Switch adjustment	$12,600	$12,600	$12,600	
Painting and other maintenance repairs	$10,800	$10,800	$10,800	
Total Maintenance Costs	$51,200	$51,200	$51,200	

Assumptions
Operators are present 24/7
Exisitng and Low level bridge open approximately 3600 times per year
The mid level bascule bridge will open 60% as the low level bridge (3600 x 0.60 = 2160)
The Bridge is Lubricated monthly and the generator is exercised for 1 hour
Traffic gate arms are replaced annually
A seven minute opening cycle is assumed
Roadway Lighting operates for 10 hours per day year round

Cost reduction	current	25 year cost	Reduction to 68%	25 year cost
Operators	150,000.00	4,580,000.00	102,000.00	3,114,400.00
Electrical Power for Existing Bridge	$1,694.94		$1,152.56	
Electrical Power for Low Span Bascule	$1,946.10		$1,323.35	
Electrical Power for Mid Span Bascule	$1,780.86		$1,210.98	

Base Year Calculations
Electrical Power Consumption

Bascule Bridge operating power requirements
opening x 7 minutes cycle time x KW (motor loads) x 1hr/60 minutes = KWH

	# openings	Drive Motor s	KWH	$/KWH	$
Existing	3600	42	2698.92	$ 0.06	$162
Low level	3600	150	6885	$ 0.06	$413
Mid Level	2160	150	6885	$ 0.06	$248

Bridge Lighting Loads

	# Lamps	Unit KW Cons	Total Annual*	$/KWH	$
Roadway	20	0.15	3650	$ 0.06	$657
Pier Lighting	20	0.1	3650	$ 0.06	$438
Misc Lighting	20	0.1	3650	$ 0.06	$438
					$1,533

* Total Annual = 10 hrs x 365 days = 3650 hours

	Bridge Operation	Lighting	Total
Existing	$162	$1,533	$1,695
Low Level	$413	$1,533	$1,946
Mid Level	$248	$1,533	$1,781

Generator Fuel Consumption

	Generator size	Gal/Hr	$/Gal	Hrs/year	$	
Existing	63	8.45	$ 3.00	20	$507	assume 100kw generator
Low Level	275	22.5	$ 3.00	20	$1,350	assume 275 kw generator
Mid Level	275	22.5	$ 3.00	20	$1,350	assume 275 kw generator

Hrs/Year = 1 hour per month plus 8 hours misc = 20

Routine Maintenance

2 men 1 day per month = 192 hours at $50/hr =		$9,600
Assume $150 Lubricants per month x 12 months =		$1,800
		$11,400

Routine Repairs

Traffic gate Arm Replacement			
Cost of Arm ($2000 material)		$2,000	
Labor to change (2 men 1 day = 16 hours at $50/hr)		$800	
		$2,800	per occurance
	x 4 per bridge	$11,200	
Lamp Replacement			
Roadway Lights			
Lamps ($100 each) - assume 2 year life		$1,000	
Labor (2 men 2 hours/lamp = 4 hours at $50/hr)		$2,000	
		$3,000	
Other Lamps			
Lamps $5 each - assume 1 year life		$200	
Labor 1 man 1 hour each at $50/hr		$2,000	
		$2,200	
	Total lamp replacement costs =	$5,200	
Limit Switch Adjustments/Misc repairs			
Labor (2 men , 1 day per month at $50/hr)		$9,600	
Materials ($250/month)		$3,000	
	Total LS and Misc Elect Repairs	$12,600	
Painting and Misc Repairs			
Labor (2 men, 1 day per month at $50/hr)		$9,600	
Materials ($100/month)		$1,200	
		$10,800	

Maintenance Costs - Fixed Bridge

Alternates	Existing		Low Level		Mid Level		High Level		West (Relief)	
	Length (ft)	Area (SF)	Length (ft)	Area (SF)	Length (ft)	Area (SF)	Length (ft)	Area (SF)	Length (ft)	Area (SF)
	1056	69696	1056	69696	1320	87120	2526	166716	432	28512
	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost	Cost/ sq. ft	Cost
Total Cost	$0.04	$2,788	$0.04	$2,788	$0.04	$3,485	$0.04	$6,669	$0.04	$1,140

Demolition Costs

	Length	Width	Area	Unit Cost	Total
Main Bridge - appr	960	39.92	38323.2	$50	$1,916,160
Main Bridge - bascule	230.5	39.92	9201.56	$70	$644,109
					$2,560,269
Relief Bridge	384	39.92	15329.3	$50	**$766,464**

BID OPENING DATE:	October 19, 2006			(Engineer's Estimate)		(1st Low Bid)		(2nd Low Bid)		(Engineer's Estimate)	
			Belleair Relief Bridge Costs	2006 HDR Engineering, Inc.		Misener Marine Construction Inc.		PCL Civil Constructors, Inc.		2009 HDR Engineering, Inc.	
ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
STRUCTURE											
F0400-2-10	81.36	CY	CONC CLASS II (APPROACH SLABS)	$ 430.00	$34,985	$ 320.00	$26,035	$ 250.00	$20,340	$ 287.19	$ 23,366
F0400-4-4	605.00	CY	CONC CLASS IV (SUPERSTRUCTURE)	$ 1,100.00	$665,500	$ 885.00	$535,425	$ 1,000.00	$605,000	$ 847.21	$ 512,562
F0400-4-5	44.60	CY	CONC CLASS IV (SUBSTRUCTURE)	$ 1,085.00	$48,391	$ 1,778.00	$79,299	$ 1,500.00	$66,900	$ 737.95	$ 32,913
F0400-4-25	168.70	CY	CONC CLASS IV (MASS)(SUBSTRUCTURE)	$ 700.00	$118,090	$ 1,362.12	$229,790	$ 1,350.00	$227,745	$ 1,072.00	$ 180,846
F0400-9	1604.00	SY	BRIDGE FLOOR GROOVING	$ 4.39	$7,042	$ 5.59	$8,966	$ 2.50	$4,010	$ 5.54	$ 8,886
F0400-147	14.00	CF	COMPOSITE NEOPRENE PADS	$ 784.00	$10,976	$ 1,000.00	$14,000	$ 900.00	$12,600	$ 863.13	$ 12,084
F0415-1-4	153206.00	LB	REINF STEEL (SUPERSTRUCTURE)	$ 1.00	$153,206	$ 1.15	$176,187	$ 1.00	$153,206	$ 1.03	$ 157,802
F0415-1-5	39501.00	LB	REINF STEEL (SUBSTRUCTURE)	$ 1.00	$39,501	$ 0.95	$37,526	$ 1.00	$39,501	$ 1.01	$ 39,896
F0415-1-9	28012.00	LB	REINF STEEL (APPROACH SLABS)	$ 1.00	$28,012	$ 1.00	$28,012	$ 1.00	$28,012	$ 1.03	$ 28,852
F0450-1-3	2574.00	LF	PRESTRESSED BEAM (TYPE IV)	$ 200.00	$514,800	$ 249.50	$642,213	$ 160.00	$411,840	$ 203.00	$ 522,522
F0455-88-3	1540.00	LF	DRILLED SHAFT (36" DIA)	$ 275.00	$423,500	$ 269.82	$415,523	$ 300.00	$462,000	$ 270.00	$ 415,800
F0455-107-3	359.00	LF	DRILLED SHAFT CASING (36" DIA)	$ 165.00	$59,235	$ 90.32	$32,425	$ 125.00	$44,875	$ 192.02	$ 68,935
F0455-122-3	1448.00	LF	EXCAVATION UNCLASSIFIED SHAFT (36" DIA)	$ 50.00	$72,400	$ 155.24	$224,788	$ 175.00	$253,400	$ 50.00	$ 72,400
F0455-142	2.00	EA	CROSSHOLE SONIC LOGGING	$ 1,600.00	$3,200	$ 2,452.45	$4,905	$ 1,000.00	$2,000	$ 5,302.12	$ 10,604
F0460-70-3	768.00	LF	ALUMINUM RAILINGS (TRIPLE RAIL)	$ 75.00	$57,600	$ 35.00	$26,880	$ 55.00	$42,240	$ 48.95	$ 37,594
F0514-71-2	745.00	SY	PLASTIC FILTER FABRIC (STABILIZATION)	$ 5.00	$3,725	$ 6.00	$4,470	$ 5.00	$3,725	$ 2.85	$ 2,123
F0521-5-1	768.00	LF	CONCRETE TRAFFIC RAILING BARRIER BRIDGE (32" F-SHAPE)	$ 100.00	$76,800	$ 75.00	$57,600	$ 65.00	$49,920	$ 100.71	$ 77,345
F0530-3-3	958.00	T	RIPRAP (RUBBLE)	$ 64.00	$61,312	$ 120.00	$114,960	$ 80.00	$76,640	$ 86.01	$ 82,398
F0530-74	183.00	T	BEDDING STONE	$ 64.00	$11,712	$ 120.00	$21,960	$ 60.00	$10,980	$ 88.98	$ 16,283
			STRUCTURE SUBTOTAL	$2,389,986		$2,680,963		$2,514,934		$2,303,212	
		324	Bridge length evaluated (ft)								
		65	Bridge width evaluated (ft)								
		21060	Bridge area evaluated (ft^2)								
			Cost per sq ft of deck:	$113		$127		$119		$109	

BID OPENING DATE:	October 19, 2006			(Engineer's Estimate)		(1st Low Bid)		(2nd Low Bid)		(Engineer's Estimate)	
			Belleair Main Bridge Costs	2006 HDR Engineering, Inc.		Misener Marine Construction Inc.		PCL Civil Constructors, Inc.		2009 HDR Engineering, Inc.	
ITEM NO.	QUANTITY	UNIT	ITEM DESCRIPTION	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount	Unit Price	Amount
STRUCTURE											
F0102-90	912.00	DAY	BRIDGE OPERATOR	$ 360.00	$328,320	$ 345.00	$314,640	250.00	$228,000	$ 360.00	$328,320
F0102-91	912.00	DAY	UTILITY BOAT	$ 110.00	$100,320	$ 103.26	$94,173	100.00	$91,200	$ 110.00	$100,320
F0102-100	1	LS	BASCULE BRIDGE PREVENTIVE MAINTENANCE	LUMP SUM	$40,000	LUMP SUM	$32,000	LUMPSUM	$30,000	LUMP SUM	$30,000
F0110-3	58650.00	LS	STRUCTURE REMOVAL OF EXISTING - 58650 SF	$ 35.00	$2,052,750	LUMP SUM	$2,465,281	LUMP SUM	$1,200,000	$ 18.49	$1,084,439
F0110-73	2415.00	LF	EXISTING BULKHEAD REMOVAL	$ 55.00	$132,825	$ 26.01	$62,814	45.00	$108,675	$ 100.00	$241,500
F0141-70	6.00	EA	SETTLEMENT PLATE ASSEMBLY	$ 750.00	$4,500	$ 1,800.00	$10,800	1,500.00	$9,000	$ 550.00	$3,300
F0400-2-10	322.70	CY	CONC CLASS II (APPROACH SLABS)	$ 430.00	$138,761	$ 320.00	$103,264	250.00	$80,675	$ 287.19	$92,676
F0400-3-20	594.10	CY	CLASS III CONCRETE (SEAL)	$ 700.00	$415,870	$ 286.65	$170,299	3,000.00	$1,782,300	$ 400.00	$237,640
F0400-4-4	4773.50	CY	CONC CLASS IV (SUPERSTRUCTURE)	$ 1,100.00	$5,250,850	$ 885.00	$4,224,548	1,000.00	$4,773,500	$ 847.21	$4,044,157
F0400-4-5	130.40	CY	CONC CLASS IV (SUBSTRUCTURE)	$ 1,085.00	$141,484	$ 1,778.00	$231,851	1,500.00	$195,600	$ 737.95	$96,229
F0400-4-8	439.40	CY	CONC CLASS IV (BULKHEAD)	$ 1,000.00	$439,400	$ 1,116.57	$490,621	1,500.00	$659,100	$ 913.59	$401,431
F0400-4-11	83.70	CY	CONC CLASS IV (RETAINING WALL)	$ 884.00	$73,991	$ 825.00	$69,053	1,500.00	$125,550	$ 583.16	$48,810
F0400-4-25	6988.50	CY	CONC CLASS IV (MASS)(SUBSTRUCTURE)	$ 700.00	$4,891,950	$ 1,362.12	$9,519,176	1,350.00	$9,434,475	$ 1,072.00	$7,491,672
F0400-9	18846.00	SY	BRIDGE FLOOR GROOVING	$ 4.39	$82,734	$ 5.59	$105,349	2.50	$47,115	$ 5.54	$104,407
F0400-8-4	8608.70	CY	CONC CLASS V (SUPERSTRUCTURE)	$ 1,100.00	$9,469,570	$ 800.00	$6,886,960	1,000.00	$8,608,700	$ 1,100.00	$9,469,570
F0400-147	196.30	CF	COMPOSITE NEOPRENE PADS	$ 784.00	$153,899	$ 1,000.00	$196,300	900.00	$176,670	$ 863.13	$169,432
F0415-1-4	1266041.00	LB	REINF STEEL (SUPERSTRUCTURE)	$ 1.00	$1,266,041	$ 1.15	$1,455,947	1.00	$1,266,041	$ 1.03	$1,304,022
F0415-1-5	1424047.00	LB	REINF STEEL (SUBSTRUCTURE)	$ 1.00	$1,424,047	$ 0.95	$1,352,845	1.00	$1,424,047	$ 1.01	$1,438,287
F0415-1-9	58653.00	LB	REINF STEEL (APPROACH SLABS)	$ 1.00	$58,653	$ 1.00	$58,653	1.00	$58,653	$ 1.03	$60,413
F0450-1-3	2574.00	LF	PRESTRESSED BEAM (TYPE IV)	$ 200.00	$514,800	$ 249.50	$642,213	160.00	$411,840	$ 203.00	$522,522
F0450-1-278	12876.00	LF	PRESTRESSED BEAM (FLORIDA BULB T 78")	$ 300.00	$3,862,800	$ 415.00	$5,343,540	300.00	$3,862,800	$ 220.00	$2,832,720
F0450-1-378	1204.00	LF	PRESTRESSED BEAM (BULB T 78" HAUNCHED MODIFIED)	$ 550.00	$662,200	$ 1,280.00	$1,541,120	1,200.00	$1,444,800	$ 550.00	$662,200
F0455-34-2	8221.00	LF	PRESTRESSED CONCRETE PILING (14" SQ)	$ 66.00	$542,586	$ 41.27	$339,281	40.00	$328,840	$ 60.00	$493,260
F0455-88-3	1540.00	LF	DRILLED SHAFT (36" DIA)	$ 275.00	$423,500	$ 269.82	$415,523	300.00	$462,000	$ 270.00	$415,800
F0455-88-5	5269.00	LF	DRILLED SHAFT (48" DIA)	$ 360.00	$1,896,840	$ 267.11	$1,407,403	400.00	$2,107,600	$ 380.15	$2,003,010
F0455-88-6	1148.00	LF	DRILLED SHAFT (60" DIA)	$ 520.00	$596,960	$ 404.65	$464,538	800.00	$918,400	$ 482.00	$553,336
F0455-107-3	359.00	LF	DRILLED SHAFT CASING (36" DIA)	$ 165.00	$59,235	$ 90.32	$32,425	125.00	$44,875	$ 192.02	$68,935
F0455-107-5	646.00	LF	DRILLED SHAFT CASING (48" DIA)	$ 235.00	$151,810	$ 120.12	$77,598	175.00	$113,050	$ 146.67	$94,749
F0455-107-6	504.00	LF	DRILLED SHAFT CASING (60" DIA)	$ 320.00	$161,280	$ 150.00	$75,600	200.00	$100,800	$ 375.00	$189,000
F0455-111	2689.00	LF	CORE (SHAFT EXCAVATION)	$ 50.00	$134,450	$ 166.57	$447,907	55.00	$147,895	$ 50.00	$134,450
F0455-122-3	1448.00	LF	EXCAVATION UNCLASSIFIED SHAFT (36" DIA)	$ 50.00	$72,400	$ 155.24	$224,788	175.00	$253,400	$ 50.00	$72,400
F0455-122-5	5570.00	LF	EXCAVATION UNCLASSIFIED SHAFT (48" DIA)	$ 100.00	$557,000	$ 212.73	$1,184,906	275.00	$1,531,750	$ 175.00	$974,750
F0455-122-6	1054.00	LF	EXCAVATION UNCLASSIFIED SHAFT (60" DIA)	$ 160.00	$168,640	$ 213.44	$224,966	350.00	$368,900	$ 332.18	$350,118
F0455-133-2	3335.00	SF	SHEET PILING STEEL (TEMPORARY - CRITICAL)	$ 7.00	$23,345	$ 15.00	$50,025	12.00	$40,020	$ 15.21	$50,725
F0455-133-3	120772.00	SF	SHEET PILING STEEL (PERMANENT) (FURNISH & INSTALL)	$ 35.38	$4,273,376	$ 32.00	$3,864,704	20.00	$2,415,440	$ 34.25	$4,136,441
F0455-142	17.00	EA	CROSSHOLE SONIC LOGGING	$ 1,600.00	$27,200	$ 2,452.45	$41,692	1,000.00	$17,000	$ 5,302.12	$90,136
F0459-71	108.00	SY	POLYETHENE SHEETING	$ 3.88	$419	$ 35.58	$3,843	15.00	$1,620	$ 2.21	$239
F0460-7-4	517.00	LF	EXPANSION JOINT SEAL (STRIP ELASTOMERIC)	$ 150.00	$77,550	$ 305.00	$157,685	450.00	$232,650	$ 150.00	$77,550
F0460-70-2	1740.00	LF	ALUMINUM RAILINGS (DOUBLE RAIL)	$ 75.00	$130,500	$ 29.00	$50,460	50.00	$87,000	$ 35.83	$62,344
F0460-70-3	7559.00	LF	ALUMINUM RAILINGS (TRIPLE RAIL)	$ 75.00	$566,925	$ 35.00	$264,565	55.00	$415,745	$ 48.95	$370,013
F0460-92-1	122.00	LF	MODULAR EXPANSION ASSEMBLY (6" MOVEMENT)	$ 500.00	$61,000	$ 1,200.00	$146,400	1,100.00	$134,200	$ 500.00	$61,000
F0462-2-11	427493.00	LB	POST TENSION TENDONS (SUPERSTRUCTURE STRAND)	$ 3.25	$1,389,352	$ 5.00	$2,137,465	3.00	$1,282,479	$ 6.00	$2,564,958
F0470-1	21.20	MB	TREATED TIMBER, STRUCTURAL	$ 6,000.00	$127,200	$ 5,981.42	$126,806	13,000.00	$275,600	$ 15,000.00	$318,000
F0506-2	2614.00	LF	BRIDGE DRAINAGE PIPING	$ 58.00	$151,612	$ 60.00	$156,840	40.00	$104,560	$ 204.43	$534,380
F0506-3	12.00	EA	BRIDGE DRAINS	$ 2,500.00	$30,000	$ 2,700.00	$32,400	2,700.00	$32,400	$ 861.01	$10,332
F0514-71-2	745.00	SY	PLASTIC FILTER FABRIC (STABILIZATION)	$ 5.00	$3,725	$ 6.00	$4,470	5.00	$3,725	$ 2.85	$2,123
F0521-5-1	7558.00	LF	CONCRETE TRAFFIC RAILING BARRIER BRIDGE (32" F-SHAPE)	$ 100.00	$755,800	$ 75.00	$566,850	65.00	$491,270	$ 100.71	$761,166
F0521-5-4	39.00	LF	CONCRETE TRAFFIC RAILING BARRIER BRIDGE (32" VERTICAL FACE)	$ 100.00	$3,900	$ 85.00	$3,315	100.00	$3,900	$ 94.00	$3,666
F0521-5-8	384.00	LF	CONCRETE TRAFFIC RAILING-BRIDGE(RETROFIT-VERTICAL FACE)	$ 175.00	$67,200	$ 80.00	$30,720	80.00	$30,720	$ 103.41	$39,709
F0521-6-1	7558.00	LF	CONCRETE PARAPET (PEDEST/BICYCLE)	$ 75.00	$566,850	$ 54.00	$408,132	70.00	$529,060	$ 83.21	$628,901
F0521-6-3	1515.00	LF	CONCRETE PARAPET (PEDEST/BICYCLE W/ SIDEWALK)	$ 150.00	$227,250	$ 35.00	$53,025	80.00	$121,200	$ 206.00	$312,090
F0521-8-3	1715.00	LF	CONCRETE TRAFFIC RAILING BARRIER (RW MOUNTED W/ SLEEPER SLAB 32" Vert.)	$ 150.00	$257,250	$ 210.00	$360,150	65.00	$111,475	$ 204.77	$351,181
F0530-3-3	958.10	T	RIPRAP (RUBBLE)	$ 64.00	$61,318	$ 120.00	$114,972	80.00	$76,648	$ 86.01	$82,406
F0530-74	182.80	T	BEDDING STONE	$ 64.00	$11,699	$ 120.00	$21,936	60.00	$10,968	$ 88.98	$16,266
F0531-1	2186.00	SY	MARINE MATTRESS	$ 108.00	$236,088	$ 200.00	$437,200	75.00	$163,950	$ 108.00	$236,088
F0532-1	1000.00	SY	ARTICULATED CONCRETE BLOCK	$ 125.00	$125,000	$ 160.00	$160,000	100.00	$100,000	$ 125.00	$125,000
F0548-12	15561.00	SF	RETAINING WALL SYSTEM (PERMANENT)	$ 35.00	$544,635	$ 65.00	$1,011,465	40.00	$622,440	$ 25.97	$404,119
F0548-13	1652.00	SF	RETAINING WALL SYSTEM (TEMPORARY)		$0		$0		$0		$0
F0548-14	10504.00	SF	RETAINING WALL SYSTEM (PERMANENT - WIDENING)	$ 56.00	$588,224	$ 90.00	$945,360	60.00	$630,240	$ 126.66	$1,330,437
F0560-1	1136.00	TN	PAINTING STRUCTURAL STEEL (PILING)		$0		$0		$0		$0
F0563-3	22819.00	SY	ANTI-GRAFFITI COATING	$ 1.25	$28,524	$ 2.00	$45,638	6.00	(b) $136,914	$ 0.70	$15,973
F0521-5-8	384.00	LF	CONCRETE TRAFFIC RAILING -BRIDGE (RETROFIT- VERTICAL FACE)		$0		$0		$0		$0
			STRUCTURE SUBTOTAL	$46,606,409		$51,462,496		$50,467,475		$48,699,120	
			Relief Bridge Cost	-$2,389,986		-$2,680,963		-$2,514,934		-$2,303,212	
			STRUCTURE SUBTOTAL	$44,216,422		$48,781,533		$47,952,541		$46,395,908	
		3350	Bridge length evaluated (ft)								
		65	Bridge width evaluated (ft)								
		217750	Bridge area evaluated (ft^2)								
			Cost per sq ft of deck:	$203		$224		$220		$213	

Bridge Costs

A highway bridge is defined as any span of 20 feet or more in length. Not all bridges go over bodies of water. Overpasses and ramps that are part of highway interchanges are bridges too. A large proportion of the statewide highway construction budget, usually in excess of 20%, is devoted to bridge construction. Typically, the FDOT completes between 100 and 200 bridges each year. As a rule of thumb, bridges from 20 to 45 feet in length are short span bridges. Bridges from 45 to 150 feet are medium span bridges, and those extending over 150 feet are long span bridges.

After several years of rapid increases, bridge construction costs mostly stopped going up in 2008, with average costs for several categories actually decreasing. This is consistent with overall trends for highway construction and contracting.

New Construction

(Cost per Square Foot)

Bridge Type	Low	High
Short Span Bridges:		
Reinforced Concrete Flat Slab Simple Span*	$122	$160
Pre-cast Concrete Slab Simple Span*	$115	$200
Reinforced Concrete Flat Slab Continuous Span*	NA	NA
Medium and Long Span Bridges:		
Concrete Deck/ Steel Girder - Simple Span*	$110	$135
Concrete Deck/ Steel Girder - Continuous Span*	$125	$155
Concrete Deck/ Pre-stressed Girder - Simple Span	$75	$140
Concrete Deck/ Pre-stressed Girder - Continuous Span	$95	$155
Concrete Deck/ Steel Box Girder – Span Range from 150' to 280' (for curvature, add a 15% premium)	$145	$175
Segmental Concrete Box Girders - Cantilever Construction, Span Range from 150' to 280'	$145	$175
Movable Bridge - Bascule Spans and Piers	$1,800	$2,000
* Increase the cost by twenty percent for phased construction.		

Bridge Demolition and Widening
(Cost per Square Foot)

Bridge Demolition:	**Low**	**High**
Typical Bridge Removal	$20	$50
Movable Span Bridge (Bascule)	$55	$70
Project Type:		
Bridge Widening Construction	$95	$175

CONTACT:

Martin Markovich, Office of Policy Planning (850) 414-4918, martin.markovich@dot.state.fl.us

Roadway Cost Per Centerline Mile
Revised June 2009

	Construction Cost From LRE	MOT*	Mobilization*	Subtotal	Scope Contingency (25%)	Total Construction Cost	PE Design (15%)	CEI (15%)	Total Project Cost**
Rural Arterial									
New Construction (2-Lane Roadway) with 5' Paved Shoulders	$4,524,370	$452,437	$497,681	$5,474,488	$1,368,622	**$6,843,110**	$1,026,466	$1,026,466	**$8,896,042**
New Construction (4-Lane Roadway) with 5' Paved Shoulders	$6,991,163	$699,116	$769,028	$8,459,307	$2,114,827	**$10,574,133**	$1,586,120	$1,586,120	**$13,746,373**
New Construction (6-Lane Roadway) with 5' Paved Shoulders	$8,805,269	$880,527	$968,580	$10,654,375	$2,663,594	**$13,317,969**	$1,997,695	$1,997,695	**$17,313,359**
Milling and Resurfacing (4-Lane Roadway) with 5' Paved Shoulders	$1,180,057	$118,006	$129,806	$1,427,869	$356,967	**$1,784,836**	$267,725	$267,725	**$2,320,286**
Milling and Resurfacing (6-Lane Roadway) with 5' Paved Shoulders	$1,715,672	$171,567	$188,724	$2,075,963	$518,991	**$2,594,953**	$389,243	$389,243	**$3,373,439**
Add Lanes (2 to 4 Lanes) with 5' Paved Shoulders (Includes milling and resurfacing of existing pavement)	$4,829,198	$482,920	$531,212	$5,843,329	$1,460,832	**$7,304,162**	$1,095,624	$1,095,624	**$9,495,410**
Add Lanes (4 to 6 Lanes) with 5' Paved Shoulders (Includes milling and resurfacing of existing pavement)	$5,297,756	$529,776	$582,753	$6,410,285	$1,602,571	**$8,012,856**	$1,201,928	$1,201,928	**$10,416,713**
Add Lanes (4 to 8 Lanes) with 5' Paved Shoulders (Includes milling and resurfacing of existing pavement)	$7,070,561	$707,056	$777,762	$8,555,379	$2,138,845	**$10,694,224**	$1,604,134	$1,604,134	**$13,902,491**
Add Lanes (6 to 8 Lanes) with 5' Paved Shoulders (Includes milling and resurfacing of existing pavement)	$6,666,176	$666,618	$733,279	$8,066,073	$2,016,518	**$10,082,592**	$1,512,389	$1,512,389	**$13,107,369**
Add 1 Through Lane on Inside (To Existing) with 5' Paved Shoulders	$1,148,617	$114,862	$126,348	$1,389,826	$347,457	**$1,737,283**	$260,592	$260,592	**$2,258,468**
Add 1 Through Lane on Outside (To Existing) with 5' Paved Shoulders	$1,765,466	$176,547	$194,201	$2,136,213	$534,053	**$2,670,267**	$400,540	$400,540	**$3,471,347**
Add 300' Exclusive Left Turn Lane	$54,198	$8,130	$9,349	$71,677	$17,919	**$89,596**	$13,439	$13,439	**$116,475**
Add 300' Exclusive Right Turn Lane	$132,555	$19,883	$22,866	$175,303	$43,826	**$219,129**	$32,869	$32,869	**$284,868**
Urban Arterial									
New Construction (2-Lane Roadway) with 5' Sidewalk, and Curb & Gutter	$6,095,198	$609,520	$670,472	$7,375,189	$1,843,797	**$9,218,987**	$1,382,848	$1,382,848	**$11,984,683**
New Construction (4-Lane Roadway) with 5' Sidewalk, and Curb & Gutter	$8,537,780	$853,778	$939,156	$10,330,714	$2,582,679	**$12,913,393**	$1,937,009	$1,937,009	**$16,787,411**
New Construction (6-Lane Roadway) with 5' Sidewalk, and Curb & Gutter	$10,447,044	$1,044,704	$1,149,175	$12,640,924	$3,160,231	**$15,801,154**	$2,370,173	$2,370,173	**$20,541,501**
Milling and Resurfacing (4-Lane Roadway) with 5' Sidewalk, and Curb & Gutter	$1,259,576	$125,958	$138,553	$1,524,087	$381,022	**$1,905,109**	$285,766	$285,766	**$2,476,641**
Milling and Resurfacing (6-Lane Roadway) with 5' Sidewalk, and Curb & Gutter	$1,784,574	$178,457	$196,303	$2,159,335	$539,834	**$2,699,169**	$404,875	$404,875	**$3,508,920**
Add Lanes (2 to 4 Lanes) with 5' Sidewalk, and Curb & Gutter (Includes milling and resurfacing existing pavement)	$5,763,328	$576,333	$633,966	$6,973,627	$1,743,407	**$8,717,034**	$1,307,555	$1,307,555	**$11,332,144**
Add Lanes (4 to 6 Lanes) with 5' Sidewalk, and Curb & Gutter (Includes milling and resurfacing existing pavement)	$6,349,351	$634,935	$698,429	$7,682,715	$1,920,679	**$9,603,394**	$1,440,509	$1,440,509	**$12,484,412**
Add Lanes (4 to 8 Lanes) with 5' Sidewalk, and Curb & Gutter (Includes milling and resurfacing existing pavement)	$8,599,679	$859,968	$945,965	$10,405,612	$2,601,403	**$13,007,015**	$1,951,052	$1,951,052	**$16,909,120**
Add Lanes (6 to 8 Lanes) with 5' Sidewalk, and Curb & Gutter (Includes milling and resurfacing existing pavement)	$7,641,191	$764,119	$840,531	$9,245,841	$2,311,460	**$11,557,301**	$1,733,595	$1,733,595	**$15,024,491**
Add 1 Through Lane on Inside (To Existing) with 5' Sidewalk, and Curb & Gutter	$1,165,936	$116,594	$128,253	$1,410,782	$352,696	**$1,763,478**	$264,522	$264,522	**$2,292,521**
Add 1 Through Lane on Outside (To Existing) with 5' Sidewalk, and Curb & Gutter	$2,585,883	$258,588	$284,447	$3,128,918	$782,230	**$3,911,148**	$586,672	$586,672	**$5,084,492**
Add 300' Exclusive Left Turn Lane	$72,032	$10,805	$12,426	$95,263	$23,816	**$119,078**	$17,862	$17,862	**$154,802**
Add 300' Exclusive Right Turn Lane	$151,875	$22,781	$26,198	$200,855	$50,214	**$251,069**	$37,660	$37,660	**$326,390**

*** A 15% MOT and Mobilization factor was used for exclusive left and right turn lanes. A 10% factor was used for all other figures.**

**** Total cost shown is derived from a standard typical section. Costs will need to be adjusted to account for signals, bridges, or any additional item not deemed typical.**

Note:
1. Estimates were derived from FDOT LRE system
2. These figures exclude costs for intersections/interchanges, improvements to cross streets, bridges over 20', right-of-way, landscaping, ITS, and traffic signals.
3. The figures are based on market costs for Hillsborough County.
4. Costs shown are present day costs.
5. The costs developed for this report are not project-specific and should be used for preliminary estimating purposes only.

Roadway Cost Per Centerline Mile
Revised June 2009

	Construction Cost From LRE	MOT (10%)	Mobilization (10%)	Subtotal	Scope Contingency (25%)	Total Construction Cost	PE Design (15%)	CEI (15%)	Total Project Cost
Rural Arterial									
Add Lanes (4 to 6 Lanes) with 5' Paved Shoulders, 2 Traffic Signals, Highway Lighting, Fiber Based Communication Backbone, Widening 150' Low Level Bridge, and Milling & Resurfacing Existing 4 Lanes	$7,366,494	$736,649	$810,314	$8,913,457	$2,228,364	**$11,141,822**	$1,671,273	$1,671,273	**$14,484,368**
Urban Arterial									
Add Lanes (4 to 6 Lanes) with 5' Sidewalk, Bike Lanes, 2 Traffic Signals, Highway Lighting, Fiber Based Communication Backbone, Widening 150' Low Level Bridge, and Milling & Resurfacing Existing 4 Lanes	$7,650,770	$765,077	$841,585	$9,257,431	$2,314,358	**$11,571,789**	$1,735,768	$1,735,768	**$15,043,326**

Note:

1. **Estimates were derived from FDOT LRE system**
2. **These figures exclude costs for intersections/interchanges, cross street improvements, right-of-way, ITS, and landscaping.**
3. **The figures are based on market costs for Hillsborough County.**
4. **Costs shown are present day costs.**
5. **The costs developed for this report are not site-specific and should be used for preliminary estimating purposes only.**

Bridge Cost Per Square Foot
Revised June 2009

	Cost Per Square Foot
New Construction	
Low Level	$135
Mid Level	$155
High Level	$185
Overpass (Over Roadway)	$170
Bascule	$1,830
Pedestrian Overpass	$365
Widening	
Low Level	$165
Mid Level	$190
High Level	$220
Overpass (Over Roadway)	$200
Bridge Removal	
Concrete Bridge	$55

Note:
1. Figures are for construction costs per square foot of deck area.
2. All figures exclude costs for right-of-way, bridge approaches, and approach slabs.
3. Figures account for recent increases in concrete and steel, and the effects of labor and material shortages in the construction industry.
4. The costs developed for this report are not site-specific and should be used for preliminary estimating purposes only.

Other Roadway Related Costs
Revised June 2009

	Construction Cost From LRE	MOT*	Mobilization (15%)	Subtotal	Scope Contingency (25%)	Total Construction Cost	PE Design (15%)	CEI (15%)	Total Project Cost
Intersection Traffic Signalization (Mast Arm Assembly)**									
2-Lane Roadway Intersecting 2-Lane Roadway	$167,959	$25,194	$28,973	$222,126	$55,532	**$277,658**	$41,649	$41,649	**$360,955**
4-Lane Roadway Intersecting 4-Lane Roadway	$188,208	$28,231	$32,466	$248,906	$62,226	**$311,132**	$46,670	$46,670	**$404,472**
6-Lane Roadway Intersecting 6-Lane Roadway	$236,788	$35,518	$40,846	$313,152	$78,288	**$391,440**	$58,716	$58,716	**$508,871**
Bicycle and Pedestrian Facilities									
Sidewalks Per Mile (5' Width - 1 Side)	$95,539	$4,777	$15,047	$115,363	$28,841	**$144,204**	$21,631	$21,631	**$187,465**
Sidewalks Per Mile (6' Width - 1 Side)	$114,646	$5,732	$18,057	$138,436	$34,609	**$173,044**	$25,957	$25,957	**$224,958**
Multi-Use Trail Per Mile (12' Width - 1 Side)	$170,591	$8,530	$26,868	$205,989	$51,497	**$257,486**	$38,623	$38,623	**$334,731**
Stormwater Retention Facilities									
1 Acre Pond Site (6' Depth)	$343,782	$17,189	$54,146	$415,116	$103,779	**$518,895**	$77,834	$77,834	**$674,564**
Median Retrofit									
Convert 14' Center Turn Lane to 14' Raised Median (Per Mile)	$225,492	$33,824	$38,897	$298,213	$74,553	**$372,766**	$55,915	$55,915	**$484,596**
Cross Street Improvements									
Widen 1-Leg of Existing Rural 2-Lane Cross Street to Accommodate 2 Receiving Lanes, Dual Left Turn lanes, and Exclusive Right Turn Lane (Approximate Length of 0.25 Miles)	$1,500,781	$225,117	$258,885	$1,984,783	$496,196	**$2,480,979**	$372,147	$372,147	**$3,225,272**

* A 15% MOT factor was used for Traffic Signals, Median Retrofit, and Cross Street Improvements. A 5% factor was used for all other figures.

**The cost of traffic signalization assumes the installation of mast arms on all four legs of an intersection. To obtain the cost of signalizing a four-lane roadway intersecting a two-lane roadway, divide the signal cost of a four-lane roadway by two and add this figure to the signal cost of the two-lane roadway divided by two.

Notes:

1. Estimates were derived from FDOT LRE system
2. The figures are based on market costs for Hillsborough County.
3. Costs shown are present day costs.
4. The costs developed for this report are not site-specific and should be used for preliminary estimating purposes only.

Interchange Cost
Revised June 2009

	Construction Cost From LRE	MOT (10%)	Mobilization (10%)	Subtotal	Scope Contingency (25%)	Total Construction Cost	PE Design (15%)	CEI (15%)	Subtotal Project Cost
Single Point Urban Interchange (SPUI)	$ 25,394,863.74	$2,539,486	$2,793,435	$30,727,785	$7,681,946	**$38,409,731**	$5,761,460	$5,761,460	**$49,932,651**

Note:

1. Cost was derived from an LRE estimate to modify the existing diamond interchange at I-75/SR 54 to a single point urban interchange.
2. Cost shown is for construction only. Does not include Design, CEI, and right-of-way.

Appendix G

Florida Natural Areas Inventory

Standard Data Report

FLORIDA
Natural Areas
INVENTORY

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax 850-681-9364
www.fnai.org

January 30, 2009

Stephanie Morse
HDR Inc.
5426 Bay Center Drive, Suite 400
Tampa, FL 33609

Dear Ms. Morse,

Thank you for your request for information from the Florida Natural Areas Inventory (FNAI). We have compiled the following information for your project area.

Project:	Dunedin Causeway Bridge Replacement Feasibility Study
Date Received:	January 26, 2009
Location:	Pinellas County

Element Occurrences

A search of our maps and database indicates that currently we have several Element Occurrences mapped within the vicinity of the study area (see enclosed map and element occurrence table). Please be advised that a lack of element occurrences in the FNAI database is not a sufficient indication of the absence of rare or endangered species on a site.

The Element Occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates that some element occurrences occur in the general vicinity of the label point. This may be due to lack of precision of the source data, or an element that occurs over an extended area (such as a wide ranging species or large natural community). For animals and plants, Element Occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some element occurrences represent historically documented observations which may no longer be extant.

Likely and Potential Rare Species

In addition to documented occurrences, other rare species and natural communities may be identified on or near the site based on habitat models and species range models (see enclosed Biodiversity Matrix Report). These species should be taken into consideration in field surveys, land management, and impact avoidance and mitigation.

FNAI habitat models indicate areas, which based on land cover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Habitat models have been developed for approximately 300 of the rarest species tracked by the Inventory, including all federally listed species.

FNAI species range models indicate areas that are within the known or predicted range of a species, based on climate variables, soils, vegetation, and/or slope. Species range models have been developed for approximately 340 species, including all federally listed species.

Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

The FNAI Biodiversity Matrix Geodatabase compiles Documented, Likely, and Potential species and natural communities for each square mile Matrix Unit statewide.

Managed Areas
Portions of the site appear to be located within the Honeymoon Island State Park, managed by the Florida Department of Environmental Protection, Division of Recreation and Parks.

The Managed Areas data layer shows public and privately managed conservation lands throughout the state. Federal, state, local, and privately managed conservation lands are included.

The Inventory always recommends that professionals familiar with Florida's flora and fauna should conduct a site-specific survey to determine the current presence or absence of rare, threatened, or endangered species.

Please visit www.fnai.org/trackinglist.cfm for county or statewide element occurrence distributions and links to more element information.

The database maintained by the Florida Natural Areas Inventory is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore, this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

Information provided by this database may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. FNAI data may not be resold for profit.

Thank you for your use of FNAI services. If I can be of further assistance, please give me a call at (850) 224-8207.

Sincerely,

Lindsay Horton

Lindsay Horton
Data Services Coordinator

Encl

Dunedin Causeway Bridge Replacement Feasibility Study

Pinellas County

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
(850) 224-8207
(850) 681-9364 Fax
www.fnai.org

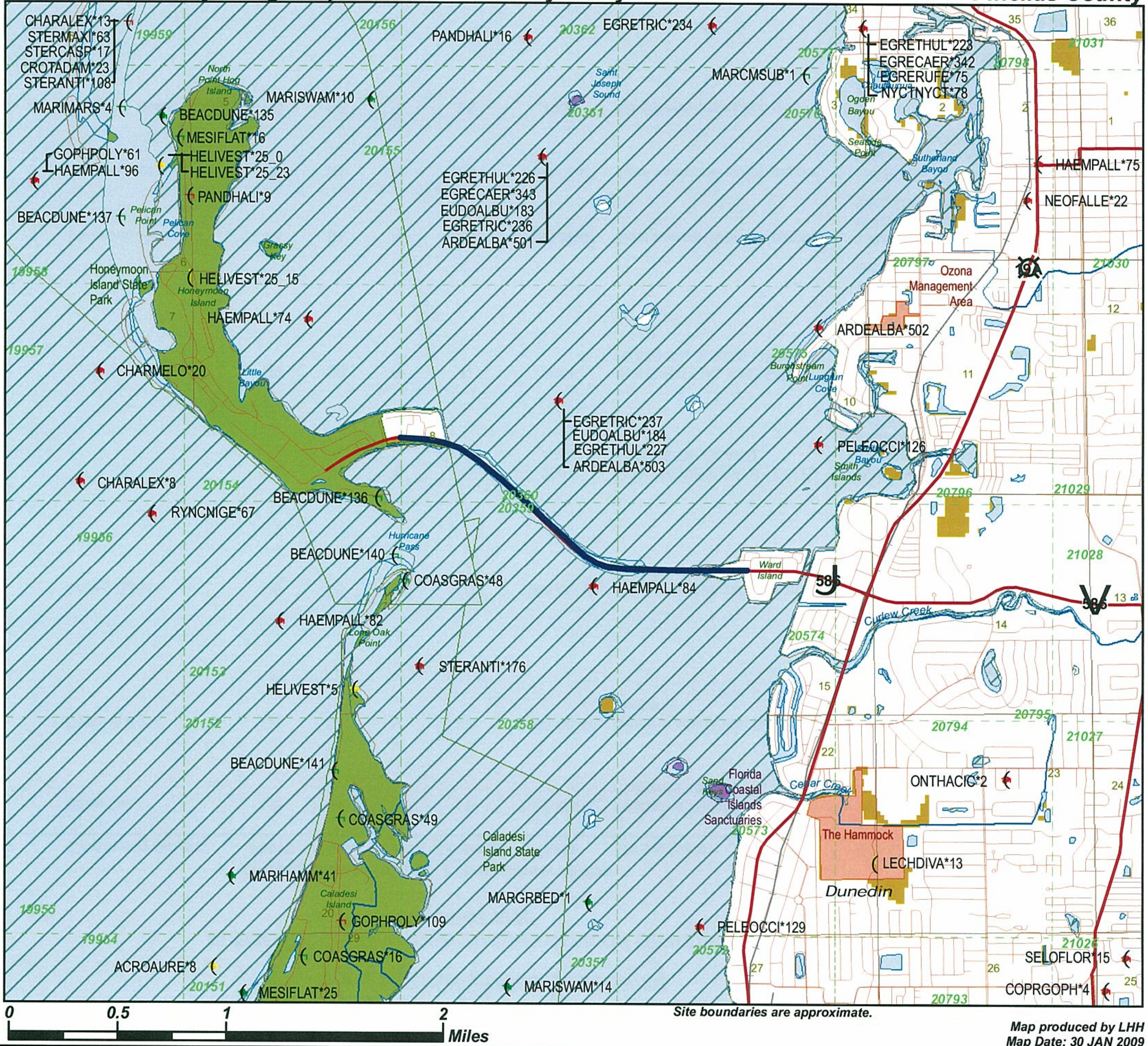
FLORIDA Natural Areas INVENTORY

Element Occurrences
- Animals
- Plants
- Communities
- Other
- Data Sensitive
- Point Indicates General Vicinity of Element
- U.S. Fish & Wildlife Service Scrub Jay Survey 1992-96

Conservation Lands
- Federal
- State
- Local
- Private
- State Aquatic Preserves

Land Acquisition Projects
- Florida Forever Board of Trustees Projects
- FNAI Rare Species Habitat
- FNAI Biodiversity Matrix Square Mile Units
- County Boundary
- Interstate
- Turnpike
- Major Highway
- Local Road
- Railroad [Inactive railroads shown in Gray]
- Water

5



Site boundaries are approximate.

NOTE
Map should not be interpreted without accompanying documents.

Map produced by LHH
Map Date: 30 JAN 2009

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Florida Natural Areas Inventory

Florida Natural Areas Inventory

ELEMENT OCCURRENCES DOCUMENTED ON OR NEAR
PROJECT SITE

Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
EUDOALBU*183	Eudocimus albus	White Ibis	G5	S4	N	LS	1988-06-17	Casuarina, Brazilian pepper, mangrove spoil island.	1988/06/17: K.J. McGowan, GFC. Active nest count. Young TCHE flying/ready. No obs. on other spp (GREG, SNEG, CAEG, GBHE, LBHE, WHIB). "Total" = 90.
EGRERUFE*75	Egretta rufescens	Reddish Egret	G4	S2	N	LS	1988-06-17	Island in sound with Brazilian pepper.	1988-06-17: K.J. McGowan - LBHE seen in incubating and downy young nesting stages. TCHE in downy young stage. No obs. on the other spp. "Total" (nests?) = 40 (also includes SNEG, BCNH, REEG). Deep in Shinus; all nests under canopy. East of Atlas # 611165
EGRETHUL*223	Egretta thula	Snowy Egret	G5	S3	N	LS	1988-06-17	Deep in Shinus; all nests under canopy.	1988/06/17: K.J. McGowan, IND. LBHE seen in incubating and downy young nesting stages. TCHE in downy young stage. No obs. on the other spp. "Total" (nests?) = 40 (also includes SNEG, BCNH, REEG).
MARISWAM*14	Marine tidal swamp		G5	S4	N	N	2004	MANGROVE SWAMP, ON E. FRINGE OF ISLAND.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1988-) (U05FNA02FLUS). RED, BLACK, AND WHITE MANGROVES.
MARGRBED*1	Marine grass bed		G3	S2	N	N	2004	IN INTERTIDAL AND SUBTIDAL FLATS ON E. SIDE OF ISLAND.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1984) (U05FNA02FLUS). CUBAN SHOAL GRASS, WITH LESSER AMOUNTS OF TURTLE GRASS AND MANATEE GRASS.
EGRETRIC*237	Egretta tricolor	Tricolored Heron	G5	S4	N	LS	1988-06-07	Tidal swamp; Brazilian pepper.	1988/06/07: K.J. McGowan, GFC. WADING BIRD RECORD FROM MILLSAP'S OCCUR.DBF
EGRETHUL*227	Egretta thula	Snowy Egret	G5	S3	N	LS	1988-06-07	Tidal swamp; Brazilian pepper.	1988/06/07: K.J. McGowan, GFC. WADING BIRD RECORD FROM MILLSAP'S OCCUR.DBF
HAEMPALL*75	Haematopus palliatus	American Oystercatcher	G5	S2	N	LS	1986	No general description given	1986: 10/09 9 birds;10/23 18;11/09 20;12/10 12. 1987: 01/17 40 birds;02/20 20;03/21 8;05/01 10;05/13 6;05/30 6;06/08 5;10/03 3;10/25 8;11/28 4;12/27 8. 1988: 01/20 33 birds;02/04 18;03/07 8;04/02 12;04/17 10;04/27 6;05/08 4;06/10 6. 1989: 10/16 12 birds;

FLORIDA Natural Areas INVENTORY
1018 Thomasville Road
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www.fnai.org

Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
MARIHAMM*41	Maritime hammock		G3	S2	N	N	2004	N. CENTRAL PART OF ISLAND, BY DEVELOPED AREA.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1984-) (U05FNA02FLUS). DOMINATED BY LIVE OAK, CABBAGE PALM.
EUDOALBU*184	Eudocimus albus	White Ibis	G5	S4	N	LS	1988-06-07	Tidal swamp; Brazilian pepper.	1988/06/07: K.J. McGowan, GFC. WADING BIRD RECORD FROM MILLSAP'S OCCUR.DBF
EGRETHUL*226	Egretta thula	Snowy Egret	G5	S3	N	LS	1988-06-17	Casuarina, Brazilian pepper, mangrove island.	1988/06/17: K.J. McGowan, GFC. Active nest count. Young TCHE flying/ready. No obs. on other spp (GREG, SNEG, CAEG, GBHE, LBHE, WHIB). "Total" = 90.
NYCTNYCT*78	Nycticorax nycticorax	Black-crowned Night-heron	G5	S3	N	N	1988-06-17	Island in sound; all nests under canopy of Brazilian pepper.	1988-06-17: K.J. McGowan, IND, observation. LBHE seen in incubating and downy young nesting stages. TCHE in downy young stage. No obs. on the other spp. "Total" (nests?) = 40 (also includes SNEG, BCNH, REEG).
EGRETRIC*234	Egretta tricolor	Tricolored Heron	G5	S4	N	LS	1988-06-17	Island in sound with all nests under canopy of Brazilian pepper.	1988/06/17: K.J. McGowan, IND. LBHE seen in incubating and downy young nesting stages. TCHE in downy young stage. No obs. on the other spp. "Total" (nests?) = 40 (also includes SNEG, BCNH, REEG).
EGRETRIC*236	Egretta tricolor	Tricolored Heron	G5	S4	N	LS	1988-06-17	Casuarina, Brazilian pepper, mangrove spoil island.	1988/06/17: K.J. McGowan, GFC. Active nest count. Young TCHE flying/ready. No obs. on other spp (GREG, SNEG, CAEG, GBHE, LBHE, WHIB). "Total" = 90.
EGRECAER*343	Egretta caerulea	Little Blue Heron	G5	S4	N	LS	1988-06-17	Spoil island - Casuarina, Brazilian pepper, mangrove island.	1988/06/17: K.J. McGowan, GFC, observation. Active nest count. Young TCHE flying/ready. No obs. on other spp (GREG, SNEG, CAEG, GBHE, LBHE, WHIB). "Total" = 90.
EGRECAER*342	Egretta caerulea	Little Blue Heron	G5	S4	N	LS	1988-06-17	Deep in Shinus; all nests under canopy.	1988/06/17: K.J. McGowan, IND, observation. LBHE seen in incubating and downy young nesting stages. TCHE in downy young stage. No obs. on the other spp. "Total" (nests?) = 40 (also includes SNEG, BCNH, REEG).

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Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
MARISWAM*10	Marine tidal swamp		G5	S4	N	N	2004	ON NE FRINGE OF ISLAND.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1984) (U05FNA02FLUS). DOMINANTS ARE RHIZOPHORA MANGLE, AVICENNIA GERMINANS, LAGUNCULARIA RACEMOSA AND CONOCARPUS ERECTA. MOST FREQUENT SHRUBS ARE IVA FRUT
ARDEALBA*501	Ardea alba	Great Egret	G5	S4	N	N	1988-06-17	1988-06-17: Casuarina, Brazilian pepper, mangrove island (U97GFC02FLUS).	1988-06-17: K.J. McGowan, GFC; Active nest count. Young TCHE flying/ready. No obs. on other than species list (Great Egret, Snowy Egret, Cattle Egret, Great Blue Heron, Little Blue Heron, White Ibis). Total = 90 (U97GFC02FLUS).
ARDEALBA*503	Ardea alba	Great Egret	G5	S4	N	N	1988-06-07	Tidal swamp; Brazilian pepper.	1988/06/07: K.J. McGowan, GFC; 50 GREG nests; WADING BIRD RECORD FROM MILLSAPS OCCUR.DBF.
MESIFLAT*25	Mesic flatwoods		G4	S4	N	N	1999	S. CENTRAL PART OF THE ISLAND.	1999: Update to last obs date was based on interpretation of aerial photography (previous value was 1987-01-14) (U05FNA02FLUS). MATURE S. FLA. SLASH PINE. UNDERSTORY OF DENSE CABBAGE PALM, WAX MYRTLE, AND SAW PALMETTO -- 14 JAN. 1987. (P87JOH01FL).
BEACDUNE*136	Beach dune		G3	S2	N	N	2004	NEWLY FORMED LAND SINCE 1984 (DATE OF PHOTOS USED TO REVISE TOPO MAP).	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1991-03-26) (U05FNA02FLUS). WEEDY NEAR PARKING LOT: BIDENS, ANDROPOGON SP. WITH HYDROCOTYLE BONARIENSIS, MELILOTUS SP., SOLIDAGO STRICTA; ON NEWLY ACCRETE
BEACDUNE*140	Beach dune		G3	S2	N	N	2004	FORMER TIP OF CALADESI ISLAND AT HURRICANE PASS, NOW SEPARATED FROM MAIN ISLAND.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1991-03-25) (U05FNA02FLUS). ONE RIDGE OF SMALL DUNES BACKED BY COASTAL GRASSLAND. IVA IMBRICATA-D, UNIOLA PANICULATA-D (IVA MORE DOM. ALONG PASS, UNIOLA O

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COASGRAS*48	Coastal grassland		G3	S2	N	N	2004	GRASSY CENTRAL PORTION PRESENT SINCE AT LEAST 1971.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1991-03-26) (U05FNA02FLUS). MATRIX OF SENESCENT (NO FL STEMS) SEA OATS WITH MANY OPENINGS FILLED BY OENOTHERA HUMIFUSA PLUS CROTON PUNCTATUS, OPUNTIA STRI
BEACDUNE*137	Beach dune		G3	S2	N	N	1998-05-05	1991: BEACH ERODING NEAR PARKING LOTS. NEWLY ACCRETED BEACH BEGINS JUST TO NORTH OF LAST PARKING LOT. BEACH STILL BUILDING-MORE SAND SPITS FORMING OFFSHORE. 1998: Ditto. See FDOT 1997 aerial PD4491-3-30.	1991: WIDE, OPEN BEACH WITH DUNELETS OF IVA IMBRICATA, AND OCC. UNIOLA PANICULATA. LOW AREA NEAR COVE IS A PASPALUM GRASSLAND WITH SCATTERED IVA IMBRICATA AND A FEW BLACK MANGROVE SEEDLINGS. 1998: Drove (with permission of manager!) from northernmost bea
COASGRAS*49	Coastal grassland		G3	S2	N	N	2004	SEA OATS GRASSLAND WITH SCATTERED LOW CABBAGE PALMS AND MUHLY GRASS IN LOWER AREAS.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1991-03-26) (U05FNA02FLUS). MATRIX OF SEA ON DUNES NEARER COAST AND MUHLY GRASS (MUHLENBERGIA CAPILLARIS) IN LOWER AREAS FURTHER INLAND. SCATTERED CABBAGE
BEACDUNE*135	Beach dune		G3	S2	N	N	1998-05-05	LEDGE OF SEA OATS FRONTING PINE WOODS NEAR NORTH TIP OF SPIT.	1991: NEAREST GULF: PASPALUM DISTICHUM, SPOROBOLUS VIRGINICUS, SESUVIUM PORTULACASTRUM. ON SEA OATS LEDGE 2' ABOVE BEACH: UNIOLA PANICULATA, SCAEVOLA PLUMIERI, IVA IMBRICATA. INLAND FROM SEA OATS: SHORT STAND OF ZANTHOXYLUM CLAVA-HERCULIS. 1998: Same zon
MARCMSUB*1	Marine composite substrate		G3	S3	N	N	1977-pre	VEGETATED WITH SEAGRASSES, BENTHIC ALGAE AND FRESHWATER ALGAE.	SUBMARINE SPRING CA 17 M IN DIA. AT SURFACE TO 3 M IN DIA. AT MAX DEPTH OF 6 M BELOW SEA LEVEL. SUBSTRATE IS LIMESTONE OVERLAIN BY SAND.

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COASGRAS*16	Coastal grassland		G3	S2	N	N	2004	ALONG W. SIDE OF ISLAND, JUST INLAND FROM SEA OATS DUNES.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1987-01-14) (U05FNA02FLUS). SPARTINA PATENS MUHLENBERGIA CAPILLARIS, AND SCATTERED CABBAGE PALMS BEHIND FOREDUNE (U87JOH04).
BEACDUNE*141	Beach dune		G3	S2	N	N	2004	BROAD BEACH, BUILDING - VERY SHALLOW OUT INTO GULF. NORTHERNMOST POINT OF MAIN ISLAND IS ERODING, BUTTONWOODS AND DEAD TREES ON BEACH.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1991-03-25) (U05FNA02FLUS). WELL FORMED, TALL (4 FT.) DUNES DOMINATED BY SEA OATS. SMALL DUNELETS OF IVA IMBRICATA AND SCAEVEOLA PLUMIERI. ATRIPLEX PENTAN
MARIMARS*4	Marine tidal marsh		G5	S4	N	N	1998-05-05	SALT FLATS (SALINE BEDS) AROUND SANDSPIT ON NORTHERN END OF PARK.	1984: LAGUNCULARIA IS USUAL SHRUB, WITH CYPERUS SPP., BATIS MARITIMA, SALICORNIA VIRGINICA, KOSTELETZKYA VIRGINICA, LIMOMIUM CAROLINIANUM, SESUVIUM PORTULACASTRUM AND BORRICHIA FRUTESCENS. 1998: these flats appear to be an overwash area where waves have
PANDHALI*16	Pandion haliaetus	Osprey	G5	S3S4	N	LS*	1984-	VARIOUS PLACES ON ISLAND.	UP TO 9 ACTIVE NESTS IN 1984.
NEOFALLE*22	Neofiber alleni	Round-tailed Muskrat	G3	S3	N	N	1962-04-20	No general description given	FSM SPECIMENS: FSM #07677 COLLECTED BY J. TAYLOR 1962-04-20.
HAEMPALL*84	Haematopus palliatus	American Oystercatcher	G5	S2	N	LS	1979	No general description given	1979: 03/24 2 birds; 03/27 2.
CHARMELO*20	Charadrius melodus	Piping Plover	G3	S2	LT	LT	1991-01-15	MARINE UNCONSOLIDATED SUBSTRATE (TIDAL SAND AND MUDFLATS).	WINTERING SITE: 1991 PIPING PLOVER WINTER CENSUS (U92FWS01FL) FOUND 102 BIRDS IN 4.0 MILE SURVEY. ONE TO SEVERAL OBSERVED SEP.-JAN. MOST YEARS, 1987: 5+ UNBANDED BIRDS FORAGING WITH C. ALEXANDRINUS ON EXPOSED SAND AND MUD FLATS 3 OCT. (RUNDE AND MILLSAP)
CROTADAM*23	Crotalus adamanteus	Eastern Diamondback Rattlesnake	G4	S3	N	N	1994-06-25	No general description given	94-06-25: Adult, ca. 5 ft. in length observed (U94PAS01). 7 snakes observed (6 dead/DOR, 1 unknown). See U94FSP01FL.

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HELIVEST*5	Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N	2007-01-11	2007-01-11: Back dunes of beach dune habitat and in coastal strand with Uniola paniculata, Iva imbricata, Serenoa repens, and Cenchrus echinatus (U07WOO02FLUS). 1991-03-26: inland slope of sea oats dune north of park building	2007-01-11: 2000-3000 plants (U07WOO02FLUS). 1991-03-26: plants flowering, distinguished from east coast sub-species by 1.) more finely cut leaves and 2) hairy stems, occasional low shrub in sea oats or muhly grass lands (F91JOH17FLUS). <
CHARALEX*8	Charadrius alexandrinus	Snowy Plover	G4	S1	N	LT	1987-10-03	MARINE UNCONSOLIDATED SUBSTRATE (TIDAL MUD AND SANDFLATS), BEACH DUNE.	CHARADRIUS ALEXANDRINUS OBSERVED FORAGING WITH C. MELODUS ON 3 OCT. 87 BY RUNDE AND MILLSAP.
ACROAURE*8	Acrostichum aureum	Golden Leather Fern	G5	S3	N	LT	1983	1983: none given (PNDDOD01FLUS).	1983: none given (PNDDOD01FLUS).
HAEMPALL*74	Haematopus palliatus	American Oystercatcher	G5	S2	N	LS	1986	Unconsolidated substrate	1984-86: nested in 1984-1986. Specific dates within years unknown.
GOPHPOLY*61	Gopherus polyphemus	Gopher Tortoise	G3	S3	N	LT	1984	IN HIGHER PLACES IN FLATWOODS.	APPROX. ONE DOZEN ACTIVE BURROWS IN 1984.
HAEMPALL*82	Haematopus palliatus	American Oystercatcher	G5	S2	N	LS	1992-93	No general description given	R.T. Paul, NAS - reproductive area. Data from FY 1992-93 Coastal Wildlife Questionnaire. Delorme page 82, sites # 4 & 4a.
PELEOCCI*129	Pelecanus occidentalis	Brown Pelican	G4	S3	N	LS	1989-04-26	Tidal swamp	1989/04/26: S.A. Nesbitt, GFC. DATA FROM NESBITT'S 1989 FCFWFC ANN. REPT. FOR STUDY NO. 7519. BRPE DATA ONLY INCLUDED HERE. (But no data given in record). 1987: same as above.
STERANTI*176	Sterna antillarum	Least Tern	G4	S3	N	LT	1992-93	No general description given	R.T. Paul, NAS, data (reproductive site) from FY 1992-93 Coastal Wildlife Questionnaire; Delorme page 82, sites # 4 & 4a (U97GFC02FLUS).
PELEOCCI*126	Pelecanus occidentalis	Brown Pelican	G4	S3	N	LS	1988-06-14	Casurina spoil island	1988/06/14: B.A. Millsap, GFC. PI-R-07 "Total" = C (includes GREG, BRPE, DCCO) on 6/14; K. J. McGowan - 20 adults, plus young loafing in colony.
RYNCNIGE*67	Rynchops niger	Black Skimmer	G5	S3	N	LS	1984	Unconsolidated substrate	1984 . Nested in 1984-1986. Specific dates within years unknown.

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ARDEALBA*502	Ardea alba	Great Egret	G5	S4	N	N	1988-06-17	1988-06-17: Casuarina spoil island (U97GFC02FLUS).	1988-06-17: K.J. McGowan, GFC; Great Egret and Double-crested Cormorant est. breeding pairs. Double-crested Cormorant - 30 active nests; with downy young. Great Egret count is best guess (50 nests). Brown Pelican - 20 adult count individuals. Great Eg
HELIVEST*25_1	Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N	1991-03-25	GRASSY DISTURBED PATH THROUGH PINE WOODS.	OCCASIONAL LOW PLANTS GROWING WITH SEA OATS ALONG SIDES OF PATH THROUGH PINE FLATWOODS WEST OF NORTHERNMOST PARKING LOT (FOR NATURE TRAIL). 1979-09-23: in flower
HELIVEST*25_2	Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N	2006-03-23	2006-03-23: Coastal strand bordered by mangroves and buttonwood to the west and grading to pine flatwoods to the east (U07WOO02FLUS). 1998-05-04: beach dune of sea oats; associated species: Lupinus diffusus (PNDJOH01FLUS).	2006-03-23: 200 plants in 2 areas (U07WOO02FLUS). 1998-05-04: 4 or 5 plants amidst a thick stand of sea oats on ledge about 2 feet above lagoon shore (PNDJOH01FLUS).
LECHDIVA*13	Lechea divaricata	Pine Pinweed	G2	S2	N	LE	1978	1978: Sand pine/scrub oak (A78GEN01FLUS).	1978: Rare, but present (A78GEN01FLUS).
STERMAXI*63	Sterna maxima	Royal Tern	G5	S3	N	N	1998-06-07	Sandy spit at north tip of island and sand bar to south on bay side.	Roosting EO. 1998-06-07: Ca. 100 birds seen loafing with other terns and shorebirds. 1998-05-05: Ca. 130 birds observed loafing (PNDNES03, PNDJUE01).
CHARALEX*13	Charadrius alexandrinus	Snowy Plover	G4	S1	N	LT	1998-06-07	1998: Wide, open beach with dunelets of Iva imbricata, Sporobolus virginicus, and Paspalum distichum. Beach broad at tip with soft powdery sand mixed with many shells. Sand/mud flats on bay side.	Nesting EO. 1998-06-07: Three adult birds and one immature observed on beach and sandy spit at tip. 1998-05-05: Eleven birds seen, including presumed pair with three chicks, a second pair with two chicks, and another adult with one chick (PNDNES03, PNDJO
STERANTI*108	Sterna antillarum	Least Tern	G4	S3	N	LT	1998-06-07	Sandy flats composed of sand and broken shell, with scattered mounds of vegetation (Iva imbricata, Sporobolus virginicus, etc.)	Nesting EO. 1998-06-07: Ca. 40 terns observed; 15 of these were sitting on nests in sand on seaward side of vegetation; several more were in vegetation/sand behind, and others were flying around; three juvenile birds seen at very north tip. 1998-05-05: C

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HAEMPALL*96	Haematopus palliatus	American Oystercatcher	G5	S2	N	LS	1998-05-05	Gulf shore and beach dune with scattered mounds of vegetation.	Nesting EO. 1998-05-05: Four birds seen along length of beach, including two foraging at water's edge, one resting in sand, and one presumably sitting on nest in sand between vegetation mounds (this bird was panting) (PNDNES03, PNDJUE01).
GOPHPOLY*109	Gopherus polyphemus	Gopher Tortoise	G3	S3	N	LT	1991-03-26	ON HIGHER GROUND. SEE ATTACHED MAP FOR DISTRIBUTION OF MARKED TORTOISES - DOTS REPRESENT LOCATIONS WHERE INVIDIVUDALS WERE ENCOUNTERED AND SUBSEQUENTLY MARKED.	130 INDIVIDUALS HAVE BEEN MARKED BY SHELL FILING SINCE THE START OF SURVEY IN AUG. 1984 AS OF 26 MAR. 1991.
STERCASP*17	Sterna caspia	Caspian Tern	G5	S2	N	N	1998-06-07	Sandy spit at north tip of island and sand bar to south on bay side.	Roosting EO. 1998-06-07: Three birds observed loafing with other terns and shorebirds. 1998-05-05: species not recorded on survey.
PANDHALI*9	Pandion haliaetus	Osprey	G5	S3S4	N	LS*	1998-05-04	Tall slash pine flatwoods with shrubby understory. Ospreys nest in both living and dead pines.	1998: Ca. 20 nests observed 4 May (PNDNES03, PNDJUE01); park staff reported a total of 25 nests, of which 9 were occupied as of 18 June, with a total of 15 young (5 fledged). 1991-03-25: two nests (active) observed at beginning of nature trail (Osprey Tr
MESIFLAT*16	Mesic flatwoods		G4	S4	N	N	2004	N CENTRAL PART OF ISLAND. TALL SLASH PINE FLATWOODS WITH SHRUBBY UNDERSTORY. CANOPY 40 FT., SUBCANOPY 10-15 FT. TALL.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1998-05-04) (U05FNA02FLUS). 1991: MATURE S. FLA SLASH PINE, PERHAPS NEVER LOGGED (P84DOD01). ALSO SABAL PALMETTO, JUNIPERUS SILICICOLA, TOXICODENDRON RADI
SELOFLOR*15	Selonodon floridensis	Florida Cebrionid Beetle	G2G3	S2S3	N	N	1999-Pre	1999-Pre: No description given (B99GAL01FLUS).	1999-Pre: One specimen was collected (B99GAL01FLUS).
ONTHACIC*2	Onthophagus aciculatulus	Sandyland Onthophagus Beetle	G1G2	S1S2	N	N	1994-Pre	1994-Pre: No description given (B94DEY01FLUS).	1994-Pre: This species was collected at this site (B94DEY01FLUS).
COPRGOPH*4	Copris gopheri	Gopher Tortoise Copris Beetle	G2	S2	N	N	1973-Pre	1973-Pre: No description given (B73WOO01FLUS).	1973-Pre: Four specimens were collected by Hubbard using black light traps (B73WOO01FLUS).

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HELIVEST*25_0	Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N	2006-03-23	This is a parent EO. Refer to individual sub-EOs for detailed information.	This is a parent EO for 2 sub-Eos (sub-EO #'s 15 and 23). Refer to individual sub-EOs for detailed information.

GLOBAL AND STATE RANKS

Florida Natural Areas Inventory (FNAI) defines an **element** as any rare or exemplary component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature. FNAI assigns two ranks to each element found in Florida: the **global rank**, which is based on an element's worldwide status, and the **state rank**, which is based on the status of the element within Florida. Element ranks are based on many factors, including estimated number of occurrences, estimated abundance (for species and populations) or area (for natural communities), estimated number of adequately protected occurrences, range, threats, and ecological fragility.

GLOBAL RANK DEFINITIONS

G1	Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
G2	Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3	Either very rare and local throughout its range (21-100 occurrences or less than 10,0000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4	Apparently secure globally (may be rare in parts of range).
G5	Demonstrably secure globally.
G#?	Tentative rank (e.g., G2?)
G#G#	Range of rank; insufficient data to assign specific global rank (e.g., G2G3)
G#T#	Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1)
G#Q	Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q)
G#T#Q	Same as above, but validity as subspecies or variety is questioned.
GH	Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
GNA	Ranking is not applicable because element is not a suitable target for conservation (e.g. as for hybrid species)
GNR	Not yet ranked (temporary)
GNRTNR	Neither the full species nor the taxonomic subgroup has yet been ranked (temporary)
GX	Believed to be extinct throughout range
GXC	Extirpated from the wild but still known from captivity/cultivation
GU	Unrankable. Due to lack of information, no rank or range can be assigned (e.g., GUT2).

STATE RANK DEFINITIONS

Definition parallels global element rank: substitute "S" for "G" in above global ranks, and "in Florida" for "globally" in above global rank definitions.

FEDERAL AND STATE LEGAL STATUSES (U.S. Fish and Wildlife Service – USFWS) PROVIDED BY FNAI FOR INFORMATION ONLY.

For official definitions and lists of protected species, consult the relevant state or federal agency.

FEDERAL LEGAL STATUS

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

LE Listed as Endangered Species in the List of Endangered and Threatened Wildlife and Plants under the provisions of the Endangered Species Act. Defined as any species which is in danger of extinction throughout all or a significant portion of its range.

LE,XN A non essential experimental population of a species otherwise Listed as an Endangered Species in the List of Endangered and Threatened Wildlife and Plants. LE,XN for Grus americana (Whooping crane), Federally listed as XN (Non essential experimental population) refers to the Florida experimental population only. Federal listing elsewhere for Grus americana is LE.

PE Proposed for addition to the List of Endangered and Threatened Wildlife and Plants as Endangered Species.

LT Listed as Threatened Species, defined as any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

LT,PDL Species currently listed Threatened but has been proposed for delisting.

PT Proposed for listing as Threatened Species.

C Candidate Species for addition to the list of Endangered and Threatened Wildlife and Plants, Category 1. Federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.

SAT Threatened due to similarity of appearance to a threatened species.

SC Species of Concern, species is not currently listed but is of management concern to USFWS.

N Not currently listed, nor currently being considered for addition to the List of Endangered and Threatened Wildlife and Plants.

FLORIDA LEGAL STATUSES (Florida Fish and Wildlife Conservation Commission – FFWCC/ Florida Department of Agriculture and Consumer Services – FDACS)

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission - FFWCC, 1 August 1997, and subsequent updates.

LE Listed as Endangered Species by the FFWCC. Defined as a species, subspecies, or isolated population which is so rare or depleted in number or so restricted in range of habitat due to any man-made or natural factors that it is in immediate danger of extinction or extirpation from the state, or which may attain such a status within the immediate future.

LT Listed as Threatened Species by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.

LT* Indicates that a species has LT status only in selected portions of its range in Florida. LT* for Ursus americanus floridanus (Florida black bear) indicates that LT status does not apply in Baker and Columbia counties and in the Apalachicola National Forest. LT* for Neovison vison pop. 1 (Southern mink, South Florida population) state listed as Threatened refers to the Everglades population only (Note: species formerly listed as Mustela vison mink pop. 1. Also, priorly listed as Mustela evergladensis).

LS Listed as Species of Special Concern by the FFWCC, defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification,

environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species.

LS* Indicates that a species has LS status only in selected portions of its range in Florida. LS* for Pandion haliaetus (Osprey) state listed as LS (Species of Special Concern) in Monroe County only.

PE Proposed for listing as Endangered.

PT Proposed for listing as Threatened.

PS Proposed for listing as a Species of Special Concern.

N Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or please visit: http://DOACS.State.FL.US/PI/Images/Rule05b.pdf

LE Listed as Endangered Plants in the Preservation of Native Flora of Florida Act. Defined as species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue, and includes all species determined to be endangered or threatened pursuant to the Federal Endangered Species Act of 1973, as amended.

PE Proposed by the FDACS for listing as Endangered Plants.

LT Listed as Threatened Plants in the Preservation of Native Flora of Florida Act. Defined as species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered. LT* indicates that a species has LT status only in selected portions of its range in Florida.

PT Proposed by the FDACS for listing as Threatened Plants.

N Not currently listed, nor currently being considered for listing.

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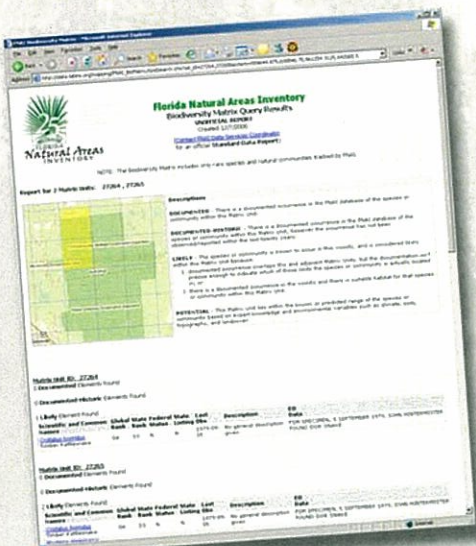
FOR IMMEDIATE RELEASE

FNAI's Biodiversity Matrix Online

The Biodiversity Matrix Map Server is a new **screening tool** from FNAI that provides **immediate, free access** to rare species occurrence information statewide. This tool allows you to zoom to your site of interest and create a report listing documented, likely, and potential occurrences of rare species and natural communities.



The FNAI Biodiversity Matrix offers **built-in interpretation** of the likelihood of species occurrence for each 1-square-mile Matrix Unit across the state. The report includes a site map and list of species and natural communities by occurrence status: Documented, Documented-Historic, Likely, and Potential.

Try it today:

www.fnai.org/biointro.cfm

Please note: FNAI will continue to offer our Standard Data Report service as always. The Standard Data Report offers the most comprehensive information available on rare species, natural communities, conservation lands, and other natural resources.

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FLORIDA Natural Areas INVENTORY

Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 20154					
Likely					
Beach dune		G3	S2	N	N
Caretta caretta	Loggerhead	G3	S3	LT	LT
Charadrius alexandrinus	Snowy Plover	G4	S1	N	LT
Charadrius melodus	Piping Plover	G3	S2	LT	LT
Crotalus adamanteus	Eastern Diamondback Rattlesnake	G4	S3	N	N
Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N
Mesic flatwoods		G4	S4	N	N
Mycteria americana	Wood Stork	G4	S2	LE	LE
Potential					
Acipenser oxyrinchus desotoi	Gulf Sturgeon	G3T2	S2	LT	LS
Ammodramus maritimus peninsulae	Scott's Seaside Sparrow	G4T3Q	S3	N	LS
Centrosema arenicola	Sand Butterfly Pea	G2Q	S2	N	LE
Chelonia mydas	Green Turtle	G3	S2	LE	LE
Dendroica discolor paludicola	Florida Prairie Warbler	G5T3	S3	N	N
Dermochelys coriacea	Leatherback	G2	S2	LE	LE
Drymarchon couperi	Eastern Indigo Snake	G3	S3	LT	LT
Eretmochelys imbricata	Hawksbill	G3	S1	LE	LE
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Gopherus polyphemus	Gopher Tortoise	G3	S3	N	LT
Haematopus palliatus	American Oystercatcher	G5	S2	N	LS
Neofiber alleni	Round-tailed Muskrat	G3	S3	N	N
Pandion haliaetus	Osprey	G5	S3S4	N	LS*
Rallus longirostris scottii	Florida Clapper Rail	G5T3?	S3?	N	N
Rynchops niger	Black Skimmer	G5	S3	N	LS
Trichechus manatus	Manatee	G2	S2	LE	LE
Matrix Unit ID: 20359					
Likely					
Beach dune		G3	S2	N	N
Caretta caretta	Loggerhead	G3	S3	LT	LT
Coastal grassland		G3	S2	N	N
Haematopus palliatus	American Oystercatcher	G5	S2	N	LS
Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N
Maritime hammock		G3	S2	N	N
Pelecanus occidentalis	Brown Pelican	G4	S3	N	LS
Sterna antillarum	Least Tern	G4	S3	N	LT
Potential					
Acipenser oxyrinchus desotoi	Gulf Sturgeon	G3T2	S2	LT	LS
Ammodramus maritimus peninsulae	Scott's Seaside Sparrow	G4T3Q	S3	N	LS
Centrosema arenicola	Sand Butterfly Pea	G2Q	S2	N	LE
Chelonia mydas	Green Turtle	G3	S2	LE	LE
Dendroica discolor paludicola	Florida Prairie Warbler	G5T3	S3	N	N
Dermochelys coriacea	Leatherback	G2	S2	LE	LE
Drymarchon couperi	Eastern Indigo Snake	G3	S3	LT	LT

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

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Scientific Name	*Common Name*	*Global Rank*	*State Rank*	*Federal Status*	*State Listing*
Eretmochelys imbricata	Hawksbill	G3	S1	LE	LE
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Neofiber alleni	Round-tailed Muskrat	G3	S3	N	N
Pandion haliaetus	Osprey	G5	S3S4	N	LS*
Rallus longirostris scottii	Florida Clapper Rail	G5T3?	S3?	N	N
Trichechus manatus	Manatee	G2	S2	LE	LE

Matrix Unit ID: 20360

Likely

Ardea alba	Great Egret	G5	S4	N	N
Caretta caretta	Loggerhead	G3	S3	LT	LT
Egretta caerulea	Little Blue Heron	G5	S4	N	LS
Egretta thula	Snowy Egret	G5	S3	N	LS
Egretta tricolor	Tricolored Heron	G5	S4	N	LS
Eudocimus albus	White Ibis	G5	S4	N	LS
Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N

Potential

Acipenser oxyrinchus desotoi	Gulf Sturgeon	G3T2	S2	LT	LS
Ammodramus maritimus peninsulae	Scott's Seaside Sparrow	G4T3Q	S3	N	LS
Centrosema arenicola	Sand Butterfly Pea	G2Q	S2	N	LE
Chelonia mydas	Green Turtle	G3	S2	LE	LE
Dendroica discolor paludicola	Florida Prairie Warbler	G5T3	S3	N	N
Dermochelys coriacea	Leatherback	G2	S2	LE	LE
Drymarchon couperi	Eastern Indigo Snake	G3	S3	LT	LT
Eretmochelys imbricata	Hawksbill	G3	S1	LE	LE
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Haematopus palliatus	American Oystercatcher	G5	S2	N	LS
Neofiber alleni	Round-tailed Muskrat	G3	S3	N	N
Pandion haliaetus	Osprey	G5	S3S4	N	LS*
Rallus longirostris scottii	Florida Clapper Rail	G5T3?	S3?	N	N
Trichechus manatus	Manatee	G2	S2	LE	LE

Matrix Unit ID: 20574

Likely

Onthophagus aciculatulus	Sandyland Onthophagus Beetle	G1G2	S1S2	N	N
Pelecanus occidentalis	Brown Pelican	G4	S3	N	LS

Potential

Acipenser oxyrinchus desotoi	Gulf Sturgeon	G3T2	S2	LT	LS
Ammodramus maritimus peninsulae	Scott's Seaside Sparrow	G4T3Q	S3	N	LS
Athene cunicularia floridana	Florida Burrowing Owl	G4T3	S3	N	LS
Caretta caretta	Loggerhead	G3	S3	LT	LT
Centrosema arenicola	Sand Butterfly Pea	G2Q	S2	N	LE
Charadrius melodus	Piping Plover	G3	S2	LT	LT
Chelonia mydas	Green Turtle	G3	S2	LE	LE
Dendroica discolor paludicola	Florida Prairie Warbler	G5T3	S3	N	N
Dermochelys coriacea	Leatherback	G2	S2	LE	LE

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
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FLORIDA Natural Areas INVENTORY

Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Drymarchon couperi	Eastern Indigo Snake	G3	S3	LT	LT
Eretmochelys imbricata	Hawksbill	G3	S1	LE	LE
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Gopherus polyphemus	Gopher Tortoise	G3	S3	N	LT
Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	LT
Haematopus palliatus	American Oystercatcher	G5	S2	N	LS
Helianthus debilis ssp. vestitus	Hairy Beach Sunflower	G5T2	S2	N	N
Lechea cernua	Nodding Pinweed	G3	S3	N	LT
Matelea floridana	Florida Spiny-pod	G2	S2	N	LE
Mustela frenata peninsulae	Florida Long-tailed Weasel	G5T3	S3	N	N
Neofiber alleni	Round-tailed Muskrat	G3	S3	N	N
Pandion haliaetus	Osprey	G5	S3S4	N	LS*
Podomys floridanus	Florida Mouse	G3	S3	N	LS
Rallus longirostris scottii	Florida Clapper Rail	G5T3?	S3?	N	N
Sciurus niger shermani	Sherman's Fox Squirrel	G5T3	S3	N	LS
Trichechus manatus	Manatee	G2	S2	LE	LE

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Appendix H

Life Cycle Cost Analysis Data

Discount Rate	Rehabilitation / Replacement	Bridge Replacement		
	Alternative A No-Build	Alternative B Low Level Bascule	Alternative C Mid Level Bascule	Alternative D High Level Fixed
0.00%	$284,916,221	$94,716,858	$99,691,535	**$34,353,736**
1.00%	$199,859,288	$68,768,419	$73,702,507	**$33,211,306**
2.00%	$143,803,595	$53,992,048	$58,882,647	**$32,433,334**
3.00%	$106,107,169	$45,277,415	$50,123,370	**$31,855,714**
4.00%	$80,294,704	$39,930,368	$44,731,429	**$31,391,851**
5.00%	$62,324,010	$36,502,676	$41,259,069	**$30,995,126**
6.00%	$49,614,220	$34,199,528	$38,911,727	**$30,639,885**
7.00%	**$40,485,033**	**$32,574,968**	**$37,243,580**	**$30,311,671**
8.00%	$33,824,019	$31,372,835	$35,998,531	**$30,002,121**
9.00%	**$28,884,097**	$30,442,300	$35,025,782	$29,706,255
10.00%	**$25,157,330**	$29,692,232	$34,234,209	$29,421,015

Bold and highlighted values represent most cost efficent choice
per given discount rate

Construction Alternatives	Capital Cost	Maintenance And Operational Cost
Option A Rehabilitation	$190,146,758	$94,769,463
Option B Low Level Bascule	$29,288,832	$65,428,026
Option C Mid Level Bascule	$34,285,572	$65,405,963
Option D High Level Fixed	$32,254,910	$2,098,826

Alternative A: No-Build -Bridge Rehabilitation and Future Bridge Replacement

This option replaces the bridge in 2045

Area Approach = 69696 ft^2

Projected Cost:

Cost at 2010 (see Figure 6-1)

$	9,408,960	Low Level Approach
$	19,260,372	Low Level Bascule
$	619,500	Retaining Wall
$	29,288,832	Total Cost

Cost at 2045...Assuming 3.3% inflation, 2010 cost + 211% markup

$	29,261,866	Low Level Approach
$	59,899,757	Low Level Bascule
$	1,926,645	Retaining Wall
$	91,088,268	Total Cost Bridge
$	61,029,139	Future Roadway/Drainage Work (estimated as 2/3rds the cost of bridge based on 2009 low level values)
$	38,029,352	25% markup for PD&E/Design and CE&I fees
	$190,146,758	Total Project Cost (Note: This cost does NOT include Environmental / Utility Relocation and Relief bridge and roadway costs)

Projected Life Cycle (Years) 75

Bridge Rehabilitation (4)		$	23,105,763	* $18939150*1.22 Mil bridge rehab (yr 1) increased at 3.3% annual inflation
Bascule Operation (1-75)		$	152,202	*increase at 3.3% annual
Bascule Maintenance (1-4)		$	290,110	*increase every 5 years by 25%, predicted by Pinellas County in Table 3-4
Bascule Maintenance (5-36)		$	174,205	*Avg of Low Level Bascule at yr 5 and Pinellas County estimates in Table 3-4, increase at 3.3% annual
Bascule Maintenance (36-75)		$	159,044	*Same maint cost as low level at year 36, increase at 3.3% annual
Approach Maintenance (1-75)	Area*0.04$/sq. ft =	$	2,788	* Assume 3.3% annual inflation

Alternative A - No Build - Rehabilitation, Bridge Replacement, Maintenance and Operation

Year		Structure	Bascule Operation	Maintenance Bascule	Maintenance Approach	Total	
1	2010		$ 152,202	$ 290,110	$ 2,788	$ 445,100	
2	2011		$ 157,225	$ 290,110	$ 2,880	$ 450,214	
3	2012		$ 162,413	$ 290,110	$ 2,975	$ 455,498	
4	2013		$ 167,773	$ 290,110	$ 3,073	$ 460,955	
5	2014		$ 173,309	$ 23,105,763 *	$ 3,174	$ 23,282,247	
6	2015		$ 179,028	$ 174,205	$ 3,279	$ 356,513	
7	2016		$ 184,936	$ 179,954	$ 3,387	$ 368,278	
8	2017		$ 191,039	$ 185,892	$ 3,499	$ 380,431	
9	2018		$ 197,343	$ 192,027	$ 3,615	$ 392,985	
10	2019		$ 203,856	$ 198,364	$ 3,734	$ 405,953	
11	2020		$ 210,583	$ 204,910	$ 3,857	$ 419,350	
12	2021		$ 217,532	$ 211,672	$ 3,984	$ 433,188	
13	2022		$ 224,711	$ 218,657	$ 4,116	$ 447,484	25 Years
14	2023		$ 232,126	$ 225,873	$ 4,252	$ 462,251	
15	2024		$ 239,786	$ 233,326	$ 4,392	$ 477,505	
16	2025		$ 247,699	$ 241,026	$ 4,537	$ 493,263	
17	2026		$ 255,874	$ 248,980	$ 4,687	$ 509,540	
18	2027		$ 264,317	$ 257,196	$ 4,841	$ 526,355	
19	2028		$ 273,040	$ 265,684	$ 5,001	$ 543,725	
20	2029		$ 282,050	$ 274,451	$ 5,166	$ 561,668	
21	2030		$ 291,358	$ 283,508	$ 5,337	$ 580,203	
22	2031		$ 300,973	$ 292,864	$ 5,513	$ 599,349	
23	2032		$ 310,905	$ 302,528	$ 5,695	$ 619,128	
24	2033		$ 321,165	$ 312,512	$ 5,883	$ 639,559	
25	2034		$ 331,763	$ 322,825	$ 6,077	$ 660,665	
26	2035		$ 342,711	$ 333,478	$ 6,277	$ 682,467	
27	2036		$ 354,021	$ 344,483	$ 6,484	$ 704,988	
28	2037		$ 365,703	$ 355,851	$ 6,698	$ 728,253	
29	2038		$ 377,772	$ 367,594	$ 6,920	$ 752,285	
30	2039		$ 390,238	$ 379,724	$ 7,148	$ 777,110	
31	2040		$ 403,116	$ 392,255	$ 7,384	$ 802,755	
32	2041		$ 416,419	$ 405,200	$ 7,627	$ 829,246	
33	2042		$ 430,160	$ 418,571	$ 7,879	$ 856,611	
34	2043		$ 444,356	$ 432,384	$ 8,139	$ 884,879	
35	2044		$ 459,019	$ 446,653	$ 8,408	$ 914,080	
36	2045	$ 190,146,758 **	$ 474,167	$ 159,508	$ 8,685	$ 190,789,118	
37	2046		$ 489,815	$ 164,771	$ 8,972	$ 663,558	
38	2047		$ 505,979	$ 170,209	$ 9,268	$ 685,455	25 Years
39	2048		$ 522,676	$ 175,826	$ 9,574	$ 708,075	
40	2049		$ 539,924	$ 181,628	$ 9,890	$ 731,442	
41	2050		$ 557,742	$ 187,622	$ 10,216	$ 755,579	
42	2051		$ 576,147	$ 193,813	$ 10,553	$ 780,513	
43	2052		$ 595,160	$ 200,209	$ 10,901	$ 806,270	
44	2053		$ 614,800	$ 206,816	$ 11,261	$ 832,877	
45	2054		$ 635,089	$ 213,641	$ 11,633	$ 860,362	
46	2055		$ 656,047	$ 220,691	$ 12,017	$ 888,754	
47	2056		$ 677,696	$ 227,974	$ 12,413	$ 918,083	
48	2057		$ 700,060	$ 235,497	$ 12,823	$ 948,380	
49	2058		$ 723,162	$ 243,268	$ 13,246	$ 979,676	
50	2059		$ 747,026	$ 251,296	$ 13,683	$ 1,012,006	
51	2060		$ 771,678	$ 259,589	$ 14,135	$ 1,045,402	
52	2061		$ 797,144	$ 268,155	$ 14,601	$ 1,079,900	
53	2062		$ 823,449	$ 277,004	$ 15,083	$ 1,115,537	
54	2063		$ 850,623	$ 286,146	$ 15,581	$ 1,152,349	
55	2064		$ 878,694	$ 295,588	$ 16,095	$ 1,190,377	
56	2065		$ 907,691	$ 305,343	$ 16,626	$ 1,229,659	
57	2066		$ 937,644	$ 315,419	$ 17,175	$ 1,270,238	
58	2067		$ 968,587	$ 325,828	$ 17,741	$ 1,312,156	
59	2068		$ 1,000,550	$ 336,580	$ 18,327	$ 1,355,457	
60	2069		$ 1,033,568	$ 347,687	$ 18,932	$ 1,400,187	
61	2070		$ 1,067,676	$ 359,161	$ 19,556	$ 1,446,393	
62	2071		$ 1,102,909	$ 371,013	$ 20,202	$ 1,494,124	
63	2072		$ 1,139,305	$ 383,257	$ 20,868	$ 1,543,430	25 Years
64	2073		$ 1,176,902	$ 395,904	$ 21,557	$ 1,594,364	
65	2074		$ 1,215,740	$ 408,969	$ 22,268	$ 1,646,978	
66	2075		$ 1,255,860	$ 422,465	$ 23,003	$ 1,701,328	
67	2076		$ 1,297,303	$ 436,406	$ 23,762	$ 1,757,472	
68	2077		$ 1,340,114	$ 450,808	$ 24,546	$ 1,815,468	
69	2078		$ 1,384,338	$ 465,685	$ 25,357	$ 1,875,379	
70	2079		$ 1,430,021	$ 481,052	$ 26,193	$ 1,937,266	
71	2080		$ 1,477,212	$ 496,927	$ 27,058	$ 2,001,196	
72	2081		$ 1,525,960	$ 513,325	$ 27,951	$ 2,067,236	
73	2082		$ 1,576,316	$ 530,265	$ 28,873	$ 2,135,454	
74	2083		$ 1,628,335	$ 547,764	$ 29,826	$ 2,205,924	
75	2084		$ 1,682,070	$ 565,840	$ 30,810	$ 2,278,720	
Total		$ 190,146,758	$ 48,041,698	$ 45,847,798	$ 879,966	$ 284,916,221	

* Major bridge rehab in 2014 and operation and maintenance costs

** Bridge replacement in 2045

Table Summary Info

Bridge Cost =	$	190,146,758
Op. and Maint Cost =	$	94,769,463
	$	284,916,221

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Project:	Dunedin Causeway	Computed:	NVE	Date:	July 2009
Subject:	Future Cost Estimation	Checked:		Date:	
Task:	Bridge Replacement Option B	Page:		of:	
Job #:		No:			

Alternative B: Low Level Bascule

This option replaces the bridge in 2010

Area Approach = 69696 ft^2

Projected Cost:	$	9,408,960	Low Level Approach
(See Figure 6-1)	$	19,260,372	Low Level Bascule
	$	619,500	Retaining Walls
	$	29,288,832	Total Cost

Projected Life Cycle (Years) 75

Bascule Operation (1-75)		$	153,296	* increase at 3.3% annual
Annual Maintenance Approach (1-75)	Area*0.04$/sq. ft =	$	2,788	* increase at 3.3% annual
Annual Maintenance (1-75) Bascule		$	51,200	* increase at 3.3% annual

Alternative B - Low Level Bascule - Bridge Replacement, Maintenance, and Operation

Year		Structure	Bascule Operation	Maintenance Bascule	Maintenance Approach	Total	
1	2010	$ 29,288,832	$ 153,296	$ 51,200	$ 2,788	$ 29,496,116	
2	2011		$ 158,355	$ 52,890	$ 2,880	$ 214,124	
3	2012		$ 163,581	$ 54,635	$ 2,975	$ 221,190	
4	2013		$ 168,979	$ 56,438	$ 3,073	$ 228,490	
5	2014		$ 174,555	$ 58,300	$ 3,174	$ 236,030	
6	2015		$ 180,315	$ 60,224	$ 3,279	$ 243,819	
7	2016		$ 186,266	$ 62,212	$ 3,387	$ 251,865	
8	2017		$ 192,413	$ 64,265	$ 3,499	$ 260,176	
9	2018		$ 198,762	$ 66,385	$ 3,615	$ 268,762	
10	2019		$ 205,321	$ 68,576	$ 3,734	$ 277,631	
11	2020		$ 212,097	$ 70,839	$ 3,857	$ 286,793	
12	2021		$ 219,096	$ 73,177	$ 3,984	$ 296,257	
13	2022		$ 226,326	$ 75,592	$ 4,116	$ 306,034	25 Years
14	2023		$ 233,795	$ 78,086	$ 4,252	$ 316,133	
15	2024		$ 241,510	$ 80,663	$ 4,392	$ 326,565	
16	2025		$ 249,480	$ 83,325	$ 4,537	$ 337,342	
17	2026		$ 257,713	$ 86,075	$ 4,687	$ 348,474	
18	2027		$ 266,217	$ 88,915	$ 4,841	$ 359,974	
19	2028		$ 275,003	$ 91,849	$ 5,001	$ 371,853	
20	2029		$ 284,078	$ 94,880	$ 5,166	$ 384,124	
21	2030		$ 293,452	$ 98,011	$ 5,337	$ 396,800	
22	2031		$ 303,136	$ 101,246	$ 5,513	$ 409,895	
23	2032		$ 313,140	$ 104,587	$ 5,695	$ 423,421	
24	2033		$ 323,473	$ 108,038	$ 5,883	$ 437,394	
25	2034		$ 334,148	$ 111,603	$ 6,077	$ 451,828	
26	2035		$ 345,175	$ 115,286	$ 6,277	$ 466,739	
27	2036		$ 356,566	$ 119,091	$ 6,484	$ 482,141	
28	2037		$ 368,332	$ 123,021	$ 6,698	$ 498,052	
29	2038		$ 380,487	$ 127,081	$ 6,920	$ 514,487	
30	2039		$ 393,043	$ 131,274	$ 7,148	$ 531,465	
31	2040		$ 406,014	$ 135,606	$ 7,384	$ 549,004	
32	2041		$ 419,412	$ 140,081	$ 7,627	$ 567,121	
33	2042		$ 433,253	$ 144,704	$ 7,879	$ 585,836	
34	2043		$ 447,550	$ 149,479	$ 8,139	$ 605,168	
35	2044		$ 462,319	$ 154,412	$ 8,408	$ 625,139	
36	2045		$ 477,576	$ 159,508	$ 8,685	$ 645,769	
37	2046		$ 493,336	$ 164,771	$ 8,972	$ 667,079	
38	2047		$ 509,616	$ 170,209	$ 9,268	$ 689,093	25 Years
39	2048		$ 526,433	$ 175,826	$ 9,574	$ 711,833	
40	2049		$ 543,806	$ 181,628	$ 9,890	$ 735,323	
41	2050		$ 561,751	$ 187,622	$ 10,216	$ 759,589	
42	2051		$ 580,289	$ 193,813	$ 10,553	$ 784,655	
43	2052		$ 599,438	$ 200,209	$ 10,901	$ 810,549	
44	2053		$ 619,220	$ 206,816	$ 11,261	$ 837,297	
45	2054		$ 639,654	$ 213,641	$ 11,633	$ 864,928	
46	2055		$ 660,763	$ 220,691	$ 12,017	$ 893,470	
47	2056		$ 682,568	$ 227,974	$ 12,413	$ 922,955	
48	2057		$ 705,093	$ 235,497	$ 12,823	$ 953,412	
49	2058		$ 728,361	$ 243,268	$ 13,246	$ 984,875	
50	2059		$ 752,397	$ 251,296	$ 13,683	$ 1,017,376	
51	2060		$ 777,226	$ 259,589	$ 14,135	$ 1,050,949	
52	2061		$ 802,874	$ 268,155	$ 14,601	$ 1,085,631	
53	2062		$ 829,369	$ 277,004	$ 15,083	$ 1,121,456	
54	2063		$ 856,738	$ 286,146	$ 15,581	$ 1,158,464	
55	2064		$ 885,011	$ 295,588	$ 16,095	$ 1,196,694	
56	2065		$ 914,216	$ 305,343	$ 16,626	$ 1,236,185	
57	2066		$ 944,385	$ 315,419	$ 17,175	$ 1,276,979	
58	2067		$ 975,550	$ 325,828	$ 17,741	$ 1,319,119	
59	2068		$ 1,007,743	$ 336,580	$ 18,327	$ 1,362,650	
60	2069		$ 1,040,998	$ 347,687	$ 18,932	$ 1,407,617	
61	2070		$ 1,075,351	$ 359,161	$ 19,556	$ 1,454,069	
62	2071		$ 1,110,838	$ 371,013	$ 20,202	$ 1,502,053	
63	2072		$ 1,147,496	$ 383,257	$ 20,868	$ 1,551,621	25 Years
64	2073		$ 1,185,363	$ 395,904	$ 21,557	$ 1,602,824	
65	2074		$ 1,224,480	$ 408,969	$ 22,268	$ 1,655,717	
66	2075		$ 1,264,888	$ 422,465	$ 23,003	$ 1,710,356	
67	2076		$ 1,306,629	$ 436,406	$ 23,762	$ 1,766,798	
68	2077		$ 1,349,748	$ 450,808	$ 24,546	$ 1,825,102	
69	2078		$ 1,394,290	$ 465,685	$ 25,357	$ 1,885,331	
70	2079		$ 1,440,301	$ 481,052	$ 26,193	$ 1,947,547	
71	2080		$ 1,487,831	$ 496,927	$ 27,058	$ 2,011,816	
72	2081		$ 1,536,929	$ 513,325	$ 27,951	$ 2,078,205	
73	2082		$ 1,587,648	$ 530,265	$ 28,873	$ 2,146,786	
74	2083		$ 1,640,041	$ 547,764	$ 29,826	$ 2,217,630	
75	2084		$ 1,694,162	$ 565,840	$ 30,810	$ 2,290,812	
Total		$ 29,288,832	$ 48,387,063	$ 16,160,996	$ 879,966	$ 94,716,858	

Table Summary Info

Bridge Cost =	$	29,288,832
Op. and Maint Cost =	$	65,428,026
	$	94,716,858

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Project:	Dunedin Causeway	Computed:	NVE	Date:	July 2009
Subject:	Future Cost Estimation	Checked:		Date:	
Task:	Bridge Replacement Option C	Page:		of:	
Job #:		No:			

Alternative C: Mid Level Bascule

This option replaces the bridge in 2010

Area Approach = 87120 ft^2

Projected Cost:	$	13,503,600	Mid Level Approach
(See Figure 6-1)	$	19,634,372	Mid Level Bascule
	$	1,147,600	Retaining Wall
	$	34,285,572	Total Cost

Projected Life Cycle (Years) 75

Bascule Operation (1-75)		$	153,131	* increase at 3.3% annual
Annual Maintenance (1-75) Approach	Area * $.04/sq. ft =	$	3,485	* increase at 3.3% annual
Annual Maintenance (1-75) Bascule		$	51,200	* increase at 3.3% annual

Alternative C - Mid Level Bascule - Bridge Replacemetn, Operation and Maintenance

Year		Structure	Bascule Operation	Maintenance Bascule	Maintenance Approach	Total	
1	2010	$ 34,285,572	$ 153,131	$ 51,200	$ 3,485	$ 34,493,388	
2	2011		$ 157,725	$ 52,736	$ 3,589	$ 214,050	
3	2012		$ 162,930	$ 54,476	$ 3,708	$ 221,114	
4	2013		$ 168,306	$ 56,274	$ 3,830	$ 228,411	
5	2014		$ 173,860	$ 58,131	$ 3,957	$ 235,948	
6	2015		$ 179,598	$ 60,049	$ 4,087	$ 243,734	
7	2016		$ 185,525	$ 62,031	$ 4,222	$ 251,778	
8	2017		$ 191,647	$ 64,078	$ 4,361	$ 260,086	
9	2018		$ 197,971	$ 66,193	$ 4,505	$ 268,669	
10	2019		$ 204,504	$ 68,377	$ 4,654	$ 277,535	
11	2020		$ 211,253	$ 70,633	$ 4,807	$ 286,694	
12	2021		$ 218,224	$ 72,964	$ 4,966	$ 296,155	
13	2022		$ 225,426	$ 75,372	$ 5,130	$ 305,928	25 Years
14	2023		$ 232,865	$ 77,859	$ 5,299	$ 316,023	
15	2024		$ 240,549	$ 80,429	$ 5,474	$ 326,452	
16	2025		$ 248,487	$ 83,083	$ 5,655	$ 337,225	
17	2026		$ 256,688	$ 85,825	$ 5,841	$ 348,354	
18	2027		$ 265,158	$ 88,657	$ 6,034	$ 359,849	
19	2028		$ 273,908	$ 91,583	$ 6,233	$ 371,724	
20	2029		$ 282,947	$ 94,605	$ 6,439	$ 383,991	
21	2030		$ 292,285	$ 97,727	$ 6,652	$ 396,663	
22	2031		$ 301,930	$ 100,952	$ 6,871	$ 409,753	
23	2032		$ 311,894	$ 104,283	$ 7,098	$ 423,275	
24	2033		$ 322,186	$ 107,724	$ 7,332	$ 437,243	
25	2034		$ 332,818	$ 111,279	$ 7,574	$ 451,672	
26	2035		$ 343,801	$ 114,952	$ 7,824	$ 466,577	
27	2036		$ 355,147	$ 118,745	$ 8,082	$ 481,974	
28	2037		$ 366,867	$ 122,664	$ 8,349	$ 497,879	
29	2038		$ 378,973	$ 126,711	$ 8,624	$ 514,309	
30	2039		$ 391,479	$ 130,893	$ 8,909	$ 531,281	
31	2040		$ 404,398	$ 135,212	$ 9,203	$ 548,814	
32	2041		$ 417,743	$ 139,674	$ 9,507	$ 566,924	
33	2042		$ 431,529	$ 144,284	$ 9,820	$ 585,633	
34	2043		$ 445,769	$ 149,045	$ 10,144	$ 604,959	
35	2044		$ 460,480	$ 153,964	$ 10,479	$ 624,922	
36	2045		$ 475,676	$ 159,044	$ 10,825	$ 645,545	
37	2046		$ 491,373	$ 164,293	$ 11,182	$ 666,848	
38	2047		$ 507,588	$ 169,714	$ 11,551	$ 688,854	25 Years
39	2048		$ 524,339	$ 175,315	$ 11,932	$ 711,586	
40	2049		$ 541,642	$ 181,100	$ 12,326	$ 735,068	
41	2050		$ 559,516	$ 187,077	$ 12,733	$ 759,326	
42	2051		$ 577,980	$ 193,250	$ 13,153	$ 784,383	
43	2052		$ 597,053	$ 199,627	$ 13,587	$ 810,268	
44	2053		$ 616,756	$ 206,215	$ 14,036	$ 837,007	
45	2054		$ 637,109	$ 213,020	$ 14,499	$ 864,628	
46	2055		$ 658,134	$ 220,050	$ 14,977	$ 893,161	
47	2056		$ 679,852	$ 227,312	$ 15,471	$ 922,635	
48	2057		$ 702,287	$ 234,813	$ 15,982	$ 953,082	
49	2058		$ 725,463	$ 242,562	$ 16,509	$ 984,534	
50	2059		$ 749,403	$ 250,566	$ 17,054	$ 1,017,023	
51	2060		$ 774,133	$ 258,835	$ 17,617	$ 1,050,585	
52	2061		$ 799,680	$ 267,377	$ 18,198	$ 1,085,254	
53	2062		$ 826,069	$ 276,200	$ 18,799	$ 1,121,068	
54	2063		$ 853,329	$ 285,315	$ 19,419	$ 1,158,063	
55	2064		$ 881,489	$ 294,730	$ 20,060	$ 1,196,279	
56	2065		$ 910,578	$ 304,456	$ 20,722	$ 1,235,756	
57	2066		$ 940,627	$ 314,503	$ 21,406	$ 1,276,536	
58	2067		$ 971,668	$ 324,882	$ 22,112	$ 1,318,662	
59	2068		$ 1,003,733	$ 335,603	$ 22,842	$ 1,362,178	
60	2069		$ 1,036,856	$ 346,678	$ 23,596	$ 1,407,130	
61	2070		$ 1,071,073	$ 358,118	$ 24,374	$ 1,453,565	
62	2071		$ 1,106,418	$ 369,936	$ 25,179	$ 1,501,533	
63	2072		$ 1,142,930	$ 382,144	$ 26,010	$ 1,551,083	25 Years
64	2073		$ 1,180,646	$ 394,755	$ 26,868	$ 1,602,269	
65	2074		$ 1,219,608	$ 407,781	$ 27,755	$ 1,655,144	
66	2075		$ 1,259,855	$ 421,238	$ 28,671	$ 1,709,764	
67	2076		$ 1,301,430	$ 435,139	$ 29,617	$ 1,766,186	
68	2077		$ 1,344,377	$ 449,499	$ 30,594	$ 1,824,470	
69	2078		$ 1,388,742	$ 464,332	$ 31,604	$ 1,884,677	
70	2079		$ 1,434,570	$ 479,655	$ 32,647	$ 1,946,872	
71	2080		$ 1,481,911	$ 495,484	$ 33,724	$ 2,011,119	
72	2081		$ 1,530,814	$ 511,835	$ 34,837	$ 2,077,486	
73	2082		$ 1,581,331	$ 528,725	$ 35,986	$ 2,146,043	
74	2083		$ 1,633,515	$ 546,173	$ 37,174	$ 2,216,862	
75	2084		$ 1,687,421	$ 564,197	$ 38,401	$ 2,290,018	
Total		$ 34,285,572	$ 48,194,979	$ 16,114,210	$ 1,096,773	$ 99,691,535	

Table Summary Info

Bridge Cost =	$	34,285,572
Op. and Maint Cost =	$	65,405,963
	$	99,691,535

Alternative D: High Level Fixed Bridge

This option replaces the bridge in 2010

Area Bridge = 166716 ft^2

Projected Cost:	$	29,010,960	Approach Spans
(See Figure 6-1)	$	1,831,500	Main Span
	$	1,412,450	Retaining Walls
	$	32,254,910	Total Cost

Projected Life Cycle (Years) 75

Annual Maintenance (1-75) Total Area*$.04/SF = $ 6,669 * increase at 3.3% annual

Alternative D - High Level Fixed - Bridge Replacement, and Maintenance

Year		Structure	Maintenance	Total	
1	2010	$ 32,254,910	$ 6,669	$ 32,261,579	
2	2011		$ 6,869	$ 6,869	
3	2012		$ 7,095	$ 7,095	
4	2013		$ 7,330	$ 7,330	
5	2014		$ 7,571	$ 7,571	
6	2015		$ 7,821	$ 7,821	
7	2016		$ 8,079	$ 8,079	
8	2017		$ 8,346	$ 8,346	
9	2018		$ 8,621	$ 8,621	
10	2019		$ 8,906	$ 8,906	
11	2020		$ 9,200	$ 9,200	
12	2021		$ 9,503	$ 9,503	
13	2022		$ 9,817	$ 9,817	25 Years
14	2023		$ 10,141	$ 10,141	
15	2024		$ 10,476	$ 10,476	
16	2025		$ 10,821	$ 10,821	
17	2026		$ 11,178	$ 11,178	
18	2027		$ 11,547	$ 11,547	
19	2028		$ 11,928	$ 11,928	
20	2029		$ 12,322	$ 12,322	
21	2030		$ 12,729	$ 12,729	
22	2031		$ 13,149	$ 13,149	
23	2032		$ 13,583	$ 13,583	
24	2033		$ 14,031	$ 14,031	
25	2034		$ 14,494	$ 14,494	
26	2035		$ 14,972	$ 14,972	
27	2036		$ 15,466	$ 15,466	
28	2037		$ 15,977	$ 15,977	
29	2038		$ 16,504	$ 16,504	
30	2039		$ 17,048	$ 17,048	
31	2040		$ 17,611	$ 17,611	
32	2041		$ 18,192	$ 18,192	
33	2042		$ 18,792	$ 18,792	
34	2043		$ 19,413	$ 19,413	
35	2044		$ 20,053	$ 20,053	
36	2045		$ 20,715	$ 20,715	
37	2046		$ 21,399	$ 21,399	
38	2047		$ 22,105	$ 22,105	25 Years
39	2048		$ 22,834	$ 22,834	
40	2049		$ 23,588	$ 23,588	
41	2050		$ 24,366	$ 24,366	
42	2051		$ 25,170	$ 25,170	
43	2052		$ 26,001	$ 26,001	
44	2053		$ 26,859	$ 26,859	
45	2054		$ 27,745	$ 27,745	
46	2055		$ 28,661	$ 28,661	
47	2056		$ 29,607	$ 29,607	
48	2057		$ 30,584	$ 30,584	
49	2058		$ 31,593	$ 31,593	
50	2059		$ 32,635	$ 32,635	
51	2060		$ 33,712	$ 33,712	
52	2061		$ 34,825	$ 34,825	
53	2062		$ 35,974	$ 35,974	
54	2063		$ 37,161	$ 37,161	
55	2064		$ 38,388	$ 38,388	
56	2065		$ 39,654	$ 39,654	
57	2066		$ 40,963	$ 40,963	
58	2067		$ 42,315	$ 42,315	
59	2068		$ 43,711	$ 43,711	
60	2069		$ 45,154	$ 45,154	
61	2070		$ 46,644	$ 46,644	
62	2071		$ 48,183	$ 48,183	
63	2072		$ 49,773	$ 49,773	25 Years
64	2073		$ 51,416	$ 51,416	
65	2074		$ 53,112	$ 53,112	
66	2075		$ 54,865	$ 54,865	
67	2076		$ 56,676	$ 56,676	
68	2077		$ 58,546	$ 58,546	
69	2078		$ 60,478	$ 60,478	
70	2079		$ 62,474	$ 62,474	
71	2080		$ 64,535	$ 64,535	
72	2081		$ 66,665	$ 66,665	
73	2082		$ 68,865	$ 68,865	
74	2083		$ 71,137	$ 71,137	
75	2084		$ 73,485	$ 73,485	
Total		$ 32,254,910	$ 2,098,826	$ 34,353,736	

Table Summary Info

Bridge Cost =	$ 32,254,910
Op. and Maint Cost =	$ 2,098,826
	$ 34,353,736

Inflation Factors

This *"Transportation Costs"* report is one of a series of reports issued by the Office of Policy Planning. It provides information on inflation factors and other indices that may be used to adjust project costs.

Please note that the methodology for Inflationary adjustments relating to specific transportation projects should be addressed with the district office where the project will be located. For general use or non-specific areas, the general guidelines provided herein may be used for inflationary adjustments.

Construction Cost Inflation Factors

The table below includes the inflation factors and present day cost (PDC) multipliers that are applied to the Department's Work Program for highway construction costs expressed in 2009 dollars.

Fiscal Year	Inflation Factor	PDC Multiplier
2009	--	1.000
2010	5.0%	1.050
2011	4.5%	1.097
2012	4.0%	1.141
2013	3.5%	1.181
2014	3.3%	1.220
2015	3.3%	1.260
2016	3.3%	1.302
2017	3.3%	1.345
2018	3.3%	1.389
2019	3.3%	1.435
Source: Office of Financial Development, (Fiscal Year 2009 is July 1, 2008 to June 30, 2009)		

Other Transportation Cost Inflation Factors

Other indices may be used to adjust project costs for other transportation modes or non construction costs. Examples are as follows:

The Consumer Price Index (CPI, also retail price index) is a statistical measure of a weighted average of prices of a specified set of goods and services purchased by wage earners in urban areas. It is a price index which tracks the prices of a specified set of consumer goods and services, providing a measure of inflation. The CPI is a fixed quantity price index and a sort of cost-of-living index.

The Producer Price Index for Highway and Street Construction (PPI) is reported monthly by the U.S. Department of Labor's Bureau of Labor Statistics. It is derived from current pricing information of material and services used directly or indirectly in highway construction. It does not forecast future inflation rates.

The Employment Cost Index (ECI), a component of the National Compensation Survey, measures quarterly changes in compensation costs, which include wages, salaries, and employer costs for employee benefits for civilian workers (nonfarm private industry and state and local government).