

DRAFT POND SITING MEMORANDUM

Florida Department of Transportation

District 1

SR 789 (Ringling) Project Development & Environment (PD&E) Study

from Bird Key Drive to Sarasota Harbour West

Sarasota County, Florida

Financial Management Number(s): 436680-1-22-01 & 436680-1-32-01

ETDM Number: 14384

Date: February 2024

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by the Federal Highway Administration and FDOT.

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY

JASON W. DUNN, PE

ON THE DATE ADJACENT TO THE SEAL.

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PROFESSIONAL ENGINEER CERTIFICATION

POND SITING MEMORANDUM

Project: SR 789 (Ringling) PD&E Study from Bird Key Drive to Sarasota Harbour West

ETDM Number: 14384

Financial Project ID: 436680-1-22-01 & 436680-1-32-01

Federal Aid Project Number: TBD

This pond siting memorandum contains engineering information that fulfills the purpose and need for the SR 789 (Ringling) Project Development & Environment Study from Bird Key Drive to Sarasota Harbour West in Sarasota County, Florida. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgment and experience.

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Hardesty & Hanover, LLC, and that I have prepared or approved the evaluation, findings, opinions, conclusions or technical advice for this project.

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EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT), District One, is conducting a Project Development and Environment (PD&E) Study which will investigate reconstruction and/or rehabilitation of the SR 789 Little Ringling bridges over the Coon Key Waterway in Sarasota. The project will not add additional travel lanes. Bicycle, pedestrian, and transit accommodations shall be incorporated into the design along the roadway and bridge crossing. The project limits are from Bird Key Drive to Sarasota Harbour West. The project segment is 0.741 miles in length. As part of the PD&E study, a Pond Siting Memorandum is necessary in order to calculate preliminary stormwater quality volumes that can be provided within the available right of way and estimate the stormwater management needs for the preferred roadway alternative.

1.0 PROJECT SUMMARY

1.1 Project Description

This project involves the reconstruction of the SR 789 (John Ringling Causeway) bridges [Structure Numbers 170022 and 170951]. The limits of the improvements are from Bird Key Drive to Sarasota Harbour West in Sarasota County, shown on **Figure 1-1**. The purpose of the study is to address structural integrity and operational deficiencies. SR 789 is classified as an Urban, Minor Arterial and consists of a four-lane, divided typical section between Bird Key Drive and Sarasota Harbour West, a distance of 0.741 miles. SR 789 serves as the only connection from downtown Sarasota to St. Armands Key and Lido Key. Although SR 789 is designated as a north-south route, within the project limits SR 789 runs in a generally east-west direction. See **Figure 1-2** for Quadrangle Map.

The existing twin bridges were constructed in 1958 and cross the Coon Key Waterway, a navigable waterway without a defined channel. The existing deck elevation at the center of the bridges is approximately 15.73 feet (ft). The bridges are spaced 100 ft apart (center to center) and each bridge is 1,006 ft-10-inches (-in) long (19 spans of 48 ft each, and 2 spans at 47 ft-5-in). Each bridge has two 12-foot (-ft) travel lanes and a 5-ft wide sidewalk on both sides. There are currently no shoulders or designated bicycle facilities across the bridges.

This memorandum will evaluate preliminary stormwater quality volumes that can be provided within the available right of way and estimate the stormwater management facility needs for the preferred roadway alternative.

1.2 Purpose and Need

The purpose of the project is to address structural integrity and operational deficiencies of the SR 789 bridges [Structure Numbers 170022 and 170951]. The ultimate goal of the project is to identify the optimal solution for a bridge structure in need of repair due to deteriorating conditions and to accommodate greater multimodal transportation access. The project has evaluated alternatives for reconstruction or rehabilitation, with consideration of bicycle/pedestrian and transit facilities, of 0.741 miles of roadway that provides a connection between nearby neighborhoods and recreational facilities (Bird Key Park, West Causeway Park and the Sarasota Yacht Club). The need for the project is based on the following criteria:

1.2.1 Bridge Deficiencies: Operational and Structural

The current concrete prestressed girder bridges are the second bridges that have existed at this location, replacing the original bridge in 1958. Several sections of the deck were replaced on the northbound bridge in 2016 along with a variety of other repair-type work throughout the years. The SR 789 bridges, located between downtown Sarasota and St. Armands Key and Lido Key, are more than fifty-years old, the typical expected design life for transportation infrastructure of this era, and are operationally deficient, particularly for transit. SR 789, including the bridges, is identified as a constrained roadway by the Sarasota / Manatee Metropolitan Planning

Organization (MPO), meaning it does not preclude any type of improvement in the future, but it identifies that the corridor has physical, or policy challenges associated with a widening/capacity project.

**Figure 1-1
Project Location Map**



Based on a January 2023 FDOT bridge inspection report, the northbound SR 789 bridge carrying traffic west to St. Armands, received a sufficiency rating of 76.9 and a health index of 68.0, while the southbound bridge carrying traffic east to the mainland, based on a July 2023 inspection report, received a sufficiency rating of 77.7 and a health index of 71.04, as measured on scales of 0-100.

Sufficiency rating is an overall rating of a bridge's fitness to remain in service and whether it will be repaired or replaced. A bridge with a sufficiency rating of 80 or less is generally eligible for bridge rehabilitation funding. The health index is a tool that measures the overall condition of a bridge and typically includes about 10 to 12 different elements that are evaluated by the department. A health index below 85 generally indicates that some repairs are needed, although it doesn't mean the bridge is unsafe. A low health index may also indicate that it would be more economical to replace the bridge than repair it. Both bridges do not meet current road design and safety standards. The bridge conditions are as follows:

Northbound (170022)

- Overall Condition: Fair
- Deck: Fair
- Superstructure: Satisfactory
- Substructure: Satisfactory
- Deck Geometry Appraisal: Substandard typical section elements
- Countermeasures have been installed to mitigate a potential problem with scour.

Southbound (170951)

- Overall Condition: Good
- Deck: Satisfactory
- Superstructure: Good
- Substructure: Satisfactory
- Deck Geometry Appraisal: Substandard typical section elements
- Countermeasures have been installed to mitigate a potential problem with scour.

1.2.2 Modal Interrelationships

SR 789 serves as the primary connection between downtown Sarasota and St. Armand's Key and Lido Key and is frequently used by bicyclists and pedestrians to access the adjacent parks and recreational facilities [Bird Key Park, West Multi-Use Recreational Trail (MURT) Bird Key / Coon Key Phase I, John Ringling Boulevard Trail and Longboat Key Trail]. The Longboat Key Trail SUN Trail exists throughout most of the project; however, it does not currently exist on either of the bridges over the Coon Key Waterway. While there are 5-ft wide sidewalks on both sides of the bridges, there are currently no shoulders or designated bicycle facilities across the bridges. Due to the minimal sidewalk width, there are often conflicts between pedestrians and bicyclists. Overall, the proposed

project intends to enhance mobility by evaluating alternatives for reconstruction or rehabilitation with consideration of bicycle/pedestrian and transit facilities within the study limits.

1.2.3 Safety

Serving as part of the emergency evacuation route network designated by the Florida Division of Emergency Management and City of Sarasota, SR 789 plays a critical role in facilitating traffic during emergency evacuation periods as the primary connection between downtown Sarasota and St. Armand's Key and Lido Key. The entire project corridor is located in the City of Sarasota's Hurricane Evacuation Zone "A."

The City of Sarasota Climate Adaptation Plan (December 4, 2017) studied and evaluated climate threats to public infrastructure to understand how sea level rise, storm surge, extreme precipitation, and extreme heat might impact the City of Sarasota's transportation network, stormwater management, water supply, wastewater systems, public lands, and critical buildings. Thirty-four transportation assets were evaluated of which 15 were deemed most vulnerable, including SR 789 [Project ID T15, pg. 31]. When prioritizing transportation vulnerabilities, the SR 789 bridge received a risk score of 64.4 (on a scale of 0-100). The potential reconstruction or rehabilitation of the SR 789 (Little Ringling) bridges would make it more resilient to climate vulnerabilities.

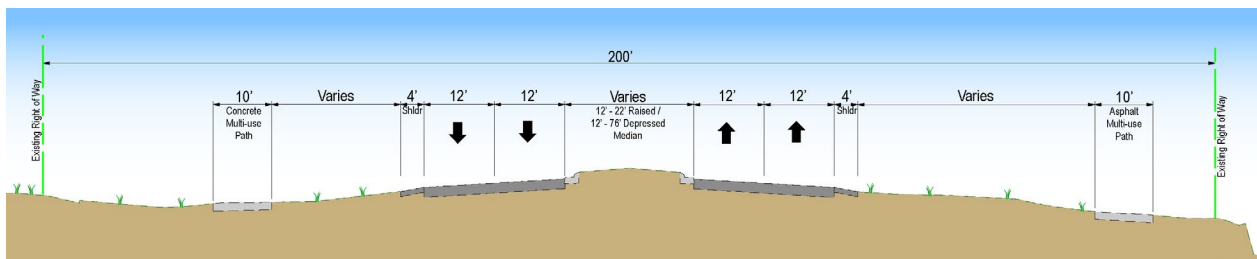
2.0 EXISTING CONDITIONS

2.1 Existing Roadway Conditions

2.1.1 Bird Key Drive to the Bridge

The existing typical section includes two 12-ft wide travel lanes in each direction, separated by a curb and gutter and flush landscaped median ranging in width from a minimum of 12 ft to a maximum of 76 ft. This section of roadway also includes 4-ft wide paved shoulders and a 10-ft multi-use path on the north side and a meandering 10-ft multi-use path within Bird Key Park that connects to the existing bridges, shown on **Figure 2-1**.

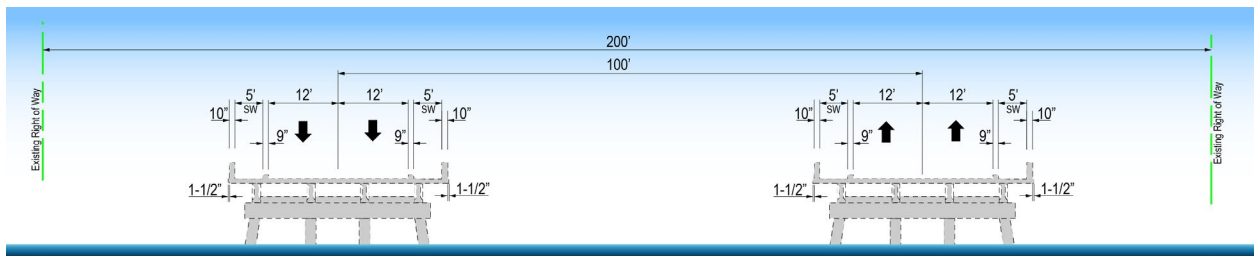
Figure 2-1
SR 789 Existing Roadway Typical Section - Bird Key Drive to the Bridge



2.1.2 Bridge Crossing Typical Section

The existing twin bridge typical section includes two 12-ft wide travel lanes, 5-ft sidewalks separated by a 9-inch (-in) raised curb for conduits and 10-in railings on both sides. No shoulders or bicycle lanes are currently provided on the bridge. The total width of each bridge is 37 ft 5-in. The clear space between the twin bridges is 62 ft 7-in, shown on **Figure 2-2**.

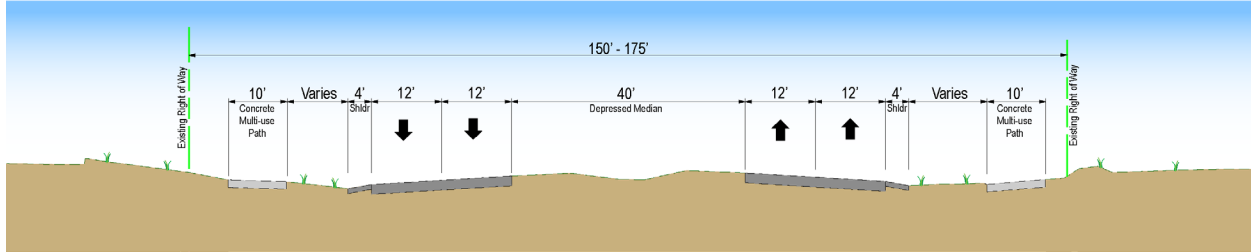
Figure 2-2
SR 789 Existing Twin Bridge Typical Section



2.1.3 Bridge to Sarasota Harbour West

The existing typical section includes two 12-ft wide travel lanes in each direction, separated by a 40-ft depressed landscaped median. This section of roadway also includes 4-ft wide paved shoulders, and 10-ft shared-use paths on both sides, shown on **Figure 2-3**. An existing overhead power line is located within the median.

Figure 2-3
SR 789 Existing Roadway Typical Section - Bridge to Sarasota Harbour West



2.2 Watershed Characteristics

This project is located in the Sarasota Bay Watershed. The Florida Department of Environmental Protection (FDEP) defines the project in WBID 1968B, impaired for bacteria and WBID 1968C, impaired for nutrients. The Sarasota Bay is also listed as an Outstanding Florida Water (OFW). Runoff from the existing bridge deck directly discharges to the Sarasota Bay via existing scuppers. Runoff from the roadway, east and west of the bridge, flows to adjacent grassed swales and landscaped medians which are graded to drain toward the Sarasota Bay.

Since all portions of the project drain toward the bay, there is one overall drainage basin (13.5 acres) in the existing condition. See **Figure 2-4** for existing sub catchment areas and drainage patterns. There is one existing stormwater management facility for the Sarasota Yacht Club adjacent to the project limits on the south west side of the bridge. The existing SR 789 roadway within the project limits is currently an untreated impervious surface.

2.3 Existing Soils

This project is located in sandy soils adjacent to bay waters. Per the National Resources Conservation Service (NRCS) Soil Survey of Sarasota County, two soil types were identified along the project corridor on both Bird Key (eastern project limits) and Coon Key (western project limits). These soil types were identified as Canaveral fine sand, 0 to 5 percent slopes (map symbol 6) and St. Augustine fine sand (map symbol 39), both having a high infiltration rate (low runoff potential). Groundwater conditions will vary with seasonal conditions and environmental factors such as wet season rainfall patterns, tides and man-made drainage features. See **Figure 2-5** USGS NRCS Soils Map

for the NRCS Soils map. The water table at the time of the SPT borings was approximately 0.3 ft NAVD88. Based on permit plans for the Plymouth Harbor Assisted Living Facility (ERP 978.004), the estimated seasonal high groundwater table is 2.02 ft NAVD88 (converted from NGVD29). Two Double Ring Infiltration Tests were performed on April 20th, 2023 on each side of the bridge near proposed pond locations. The results showed very low infiltration rates in the existing soil: PB-1 0.19 in/hr and PB-2 0.16 in/hr. Refer to **Appendix C** for Geotechnical correspondence.

Figure 2-4
Existing Basin Map

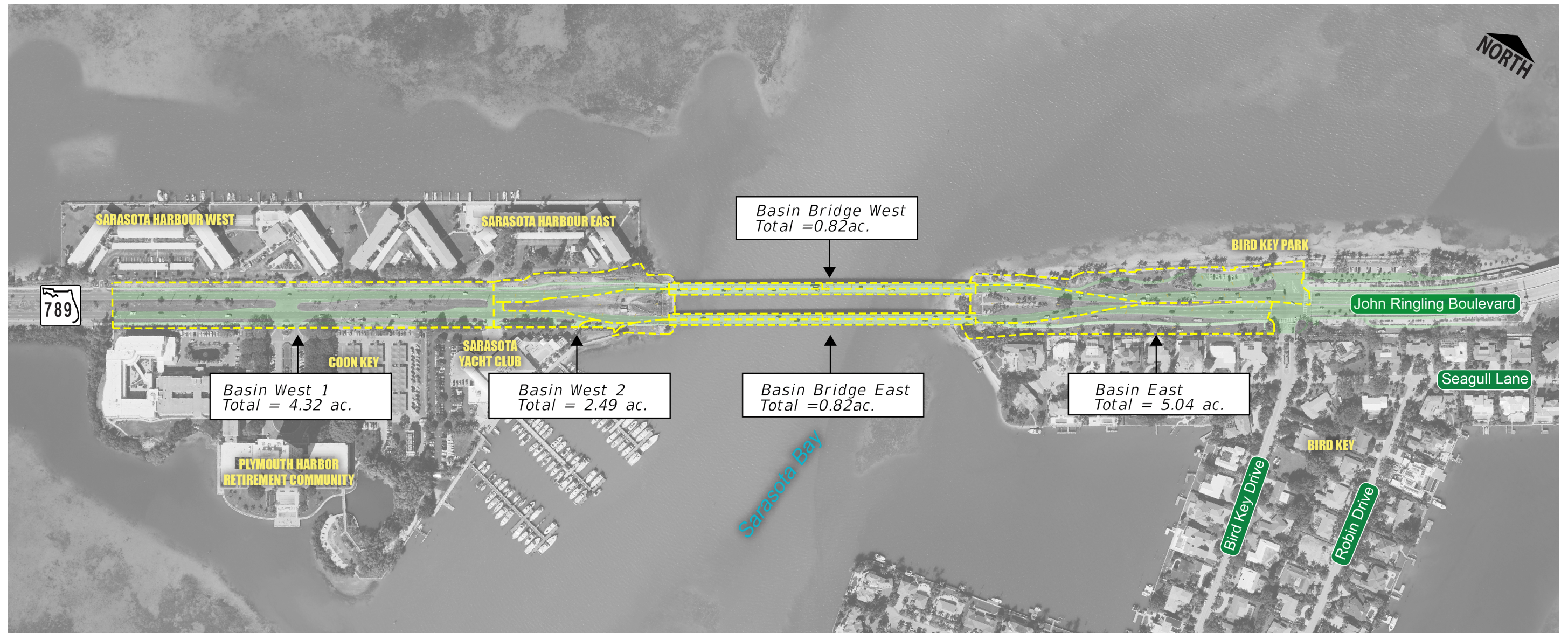


Figure 2-5
USGS NRCS Soils Map



2.4 Floodplains

Per FEMA FIRM 12115C0129F (11/04/16), the project is located in Zone VE with a base flood elevation of 13.0 ft NAVD88. This Zone VE designation indicates the bridge will experience high surge and wave climate. The bridge approaches and roadway improvements are in Zone AE with a base flood elevation of 11 to 13 ft NAVD88. There were no documented flooding complaints identified at the drainage kick-off meeting. There are no regulatory floodways within the project limits. See **Figure 2-6** showing the FEMA floodplains within the project limits, referenced from the FEMA National Flood Hazard Layer (NFHL) Viewer.

2.5 Existing Permits

There are two existing Environmental Resource Permits (ERP) at the bridge over Sarasota Bay. ERP 40867.0 – FDOT Pile Jacket Installation and ERP 40404 – Bridge Scour Countermeasures have been permitted through the Southwest Florida Water Management District (SWFWMD). The Ringling Causeway bridge (ERP 18555.01) permit provides details of the permitted dry retention pond at the eastern end of Bird Key. The as-builts show the pond bottom at elevation 2.27 ft NAVD88 and mean high water at 0.1 ft NAVD88 (converted from metric and NGVD). Additionally, there is a Self Cert Permit for the Sarasota Yacht Club pedestrian walkway that covers the adjacent stormwater management facility (Station 113+00 RT) and there are several ERP permit exemptions for pedestrian improvements.

2.6 Scour Countermeasures

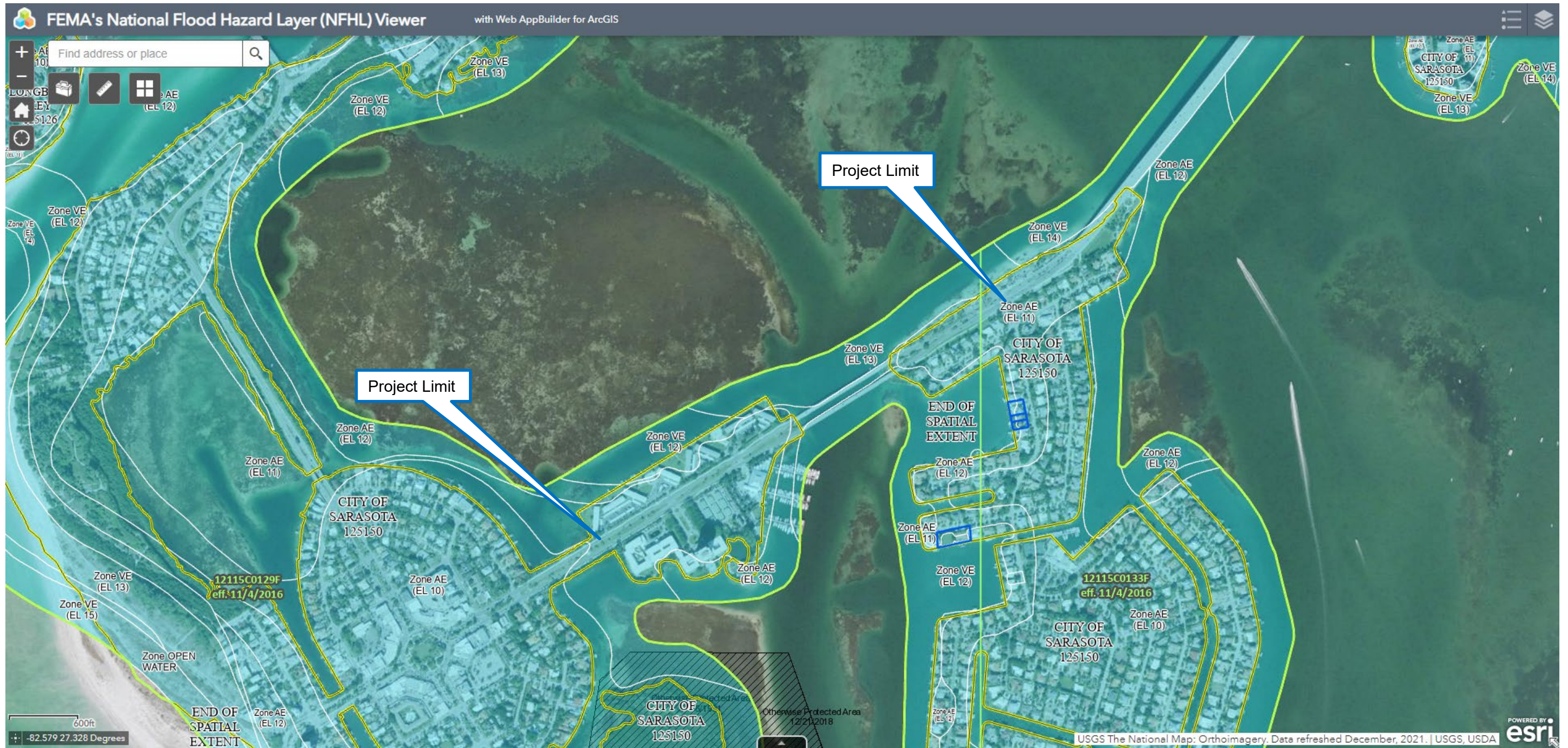
The existing bridges utilize rubble riprap as a means of scour countermeasures around 13 intermediate bents of the existing eastbound and westbound bridges. The existing rubble riprap is 18-in thick and the typical dimensions at each bridge pile are 26-ft parallel to the bridge and extending 8-ft from bridge pile perpendicular to the bridge.

2.7 Environmental

2.7.1 *Wetlands and Other Surface Waters*

As documented within the December 2023 Natural Resource Evaluation (NRE) for this project, the boundaries of all wetlands and other surface waters within the study area were approximated using both desktop and field reviews. No jurisdictional delineations/determinations were conducted. The existing conditions of all surface waters (including wetlands) within the study area were assessed using GIS data resources and field verification. Twenty-two systems occur within the study area. These systems all occur within the Sarasota Bay watershed and are presumed to be both state and federally jurisdictional. These systems are further described in the NRE, which includes the total acreage within the study area, the FLUCFCS Code and description, and the National Wetland Inventory (NWI) classification of each.

Figure 2-6
FEMA Map



Flood Hazard Zones
1% Annual Chance Flood Hazard

2.7.2 Essential Fish Habitat

Essential Fish Habitat (EFH) was identified within the study area for penaeid shrimp, red drum, schoolmaster and mutton snapper; gag, goliath, red, black, and yellowfin grouper; as well as lane, dog, yellowtail, and cubera snapper. Within the study area, EFH occurs within the Coon Key Waterway (i.e., part of Sarasota Bay), and consists of seagrasses; estuarine water column, and mud, sand, shell, rock substrates, and estuarine shrub/scrub (mangroves). No Habitat Areas of Particular Concern (HPACs) were identified within or adjacent to the project study area.

2.7.3 Outstanding Florida Waters

The Coon Key Waterway is part of the Sarasota Bay Estuarine System, designated as an Outstanding Florida Water (OFW) under 62.302.700 F.A.C. Although temporary minor impacts could result during project construction, the project's proposed stormwater management facilities are anticipated to result in an overall water quality benefit for the project area through the treatment of currently untreated stormwater runoff. Coordination will continue with the SWFWMD and FDEP as needed during future project phases to avoid and minimize potential impacts to this OFW. A mixing zone will be required for any work proposed in water and pursuant to Rule 62-4.242(2)(a) and (b), F.A.C.: the required mixing zone will located within the OFW may not be degraded for a period exceeding 30 days and will not exceed 29 Nephelometric Turbidity Units (NTUs) above the natural background for this specific area. The construction plans will be required to show the limits of the mixing zone and include a turbidity monitoring plan.

2.7.4 Coastal Barrier Resources

The project limits are outside (east) of the limits of Coastal Barrier Resource System (CRBS) Unit FL-72P (Lido Key). This unit is designated as an "otherwise protected area". The Coon Key Bridge is approximately 0.36 mile away from (northeast of) this unit. This unit will not be affected and CBRS coordination with the USFWS is not required.

2.7.5 Florida Wildlife Commission (FWC) Criteria

Based on the FWC's publication: "Grates and Other Manatee Exclusion Devices for Culverts and Pipes (February 2011)"; stormwater outfall pipes and structures extending below the Mean High-Water Line, exceeding 8 inches in diameter, will require manatee grating to be installed over the waterward end to ensure no manatees can become entrapped.

3.0 DESIGN CRITERIA

The design criteria for stormwater management facilities will comply with all regulatory requirements, including the SWFWMD ERP Applicant's Handbook, Volume II, Chapter 5 of the 2024 FDOT Drainage Manual and Chapter 9 of the 2024 FDOT Drainage Design Guide. Pre-application meetings were held with SWFWMD on July 11, 2019 and November 3, 2022. Refer to **Appendix C** for SWFWMD correspondence.

3.1 Water Quality

Sarasota Bay (WBID 1968C) is impaired for nutrients as of Cycle 20-22 and the project discharges directly into an Outstanding Florida Water (OFW). An additional 50% of treatment volume above the presumptive treatment requirement is required. A nutrient loading analysis should not be required if the OFW criteria is applied. The proposed improvements do not add capacity to the existing roadway and the additional impervious from bicycle lanes and sidewalks are exempt from water quality requirements. However, based on the November 3, 2022 meeting, the SWFWMD will require the treatment of shoulders that will be used by transit vehicles and buses.

Water quality improvements within the available "green space" include Stormwater Management Facilities (SMFs) within the existing right-of-way. Due to the additional bridge shoulder width, the removal of scuppers shall be considered to remove directly connected impervious areas from the Sarasota Bay.

3.2 Water Quantity

As verified with SWFWMD on July 11, 2019 and November 3, 2022, for projects discharging to a tidal water body, the peak discharge requirements are not required, therefore no water quantity volumes are considered for this report. Floodplain compensation is also exempt due to the tidal outfall.

3.3 Stormwater Management Facilities

Due to the low infiltration rates of the underlying soil and no attenuation storage requirements, on-line dry retention with effluent filtration is the recommended option for this project for the following reasons:

- Pollutant removal efficiencies
- Can be accomplished with shallow depth basins
- Applicable to varying and high-water table conditions
- Can add aesthetic features to the project

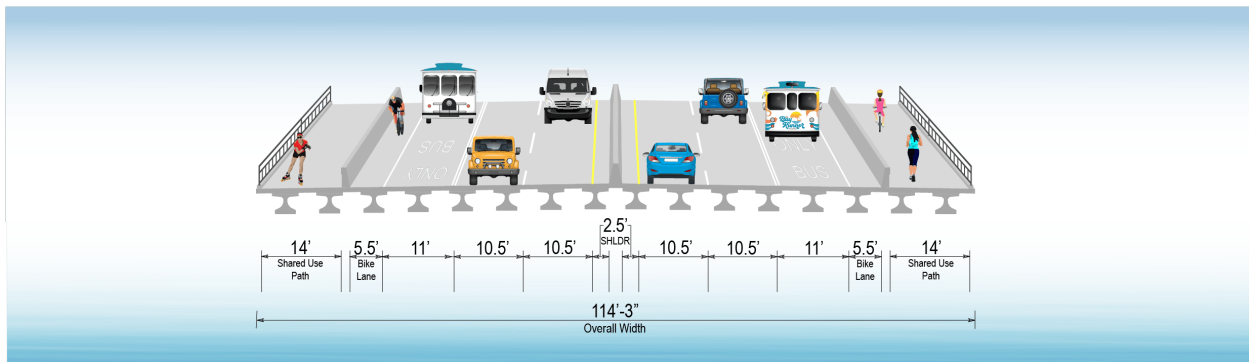
In segments where the roadway profile grade line is moderate to steep (at bridge approaches), median linear treatment areas were investigated but were not selected since they require a flat basin bottom. Based on SWFWMD criteria, SMF retention volume should be recovered within 36 hours. During design, the SMF's bottom elevation and receiving tailwater elevations will account for future sea level rise.

4.0 ROADWAY ANALYSIS

4.1 Preferred Alternative - Single Bridge

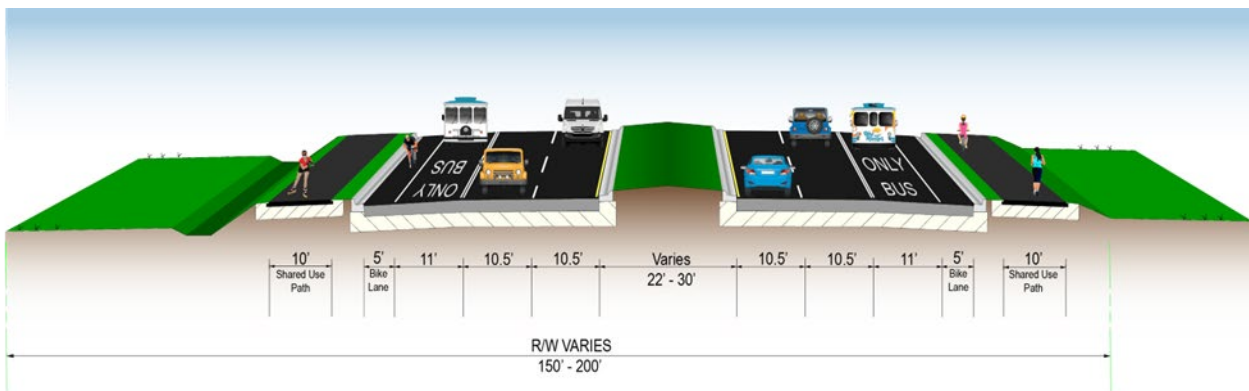
The preferred alternative replaces the existing twin bridges with a single bridge. Project improvements were evaluated using a 2045 design year. The single bridge typical section includes two 10.5-ft wide travel lanes, a dedicated 11-ft transit lane, a 2.5-ft inside shoulder, a 5.5-ft bike lane, and a 14-ft shared use path in each direction, shown on **Figure 4-1**. The total width of the bridge is 114 ft-3-in. The proposed deck elevation at the center of the new bridge will be approximately 26.23 ft, making it approximately 10.5 ft higher than the existing bridges. The additional height is to address storm surge and wave forces and FDOT corrosion criteria. The proposed bridge will not have scuppers.

Figure 4-1
SR 789 Preferred Bridge Typical Section



The new bridge will transition to a curb and gutter roadway typical section that includes two 10.5-ft wide travel lanes, a dedicated 11-ft transit lane, and a 5-ft bike lane in each direction, separated by a median with Type E curb and gutter. This section of roadway also includes a 10-ft shared-use path on both sides of the roadway that connects to the bridge, shown on **Figure 4-2**.

Figure 4-2
SR 789 Preferred Roadway Typical Section



5.0 POND SITING ANALYSIS

5.1 Stormwater Management Facility

Two alternative SMFs were evaluated for the preferred single bridge alignment: one on Coon Key (western project limits) and one on Bird Key (eastern project limits). Refer to **Figure 5-1** showing the use of the remnant “green space” within the existing right-of-way which can be used for SMF(s). SMF Alternative 1 and 2 are necessary to meet the volumetric treatment requirements of this project.

5.1.1 SMF Alternative 1

This alternative includes an area on the Bird Key (east) side of the project between the sidewalk and the proposed wall leading up to the bridge. The 0.24-ac pond provides approximately 0.06 ac-ft of treatment storage up to a depth of 6-in. The pond bottom (control) is set to elevation 4.0 ft NAVD88 (2-ft above estimated SHWT), while the top of bank is approximately elevation 5.5 ft NAVD88. See **Appendix A** for calculations.

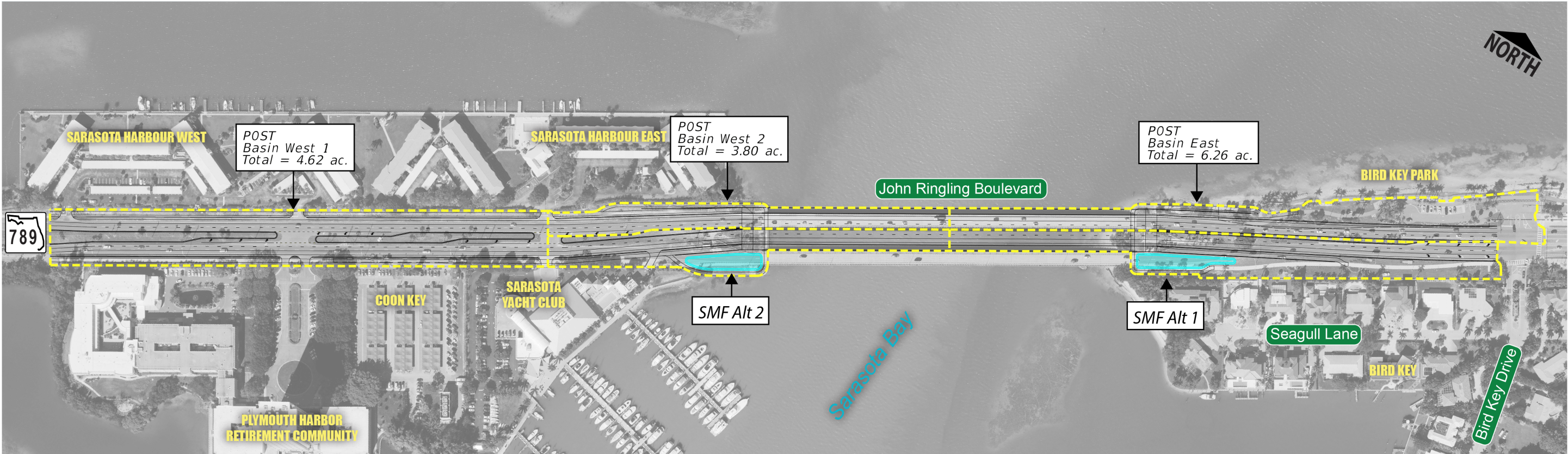
5.1.2 SMF Alternative 2

This alternative includes an area on the Coon Key (west) side of the project between the sidewalk and the proposed wall leading up to the bridge. The 0.23-ac pond provides approximately 0.06 ac-ft of treatment storage up to a depth of 6-in. The pond bottom (control) is set to elevation 4.0 ft NAVD88 (2-ft above estimated SHWT), while the top of bank is approximately elevation 5.5 ft NAVD88. See Appendix A for calculations.

5.2 Bridge Abutments

During the design phase, there is potential for SMFs in the areas between the waterway and the bridge abutments. Either an extension of the bridge limits or an abutment wall option would likely be necessary to accommodate the area needed for retention of runoff. However, due to significant construction costs these sites are not included in the alternative analysis. These areas will only be necessary if there are unforeseen hardships or permitting requirements during design.

Figure 5-1
Proposed Basins and SMF Map



6.0 FLOODPLAIN COMPENSATION

The bridge replacement is located in Zone VE with a base flood elevation of 13.0 ft NAVD88. The bridge approaches and roadway improvements are in Zone AE with a base flood elevation of 11 to 12 ft NAVD88. The floodplains are tidally influenced, and the bridge hydraulics analysis will ensure appropriate low member elevation, wave loading considerations and scour countermeasures. Therefore, no floodplain compensation is required for this project.

7.0 SUMMARY OF RESULTS

The results of this pond siting analysis shows that two dry detention areas (SMF 1 and SMF 2) can accomplish the proposed treatment of the transit lane for the limits of the project. Since both alternatives are located within the right of way, the costs of both dry detention areas are limited to grading, underdrain, control structures and piped outfalls. Refer to **Appendix B** for the Construction Cost Estimate. These costs should be included in the proposed design and are not determining factors for pond siting.

Appendix A
Calculations

Computations For:
SR 789 Ringling Bridge

Made By JWD

Date 12/11/23

Job No. 436680-1

Checked By ZSG

Date 12/14/23

Sec. No. _____

Back Checked By _____

Date _____

Sheet No. _____

Post-Development

Cover Description	NRCS			Rational	
	CN	Area (Ac)	CN x Area (Ac)	C	C x Area (Ac)
Roadway					
Pavement (Transit Lane)	98	1.80	176.56	0.95	1.71
Open Space, good cond. (A Soils)	39	0.00	0.00	0.20	0.00
Subtotal		1.80			
Total	98.0	1.80	176.56	0.95	1.71

Pond Sizing

SMF 1 (East)

Stage	Elevation (Ft)	Area (Ac)	Volume (Ac-Ft)
Berm (Back)	5.5	0.24	0.27
Berm (Front)	5.0	0.19	0.17
Design High Water	4.5	0.17	0.08
Weir (Design Low Water)	4.4	0.16	0.06
Control (Pond Bottom)	4.0	0.14	0.00

* SHW = 2.0

SMF 2 (West)

Stage	Elevation (Ft)	Area (Ac)	Volume (Ac-Ft)
Berm (Back)	5.5	0.23	0.27
Berm (Front)	5.0	0.19	0.17
Design High Water	4.5	0.17	0.08
Weir (Design Low Water)	4.4	0.16	0.06
Control (Pond Bottom)	4.0	0.14	0.00

* SHW = 2.0

Required Treatment Volume (SWFWMD)

* Detention Criteria with OFW

0.75" of Runoff from Bus Lane Shoulder (0.75" x C x Total Area) =

Provided Treatment Volume

Volume between Control and Weir =

Attenuation Volume

Not required, tidal outfall

Appendix B
Construction Cost Estimate

Construction Cost Estimate

Preferred Alternative

SMF #1

		Quantity	Unit	Unit Price*	Cost
0120 1	Earthwork (excavation)	323	CY	\$15.43	\$4,978.75
0120 6	Earthwork (embankment)	50	CY	\$34.36	\$1,718.00
0110 1 1	Clearing and Grubbing	0.20	AC	\$70,890.70	\$14,178.14
0425 1541	Type D Outlet Structure	1	EA	\$9,155.99	\$9,155.99
0430175124	Round 24" Pipe	120	LF	\$172.71	\$20,725.20
430982129	24" Mitered End Section	5	EA	\$3,556.54	\$17,782.70
0530 3 3	Rubble Riprap - Bank & Shore	10	TN	\$226.09	\$2,260.90
	Misc. Costs (vegetation, underdrain, etc.)	1	EA	\$50,000.00	\$50,000.00
				Total:	\$120,799.68

SMF #2

		Quantity	Unit	Unit Price*	Cost
0120 1	Earthwork (excavation)	323	CY	\$15.43	\$4,978.75
0120 6	Earthwork (embankment)	50	CY	\$34.36	\$1,718.00
0110 1 1	Clearing and Grubbing	0.20	AC	\$70,890.70	\$14,178.14
0425 1541	Type D Outlet Structure	1	EA	\$9,155.99	\$9,155.99
0430175124	Round 24" Pipe	50	LF	\$172.71	\$8,635.50
430982129	24" Mitered End Section	3	EA	\$3,556.54	\$10,669.62
0530 3 3	Rubble Riprap - Bank & Shore	10	TN	\$226.09	\$2,260.90
	Misc. Costs (vegetation, underdrain, etc.)	1	EA	\$50,000.00	\$50,000.00
				Total:	\$101,596.90

* - FDOT Statewide Average From 2023/05/01 to 2023/10/31

Appendix C
Correspondence

THIS FORM IS INTENDED TO FACILITATE AND GUIDE THE DIALOGUE DURING A PRE-APPLICATION MEETING BY PROVIDING A PARTIAL "PROMPT LIST" OF DISCUSSION SUBJECTS. IT IS NOT A LIST OF REQUIREMENTS FOR SUBMITTAL BY THE APPLICANT.



**SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
RESOURCE REGULATION DIVISION
PRE-APPLICATION MEETING NOTES**

**FILE
NUMBER:
PA 406905**

Date:	7/11/2019		
Time:	3:00		
Project Name:	FDOT SR 789 (Ringling) - Bird Key Dr to Sarasota Harbor West		
District Engineer:	Monte Ritter		
District ES:	Kim Dymond		
Attendees:	Jason Dunn jdunn@hardestyhanover.com , Tom Pride		
County:	Sarasota	Sec/Twp/Rge:	25,26/36/17
Total Land Acreage:		Project Acreage:	<10 acres

Prior On-Site/Off-Site Permit Activity:

- ERPs 40404.000 and 40867.000 (ERP Noticed General for bridge repairs)

Project Overview:

- Proposed roadway widening and bridge replacement project over tidal waters. Roadway widening and bridge replacement will not include additional traffic lanes, but will include paved shoulders and will replace existing 5' sidewalks with 10' wide multi-use path. If wetland or surface water impacts are less than 0.5 acres proposed activity can qualify for a General Permit per Rule 62-330.443, F.A.C. Otherwise, proposed activity will qualify for an Individual ERP.

Environmental Discussion: (Wetlands On-Site, Wetlands on Adjacent Properties, Delineation, T&E species, Easements, Drawdown Issues, Setbacks, Justification, Elimination/Reduction, Permanent/Temporary Impacts, Secondary and Cumulative Impacts, Mitigation Options, SHWL, Upland Habitats, Site Visit, etc.)

- Provide the limits of jurisdictional surface waters.
- Project may qualify for General Permit 62-330.443, F.A.C. which allows for up to 0.50 acre of wetland and surface water impacts for certain activities. If construction exceeds 0.50 acre of impacts, an Individual ERP and mitigation will be required.
- As of October 1, 2017, the District will no longer send a copy of an application that does not qualify for a State Programmatic General Permit (SPGP) to the U.S. Army Corps of Engineers. If a project does not qualify for a SPGP, you will need to apply separately to the Corps using the appropriate federal application form for activities under federal jurisdiction. Please see the Corps' Jacksonville District Regulatory Division Sourcebook for more information about federal permitting. Please call your local Corps office if you have questions about federal permitting. Link: <http://www.saj.usace.army.mil/Missions/Regulatory/Source-Book/>

Site Information Discussion: (SHW Levels, Floodplain, Tailwater Conditions, Adjacent Off-Site Contributing Sources, Receiving Waterbody, etc.)

- WBIDs – Sarasota Bay (WBIDs 1968BA, 1968B and 1968C). None of these WBIDs are currently listed for nutrient related impairments. WBIDs need to be independently verified by the consultant
- Provide documentation to support tailwater conditions for quality and quantity design
- OFW – Sarasota bay Estuary System adjacent to project area.
- Any wells on site should be identified and their future use/abandonment must be designated.

Water Quantity Discussions: (Basin Description, Storm Event, Pre/Post Volume, Pre/Post Discharge, etc.)

- Peak rate attenuation not required for bridge replacement project.
- Demonstrate proposed bridge hydraulic openings will prevent downstream scour, increased downstream velocities, and increased flood elevations on the property of others from flood events up to and including the 100-year, 24-hour event. Evaluation of the 2.33-year, 10-year, 25-year, and 100-year, 24-hour events will be acceptable.
- Demonstrate that site will not impede the conveyance of contributing off-site flows.

Water Quality Discussions: (Type of Treatment, Technical Characteristics, Non-presumptive Alternatives, etc.)

For General Permit:

- Formal water quality treatment not required.

For Individual Permit:

- Presumptive treatment not required since new travel lanes will not cause an increase in pollutant load over the existing lanes.
- Net improvement
-Refer to rule 62-330.301(2), F.A.C.
- -Net improvement not required since no new non exempt impervious areas are proposed.

Sovereign Lands Discussion: (Determining Location, Correct Form of Authorization, Content of Application, Assessment of Fees, Coordination with FDEP)

- The project may be located within state owned sovereign submerged lands (SSSL). Be advised that a title determination will be required from FDEP to verify the presence and/or location of SSSL.
- If use of SSSL is proposed, authorization will be required. Refer to Chapter 18-21, F.A.C. and Chapter 18-20, F.A.C. for guidance on projects that impact SSSL and Aquatic Preserves.
- If there is an existing SSL public easement, the easement will need to be modified. Refer to Chapter 18-21.005, F.A.C.

Operation and Maintenance/Legal Information: (Ownership or Perpetual Control, O&M Entity, O&M Instructions, Homeowner Association Documents, Coastal Zone requirements, etc.)

- The permit must be issued to entity that owns or controls the property. FDOT will be permittee.

Application Type and Fee Required:

- Notice of Intent to Use an Environmental Resource General Permit Application. \$250 for online submittal.
- Individual ERP- Sections A, C and E of application. Fee will be dependent upon project area and wetland/surface water impacts.
- Consult the [fee schedule](#) for different thresholds.

Other: (Future Pre-Application Meetings, Fast Track, Submittal Date, Construction Start Date, Required District Permits – WUP, WOD, Well Construction, etc.)

- The plans and drainage report submitted electronically must include the appropriate information required under Rules 61G15-23.005 and 61G15-23.004 (Digital), F.A.C. The following text is required by the Florida Board of Professional Engineers (FBPE) to meet this requirement when a digitally created seal is not used and must appear where the signature would normally appear:

ELECTRONIC (Manifest): *[NAME] State of Florida, Professional Engineer, License No. [NUMBER] This item has been electronically signed and sealed by [NAME] on the date indicated here using a SHA authentication code. Printed copies of this document are not considered signed and sealed and the SHA authentication code must be verified on any electronic copies*

DIGITAL: *[NAME] State of Florida, Professional Engineer, License No. [NUMBER]; This item has been digitally signed and sealed by [NAME] on the date indicated here using a Digital Signature; Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.*

- Provide soil erosion and sediment control measures for use during construction. Refer to ERP Applicant's Handbook Vol. 1 Part IV Erosion and Sediment Control.

Disclaimer: The District ERP pre-application meeting process is a service made available to the public to assist interested parties in preparing for submittal of a permit application. Information shared at pre-application meetings is superseded by the actual permit application submittal. District permit decisions are based upon information submitted during the application process and Rules in effect at the time the application is complete.

AGENDA

Drainage Kick-off Meeting Minutes

SR 789 (Ringling) from Bridge Key Drive to Sarasota Harbor West Concurrent Project Development and Environment (PD&E) Study and Design Sarasota County

FPID#: 436680-1-22-01 and 436680-1-32-01

Thursday October 26, 2022 (11:00 AM – 12:00 PM)
Teams Meeting

- I. Introductions
 - Florida Department of Transportation
 - Brent Setchell, Sergio Figueroa, Jonathon Bennett
 - Hardesty & Hanover Team
 - Jim Englert, Jason Dunn, Zachary Gross (H&H), Gordon Mullen (RK&K)

- II. Drainage Design
 - Existing Condition
 - Sarasota Bay (WBID 1968) impaired for bacteria, but is an OFW
 - Bridge runoff is direct discharge to Sarasota Bay via existing scuppers
 - Roadway runoff sheet flows to landscaped median and grassed areas
 - FEMA Flood Zones AE and VE
 - Proposed Condition
 - Eliminate scuppers from design and direct discharge to Sarasota Bay
 - Add BMPs in green spaces where possible
 - Stormwater conveyance
 - Combination of open swale and closed collection system
 - Based on 10-year storm frequency
 - Allow Spread Criteria based on DS 40 mph: keep ½ lane clear
 - Draft PSR/LHR
 - Developed Draft PSR January 2021
 - Evaluated single v. twin bridges
 - Identified BMP alternatives
 - Linear Treatment Areas on South side of bridge, created by the realignment
 - Under bridge approaches
 - Typical Section modifications with 15% L&G
 - Single Bridge Selection
 - Increased inside shoulder width
 - Potential for transit lane

- III. Permitting approach
 - Bridge Replacement - Not adding capacity to roadway

- Shoulders, bicycle lanes and sidewalks are exempt from providing water quality
- Exempt from water quantity due to tidal outfall
- SMFs are not required
 - Verified with SWFWMD on 7/11/19

IV. Open discussion

- Schedule
 - Jason- 2021 Draft PSR was put on hold due to funding and determination of single v. twin bridge as well as typical section components
 - PD&E is going to public hearing in early April 2022
 - H&H to show the single bridge with the 15% L&G typical in the PSR and LHR. PD&E technical documents are due in for D1 review in January due to schedule needed prior to the public hearing.
 - Jason mentioned the PD&E and Design overlap relative to H&H's recent 15% L&G submittal.
 - Brent -combined PD&E/Design schedule puts more urgency on these design discussions. Patrick Bateman is working to set up typical section and L&G review meetings with D1 staff.
- Permitting approach for transit lane
 - Jim-Transit/shoulder is being added for both Big Ringling and Little Ringling bridges. Stripe out 12' outside shoulder, which requires a 2' reduction to the inside shoulder width. No change to total bridge width
 - Brent stated transit lanes are not considered travel/capacity lanes. Brent will discuss the concept with Dave Kramer/SWFWMD. With incorporation of BMPs, he thinks SWFWMD may be okay with the current bus on shoulder concept.
 - Jim – D1 EMO wants to show in public hearing the future transit lane concept (a striping change from safety to a transit project).
 - Brent agrees with the BMP approach, starting with net new impervious, scupper removal and routing all runoff through the BMPs/ponds. Demonstrate ROW hardship, as no ROW acquisition is needed for the preferred alternative.
- Treatment
 - Sergio how much additional impervious area in pre- vs post?
 - H&H will calculate but new impervious for bridge exceeds the 0.5 acre over water threshold for General Bridge Replacement Permit
 - Brent - Even if we're not meeting volumetric requirements for treatment, at least routing the stormwater runoff through the BMPs (esp. trash removal) could be sold as a net project WQ benefit.
- Compensatory treatment from another project
 - Jason mentioned the potential for using WQ credits from traffic circle at Gulfstream Drive? Brent would rather keep treatment options within this project but could use that credit as a backup if SWFWMD does not accept the WQ approach. Brent isn't immediately aware of any other regional WQ improvement projects.
 - Any need for a dedicated environmental look around meeting? Brent – not needed at the moment.

- Sea Wall Design
 - Brent –sea level rise (resiliency) is important to consider in the development of the seawall design (i.e., implications of cost versus potential risk). Sergio asked about looking into the feasibility of adding flap gates or tide valves.
 - Brent – displayed Port Manatee data, suggesting 2.43’ NAVD as the MHW in 2100 using linear interpretation. Brent would like to apply more science in the justification in the sea wall and bridge profile heights (versus bridge design life). Brent forwarded his e-mail to the team for reference. Jason will review this with Intera, the coastal engineer.

- Stormwater conveyance
 - Jason- combination of open and closed drainage systems may be used for this project due to ROW-restricted areas and added turn lane areas.
 - Jason- need to evaluate how spread could impact the transit lane. Using a design speed of 40 mph half the lane is required to be clear. Do we need to apply this criteria to the transit lane or use the allowable spread of the entire shoulder on the bridge. Brent - If you can’t meet spread, a design variation may be needed. Sergio doesn’t think this will be an issue relative to the longitudinal grade of the bridge (most of the water should be able to be collected). Gordon mentioned the potential for unauthorized vehicle use of the bus on shoulder lane (similar to what is seen on SR 865/Matanzas Pass Bridge into Ft. Myers Beach).
 - Sergio asked about looking into the feasibility of adding flap gates or tide valves.
 - Jason mentioned a public workshop comment about flooding complaints along south ROW, will address by capturing roadway runoff in the proposed conveyance design.

- Maintenance of Traffic
 - Brent asked about MOT approach. Jason/Jim - partial construction build half bridge in the median, switch traffic, then build the rest of the bridge. Temporary work trestle? Yes, start at one end then work across the channel.

- Environmental
 - Gordon showed the draft wetland/SAV/oyster/EFH impacts table being used in the pending Draft NRE. Brent mentioned that D1 will be using the Skyway SAV Mitigation site currently being permitted by D1 Permits (12 mitigation plan components are being developed). This site is out-of-basin, so Brent is using ratios. There is currently no D1 Permits plan for mangrove mitigation due to limited banks available. Gordon mentioned that during field reviews, he saw evidence of prior on-site mangrove plantings – not sure who tried this? These were generally unsuccessful as only the plastic pots were left in the water-front substrate.

V. Project Schedule

- NTP – November 4, 2019
- Design Execution – December 2019
- Alternatives Public Workshop – April 5 and April 7, 2022
- Typical Section Package – September 16, 2022

- 15% Line & Grade – September 16, 2022
- BDR (30% Plans) – TBD
- Public Hearing – April 2023

VI. Action Items

- H&H- Update PSR and LHR for use in the public hearing
- H&H- Attend monthly FDOT/SWFWMD meeting on 11/3

Minutes

SWFWMD/FDOT Meeting Minutes

SR 789 (Ringling) from Bridge Key Drive to Sarasota Harbor West Concurrent Project Development and Environment (PD&E) Study and Design Sarasota County

FPID#: 436680-1-22-01 and 436680-1-32-01

Thursday November 3, 2022 (2:00 – 3:00 PM)
Teams Meeting

- I. Introductions
 - SWFWMD
 - David Kramer, Al Gagne
 - Florida Department of Transportation
 - Nicole Monies, Brent Setchell, Ben Shepard
 - Hardesty & Hanover Team
 - Jason Dunn (H&H), Gordon Mullen (RK&K)
- II. Project Overview
 - Proposed roadway widening and bridge replacement project over tidal waters. Roadway widening and bridge replacement will not include additional traffic lanes, but will include paved shoulders and will replace existing 5' sidewalks with 14' wide multi-use paths. Additionally, FDOT is considering narrowing the travel lanes which would allow wider outside shoulders for occasional transit use for the trolley
 - Proposed typical section is a single bridge, the twin parallel bridges will be removed.
 - Right turn lanes are also contemplated on the island
 - A draft profile and typical sections was shown from the 15% Line and Grade submittal
- III. Site Information
 - Sarasota Bay (WBID 1968) impaired for bacteria
 - Sarasota Bay is an OFW
 - Existing Bridge runoff is direct discharge to Sarasota Bay via scuppers
 - FEMA Flood Zones AE and VE
- IV. Water Quantity
 - Tidal outfall
 - Exempt from peak rate attenuation
 - Scour analysis for proposed condition
- V. Water Quality
 - Bridge Replacement - Not adding capacity to roadway (4 lanes existing will be replaced with 4 lanes)
 - Reference PA 406905, Verified with SWFWMD on 7/11/19

- Shoulders, bicycle lanes and sidewalks are exempt from providing water quality
- Jason: Proposed design will remove the direct discharge to Sarasota Bay by removing the bridge scuppers in the proposed design
- Jason: Design team will maximize green spaces from bridge realignment to provide BMPs for treatment (dry retention)
- Jason: Identified hardship that all project improvements will occur within existing right of way.
- David Kramer: Transit use on shoulder would require treatment of this additional impervious surface
 - Reference FDOT District 7 project I-275 bus on shoulder project
- Treatment volume was determined to be presumptive criteria plus 150% OFW adjustment for additional transit lane.
- A temporary mixing zone will be established during construction

VI. Sovereign Lands Discussion

- Project will be constructed within the existing SSL easement

VII. Environmental

- Seagrass mitigation
 - Estimated 0.05 acre of direct impacts and 0.12 acre of secondary impacts (using a 100-foot buffer from the outside edges of the existing bridges).
 - Anticipates using the FDOT D1 Skyway WADs site (pending permitting). Since it is out-of-basin, FDOT is proposing the use of a ratio.
 - SWFWMD staff confirmed that a coastal cumulative impact analysis will be required.
- Mangrove mitigation
 - Estimated 0.05 acre of direct impacts (mostly of individual mangroves along the eastern end of the bridge).
 - Brent stated that potential mitigation options are still being evaluated due to lack of available local mitigation banks with mangrove/estuarine credits.
 - SWFWMD suggested that on-site planting could be an option.
 - Mitigation planting would also likely require additional coordination with the City of Sarasota (Bird Key Park owner) and/or the FDEP for potential Sovereign Submerged Lands involvement.
- Listed/protected species –
 - Applicable federal species include free-swimming sea turtles (several species), West Indian manatee and low potential for small tooth sawfish and Gulf sturgeon.
 - State-listed species generally consist of state-threatened shorebird and water bird species.
 - The PD&E study's Draft Natural Resources Evaluation document is being prepared with the intent to have as much preliminary construction information available to seek advanced consultation with the National Marine Fisheries Service.

April 20, 2023

Geotechnical Department Manager
Florida Department of Transportation
District 1

**Re: Madrid Project No. 14103
Submittal of Boring Logs and DRI Test Result
SR789 Little Ringling Bridge
Bird Key Drive to Sarasota Harbor West
Sarasota County, Florida**

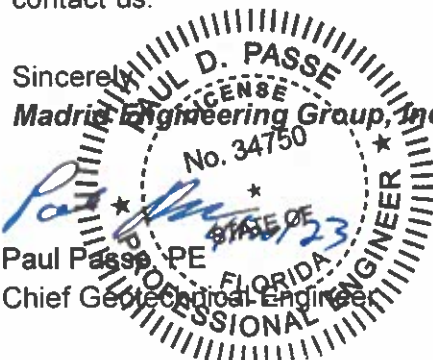
Dear Geotechnical Department Manager:

Madrid Engineering Group, Inc., dba Madrid CPWG (Madrid) is pleased to submit this data report summarizing the results of two borings and two double ring infiltration (DRI) tests performed at SR789 Little Ringling Bridge in Sarasota County, Florida on 03/20/2023. Associated laboratory testing was performed on the selected samples from the borings which included Percent Passing #200 sieve size and Natural Moisture Content tests. The laboratory test results are presented on the boring logs. The soil borings, DRI and laboratory tests were completed in general accordance with the appropriate ASTM standards.

The work was completed in agreement with the unit rates provided in the Subcontractor Task Order Contract/ Master Services Agreement.

We appreciate the opportunity to be of service to you on this project and look forward to working with you on future projects. If you have any questions, please do not hesitate to contact us.

Sincerely,
Madrid Engineering Group, Inc. (EB 6509)



Paul Passe, PE
Chief Geotechnical Engineer

Attachment: Boring Logs and DRI Test Results



Aerial Data Source – 2021 Microsoft Corporation, 2021 CNES Distribution Airbus DS.



MADRID CPWG

2030 State Road 60 East
 Bartow, Florida 33830
 863 533-9007 Fax: 863 533-8997
 EB-0006509

Hardesty & Hanover

FIGURE 1
Boring Location Plan
SR 789 Little Ringling Blvd
Sarasota, Florida

Project Number:
14103

Notes: Base map provided by Client.

Drawn By: CJ

Checked By: DeS

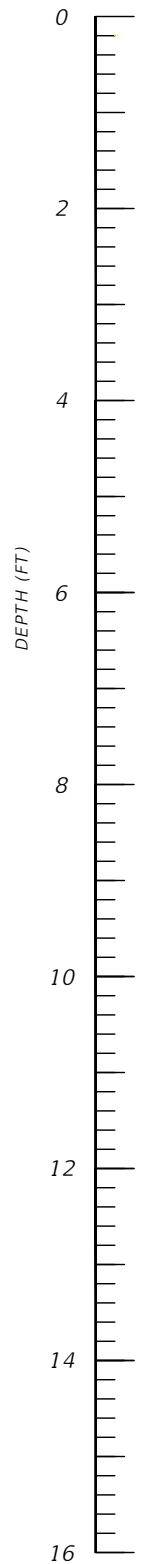
BORING ID
DATE
LATITUDE
LONGITUDE
HAMMER
DRILLED BY

PB-1
3/27/23
27.3255556
-82.5638889
AUTO
FP

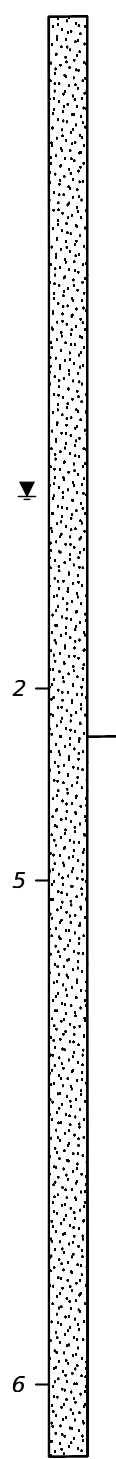
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3/27/23
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FP

LEGEND

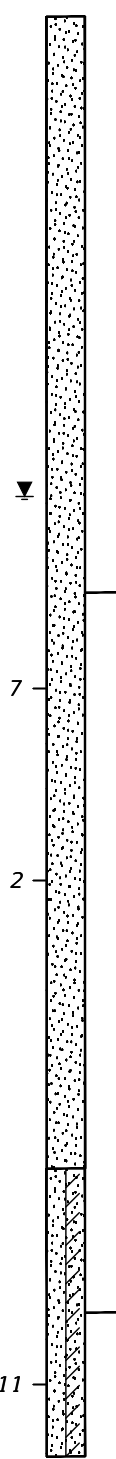
- FINE SAND (SP)
- SLIGHTLY SILTY SAND (SP-SM)
- SILTY SAND (SM)
- SLIGHTLY CLAYEY SAND (SP-SC)
- CLAYEY SAND (SC)
- SILT (ML)
- CLAY (CL)
- LIMESTONE
- ORGANIC
- BORDERLINE CLAYEY SAND/SANDY CLAY (SC/CL)
- GNE GROUNDWATER TABLE NOT ENCOUNTERED
- GSE GROUND SURFACE ELEVATION (FEET)
- GNA GROUNDWATER TABLE NOT APPARENT
- 50/6" FIFTY BLOWS FOR 6 INCHES
- WOH/WOR WEIGHT OF HAMMER/ROD
- CASING USED
- GROUNDWATER TABLE ENCOUNTERED
- ESTIMATED SEASONAL HIGH GROUNDWATER TABLE
- STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
- LOSS OF CIRCULATION (%)
- A WITH LIMEROCK FRAGMENTS
- B WITH SHELL FRAGMENTS
- C WITH ROCK FRAGMENTS



<#200: 3.2%
NMC: 19.7%



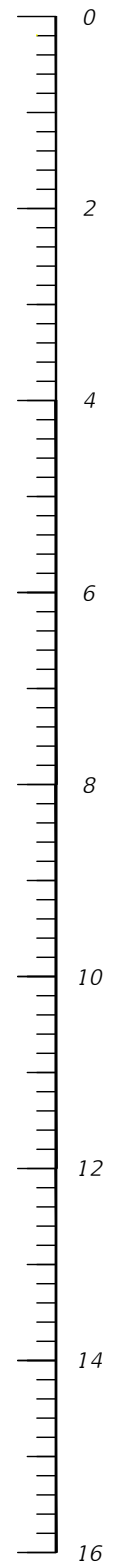
LIGHT GRAY SAND (SP)



LIGHT GRAY SAND (SP)

PALE BROWN SLIGHTLY CLAYEY SAND (SP-SC)

<#200: 5.5%
NMC: 24.5%



	SAFETY HAMMER	AUTOMATIC HAMMER
GRANULAR MATERIALS-RELATIVE DENSITY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY LOOSE	LESS THAN 4	LESS THAN 3
LOOSE	4 TO 10	3 TO 8
MEDIUM DENSE	10 TO 30	8 TO 24
DENSE	30 TO 50	24 TO 40
VERY DENSE	GREATER THAN 50	GREATER THAN 40
SILTS AND CLAYS CONSISTENCY	SPT N-VALUE (BLOWS/FT.)	SPT N-VALUE (BLOWS/FT.)
VERY SOFT	LESS THAN 2	LESS THAN 1
SOFT	2 TO 4	1 TO 3
FIRM	4 TO 8	3 TO 6
STIFF	8 TO 15	6 TO 12
VERY STIFF	15 TO 30	12 TO 24
HARD	GREATER THAN 30	GREATER THAN 24

ENVIRONMENTAL CLASSIFICATION:
SUBSTRUCTURE CONCRETE: SLIGHTLY AGGRESSIVE
SUBSTRUCTURE STEEL: MODERATELY AGGRESSIVE
SUPERSTRUCTURE SLIGHTLY AGGRESSIVE

REVISIONS						DRAWN BY: CJ 04/2023	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			SHEET TITLE: REPORT OF CORE BORING SHEET	REF. DWG. NO.
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID.		
							SR 789	COLLIER	-	SR 789 LITTLE RINGLING BLVD	1

PAUL PASSE, P.E.
P.E. LICENSE NUMBER 34750
MADRID CPWG
2030 SR 60 E
BARTOW, FL 33830

CHECKED BY:
PP 04/2023

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.



MADRID ENGINEERING GROUP, INC.

2030 State Road 60 East
 Bartow, FL 33830
 863/533-9007 FAX 533-8997

DOUBLE-RING INFILTRATION TEST

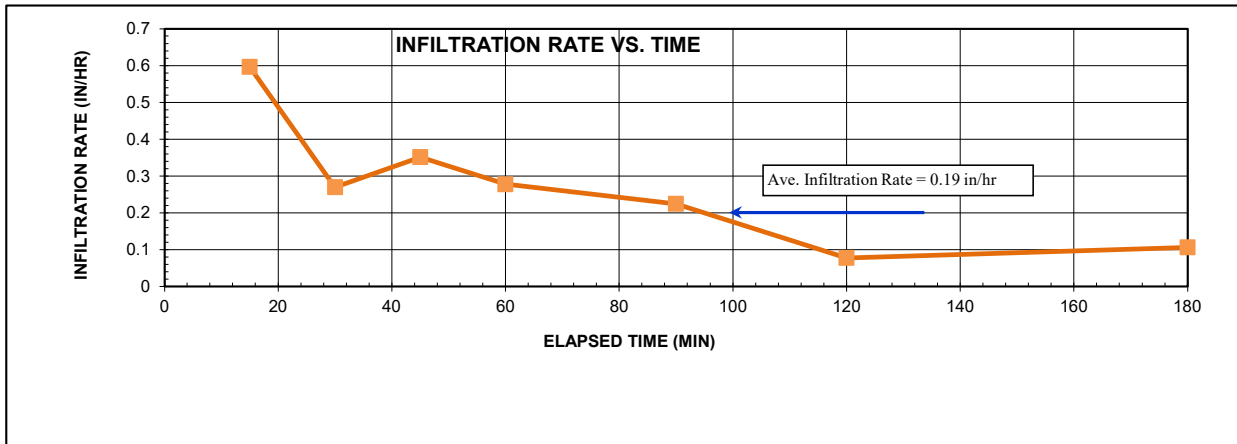
Project:	SR 789 Little Ringling Br	Location:	Sarasota County, Florida
Project No.:	14103	Surface Description:	
Client:	FL DOT-District 1		
Performed By:	FP	Test Depth:	6"
Date/Time	3/20/2023	Ring Size	12", 24"
Test No.:	PB-1	Constant Head:	1'

INNER RING FIELD TEST DATA

ELAPSED TIME (minutes)	QUANTITY H ₂ O (mL)	INFILTRATION RATE (in/hr)
15	276.31	0.60
30	124.91	0.27
45	162.76	0.35
60	128.69	0.28
90	208.18	0.22
120	71.92	0.08
180	196.82	0.11
240	166.54	0.09

Final Average

0.19





MADRID ENGINEERING GROUP, INC.

2030 State Road 60 East
 Bartow, FL 33830
 863/533-9007 FAX 533-8997

DOUBLE-RING INFILTRATION TEST

Project: SR 789 Little Ringling Br Location: Sarasota County, Florida
 Project No.: 14103 Surface Description:
 Client: FL DOT-District 1
 Performed By: FP Test Depth: 6"
 Date/Time: 3/20/2023 Ring Size: 12", 24"
 Test No.: PB-2 Constant Head: 1'

INNER RING FIELD TEST DATA

ELAPSED TIME (minutes)	QUANTITY H ₂ O (mL)	INFILTRATION RATE (in/hr)
15	0.00	0.00
30	132.48	0.29
45	124.91	0.27
60	177.90	0.38
90	60.56	0.07
120	147.62	0.16
180	109.77	0.06
240	41.64	0.02

Final Average

0.16

