STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL REPORT COVERSHEET

650-050-38
ENVIRONMENTAL
MANAGEMENT
08/22

PRELIMINARY ENGINEERING REPORT

Florida Department of Transportation

District FOUR

Project Development and Environment (PD&E) Study
SR A1A over Sebastian Inlet - Bridge 880005
Bridge Replacement

Limits of Project: MP 21.945 - MP 22.665 Roadway ID 88070000, Indian River County
MP 0.00 - MP 0.307 Roadway ID 70060000, Brevard County

Indian River and Brevard Counties, Florida

Financial Management Number: 445618-1-22-02

ETDM Number: 14433

Date: May 10, 2023

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.

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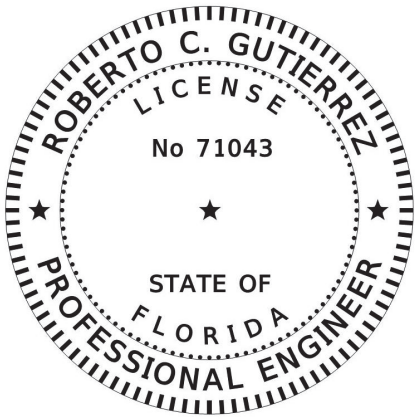

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1.0 PROJECT SUMMARY

The Florida Department of Transportation (FDOT or Department) District Four is conducting a Project Development & Environment (PD&E) Study to evaluate the replacement of the Sebastian Inlet Bridge (No. 880005) crossing the Sebastian Inlet located at the Indian River County and Brevard County boundary (**Figure 1-1**).

The project development process, alternatives developed, and the associated social, economic, and environmental analyses follow the guidance provided in the Department's current version of the PD&E Manual and FDOT Design Manual (FDM). The project also satisfies state and federal processes and incorporates the requirements of the National Environmental Policy Act (NEPA).

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.

1.1 PROJECT DESCRIPTION

The Sebastian Inlet Bridge (bridge), also known as the James H. Pruitt Memorial Bridge, is a 1,548-feet long concrete structure constructed in 1964 to carry State Road (SR) A1A over the Sebastian Inlet (Inlet). The Inlet was created from privately owned lands. In 1919 the Sebastian Inlet District (SID) was formed to maintain the Inlet and owns the submerged lands under the bridge. The fixed bridge is located within FDOT and SID right-of-way (ROW) and is adjacent to the Sebastian Inlet State Park (Park). The project limits extend approximately one mile along SR A1A from Mile Post (MP) 21.945 north to MP 22.665 of Roadway ID 88070000 in Indian River County continuing north from MP 0.00 north to MP 0.307 of Roadway ID 70060000 in Brevard County.

The bridge vertical clearance is 39-feet and horizontal clearance is 150-feet between the bridge fenders. The Inlet provides access for vessels between the Indian River and the Atlantic Ocean and is approximately 525-feet wide at the bridge.

The existing bridge has two 12-foot travel lanes and 2-foot shoulders. Within the project limits, SR A1A has two 12-foot travel lanes. North and south of the bridge, paved shoulders are 2 to 4-feet wide. South of the bridge, shoulders are marked as designated bicycle lanes. There are currently no pedestrian or bicycle facilities located within the bridge approaches or on the bridge, creating a gap in the multimodal network along SR A1A. An 8-foot shared use path is located on the west side of SR A1A north and south of the bridge.

FINANCIAL PROJECT ID: 445618-1-22-02 FEDERAL AID NO.: D420 075B ETDM NO.: 14433

FIGURE 1-1: PROJECT LOCATION MAP

1.2 PURPOSE & NEED

1.2.1 PROJECT PURPOSE

The James H. Pruitt Memorial Bridge which was constructed in 1964 to carry State Route A1A across the Sebastian Inlet is approximately 1,500 feet long with 19 spans, the longest of which is approximately 180 feet long. The posted speed limit is 45 miles per hour. The primary purpose of this project is to address the structural and functional deficiencies of the existing James h. Pruitt Memorial Bridge (Bridge # 880005) over the Sebastian Inlet. A replacement option, along with the No-Build/rehabilitation option for the bridge, will be evaluated through a Project Development and Environment (PD&E) Study. The project will also address the gap in system linkage for bicyclists and pedestrians.

1.2.2 PROJECT NEED

The bridge was inspected by FDOT District Four on November 14, 2018, following Hurricane Florence. Based on this evaluation the bridge was rated as structurally deficient with a sufficiency rating of 51.6 and a health index of 79.8. FDOT's work program requires that structurally deficient bridges, once identified, have corrective actions (repair or replacement) initiated within six years. Bridges with a health index of less than 85 require repairs or replacement.

1.2.2.1 Modal Interrelationships

There are currently no pedestrian or bicycle facilities across the bridge, creating a gap in the multimodal network along SR A1A. North and south of the bridge, SR A1A includes a separated 8-foot shared use path on the west side of the roadway. South of the Inlet, 4-foot bike lanes are marked on both side of the roadway. North of the Inlet, shoulders are 2 to 4-feet wide and not marked as bike lanes.

The Indian River County Metropolitan Planning Organization's (IRC MPO) *Indian River County Bicycle and Pedestrian Plan* (IRCMPO, 2015) recommends sidewalks be added on both sides of SR A1A from Windsor Boulevard to the County Line at the Inlet to supplement the existing marked bike lanes. In addition, SR A1A has been designated as a segment of the East Coast Greenway which provides a multimodal connection from Maine to Florida along the east coast of the United States. The Florida Greenway Trails System Plan (FDEP, 2018) states that the East Coast Greenway strives to provide a "high quality, safe, and motor vehicle free trail experience" for the users along the route.

1.3 PLANNING CONSISTENCY

1.3.1 PROJECT STATUS

The IRC MPO 2045 Long Range Transportation Plan (LRTP) *Connecting IRC 2045* was adopted on December 9, 2020. Because the project originated as a bridge maintenance project, is funded as an operation and maintenance project, and is not a capacity improvement project it

is not individually listed in the LRTP. The project is listed in the IRC MPO *Transportation Improvement Plan (TIP) 2021/22 – 2025/26* as an investment priority.

Because the project is also located within Brevard County, it is listed in the Space Coast Transportation Planning Organization's (SCTPO) *TIP FY 2023 -2027*. Additional information is provided in the Planning Consistency section of this document.

1.3.2 PLANNING CONSISTENCY

The project is consistent with *Goal 5* of *Connecting IRC 2045*. Goal 5 - *Preserving and maintaining the transportation system and transportation infrastructure* includes evaluating the structural integrity of bridges on major roads and coordination with FDOT for improvements. The project is not a capacity improvement project and, therefore, is not individually listed in the LRTP. The project originated as a bridge maintenance project and is funded as an operation and maintenance project.

Coordination with the SCTPO to include the project in the TIP by reference only is complete. An amendment to the SCTPO TIP was approved on September 8, 2022.

The project is currently funded through design and construction.

1.4 COMMITMENTS

The following commitments and recommendations have been made by the Florida Department of Transportation (FDOT) and will be adhered to during the final design and/or construction phases.

1. FDOT is committed to keeping the bridge open during construction to minimize impacts to the traveling public and emergency services. Accelerated bridge construction techniques may require temporary, short-term lane closures during off peak hours. FDOT will evaluate the need and impact of temporary, short-term lane closures during the design phase and coordinate any required lane closures with the public, Park, and emergency services prior to implementation.

2. FDOT will reinitiate consultation with NMFS during the design and permitting phase for any changes in impacts to EFH, including but not limited to, design changes, temporary trestle impacts, temporary cofferdam impacts, and barge spudding details since those details are not available during the PD&E Study Phase.

3. FDOT will install flight diverters on the replacement bridge to protect birds and provide a safer bridge crossing for motorists and pedestrians. Diverter poles should be a minimum of 10 feet tall and spaced 12 feet apart over the water. US Fish and Wildlife Service (USFWS) suggested considerations to make the poles more visible to birds without harming the birds. Agency correspondence regarding the bird diverters is in the SWEPT project file.

4. FDOT will ensure that mitigation proposed for wetland impacts within wood stork Suitable Foraging Habitat will adhere to the requirements of the USACE and USFWS.

5. To minimize adverse effects to gopher tortoises, a survey is needed prior to the start of construction. Surveys should be conducted within the existing and proposed right of way, dry swales, and area underneath the proposed underpass service road. Any gopher tortoises located within 25 feet of proposed construction will be relocated by a Florida Fish and Wildlife Conservation Commission (FWC) Authorized Gopher Tortoise Agent within the boundaries of the Sebastian Inlet State Park.

6. The FDOT will adhere to the stipulations included in the 2023 Memorandum of Agreement between the FDOT and the State Historic Preservation Officer (SHPO).

7. The FDOT will provide a qualified archaeological monitor access to the specified site during any ground disturbing activities and said monitor will have the authority to halt the ground disturbing activities as needed and appropriate to conduct and document the monitoring efforts in accordance with the monitoring plan developed in coordination with SHPO. A qualified archaeological monitor is one who meets the Secretary of the Interior's Professional Qualification Standards and Guidelines for Archaeology and Historic Preservation as set forth in 36 CFR Parts 61 and 62 and published in the Federal Register 33708-33723, June 20, 1997.

8. Section 4(f) recreational mitigation measures include:

    a. Replacement of the existing perimeter fence around the bridge on the north side of the park
    b. Repaving of both the south and north parking lots within the FDOT right of way (ROW) under the bridge
    c. Providing the funding through a Joint Participation Agreement (JPA) for installation of electronic gates at both the south and north park entrances

9. FDOT commits to continuing coordination with FDEP Parks and Recreation, FDEP Division of State Lands, and the Acquisition and Restoration Council (ARC) for all unavoidable impacts to state-owned conservation land subject to ARC approval during the design phase.

10. FDOT commits to continuing coordination with FDEP Parks and Recreation, FDEP Division of State Lands, and ARC regarding updated parking lot layouts for parking under the bridge if the layouts increase the number of parking spaces for Sebastian Inlet State Park.

11. FDOT will reinitiate informal Section 7 consultation with NMFS during the design and permitting phase for any changes in NMFS-listed species impacts, including but not limited to, design changes, temporary trestle impacts, temporary cofferdam impacts, and barge spudding details since those details are not available during the PD&E Study Phase.

12. FDOT will coordinate with the County's Artificial Reef Program to explore potential opportunities to donate existing bridge materials to an artificial reef site.

13. FDOT is committed to evaluating the creation of a swale along the east side of SR A1A south of the bridge for treatment and attenuation of Basin 1 during the design phase.

14. In the February 24, 2023 Reasonable Assurance letter, NMFS requested that FDOT commit to performing in-water pile driving activities during daylight hours only. FDOT will evaluate the feasibility of this request during the design phase and coordinate the pile driving approach with NMFS prior to construction.

15. Adhere to the Standard Manatee Conditions for In-Water Work and the FDOT Manatee Special Provision for Construction SP000070104-4

16. Adhere to the Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office

17. Utilize the ramp up or vibratory installation methodology for pile driving to warn and allow any listed species to vacate the area

18. Utilize sound diminishing measures (such as wood blocks) to minimize potential noise impacts from pile driving

19. Continue to review prudent avoidance and minimization measures during final design, permitting, and project construction

1.5 ALTERNATIVES ANALYSIS SUMMARY

The PD&E Study considers a range of alternatives that meet the purpose and need of the project while balancing engineering requirements, environmental impacts, and public input. Project alternatives include the No-Action (No-Build), Transportation Systems Management & Operations (TSM&O), Rehabilitation, and Build Alternatives.

Although the No-Action alternative does not meet the purpose and need for the project, it remained under consideration and served as a baseline for comparison against other alternatives throughout the PD&E Study.

The TSM&O alternative does not meet the purpose and need for the project. Because the bridge has been determined an eligible historic resource under Section 106 of the National Historic Preservation Act, a rehabilitation alternative was considered. Based on the results of the rehabilitation alternative analysis, this alternative was removed from further consideration.

Build Alternatives were developed and evaluated based on the following criteria:

- Ability to satisfy the purpose and need for the project
- Vertical and horizontal navigational clearances
- Bridge, roadway, and Park entrance geometry
- Natural, social, cultural and physical environment impacts
- Section 4(f) impacts

- Section 106 criteria of the National Historic Preservation Act (NHPA)
- Required ROW
- Project costs
- Avoidance of bridge closure during construction

Three build alternatives were considered that meet the purpose and need of the project while balancing engineering requirements, environmental impacts, and public input:

- Build Alternative 1 includes a new bridge on the existing alignment.
- Build Alternative 2 includes a new bridge alignment that is shifted to the east of the centerline of the existing bridge.
- Build Alternative 3 includes a new bridge on alignment that is shifted to the west of the centerline of the existing bridge.

1.6 DESCRIPTION OF PREFERRED ALTERNATIVE

Following the January 11 and 13, 2022 Alternatives Public Workshop and as a result of the comprehensive resources evaluation, environmental and engineering studies, costs, and involvement of the public, local officials, and federal and state resource agencies, sufficient information and public opinion exist to identify the **Alternative 2 (East)** as the **Preferred Alternative (Appendix A)**.

The Preferred Alternative avoided where possible and minimized overall impacts, to the greatest extent practicable, while meeting the stated purpose and need to address the structural and functional deficiencies of the existing bridge and the gap in system linkage for bicyclists and pedestrians.

A key criterion for the alternatives development is the vertical and horizontal clearances of the bridge. A navigation needs analysis memorandum was submitted to the USCG and a preliminary clearance determination was received in July 2021 which stated a desired minimum vertical clearance of 65-feet above mean high water (MHW) for a fixed bridge and 125-feet minimum horizontal clearance.

Based on the USCG response, a vertical clearance evaluation was completed to demonstrate a bridge vertical clearance of less than 65-feet, as preliminarily determined by the USCG, provides for reasonable needs of navigation at the Inlet (**Appendix B**). The vertical clearance evaluation considered the purpose and need for the project, impacts to the north and south Park entrances, character of the Inlet, inlet bottom topography, surrounding resources, maintenance of the Inlet and adjacent waterways, and connectivity to the Intracoastal Waterway (ICW). A Vertical Clearance Evaluation Memorandum was submitted to the USCG for review. A revised preliminary clearance determination was received from the USCG in November 2021 (**Appendix C**) which stated a minimum vertical clearance of 51-feet above MHW for a fixed bridge and 125-feet minimum horizontal clearance will meet the reasonable needs of navigation for a bridge crossing the Sebastian Inlet.

The Preferred Alternative typical section is shown in **Figure 1-2** and includes:

- Two 12-foot travel lanes
- Two 8-foot shoulders
- Two 12-foot shared use paths

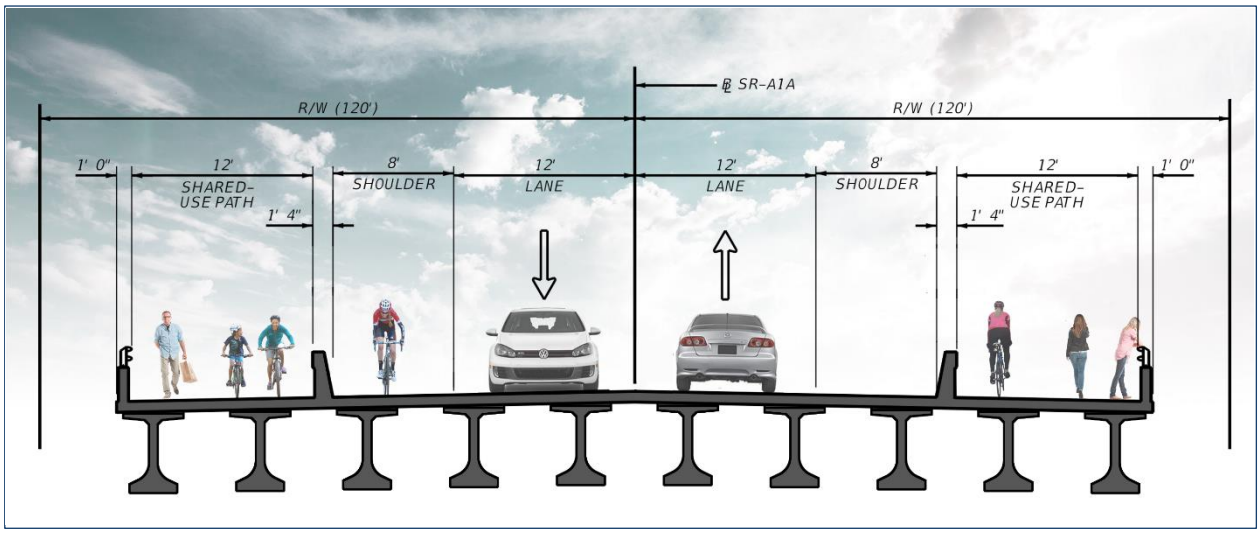


FIGURE 1-2: PREFERRED ALTERNATIVE BRIDGE TYPICAL SECTION

The Preferred Alternative includes a new bridge alignment that is shifted to the east of the of the existing bridge (**Appendix A**).

South of the bridge**,** the Preferred Alternative improvements include:

- Reconfiguration of the south Park entrance including the addition of an exit right turn lane
- A southbound acceleration lane from the south Park entrance
- Lengthened storage of the southbound right turn lane into the Park
- Continuation of the shared use path on the west side of the bridge and roadway
- Addition of a shared use path on the east side of the bridge and roadway that extends to the public parking lot located on the east side of SR A1A
- Addition of a crosswalk crossing SR A1A at the south Park entrance

North of the bridge, the Preferred Alternative improvements include:

- Reconfiguration of the north Park entrance including the addition of an exit right turn lane
- Lengthened storage of the southbound right turn lane into the Park
- Continuation of the shared use path on the west side of the bridge and roadway

- Addition of a shared use path on the east side of the bridge and roadway terminating at the north Park entrance
- Addition of a crosswalk crossing SR A1A at the north Park entrance
- Reconfiguration of the SID Access Road

All bridge improvements are located within existing FDOT ROW. Approximately 3.46 acres of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, shared use path improvements, and stormwater management.

Because the new bridge will be constructed in phases, the existing bridge will remain in place while the east portion of the new bridge is constructed. This new construction will include the shared use path, shoulder, and northbound travel lane.

Once construction of the east portion of the new bridge is completed, traffic will be diverted to the newly constructed portion of the bridge. The existing bridge will then be demolished followed by construction of the west side of the bridge completing the new bridge.

1.7 LIST OF TECHNICAL DOCUMENTS

- Navigation Needs Memorandum
- Vertical Clearance Evaluation Memorandum
- Traffic Analysis Methodology Memorandum
- Project Traffic Analysis Report
- Recommended Target Speed Memorandum
- Typical Section Package
- Pond Siting Report
- Bridge Hydraulic Report
- Geotechnical Report
- Utilities Assessment Package
- Value Engineering Report
- Sociocultural Data Report
- Noise Study Technical Memorandum
- Contamination Screening Evaluation Report
- Water Quality Impact Evaluation

- Natural Resource Evaluation
- Cultural Resource Assessment Report
- Section 4(f) Programmatic Evaluation – Historic Resources
- Section 4(f) *de minimis* Evaluation – Recreation Resources
- Project Commitment Record
- Planning Consistency Form
- Public Involvement Summary Report

2.0 EXISTING CONDITIONS

2.1 ROADWAY

SR A1A is a two-lane, undivided roadway with one 12-foot travel lane and a 2- to 4-foot shoulder in each direction within the project limits. The bridge section across the inlet has one 12-foot travel lane with a 2-foot shoulder in each direction. Barrier curb and guardrail are provided on both sides of the roadway approaches to the bridge section. An 8-foot wide shared use path extends along the west side of the SR A1A north and south of the Park entrances. The existing typical section for the bridge is illustrated in **Figure 2-1** and the roadway characteristics are summarized in **Table 2-1**.

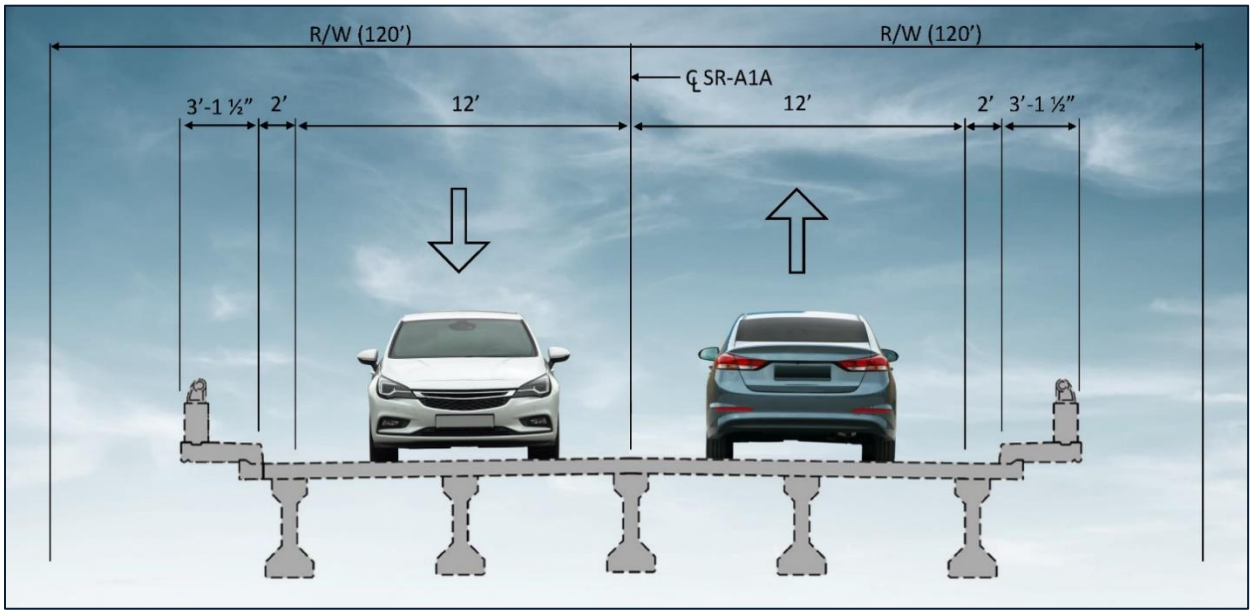


FIGURE 2-1: EXISTING SR A1A BRIDGE TYPICAL SECTION

TABLE 2-1: SR A1A ROADWAY CHARACTERISTICS

Roadway ID	88070000 (Indian River County)	Roadway ID	70060000 (Brevard County)
Begin Milepost	21.945	Begin Milepost	0.000
End Milepost	22.665	End Milepost	0.338
2019 AADT	2,959	AADT	2,959
2019 % Trucks	8.3	2019 % Trucks	8.3
% Trucks (Historic)	7.4	% Trucks (Historic)	7.4
Surface Type	FC125	Surface Type	FC95
Side of Roadway	Composite	Side of Roadway	Composite

AADT: Annual Average Daily Traffic

2.2 RIGHT-OF-WAY

The existing SR A1A ROW width varies within the project limits. Near the begin and end limits, it is typically 100-feet, widening to approximately 240-feet for the length of the bridge. **Table 2-2** lists the ROW widths with approximate stationing along the project limits. Stationing is referenced to the survey provided by FDOT District Four for the project.

TABLE 2-2: BASELINE SURVEY SR A1A

From Station	To Station	Right of Way Width
790+00	804+50	100’
804+50	809+90	145’
809+90	815+00	165’
815+00	834+00	240’
834+00	842+00	100’

2.3 ROADWAY CLASSIFICATION & CONTEXT CLASSIFICATION

SR A1A has a functional classification of rural minor arterial for the full length of the project in both Indian River and Brevard Counties. The context classification for SR A1A is C1-Natural from the beginning of the project in Indian River County continuing north to the north end of the bridge. From the north end of the bridge to the end of the project in Brevard County, the context classification for SR A1A is C2-Rural.

2.4 LAND USE

The existing land use adjacent to and surrounding the project area consists of recreational and conservation land uses associated with the Park. Indian River County classifies the adjacent and surrounding area as recreation and Brevard County as recreation/conservation. **Figure 2-2** shows the existing land uses for the area immediately surrounding the project.

2.5 ACCESS MANAGEMENT CLASSIFICATION

SR A1A has an access management classification of Access Class 4 – Non-Restrictive Median which has a standard connection spacing of 440-feet and minimum signal spacing of 2,640-feet for 45 miles per hour (mph) or less speed limit.

2.6 POSTED AND DESIGN SPEEDS

The posted speed limit for SR A1A south of the bridge in Indian River County (northbound) is 50 mph and reduces to 45 mph approximately 0.1 mile south of the bridge approach. The posted speed limit for SR A1A north of the bridge in Brevard County (southbound) is 55 mph and reduces to 45 mph approximately 0.5 mile north of the bridge approach. The bridge design speed was not indicated on the original bridge design plans.

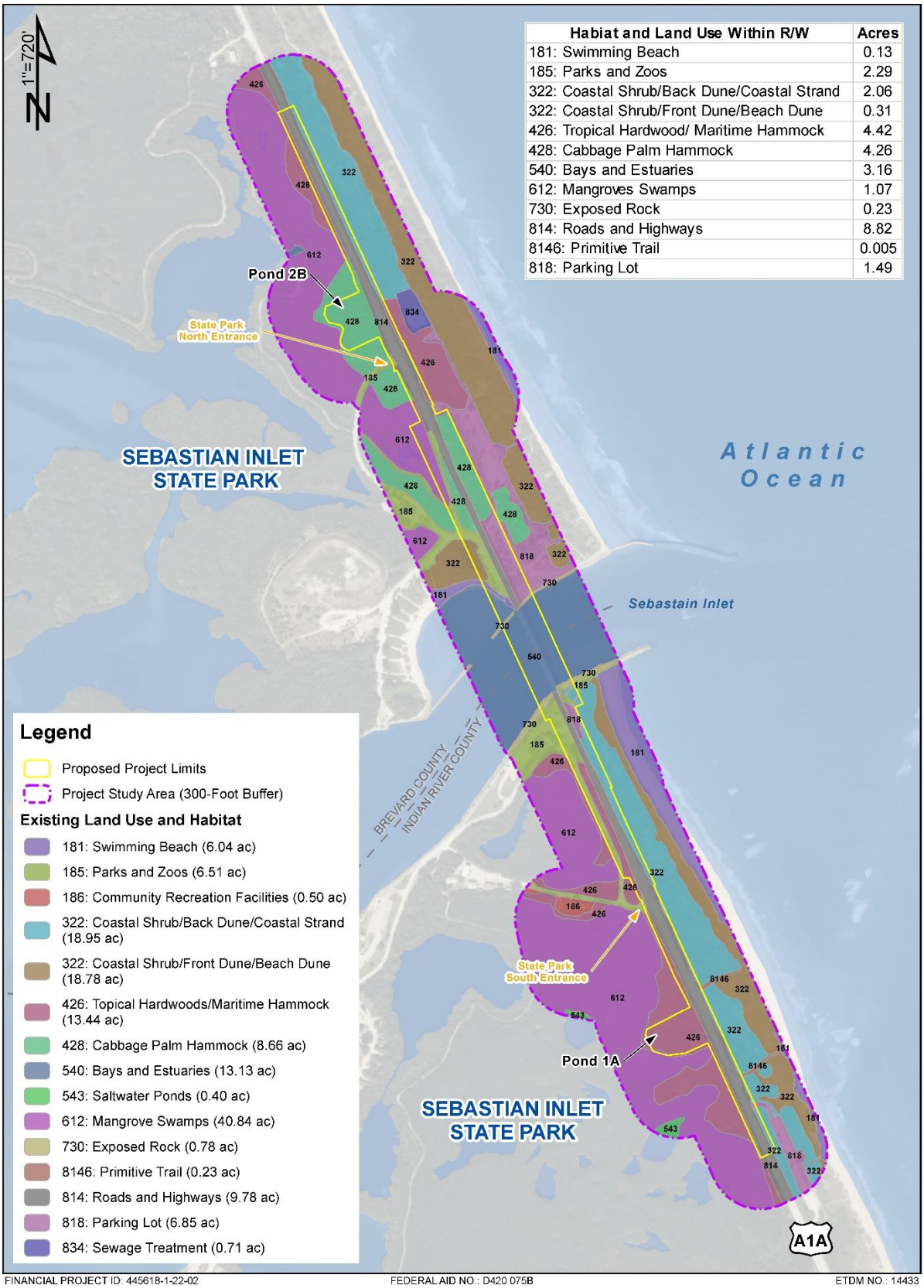


FIGURE 2-2: EXISTING LAND USE

The original design speed is unknown but, based on the K values for the vertical curves, it has been estimated to be between 45 and 50 mph, which is less than the standard design speed of 55 mph - 70 mph for a context classification of C-1 Natural / C-2 Rural.

2.7 VERTICAL AND HORIZONTAL ALIGNMENT

The existing vertical alignment for the roadway and bridge is shown in **Figure 2-3**. The bridge profile varies between 4.5 and 5 percent grade.

The existing horizontal alignment of the bridge and roadways is shown in **Figure 2-4**. The bridge is in a tangent section, including the roadway to the north and south.

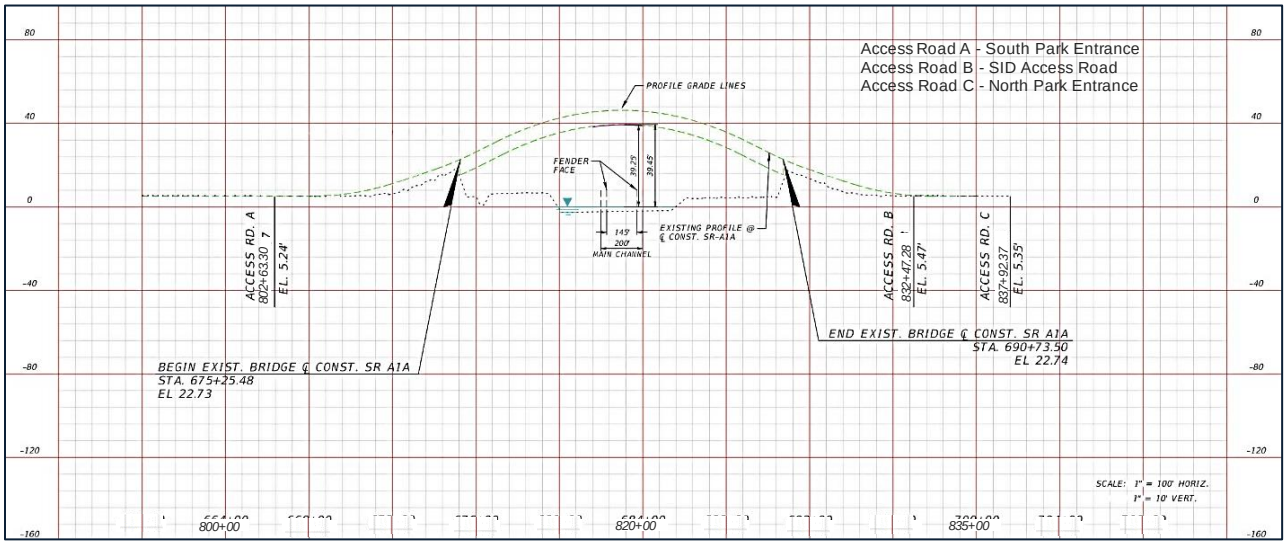


FIGURE 2-3: EXISTING BRIDGE PROFILE SECTION

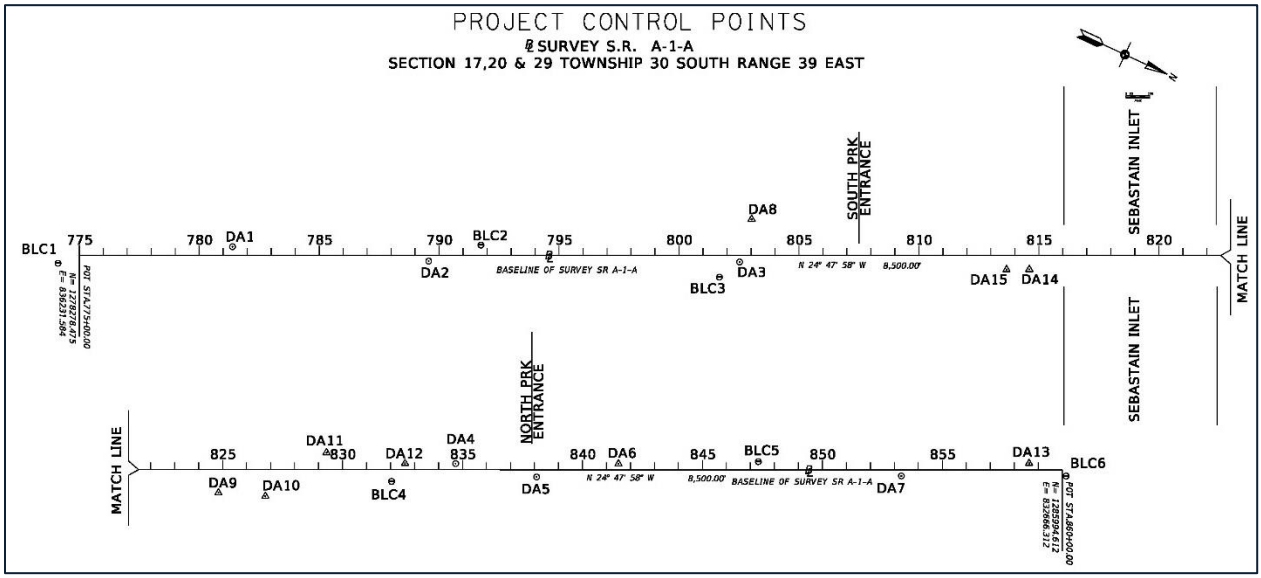


FIGURE 2-4: EXISTING HORIZONTAL ALIGNMENT

2.8 PEDESTRIAN ACCOMMODATIONS

An existing 8-foot-wide shared use path is located on the west side of SR A1A and is separated from travel lane way by an approximate 4-foot grass buffer. The shared used path extends north of the northern Park access and south of the southern Park access. No pedestrian facilities are located on the bridge.

2.9 BICYCLE FACILITIES

No bicycle facilities are located on the bridge. South of the bridge, 4-foot shoulders are marked with bicycle lanes along both sides of SR A1A. North of the bridge, 2- to 4-feet wide unmarked shoulders are provided along SR A1A.

2.10 TRANSIT FACILITIES

There are no existing transit facilities in the project area.

2.11 RAILROAD CROSSINGS

There are no existing railroad tracks or crossings in the project area.

2.12 PAVEMENT CONDITION

FDOT's Pavement Management Program conducts annual pavement surveys to assess the conditions and performance of the State's roadways and to predict future rehabilitation needs. Distress ratings for cracking and ride quality are assessed on a 0-10 scale with 0 being the worst and 10 being the best condition. Any crack rating of 6.4 or less is considered deficient pavement. For speed limits greater than 45 mph, a ride rating of 6.4 or less is considered deficient. For speed limits less than or equal to 45 mph, a ride rating of 5.4 or less is considered deficient. **Table 2-3** shows ratings from the previous 25 years to the current year. Future five-year (2026) pavement condition ratings are forecasted.

TABLE 2-3: SR A1A PAVEMENT CONDITION DISTRESS RATINGS

	Distress Rating			Distress Rating	
Surveyed Year	Cracking	Ride	Surveyed Year	Cracking	Ride
1996	10.0	8.8	1996	8.5	7.7
1997	9.0	8.9	1997	8.5	7.5
1998	8.5	9.1	1998	7.0	8.3
1999	8.0	8.9	1999	6.0*	8.1
2000	7.0	9.0	2000	6.0*	8.0
2001	7.0	8.9	2001	5.5*	7.9
2002	7.0	8.6	2002	5.5*	7.4
2003	7.0	8.5	2003	5.5*	7.6
2004	6.5	7.8	2004	10.0	8.2
2005	6.5	7.6	2005	10.0	8.2
2006	6.5	7.4	2006	10.0	8.0

TABLE 2-3: SR A1A PAVEMENT CONDITION DISTRESS RATINGS

	Distress Rating			Distress Rating	
Surveyed Year	Cracking	Ride	Surveyed Year	Cracking	Ride
2007	4.5*	7.8	2007	10.0	8.2
2008	4.5*	7.7	2008	9.5	8.2
2009	4.5*	7.4	2009	9.5	8.1
2010	10.0	8.7	2010	9.5	7.9
2011	10.0	8.6	2011	8.5	7.9
2012	10.0	8.5	2012	8.5	7.7
2013	10.0	8.5	2013	8.5	7.6
2014	9.0	8.4	2014	8.5	7.5
2015	9.0	8.3	2015	8.5	7.5
2016	9.0	8.1	2016	8.5	7.4
2017	8.5	8.0	2017	8.5	7.4
2018	8.5	8.0	2018	8.5	7.3
2019	8.5	7.8	2019	8.5	7.2
2020	8.5	7.6	2020	8.5	7.2
2021	8.0	7.7	2021	6.5	7.0
2026 (Forecast)	7.1	7.1	2026 (Forecast)	6.5	6.7

Source: FDOT All System Pavement Condition Forecast – Pavement Improvement Projects in FM WPA Tentative Plan – 2021-2026, Extracted on 02/16/2021

2.13 TRAFFIC VOLUMES AND OPERATIONAL CONDITIONS

Project study area 2019 existing traffic data including intersection turning movement counts, 72-hour bi-directional classification and volume counts, and bicycle and pedestrian data was collected. Due to the higher traffic demand based on the recreational uses in the study area, traffic data collection included both weekday and weekend traffic. The 2019 existing roadway Annual Average Daily Traffic (AADT) is shown in **Figure 2-5.** SR A1A has a total two-way AADT volume of 2,959 vehicles. Intersection volumes for the AM (6:30 AM to 12:30 PM) and PM (12:45 PM to 6:45 PM) peak hours vary for weekday and weekend periods (**Table 2-4**).

TABLE 2-4: AM AND PM PEAK PERIODS BY DAY AND LOCATION

	North Access to Sebastian Inlet State Park		South Access to Sebastian Inlet State Park	
	Period		Period	
DAY	AM	PM	AM	PM
Weekday	10:30 AM to 11:30 AM	4:45 PM to 5:45 PM	8:00 AM to 9:00 AM	4:15 PM to 5:15 PM
Friday	11:45 AM to 12:45 PM	3:15 PM to 4:15 PM	11:00 AM to 12:00 PM	4:30 PM to 5:30 PM
Saturday	11:15 AM to 12:15 PM	5:00 PM to 6:00 PM	11:15 AM to 12:15 PM	5:00 PM to 6:00 PM
Sunday	11:45 AM to 1 2:45 PM	3:15 PM to 4:15 PM	11:45 AM to 12:45 PM	3:15 PM to 4:15 PM

Source: PD&E Study Pre-work report titled: *Traffic Counts and Traffic Projections* (March 2020).

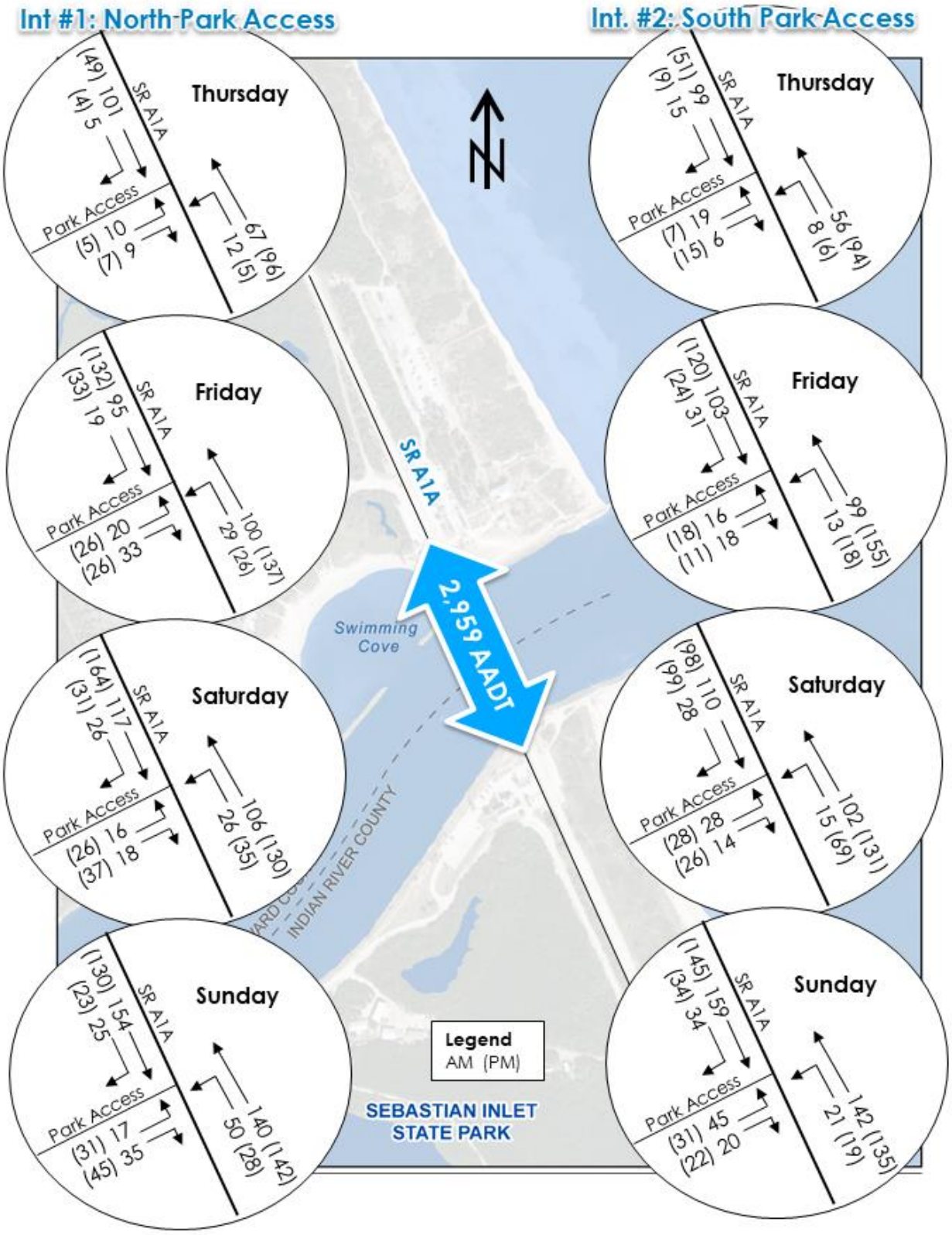


FIGURE 2-5: EXISTING (2019) TRAFFIC VOLUMES

The selected truck percentage of 8% was based on the average of the historic truck factor of 7.4% in 2020 from FDOT traffic count station 88-0291 and the measured truck factor of 8.3% from 72-hour classification counts conducted in 2019. The traffic factor calculations are provided in Appendix B of the *Project Traffic Analysis Report* (PTAR, December 2021) in the Project File. It is also found on the StateWide Environmental Project Tracker (SWEPT).

Pedestrian and bicycle counts were collected at both ends of the bridge between 6:00 AM and 8:00 PM from Thursday, December 12 through Sunday, December 15, 2019. **Table 2-5** summarizes the pedestrian and bicycle count data.

TABLE 2-5: SR A1A PEDESTRIAN AND BICYCLE COUNT DATA

Count Date	North End of Sebastian Inlet Bridge								South End of Sebastian Inlet Bridge							
	East Side SR A1A				West Side SR A1A				East Side SR A1A				West Side SR A1A			
	NB		SB		NB		SB		NB		SB		NB		SB	
12/12/2019	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12/13/2019	0	7	0	0	0	1	0	8	0	6	0	0	0	1	0	7
12/14/2019	0	20	0	0	0	3	0	28	0	21	0	0	0	3	0	23
12/15/2019	0	27	0	0	0	0	0	29	0	24	0	0	0	0	0	28
TOTALS	**0**	**54**	**0**	**0**	**0**	**4**	**0**	**65**	**0**	**51**	**0**	**0**	**0**	**4**	**0**	**58**

Source: PD&E Study Pre-work report titled: *Traffic Counts and Traffic Projections* (March 2020).

2.14 INTERSECTION LAYOUT AND TRAFFIC CONTROL

SR A1A is a two-lane, two-way facility with free flow operations. There are no traffic signals within the study area. Two intersections, one at the north Park entrance and one at the south Park entrance are accommodated with exclusive turn lanes from SR A1A. Both intersections are stop-controlled exiting the Park.

The intersection operational analysis shows all intersections, approaches, and movements operate at Level of Service (LOS) B or better during weekday periods. The analysis results indicate slightly higher delays due to the higher traffic demand during weekend periods. **Table 2-6** provides a summary of the existing intersections operational analysis.

TABLE 2-6: EXISTING (2019) INTERSECTION OPERATIONAL ANALYSIS

Intersection	Direction	AM PEAK				PM PEAK			
		Approach		Intersection[4]		Approach		Intersection[4]	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
WEEKDAY (THURSDAY)									
Intersection #1: North Access Point and SR A1A	EB	9.5	A	1.3	N/A	9.1	A	0.9	N/A
	NB (2)	7.5	A			7.4	A		
	SB (3)	N/A	N/A			N/A	N/A		
Intersection #2: South Access Point and SR A1A	EB	9.6	A	1.5	N/A	9.1	A	1.3	N/A
	NB (2)	7.5	A			7.4	A		
	SB (3)	N/A	N/A			N/A	N/A		

TABLE 2-6: EXISTING (2019) INTERSECTION OPERATIONAL ANALYSIS

Intersection	Direction	AM PEAK				PM PEAK			
		Approach		Intersection[4]		Approach		Intersection[4]	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
FRIDAY									
Intersection #1: North Access Point and SR A1A	EB	9.7	A	2.5	N/A	10.3	B	1.9	N/A
	NB (2)	7.5	A			7.7	A		
	SB (3)	N/A	N/A			N/A	N/A		
Intersection #2: South Access Point and SR A1A	EB	9.6	A	1.5	N/A	10.2	B	1.3	N/A
	NB (2)	7.5	A			7.5	A		
	SB (3)	N/A	N/A			N/A	N/A		
SATURDAY									
Intersection #1: North Access Point and SR A1A	EB	9.8	A	1.7	N/A	10.6	B	2.2	N/A
	NB (2)	7.6	A			7.8	A		
	SB (3)	N/A	N/A			N/A	N/A		
Intersection #2: South Access Point and SR A1A	EB	10.0	B	1.8	N/A	10.6	B	2.4	N/A
	NB (2)	7.5	A			7.6	A		
	SB (3)	N/A	N/A			N/A	N/A		
SUNDAY									
Intersection #1: North Access Point and SR A1A	EB	10.3	B	2.2	N/A	10.4	B	2.5	N/A
	NB (2)	7.7	A			7.6	A		
	SB (3)	N/A	N/A			N/A	N/A		
Intersection #2: South Access Point and SR A1A	EB	11.0	B	2.1	N/A	10.5	B	1.8	N/A
	NB (2)	7.6	A			7.6	A		
	SB (3)	N/A	N/A			N/A	N/A		

Notes:
1. Results shown as HCM 6th Edition Methodologies
2. Northbound-left movement operations shown
3. Southbound approach is a free flow condition
4. Overall intersection results are presented as intersection delay only since it is a two-way stop control evaluation

2.15 CRASH DATA AND SAFETY ANALYSIS

Crash data was obtained from the FDOT State Safety Office GIS (SSOGis) for the years 2016 through 2020 for SR A1A within the study area. **Figure 2-6** provides a graphical summary of the crash statistics and **Figure 2-7** shows the geographical location of crashes. Based on the crash analysis, a total of six crashes occurred within the study area from 2016 to 2020. Off-road and overturn/rollover crashes were the predominant crash types with three each. One bicycle crash was reported. Five of the six crashes occurred under daylight and dry weather conditions.

One fatal crash occurred during the five-year period. Two property damage only and three injury crashes occurred. Documented contributing causes included carelessness or negligent driving; improper turn; failed to stay in lane; and ran off roadway.

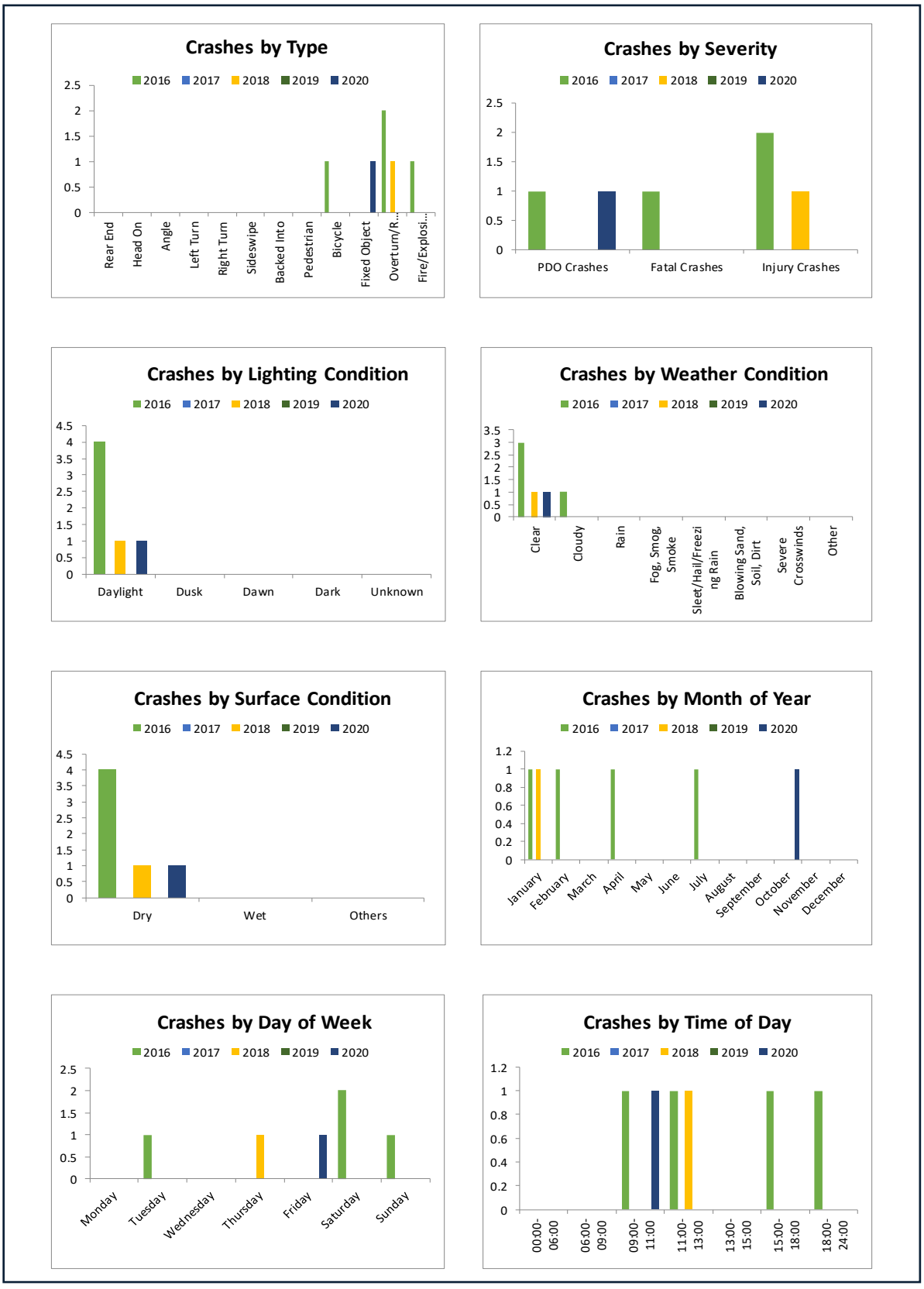


FIGURE 2-6: CRASH SUMMARY ALONG THE SR A1A PROJECT LIMITS

FIGURE 2-7: CRASH LOCATION MAP

2.15.1 CRASH RATES AND SAFETY RATIO

Average crash rates for a rural 2-3 lane, 2-way undivided roadway segment were utilized in computing the safety ratios and confidence levels using the 2016 – 2020 crash data. A safety ratio greater than one indicates abnormally high crash occurrences for the roadway segment. Safety ratios less than one translate into random crash occurrences within normal ranges.

The results of the analysis are presented in **Table 2-7**. All years recorded only one or no crashes except for 2016 which recorded 4 crashes indicating a statistically significant crash occurrence and safety ratio of 3.018. The calculated overall 5-year safety ratios and confidence levels suggests that the crash rates at this location are not abnormally high.

TABLE 2-7: CRASH RATES AND SAFETY RATIOS

Year	Number of Crashes	AADT	Actual Crash Rate (ACR)	District 4 Average Crash Rate (A)	Average Vehicle Exposure (M)	Critical Crash Rate (CCR)	Safety Ratio (ACR/ CCR)	Statistical Significance	Confidence Level
2016	4	3,023	3.251	0.469	1.230	1.077	3.018	5.167	99.99%
2017	-	-	-	-	-	-	-	-	-
2018	1	3,149	0.780	0.469	1.282	1.073	0.727	1.161	85.00%
2019	-	-	-	-	-	-	-	-	-
2020	1	3,125	0.786	0.469	1.272	1.074	0.732	1.171	85.00%
Overall	6	3,099	0.951	0.469	1.261	1.075	0.885	1.442	90.00%

Notes:
Level of statistical significance = (ACR - A + (1/2M))/SQRT(A/M)
Confidence Level = Percent probability that the crash rate is abnormally high for the study location using the district-wide average as a basis.

2.16 DRAINAGE

The project crosses over the Inlet and is adjacent to waters of the Park which flow west into the Indian River, a designated Aquatic Preserve and an Outstanding Florida Water (OFW). The project is separated into two (2) basins with the basin divide at the high point of the bridge over Sebastian Inlet (**Figure 2-8**). Both basins are open and discharge to an OFW.

2.16.1 BASIN 1

Within the project limits, Basin 1 begins approximately 1,000-feet south of the south Park entrance and continues north to the high point of the bridge. Stormwater runoff from the bridge discharges directly to the Inlet through scuppers on the bridge. The stormwater runoff from the roadway is collected by shallow roadside swales that flow south towards an existing cross drain approximately one mile south of the project, which flows to the Indian River. The offsite west of the project sheet flows west to wetlands and ultimately the Indian River. The offsite east of the project from the high point of the dunes to the roadway is collected in the shallow roadside ditches.

2.16.2 BASIN 2

Basin 2 begins at the high point of the bridge and continues approximately 700-feet north of the north Park entrance. The stormwater runoff from the bridge discharges directly to the Inlet through

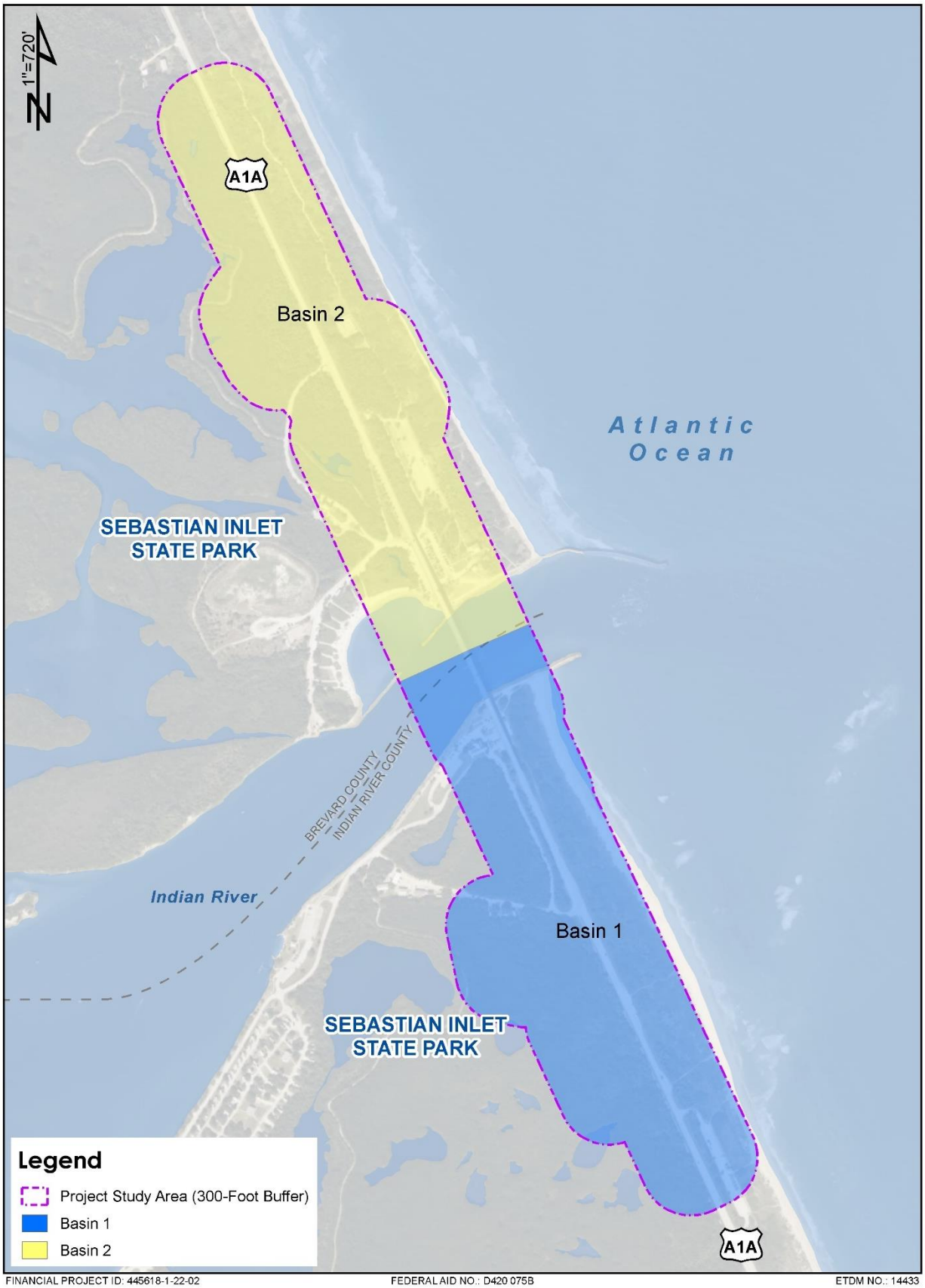


FIGURE 2-8: DRAINAGE BASIN MAP

scuppers on the bridge. The stormwater runoff from the roadway is collected by shallow roadside swales that flow south to an existing cross drain that is located 150-feet north of the parking lot in the Park. This cross drain flows west to wetlands. The offsite west of the project sheet flows west to the wetlands and ultimately the Indian River. The offsite east of the project from the high point of the dunes to the roadway is collected in the shallow roadside ditches.

2.16.3 GROUNDWATER

Groundwater levels were estimated to range from 1 foot to 4.4-feet below ground surface. Fluctuation in groundwater levels is anticipated due to environmental variation and seasonal conditions, such as rainfall frequency and magnitude.

There are currently no stormwater management facilities on the bridge or roadway within the project study limits. Stormwater runoff from the bridge discharges directly to the Sebastian Inlet through bridge scuppers. Stormwater runoff from the bridge approaches is collected in two sets of inlets on the south and north approaches that discharges via existing cross drains to small ponds located west and adjacent to SR A1A. South and north of the bridge, stormwater runoff from the roadway is collected by shallow roadside swales that flow towards existing cross drains discharging to the Indian River.

2.17 FLOODPLAINS

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRM) for Brevard County and Indian River County. According to FEMA Map Nos. 12061C0205H and 12061C0102H, the entire project is within Otherwise Protected Area. The area surrounding the roadway is within Zone VE and Zone AE. The Zone AE elevation north of the bridge ranges from 5-feet to 6-feet NAVD. The Zone AE elevation south of the bridge ranges from 7-feet to 8-feet NAVD. Since the impacts to the floodplain are considered *de minimis* and traversable, floodplain compensation is not required. The FEMA Flood Insurance Rate Maps for the project is shown in **Figure 2-9**

2.18 SOILS AND GEOTECHNICAL DATA

A review of the existing soils within the project study area was completed utilizing the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) web soil surveys for Brevard and Indian River Counties and information contained in the *Geotechnical Report* (May 2022). A summary of the soils identified in the project area along with select characteristics is provided in **Table 2-8** and shown in **Figure 2-10**.

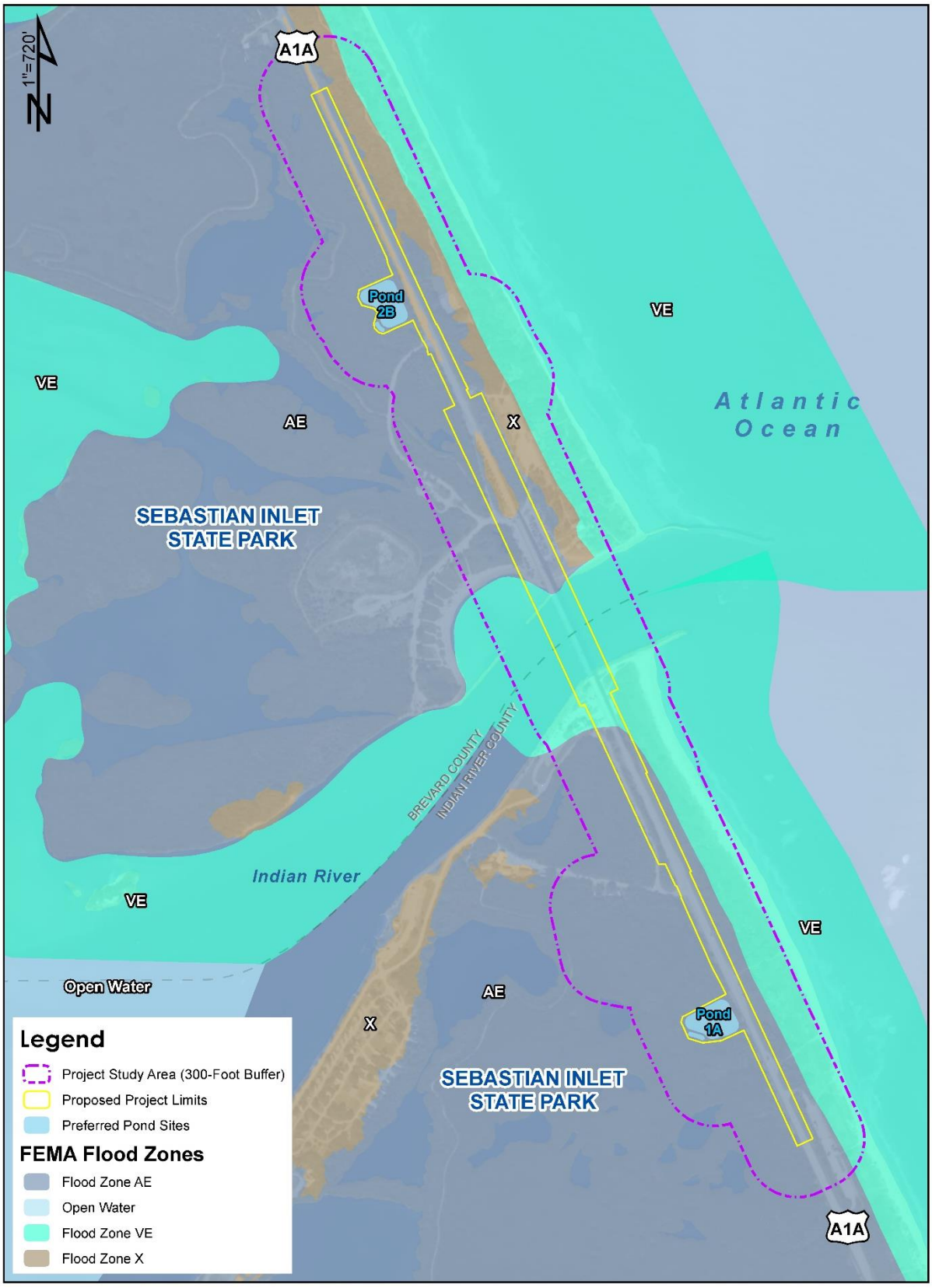


FIGURE 2-9. FEMA FLOOD INSURANCE MAP

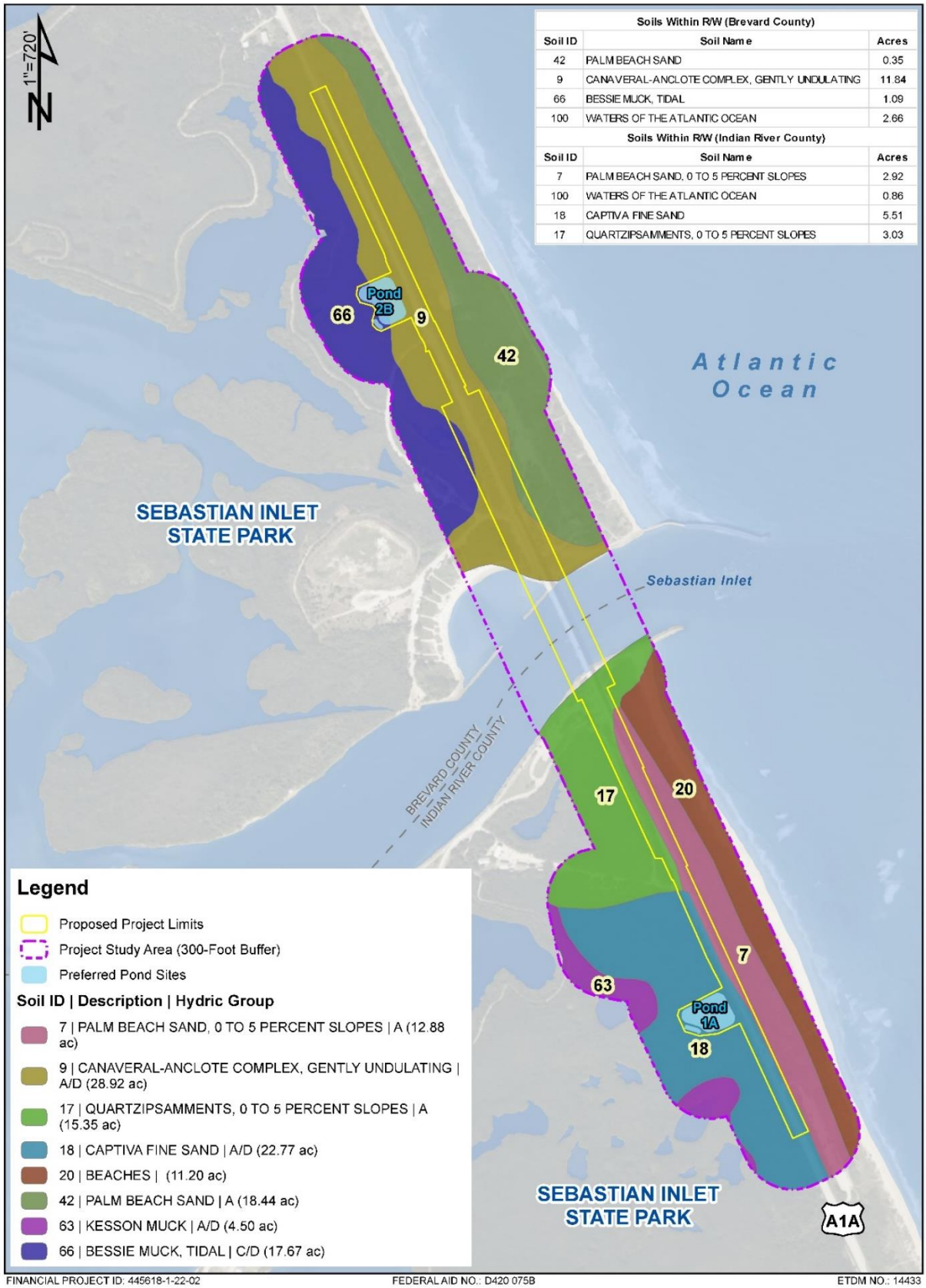


FIGURE 2-10. SOILS MAP

TABLE 2-8: EXISTING SOIL TYPES & PROPERTIES					
NRCS Map Unit & Soil Name	**Depth (inches)**	**Hydrologic Soil Group**	**Hydric Soil Rating**	**Drainage Class**	**Depth to Water Table (feet)**
Brevard County					
9 - Canaveral-Anclote complex, gently undulating (0 to 5 percent slope)	0-6, sand 6-12, sand 12-80, coarse sand	A/D	No	Somewhat poorly drained	1 to 3
42 - Palm Beach Sand (0 to 5 percent slope)	0-3, sand 3-80, sand	A	No	Excessively Drained	>6
66 – Bessie muck (0 to 1 percent slope)	0-18, muck 18-44, sandy clay 44-80, loamy fine sand	C/D	Yes	Very poorly drained	0
Indian River County					
7 - Palm Beach Sand, (0 to 5 percent slope)	0-4, sand 4-80, sand	A	No	Excessively Drained	>6
17 - Quartzipsamments (0 to 5 percent slope)	0-80, fine sand	A	No	Somewhat poorly drained	>6
18 - Captiva fine sand, frequently ponded (0 to 1 percent slope)	0 - 6, fine sand 6 – 30, fine sand 30 – 80, fine sand	A/D	Yes	Poorly drained	0 to 0.5
20 - Beaches (1 to 3 percent slope)	n/a	n/a	Unranked	Poorly drained	0 to 6
63 - Kesson muck (0 to 1 percent slope)	0 - 6, muck 6 - 30, fine sand 30 - 38, fine sand 38 - 80, fine sand	A/D	Yes	Very poorly drained	

2.19 LIGHTING

There is no existing roadway lighting along SR A1A within the project study area.

2.20 SIGNS

No overhead signs are located within the project study limits. Existing post-mounted signs are located within the project study limits along the outside of the roadway within FDOT ROW. Sign locations are clustered together before the bridge and near the Park entrances (north and south). The types of signs include:

- Roadway safety signs: speed limit, no passing, yield, stop, bicycle on bridge, bicycle lane ahead, no parking on ROW, no swimming or diving
- Information/direction signs: Park entrance, entering Brevard County, Melbourne 20, Great Florida Birding Trail, adopt a highway
- Memorial signs: post and concrete/bronze bridge memorial signs

2.21 UTILITIES

Existing utilities within the project study area were identified through Sunshine State One-Call of Florida, Inc (SSOCOF). Eight Utility Agency Owners (UAO) were identified with five UAOs indicating they have no facilities within the project limits including: Comcast, Florida Power and Light – Transmission, Indian River Utilities, Indian River Traffic, and Uniti Fiber. The three UAOs operating within the project limits include AT&T Distribution Florida, Florida Power & Light Distribution, and the Park. The existing utilities along with a description and contact information are provided in **Error! Reference source not found.**.

TABLE 2-9: EXISTING UTILITIES

Utility Type Agency/Owner/Contact	Description
Telephone AT&T Distribution Luke Folkerts lf2490@att.com 321-953-6172	South of the Inlet, an existing buried telephone (BT) 25-pair copper with 1/4" to 1/3" diameter cables cross the Park's south parking lot and continues north on the west side of SR A1A as a BT 25-pair copper cable and BT 50-pair copper cable to the end of the project limits. North of the Inlet, a BT 25-pair copper cable splits off west along north Park entrance.
Electric Florida Power & Light (Distribution) Rob Morris rob.morris@fpl.com 772-223-4215	South of the Inlet, FPL has 1-phase 7.6kV overhead electric (OE) along the west side of SR A1A continues north to the bridge. Electric service extends west into the Park via OE. North of the Inlet, a 1-phase 7.6kV buried electric (BE) runs along the parking lot east to the Inlet Grill restaurant. The BE transitions to 1-phase 7.6kV OE, crosses SR A1A, and continues north along the west side of SR A1A to the project limits.
Park Facilities Sebastian State Park Ken Torres ken.torres@floridadep.gov 321-984-4853	A well water pump station is located north of the Inlet on the east side of SR A1A that houses pumps, holding tanks, and an aerator. Water is supplied to the north side of the Park. The supply line extends south to an existing well head. A supply lateral extends east to the Inlet Grill restaurant and public restrooms. At the restaurant, a second supply line extends west under the bridge and north to the Park ranger station. Sanitary waste is currently accommodated by septic systems within the Park north and south of the Inlet.

2.22 BRIDGES AND STRUCTURES

The existing Bridge superstructure consists of concrete cast-in-place (CIP) deck supported by prestressed concrete girders. The bridge has 19 spans totaling 1,548 feet in length and an overall deck width of 34.1 feet. The typical section consists of one 12-foot lane and a 2-foot shoulder in each direction of travel. The existing pilings at the approach piers are 24-inch square steel/concrete composite piles battered 1.5-inch per 12-inches. The existing channel pier pilings are steel HP12x74 piles, battered 1.5-inch per 12-inches. Installed pile lengths are not documented in the existing plans. Test pile lengths range from 30-feet and 35-feet at the approach piers to 45-feet at the channel piers.

The Sebastian Inlet is tidally influenced connecting the Atlantic Ocean to the Indian River. Tidal datums are presented in **Table 2-10** for the National Oceanic and Atmospheric Administration (NOAA) tidal benchmark 8722004 at Sebastian Inlet. The existing bridge provides 39-feet of clearance above MHW.

TABLE 2-10: TIDAL BENCHMARK DATA NOAA STATION		
Datum	Value	Description
MHHW	0.00	Mean High-Higher Water
MHW	-0.19	Mean High Water
MSL	-1.20	Mean Sea Level
MTL	-1.24	Mean Tide Level
MLW	-2.30	Mean Low Water
MLLW	-2.43	Mean Lower-Low Water

Ref: Datums - NOAA Tides & Currents

FDOT performs biannual inspections and evaluations of all fixed bridge structures under its jurisdiction, as part of the Federal Highway Administration (FHWA) "National Bridge Inventory (NBI) and Structural Inventory and Appraisal Program". Information related to the condition of the bridge was obtained from the November 17, 2020, 2020 bridge inspection report obtained from FDOT.

The term structurally deficient means that the bridge should undergo corrective actions (repair or replacement). FDOT's work program requires that structurally deficient bridges, once identified, have corrective actions initiated within six years. Structurally deficient bridges are not considered unsafe for public use unless the bridge is also closed.

The term functionally obsolete or functionally deficient means that the bridge does not meet current roadway design standards for features such as lane width, shoulder width, or bicycle and/or pedestrian facilities. The "health Index" is a tool that measures the overall condition of a bridge; a lower health index indicates more work is needed in order to improve the bridge to an ideal condition. Bridges with a health index of less than 85 require repairs or replacement.

The sufficiency rating is used to determine whether a bridge that is structurally or functionally deficient should be repaired or replaced. The sufficiency rating considers several factors, only about half of which relate to the condition of the bridge itself. The November 2020 bridge inspection report indicated the following bridge conditions:

- Structurally deficient
- Sufficiency rating = 51.6
- Health index = 81.95
- Scour vulnerability rating of 3 SC, "scour critical", indicating that the bridge foundations were determined to be unstable for assessed or calculated scour conditions.

The existing bridge characteristics and structural information are provided in **Table 2-11**.

TABLE 2-11: EXISTING BRIDGE DATA AND STRUCTURE CONDITION	
Facility Name/ ID	SR A1A over Sebastian Inlet - Bridge No. 880005
Year Built	1964
Year Reconstructed	N/A
Superstructure Type	AASHTO Concrete Beam
Number of Spans	19
Bridge Length	1,548-feet
Maximum Span Length	180-feet
Deck Width	34.1-feet
Lane / Shoulder Width	12-foot lane / 2-foot shoulder
Overall NBI Ratings	
Sufficiency Rating	51.6
Deck	6
Superstructure	5
Substructure	4
Channel	6
Clearances	
Vertical Clearance	39-feet over Mean Sea Level
Horizontal Clearance	150-feet between existing bridge fenders
Pier Protection	
Channel Piers	Bridge fender system

Notes:
1. Construction year and bridge data obtained from Bridge Inspection Report dated 11/17/2020.
2. National Bridge Inventory (NBI) Rating: 9- Excellent; 8- Very Good; 7- Good; 6- Satisfactory; 5- Fair; 4- Poor

2.23 AESTHETICS FEATURES

The project study area is within the designated Indian River Lagoon National Scenic Byway. The designation is based on the roadway possessing characteristics of regional significance within at least one of the intrinsic quality categories—scenic, natural, historic, recreational, archaeological, or cultural. The viewsheds within this coastal area include views of beaches, bays, lagoons and the Atlantic Ocean. Adding to the visual character is the Park which encompasses the immediately adjacent and surrounding area of the study area, providing scenic views of natural resources including vegetation and wildlife.

2.24 CULTURAL RESOURCES

The bridge is a recommended eligible historic resource under Section 106 of the National Historic Preservation Act, a rehabilitation alternative was considered. The bridge is eligible under Criterion C – Engineering indicating the bridge “embodies the distinctive characteristics of type, period, or method of construction”.

One previously recorded archaeological site, the Micco Beach Site (8BR125) and one archaeological occurrence were identified within or east of the project area. One previously recorded archaeological site could not be relocated.

2.25 SECTION 4(F) RESOURCES

One publicly owned park, the Sebastian Inlet State Park, is located adjacent to and surrounding the project study area. The Park is comprised of 971 acres along SR A1A in Indian River and Brevard Counties and is managed under the FDEP. The Park is divided north and south by the manmade Sebastian Inlet. Recreational opportunities include fishing, boating, camping, swimming, surfing, hiking, and mountain biking. Amenities include campgrounds, concessions, fishing museum, boat ramp, and restrooms

Access to the Park is from SR A1A. One Park entrance is on the south and one on the north sides of the Inlet. Park activities are concentrated around the beach, jetty, fishing museum, under bridge fishing pier, campground, and boat launch on the south side of the bridge and the swimming cove, beach, jetty, concession/restaurant, and under bridge fishing pier on the north side of the bridge. (**Figures 2-11 and 2-12**). Several hiking/biking trails are located on the north and south sides of the bridge within the Park.

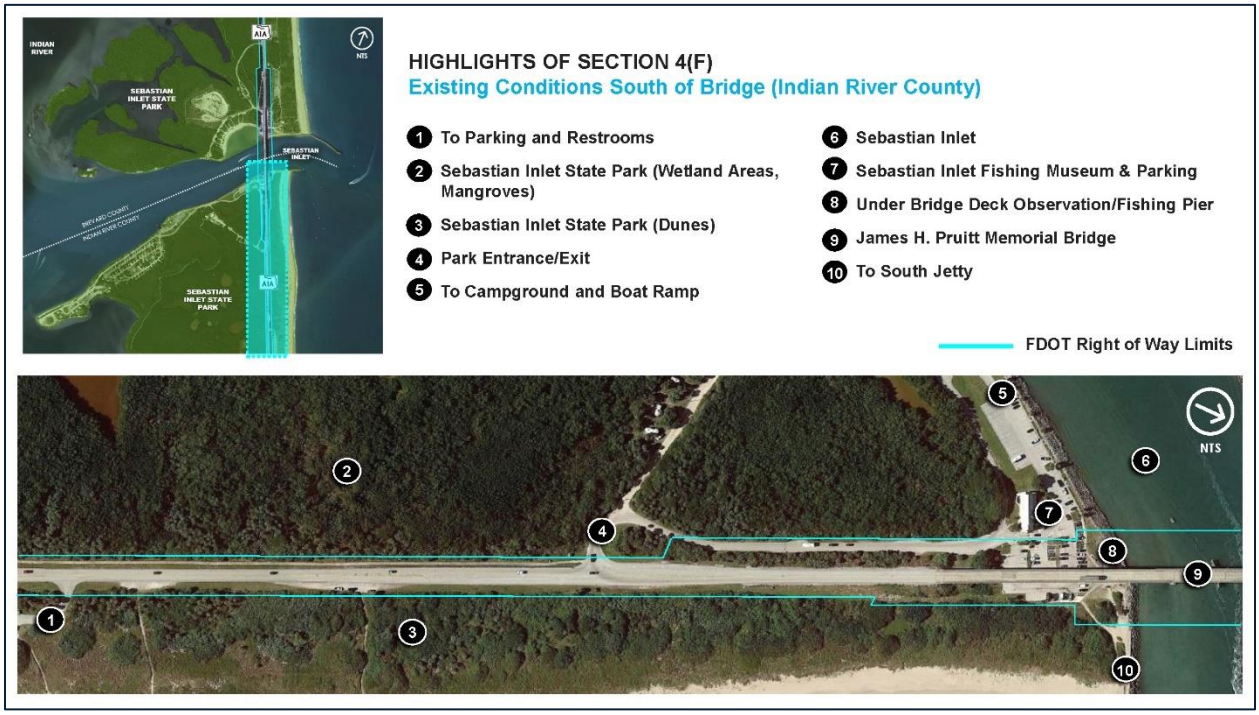


FIGURE 2-11. SECTION 4(F) SUMMARY OF RESOURCES - SOUTH

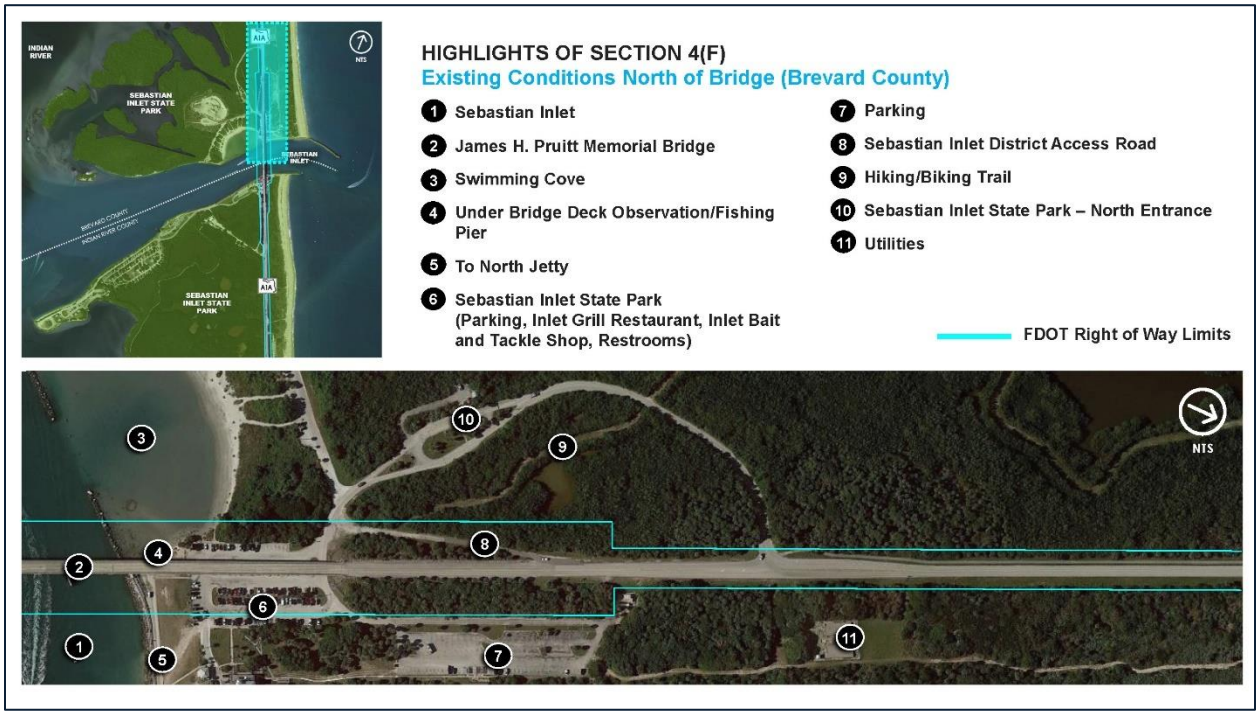


FIGURE 2-12. SECTION 4(F) SUMMARY OF RESOURCES - NORTH

3.0 PROJECT DESIGN CONTROLS & CRITERIA

3.1 ROADWAY CONTEXT CLASSIFICATION

The context classification, within the project limits, is C1-Natural from the south project limit to the north side of the bridge (MP 21.945 to MP 22.665). The context classification changes to C2-Rural from the north side of the bridge to the north project limit (MP 0.00 to MP 0.307). The context classification was determined based on the framework provided in FDOT Context Classification Guide (April 2022) and FDOT's preliminary context classification determination. With no future proposed developments or future land use plans, the area characteristics are not anticipated to change.

3.2 DESIGN CONTROLS AND CRITERIA

The project design standards are based on a functional classification of Rural Minor Arterial (Indian River County) and Urban Minor Arterial (Brevard County) with a design speed of 50 mph. The design criteria used for the bridge and roadway are summarized in **Table 3-1.** Design criteria for the shared use path elements are summarized in **Table 3-2.**

3.3 DRAINAGE DESIGN CRITERIA

The design of stormwater management facilities for this project is governed by the rules and criteria set forth by the St. Johns River Water Management District (SJRWMD), Florida Department of Environmental Protection (FDEP), and the FDOT. Because a portion of the project is located seaward of the Coastal Construction Control Line (CCCL), the FDEP Central District will be the lead agency for stormwater permitting per an existing operating agreement with SJRWMD. The FDEP Southeast District, which includes Indian River County, has agreed to defer to FDEP Central District for stormwater permitting. Coordination meetings were held on June 6, 2022, June 16, 2022, and July 6, 2022. Meeting notes are included in the *Pond Siting Report* (August 2022) in the Project File. It is also found on SWEPT. Based on the coordination meetings, the shared use path is exempt from treatment and stormwater cannot be discharged east of the CCCL.

3.3.1 WATER QUALITY AND POND RECOVERY

- Wet detention: Treatment – Greater of 1" over the basin or 2.5" over impervious area (excludes multi-use paths). (PIM, Section 8.2) (FDEP pre-application meeting on 06/16/2022)
- Outstanding Florida Water (OFW): Treat an additional fifty percent of the runoff volume (PIM, Section 8.13)
- Nutrient Load Reduction – No net increase of pollutant of concern (TN and TP) (FDOT DDG 9.3.1)

TABLE 3-1: DESIGN CRITERIA				
Roadway Design Elements	**Criteria**	**Reference**	**Section**	**Comments**
Posted Speed	45 mph	Existing Conditions		
Number Of Lanes	2	Existing Conditions		
Functional Classification	Rural Minor Arterial (IRC) Urban Minor Arterial (Brevard)	FDOT Straight Line Diagram		
Context Classification	C1-Natural (MP 21.945 to MP 22.665; IRC) C2-Rural (MP 0.00 to MP 0.307; Brevard)	FDOT Context Classification Guide (2020)	FDOT's preliminary context classification determination	*See notes at end of table
Access Classification	04	FDOT Systems Implementation Office	Access Management	
Design Speed				
Design Speed	C1/C2: 55 -70 mph (Allowable Range)	FDM	Table 201.5.1	50 mph Recommended Target Speed Memorandum
Widths				
Travel Lane	12-feet	FDM	Table 210.2.1	May be reduced to 11 feet within curbed sections featuring buffered bike lanes
Auxiliary Lane	12-feet	FDM	Table 210.2.1	May be reduced to 11 feet when keyhole bike lane is present or within curbed sections at directional median openings
Flush Shoulder Roadway Without Shoulder Gutter (Outside)	Full: 10-feet Paved: 5-feet	FDM	Table 210.4.1	
Flush Shoulder Roadway With Shoulder Gutter	Full: 15.5-feet Paved: 8-feet			At aux. lanes Full: 11.5-feet Paved: 4-feet

TABLE 3-1: DESIGN CRITERIA

Roadway Design Elements	Criteria	Reference	Section	Comments
High-Speed Curbed Roadways				
Offset from Edge of Travel Lane to Lip of Gutter	6.5-feet to Outside Curb Type E Curb	FDM	210.5.1	
Clear Zone Requirements				
Travel Lane	24-feet	FDM	Table 215.2.1	
Auxiliary Lane	14-feet			
Border Width				
Flush Shoulder Roadway[1]	From Shoulder Break: 40-feet	FDM	Table 210.7.1	
High-Speed Curbed Roadways[1]	From Outside Edge of Travel Lane: 29-feet			
1. Notes: (2) On existing roadways where R/W cannot be acquired or where the decision has been made to simply maintain and preserve the facility, the absolute minimum border under these conditions is 8 feet. No Design Variation is required for this condition. (3) On existing roadways where R/W is being acquired for other reasons, the minimum border width should be that used for new construction projects; however, the minimum length of wider border width must be a segment of sufficient length to provide reasonable continuity.				
Cross Slope				
Travel Lane	2 Lanes @ 0.02	FDM	Figure 210.2.1	
Outside / Right Shoulder	0.06		210.4.1	
Median / Left Shoulder	0.05			
Maximum Algebraic Difference at Turning Road Terminals	Design Speed 35 mph and over: 5%		Table 210.2.2	
Horizontal Curves				
Curve Length	750-feet	FDM	Table 210.8.1	
Deflections in Alignment				
Flush Shoulder Roadways	Design Speed 45 mph and greater: 0°45'00"	FDM	210.8.1	

TABLE 3-1: DESIGN CRITERIA				
Roadway Design Elements	**Criteria**	**Reference**	**Section**	**Comments**
High Speed Curbed Roadways	Design Speed 50 mph and greater: 0º45'00"			
Grades				
Maximum Grade	4%	FDM	Table 210.10.1	
	Rural Arterial, Level: 5% at 45 mph Rural Arterial, Level: 5% at 50 mph Urban Arterial, Level: 5% at 45 mph Urban Arterial, Level: 5% at 50 mph	AASHTO	Table 7-2 Table 7-4a	
Maximum Change in Grade Without Vertical Curve	0.60%	FDM	Table 210.10.2	
Minimum Grade Curbed Roadway	0.30%	FDM	210.10.1.1	
K Values for Vertical Curves				
Sag	96	FDM	210.10.3	
Crest (new construction)	136			
Minimum Vertical Curve Lengths				
SAG	200-feet	FDM	Table 210.10.4	
CREST	300-feet			
Minimum Stopping Site Distance				
Downgrade at 5%	464-feet		Table 210.11.1	
Upgrade at 5%	393-feet			
Passing Site Distance				
or 2-Lane, 2-Way Roadways (minimum)	1,835-feet	FDM	Table 210.11.2	

TABLE 3-1: DESIGN CRITERIA				
Roadway Design Elements	**Criteria**	**Reference**	**Section**	**Comments**
Roadside Slopes (Flush Shoulder and High Speed Curbed)				
Front Slope	Height of Fill less than 5-feet – 1:6 Height of Fill 5 to 10-feet – 1:6 to edge of Clear Zone, then 1:4 Height of Fill 10 to 20-feet – 1:6 to edge of Clear Zone, then 1:3	FDM	Table 215.2.3	
Back Slope	1:4 or 1:3 With a Standard Width Trapezoidal Ditch and 1:6 Front Slope			
Transverse	1:4			
DROP-OFF HAZARD				
Flush Shoulder and High-Speed Curbed Roadways,	Drop-off of 6-feet or More With a Slope Steeper than 1:3 Located Within the Clear Zone	FDM	224.15	
LATERAL OFFSET TO GUARDRAIL				
Without Shoulder Gutter	From Edge of Travel Lane: Full Shoulder Width Plus 2-feet	FDM	215.4.6	
With Shoulder Gutter	From Edge of Shoulder Gutter: 6-inches			
MARKED SHOULDERS				
Paved Shoulder with Helmeted Bicyclist Symbol and Bicycle Lane Arrow	Paved shoulders should be marked only when all the following are met: (1) Design speed ≤ 45 mph, (2) Shoulder width ≥ 5-foot, (3) Within C4, C5, C6 context classification, or within C3 when demand is demonstrated, and (4) Shared use path is not present along corridor.	FDM	223.2.2.1	

TABLE 3-2: SHARED USE PATH DESIGN CRITERIA			
Design Element	**Criteria**	**Reference**	**Section**
Functional Classification	Rural Minor Arterial (IRC) Urban Minor Arterial (Brevard)	FDOT Straight Line Diagram	
Context Classification	C1-Natural (MP 21.945 to MP 22.665; IRC) C2-Rural(MP 0.00 to MP 0.307; Brevard)	FDOT Context Classification Guide (2020)	FDOT Preliminary Context Classification Determination
Access Classification	04	FDOT Systems Implementation Office	Access Management
Design Speed (Roadway)	50 mph	Recommended Target Speed Memorandum	
WIDTHS			
Shared Use Path	Standard: 12-feet If Limited R/W: 10-feet If Constrained Conditions: 8-feet SUN Trail Network: 12-feet	FDM	224.4
CLEAR ZONE REQUIREMENTS			
Shared Use Path	Both Sides: 4-feet Clear Graded Area Both Sides: 2-feet at 1:6 Slope	FDM	224.7
SEPARATION FROM ROADWAY			
Shared Use Path on Flush Shoulder Roadway	Design Speed 45 mph: 5-feet from Edge of Paved Shoulder Design Speed ≥50 mph: 5-fee From Shoulder Break	FDM	224.12
On Curbed Roadway	5-feet from the Face of Curb		
CROSS SLOPE			
Shared Use Path	0.02	FDM	224.5
Shared Use Path – Longitudinal Grade	5%	FDM	224.6
MINIMUM STOPPING SITE DISTANCE			
Shared Use Path	383-feet	FDM	Table 224.10.2

TABLE 3-2: SHARED USE PATH DESIGN CRITERIA			
Design Element	**Criteria**	**Reference**	**Section**
DROP-OFF HAZARD			
Shared Use Path	Drop-off greater than 10 inches: Railing, Fence, or Other Barrier	FDM	224.15
LATERAL OFFSET TO GUARDRAIL			
Without Shoulder Gutter	Back of Guardrail to Shared Use Path: 7-inches (minimum)	FDM	215.4.6
With Shoulder Gutter	Back of Guardrail to Shared Use Path: 7-inches (minimum)		

Due to conflict context and functional roadway classifications all transportation characteristics must be considered including:

- Purpose and Need
- Safety for all users – will see increased bike/ped users with new bridge
- Concern by Park regarding higher speeds on roadway
- Arterials in rural context are designed to facilitate high-speed, longer distance travel
- Challenges associated with Park and entrances and increased speed – flatter bridge = higher speeds
- Providing adequate bridge vertical clearance to meet USCG guidelines and vessel users

No single set of design criteria. Need to consider the range of factors making trade-offs to achieve the most appropriate design that best serves the traveling public and the community at large.

3.3.2 WATER QUANTITY

- Open Basin - Tidally influenced – Attenuation not required due to discharge to tidally influenced water body (Indian River). (FDEP pre-application meeting on 06/16/2022)

3.3.3 POND DESIGN

- Ponds shall be designed to provide a minimum 20-foot of horizontal clearance between the top edge of the normal pool elevation and the ROW line. Maintenance berm shall be at least 15-feet with a slope of 1:8 or flatter
- Corners of ponds shall be rounded to provide an acceptable turning radius for maintenance equipment (30-foot minimum inside radius)

At least 1-foot of freeboard is required above the maximum design stage of the pond below the front of the maintenance berm.

3.3.4 SEA LEVEL RISE

Because a portion of the project is located seaward of the CCCL and will utilize funds appropriated by the state, a Sea-Level Impact Projection (SLIP) Study was completed per the requirements established by the FDEP Office of Resilience and Coastal Protection. The SLIP study considers potential local sea-level rise during the expected life of the bridge structure. The results of the SLIP Study, using NOAA sea level projections, show an intermediate sea-level rise of 2.78-feet (NAVD88) over the lifespan of the structure. The SLIP Study is in the Project File. It is also found on SWEPT.

4.0 ALTERNATIVES ANALYSIS

The PD&E Study considers a range of alternatives that meet the purpose and need of the project while balancing engineering requirements, environmental impacts, and public input. Project alternatives include the No-Action (No-Build), Transportation Systems Management & Operations (TSM&O), Rehabilitation, and Build Alternatives.

The development of alternatives and the associated environmental effects were evaluated according to FDOT's PD&E manual and FDM and were undertaken in a collaborative process utilizing input from the Department, stakeholders, and the study team. A detailed discussion of each alternative evaluated is provided in Section 4.2 through Section 4.5. A comparative evaluation of the Alternatives has been completed using a multi-criteria qualitative and quantitative analysis as part of the PD&E Study. A more detailed discussion is included in Section 4.6.

4.1 PREVIOUS PLANNING STUDIES

FDOT performed an assessment to evaluate the feasibility of replacing the existing bridge as part of a planning level activity. The results of the feasibility study are reported in the *Bridge Replacement Feasibility Report* (April 2020). Feasibility study activities included:

- Typical Section Analysis
- Horizontal and Vertical Alignment Evaluation
- Traffic Data
- Traffic Operational Analysis
- Benthic Survey of Inlet
- Vessel Survey
- Section 4(f) Research Memo
- Preliminary Geotechnical Review
- Constructability Review and Phasing

Findings from the feasibility study including ROW requirements, horizontal and geometric requirements, feasibility of phased construction, and the approach to maintenance of traffic were utilized in the PD&E Study as the foundation to further evaluate and develop build alternatives. The traffic data and operational analysis were incorporated into the *Project Traffic Analysis Report* (PTAR, January 2020). The environmental and navigation analysis were used to confirm additional data collected and evaluated during the PD&E Study.

4.2 TRANSPORTATION SYSTEMS MANAGEMENT AND OPERATIONS ALTERNATIVE (TSM&O)

The TSM&O alternative consists of short-term improvements aimed at extending the service life of the bridge or optimizing the performance of the existing facility. However, they do not address the structural deficiency of the bridge. The TSM&O alternative does not meet the purpose and need for the project.

4.3 REHABILITATION ALTERNATIVE

Because the bridge is a recommended eligible historic resource under Section 106 of the National Historic Preservation Act, a rehabilitation alternative was considered. The bridge is eligible under Criterion C – Engineering indicating the bridge "embodies the distinctive characteristics of type, period, or method of construction".

A determination of whether rehabilitation can be completed to an acceptable level in a feasible and prudent manner is a function of its ability to perform adequately in both structural and functional areas.

Rehabilitation to the original condition without changing the existing bridge design features such as lane widths and lack of shoulders was one form of rehabilitation considered. Keeping the existing bridge in service as a part of the transportation network could avoid any adverse effects. However, to remain in service, the bridge deficiencies related to its age and design must be addressed. Bridge rehabilitation can be considered an avoidance alternative if modifications sufficient enough to address bridge deficiencies are implemented. The bridge rehabilitation can be considered an avoidance alternative that satisfies Section 4(f) requirements only if both of the following conditions can be met:

1. The elements that make the bridge historically significant are preserved; and
2. Structural and functional deficiencies are addressed.

Rehabilitation that maintains the existing bridge would not sufficiently address structural and functional deficiencies of the bridge. Correction of structural and functional deficiencies would entail removal or replacement of the existing bridge components in order to meet current FDOT roadway and bridge design criteria. If the bridge is rehabilitated to meet the purpose and need for the project, at minimum, it must:

- Meet current FDOT Design Standards
- Be widened by adding shoulders and bicycle/pedestrian facilities
- Provide a 75-Year service life
- Maintains existing vertical and horizontal clearances
- Maintain traffic during construction
- Minimize impacts to the natural, cultural, and physical environments

Whether the bridge is rehabilitated to its existing condition or not, this option does not meet the purpose and need for the project and the bridge remains structurally and functionally deficient. Based on the results of the rehabilitation alternative analysis, this alternative was removed from further consideration.

4.4 NO-ACTION (NO-BUILD) ALTERNATIVE

The No-Action alternative is an alternative solution that assumes the retainment of existing conditions within the projects limits and would not have any direct impacts to the physical, natural, cultural, and social environments. Continuous maintenance is performed to make the bridge safe to use. Although this alternative does not meet the purpose and need for the project, it will remain under consideration and serve as a baseline for comparison against other alternatives throughout the PD&E Study.

4.5 FUTURE CONDITIONS

Future traffic volumes were developed as part of the feasibility study and documented in the *Traffic Counts and Traffic Projections* report (March 2020). Utilizing FDOT's *Traffic Analysis Tool, Version 3.*0, the growth rates were calculated based on the evaluation of study area traffic conditions and historical growth patterns. Data sources included historical traffic counts, the Treasure Coast Regional Planning Model (TCRPM) V4.0 2040 output data, projected population growth, and employment data. A comparison TCRPM socio-economic (population and employment) growth rates were used to qualitatively assess the recommended growth rates. Because the study area is considered a non-high density urban area, a conservative growth rate was selected.

The study area growth rate of 1.0% was selected and applied to the existing (2019) Annual Average Daily Traffic (AADT) volumes to project future AADT. Future traffic volumes were computed for Opening Year (2025) and Design Year (2045) for both weekday and weekend scenarios during AM and PM peak hours. Future intersection turning movement volumes were also calculated. The alternatives evaluated in the March 2020 report included the No-Action and one Build Alternative. Since this is a bridge replacement project and the capacity along SR A1A will be maintained, future traffic volumes for both alternatives were projected to be the same.

As part of the PD&E Study, a *Project Traffic Analysis Report* (January 2020) was prepared to:

- Validate that the 2-lane capacity will sufficiently accommodate future traffic demand
- Evaluate the two intersections along the project corridor that are access points to/from the Park
- Perform safety analysis

4.6 BUILD ALTERNATIVE(S)

Build Alternatives were developed and evaluated based on the following criteria:

- Ability to satisfy the purpose and need for the project

- Vertical and horizontal navigational clearances
- Bridge, roadway, and Park entrance geometry
- Natural, social, cultural and physical environment impacts
- Section 4(f) impacts
- Section 106 criteria of the National Historic Preservation Act (NHPA)
- Required ROW
- Avoidance of bridge closure during construction
- Project costs

A key criterion for the Alternatives development is the vertical and horizontal clearances of the bridge. A navigation needs analysis memorandum was submitted to the USCG and a preliminary clearance determination was received in July 2021 which stated a desired minimum vertical clearance of 65-feet above mean high water (MHW) for a fixed bridge and 125-feet minimum horizontal clearance.

Based on the USCG response, a vertical clearance evaluation was completed to demonstrate a bridge vertical clearance of less than 65-feet, as preliminarily determined by the USCG, provides for reasonable needs of navigation at the Inlet (**Appendix B**). The vertical clearance evaluation considered the purpose and need for the project, impacts to the north and south Park entrances, character of the Inlet, inlet bottom topography, surrounding resources, maintenance of the Inlet and adjacent waterways, and connectivity to the Intracoastal Waterway (ICW). A Vertical Clearance Evaluation Memorandum was submitted to the USCG for review. A revised preliminary clearance determination was received from the USCG in November 2021 (**Appendix D**) which stated a minimum vertical clearance of 51-feet above mean high water (MHW) for a fixed bridge and 125-feet minimum horizontal clearance will meet the reasonable needs of navigation for a bridge crossing the Sebastian Inlet.

The proposed typical section developed during the feasibility study was modified during the PD&E Study. The proposed typical section is shown in **Figure 4-1** and includes:

- Two 12-foot travel lanes
- Two 8-foot shoulders
- Two 12-foot shared use paths

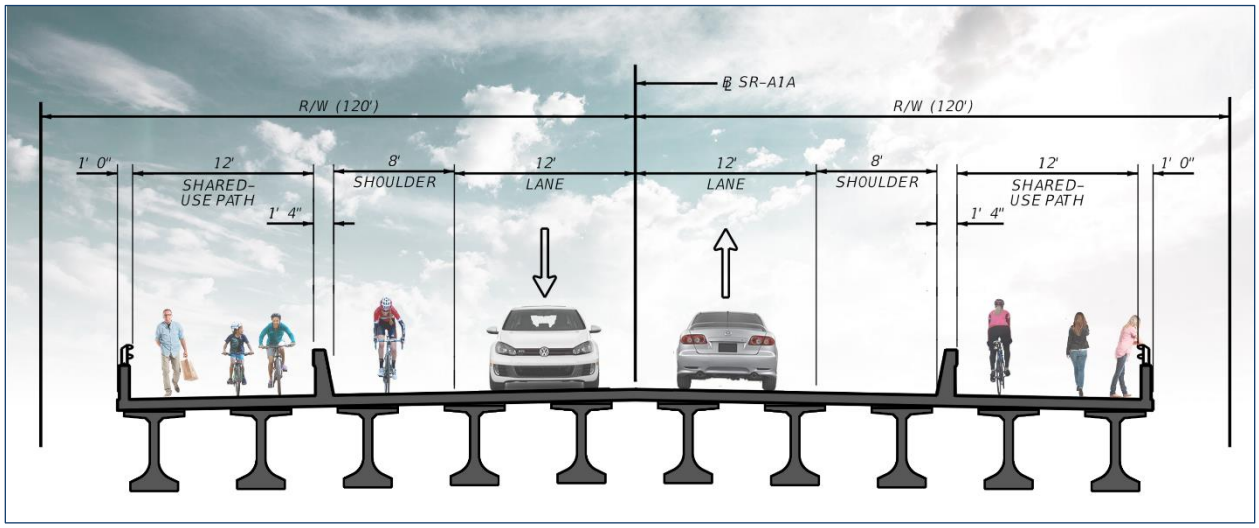


FIGURE 4-1. PROPOSED BRIDGE TYPICAL SECTION

4.6.1 BUILD ALTERNATIVE 1

Build Alternative 1 includes a new bridge on the existing alignment. This alternative requires the installation of a temporary bridge to maintain traffic and avoid bridge closing or lengthy detours.

South of the bridge, proposed Build Alternative 1 improvements include:

- The beginning of the temporary bridge
- Reconfiguration of the south Park entrance including the addition of an exit right turn lane
- A southbound acceleration lane from the south Park entrance
- Lengthened storage of the southbound right turn lane into the Park
- Continuation of the shared use path on the west side of the bridge and roadway
- Addition of a shared use path on the east side of the bridge and roadway that extends to the public parking lot located on the east side of SR A1A
- Addition of a crosswalk crossing SR A1A at the south Park entrance

North of the bridge, proposed Build Alternative 1 improvements include:

- The end of the temporary bridge
- Reconfiguration of the north Park entrance including the addition of an exit right turn lane
- Lengthened storage of the southbound right turn lane into the Park
- Continuation of the shared use path on the west side of the bridge and roadway
- Addition of a shared use path on the east side of the bridge and roadway terminating at the north Park entrance

- Addition of a crosswalk crossing SR A1A at the north Park entrance
- Reconfiguration of the SID Access Road

All bridge improvements are located within existing FDOT ROW. Approximately 3.64 acres of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, shared use path improvements and stormwater management (**Figure 4-2**).

4.6.2 BUILD ALTERNATIVE 2

Build Alternative 2 includes a new bridge alignment that is shifted to the east of the centerline of the existing bridge. South and north of the bridge**,** the proposed Build Alternative 2 improvements are the same as Build Alternative 1 except that a temporary bridge is not required.

All bridge improvements are located within existing FDOT ROW. Approximately 3.46 acres of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, shared use path improvements, and stormwater management (**Figure 4-3**).

Because the new bridge will be constructed in phases, the existing bridge will remain in place while the east portion of the new bridge is constructed. This new construction will include the shared use path, shoulder, and northbound travel lane.

Once construction of the east portion of the new bridge is completed, traffic will be diverted to the newly constructed portion of the bridge. The existing bridge will then be demolished followed by construction of the west side of the bridge completing the new bridge.

4.6.3 BUILD ALTERNATIVE 3

Build Alternative 3 includes a new bridge on alignment that is shifted to the west of the centerline of the existing bridge. South and north of the bridge**,** the proposed Build Alternative 3 improvements are the same as Build Alternative 1 except that a temporary bridge is not required.

All bridge improvements are located within existing FDOT ROW. Approximately 3.78 acres of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, shared use path improvements, and stormwater management (**Figure 4-4**).

Because the new bridge will be constructed in phases, the existing bridge will remain in place while the west portion of the new bridge is constructed. This new construction will include the shared use path, shoulder, and southbound travel lane.

Once construction of the west portion of the new bridge is completed, traffic will be diverted to the newly constructed portion of the bridge. The existing bridge will then be demolished followed by construction of the east side of the bridge completing the new bridge.

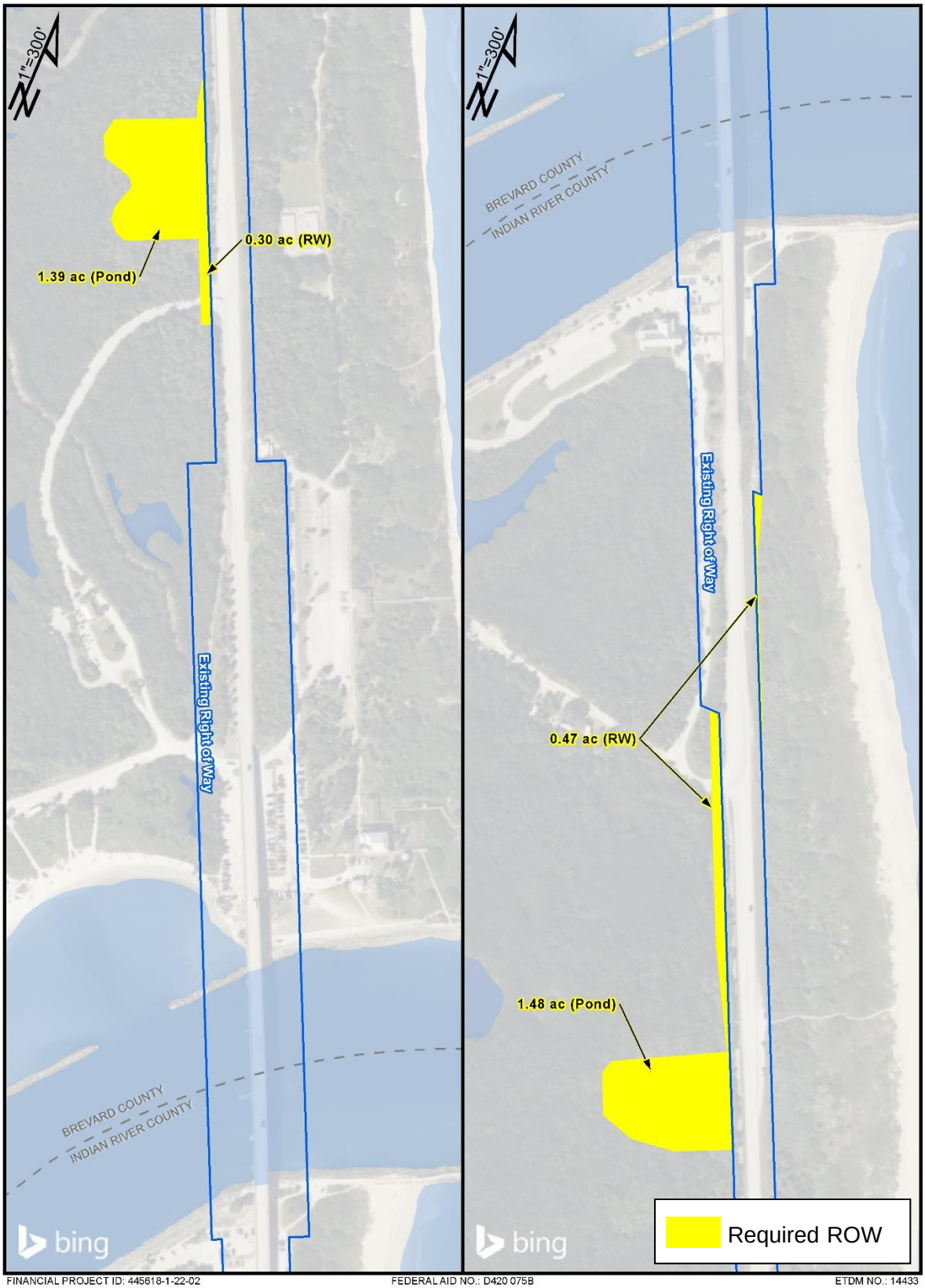


FIGURE 4-2. ALTERNATIVE 1 REQUIRED ROW

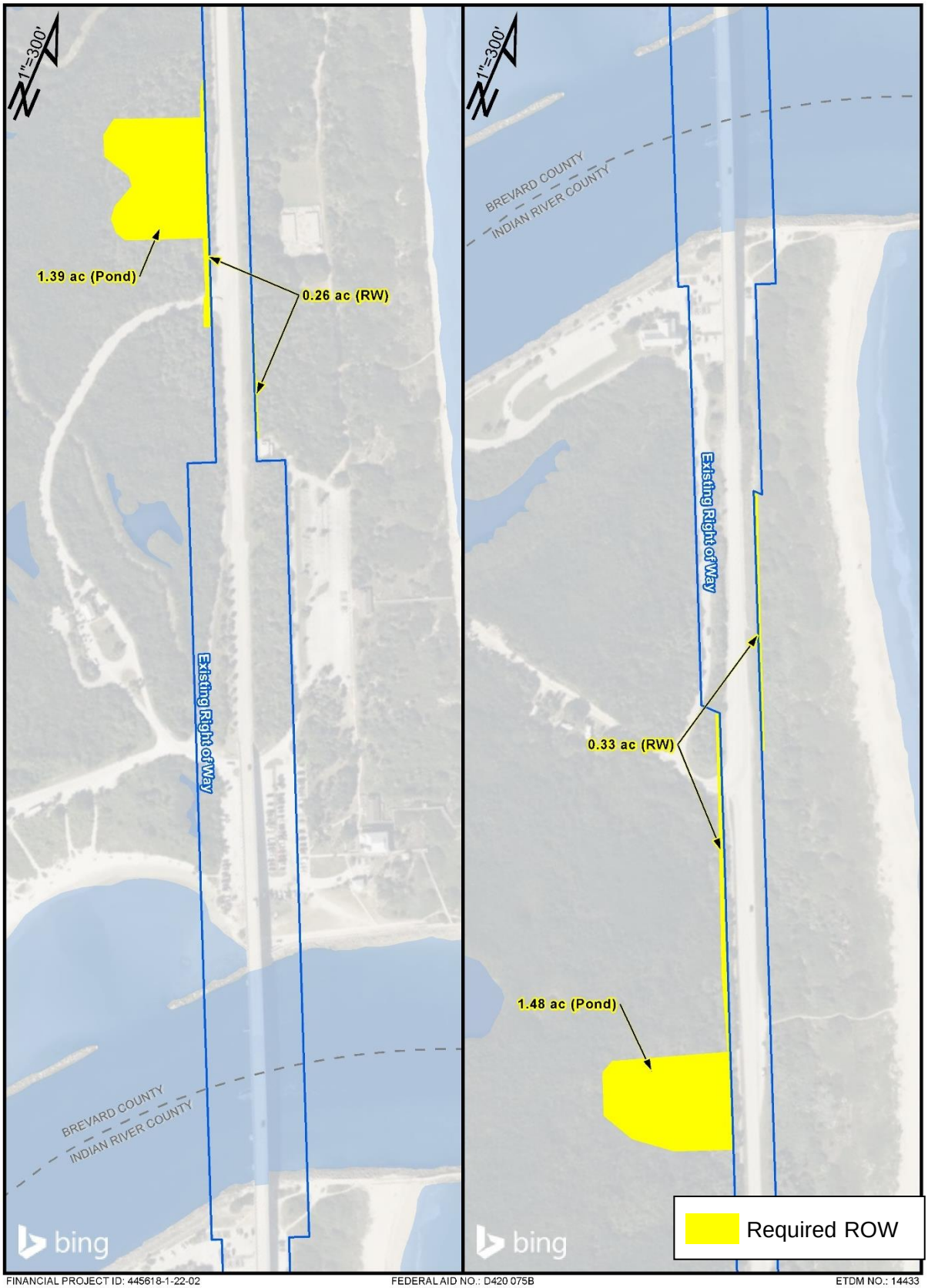


FIGURE 4-3. ALTERNATIVE 2 REQUIRED ROW

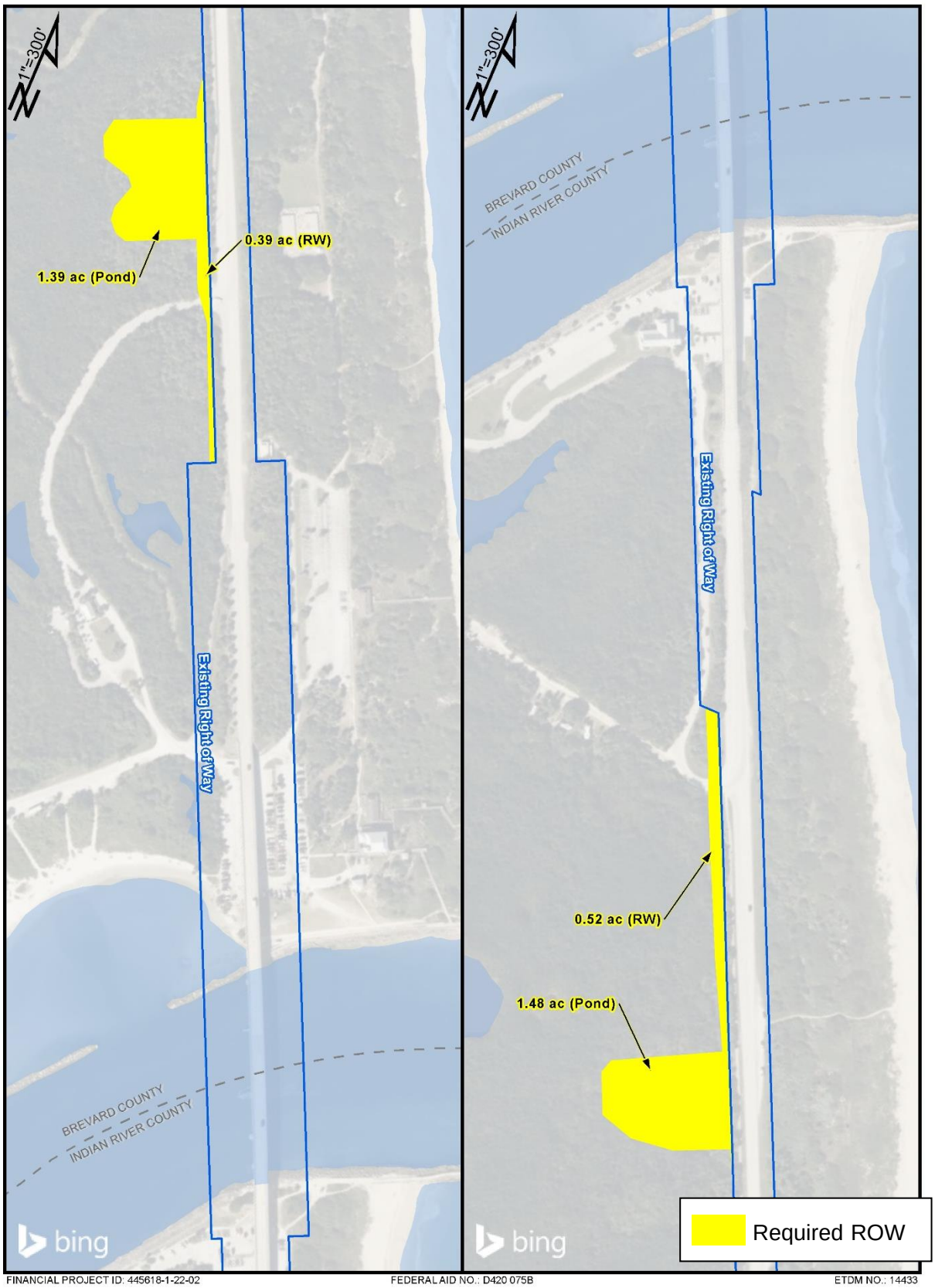


FIGURE 4-4. ALTERNATIVE 3 REQUIRED ROW

4.7 COMPARATIVE ALTERNATIVES EVALUATION

An analysis of the potential beneficial or adverse impacts of the Build, Rehabilitation, and No-Action Alternatives was completed. The Alternatives were qualitatively and quantitatively evaluated with respect to the bridge and roadway design criteria; navigation; required ROW; social, cultural, physical, and natural resource impacts; costs; and public and stakeholder input. Required mitigation costs will be determined during final design and may include Section 4(f) recreational, wetland, and ARC mitigation.

The following Technical Reports and Memorandum prepared as part of this PD&E Study and the results of which were used to provide the data for technical analysis necessary to evaluate and select the Preferred Alternative. These documents are incorporated by reference.

- Navigation Needs Memorandum
- Vertical Clearance Evaluation Memorandum
- Traffic Analysis Methodology Memorandum
- Project Traffic Analysis Report
- Pond Siting Report
- Geotechnical Report
- Typical Section Package
- Bridge Hydraulic Report
- Utilities Assessment Package
- Value Engineering Report
- Noise Study Technical Memorandum
- Level I Contamination Assessment Report
- Water Quality Impact Evaluation
- Natural Resource Evaluation
- Cultural Resource Assessment Report
- Individual Section 4(f) Evaluation
- Project Commitment Record
- Planning Consistency Form
- Alternatives Public Meeting Summary
- Public Involvement Summary Report

The analysis of the potential beneficial or adverse impacts of the project's Build, Rehabilitation, and No Action Alternatives are presented in the Evaluation Matrix (**Table 4-1**).

4.7.1 SUMMARY OF ENVIRONMENTAL IMPACTS

The Alternatives avoided where possible and minimized overall impacts, to the greatest extent practicable, while meeting the stated purpose and need to address the structural and functional deficiencies of the existing bridge and the gap in system linkage for bicyclists and pedestrians.

The No-Action Alternative and the Rehabilitation Alternative do not meet the purpose and need for the project.

The results of the Build Alternatives evaluation are the same for the following criteria:

- Satisfies the purpose and need for the project
- Maintains navigation
- Provides for maintenance of traffic during construction
- Provides a 75-year service life
- Provides improved evacuation and emergency response
- Includes improvements that provide bicycle, and pedestrian facilities
- Was developed within FDOT and FHWA policies and standards
- Adversely effects the historic bridge
- No contamination site impacts
- Aesthetic / Visual changes due to increased bridge vertical clearance

The results of the Build Alternatives evaluation relative to natural, social, cultural, and physical resources criteria shows the following:

- Alternative 2 has the lowest wetland impacts at 0.11 acres
- Alternatives 2 and 3 have the lowest surface water impacts at 0.81 acres
- Alternatives 2 and 3 have the lowest species and habitat impacts at 0 and 0.81 acres respectively
- Alternative 2 has the lowest Section 4(f) recreational impacts at 3.58 acres
- Alternative 2 has the lowest potential archaeological resource impacts at 0
- Alternatives 1 and 2 have the lowest noise receptor impacts at 0
- All three Alternatives have the lowest contamination impacts at 0
- Alternative 2 requires the least amount of ROW at 3.46 acres
- Alternatives 2 and 3 have the same estimated total project costs at $100,523,875

Required mitigation costs will be determined during final design and may include Section 4(f) recreational, wetland, and ARC mitigation.

TABLE 4-1: EVALUATION MATRIX

Criteria/Category		No Action Alternative	Rehabilitation Alternative	51-Feet Fixed Bridge Alignment		
				Alternative 1 (Existing)	Alternative 2 (East)	Alternative 3 (West)
PURPOSE AND NEED	Meets Purpose and Need for the Project	No	No	Yes	Yes	Yes
BRIDGE	Vertical Navigational Clearance above Mean High Water	39-feet	39-feet	51-feet	51-feet	51-feet
	Horizontal Navigational Clearance Between Fenders	150-feet	150-feet	150-feet	150-feet	150-feet
	Benefit to Marine Traffic	No Change	No Change	Yes	Yes	Yes
	Temporary Bridge Required	N/A	No	Yes	No	No
	Bridge Closure or Detour During Construction	N/A	No	No	No	No
	Life of Alternative (Estimated Years) [1]	5	15	75	75	75
TRAFFIC OPERATIONS	Benefit to Vehicular Traffic	No	No	Yes	Yes	Yes
	Evacuation / Emergency Response (Improved)	No	No	Yes	Yes	Yes
	Sebastian Inlet State Park North Entrance (Improved)	No	No	Yes	Yes	Yes
	Sebastian Inlet State Park South Entrance (Improved)	No	No	Yes	Yes	Yes
	Sebastian Inlet District North Access Road (Improved)	No	No	Yes	Yes	Yes
NATURAL RESOURCES	Impacts to Wetlands (Acres)	0	0	1.61	0.11	2.03

TABLE 4-1: EVALUATION MATRIX

Criteria/Category		No Action Alternative	Rehabilitation Alternative	51-Feet Fixed Bridge Alignment		
				Alternative 1 (Existing)	Alternative 2 (East)	Alternative 3 (West)
	Impacts to Surface Waters (Acres)	No Change	0.4	1.23	0.81	0.81
	Impacts to Species Habitat: EFH (Acres) / Beach Mice (Acres)	0	2.73 / 0.46	4.77 / 0.0	0.81 / 0.0	0.81 / 0.0
SOCIAL & CULTURAL RESOURCES	Impacts to Section 4(f) Resources (Park) (Acres)	No	No	3.79	3.58	5.04
	Potentially Eligible Archaeological Resources (Number)	0	0	1	0	1
	Eligible Historic Resources (Number)	0	1	1	1	1
	Bicycle and Pedestrian Facilities	No	No	Yes	Yes	Yes
PHYSICAL RESOURCES	Noise Receptors Impacted	0	0	0	0	1
	Contamination Sites [2]	0	0	0	0	0
	Aesthetics / Visual Changes	No	Yes	Yes	Yes	Yes
RIGHT-OF-WAY [3]	Additional Right-of-Way Required (Acres)	0	0	3.64	3.46	3.78
COSTS (Dollars)	Design	0	1,479,300	6,656,900	6,217,175	6,217,175
	Bridge and Roadway Construction	0	10,362,400	89,040,000	89,040,000	89,040,000
	Temporary Bridge Construction	0	0	6,906,600	0	0
	TOTAL COST	**0**	**11,841,700**	**102,603,500**	**95,257,175**	**95,257,175**

[1] FDOT policy states a structurally deficient bridge replacement be initiated within 6 years.

PRELIMINARY AND SUBJECT TO CHANGE

[2] Bridge will be evaluated for lead paint during design.

[3] ROW required for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, shared use path improvements, and stormwater management

Best Good Worst

4.8 SELECTION OF THE PREFERRED ALTERNATIVE

Following the January 11 and 13, 2022 Alternatives Public Workshop and as a result of the comprehensive resources evaluation, environmental and engineering studies, costs, and involvement of the public, local officials, and federal and state resource agencies, sufficient information and public opinion exist to identify **Alternative 2 (East)** as the **Preferred Alternative (Appendix A)**.

The Preferred Alternative avoided where possible and minimized overall impacts, to the greatest extent practicable, while meeting the stated purpose and need to address the structural and functional deficiencies of the existing bridge and the gap in system linkage for bicyclists and pedestrians.

The Preferred Alternative includes a new bridge alignment that is shifted to the east of the of the existing bridge.

South of the bridge**,** the Preferred Alternative improvements include:

- Reconfiguration of the south Park entrance including the addition of an exit right turn lane
- A southbound acceleration lane from the south Park entrance
- Lengthened storage of the southbound right turn lane into the Park
- Continuation of the shared use path on the west side of the bridge and roadway
- Addition of a shared use path on the east side of the bridge and roadway that extends to the public parking lot located on the east side of SR A1A
- Addition of a crosswalk crossing SR A1A at the south Park entrance

North of the bridge**,** the Preferred Alternative improvements include:

- Reconfiguration of the north Park entrance including the addition of an exit right turn lane
- Lengthened storage of the southbound right turn lane into the Park
- Continuation of the shared use path on the west side of the bridge and roadway
- Addition of a shared use path on the east side of the bridge and roadway terminating at the north Park entrance
- Addition of a crosswalk crossing SR A1A at the north Park entrance
- Reconfiguration of the SID Access Road

All bridge improvements are located within existing FDOT ROW.

Approximately 3.46 acres of ROW (**Figure 4-3)** is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, shared use path improvements, and stormwater management.

Because the new bridge will be constructed in phases, the existing bridge will remain in place while the east portion of the new bridge is constructed. This new construction will include the shared use path, shoulder, and northbound travel lane.

Once construction of the east portion of the new bridge is completed, traffic will be diverted to the newly constructed portion of the bridge. The existing bridge will then be demolished followed by construction of the west side of the bridge completing the new bridge.

In summary, the Preferred Alternative:

- Satisfies the purpose and need for the project
- Includes improvements that accommodate vehicular, bicycle, and pedestrian traffic
- Was developed within FDOT and FHWA policies and standards
- Has the lowest wetland and surface water impacts
- Requires the least amount of wetland and Section 4(f) mitigation
- Has the lowest Section 4(f) recreational impacts
- Has the lowest archaeological resource impacts
- Has the lowest impacts to species and habitat
- Requires the least amount of ROW
- Adversely effects the historic bridge

4.9 VALUE ENGINEERING STUDY

As part of the alternatives evaluation process, a Value Engineering (VE) Study was conducted May 2 through May 10, 2022. The VE Study is a comprehensive workshop to determine opportunities for improvements to support the overall functionality and financial feasibility of the Preferred Alternative. The VE process employs a multi-disciplinary team approach to analyze and improve the value of the proposed project. The VE team, comprised of FDOT staff and consultants, identified key areas of focus and investigation for improvements to support the overall functionality and financial feasibility of the Preferred Alternative. Key areas included operations, safety, drainage, constructability, maintenance, environment, and costs were evaluated.

The VE Study team identified six VE recommendations and 11 design suggestions for consideration in the following areas: bridge alignment, drainage, wetland impacts, SID access road, bridge span lengths, and maintenance of traffic. As part of the PD&E Study, VE recommendation numbers 2 and 3 were accepted. VE recommendation number 5 was accepted

in part and VE recommendation numbers 1, 4, and 6 were not accepted. The accepted VE recommendations are summarized below.

VE RECOMMENDATION NUMBER 2: The VE concept creates 4,650 LF swale along the east side of SR A1A South of the Bridge for treatment and attenuation for Basin 1.

PD&E RECOMMENDATION RESPONSE: Accepted
Installation of a roadside treatment swales along the east side of SRA1A to provide compensating treatment is a viable option. According to the USDA soil survey, there are locations south of the bridge where the soils are conducive to dry retention swales.

VE RECOMMENDATION NUMBER 3: Realign the Sebastian Inlet Tax District (SID) sand truck route. Relocate their access/driveway connection to the Eastside of A1A with a reconfigured connection to allow forward entrance & exit movements

PD&E RECOMMENDATION RESPONSE: Accepted
The SID access road (sand truck route) has been relocated to the east side of SR A1A within FDOT right of way (ROW). This reduces the mangrove/wetland impacts for the project by 0.74 acres.

VE RECOMMENDATION NUMBER 5: A hybrid of multiple VE ideas that include the following:

Use a horizontal curve to maximize the shift of the alignment to the east within the right of way.

PD&E RECOMMENDATION RESPONSE: Accepted in Part. *This recommendation is accepted in part as described below.*

*The use of horizonal curves to minimize impacts and maximize the shift of the Preferred Alternative farther east is acceptable and has been incorporated into the Preferred Alternative (**Appendix A**). This shift should occur at the channel with curve transitions that stay within the existing ROW to avoid additional natural resource impacts and dune impacts on the southeast side of the Sebastian Inlet.*

As part of the PD&E Study, design suggestions numbers 2 and 7 were accepted and design suggestion numbers 1, 3 - 6, and 8 – 11 were not accepted. The accepted design suggestions are summarized below.

DS #2: Create new entrance for SID (sand trucks) on west side for direct connect to the spoil area driveway by a "goose neck turn" then run along new maintenance access area along new MSE wall.

PD&E RECOMMENDATION RESPONSE: Accepted

See VE Recommendation #3 response

DS#7: Reconfigure parking on both sides of Sebastian Inlet State Park to maximize spaces.

PD&E RECOMMENDATION RESPONSE: Accepted

Conceptual parking lot layouts have been prepared by the PD&E Team for the north and south parking areas under the bridge. The parking layout for north side provides an increase in the number of parking spaces.

A more detailed discussion of the VE recommendations and design suggestions are included in the *Value Engineering Study Report* (May 2022) and PD&E Study Response Memorandum (September 2022) in the Project File. It is also found on SWEPT

5.0 PROJECT COORDINATION & PUBLIC INVOLVEMENT

A Public Involvement Plan (PIP) was initiated as part of this PD&E Study. This plan complies with Section 339.155, Florida Statutes (F.S.); Council of Environmental Quality (CEQ) Regulations for implementing the procedural provisions of the National Environmental Policy Act (NEPA) and 23 Code of Federal Regulations (CFR) 771. The purpose of the PIP is to identify various approaches to provide information to and obtain input from concerned citizens, agencies, private groups, regulatory agencies, and governmental entities. The overall goal of the PIP is to help ensure that the study reflects the values and needs of the communities. Effective public involvement is encouraged, and the participation of the public is meaningful in the transportation decision-making process. Additional details are provided in the PIP in the Project File. It is also found on SWEPT.

The outreach activities, meeting notifications, and public involvement efforts are similar for each public meeting and are summarized below. Additional details are provided in the Public Involvement Summary Report in the Project File. It is also found on SWEPT.

5.1 AGENCY/STAKEHOLDER COORDINATION

FDOT has identified federal, state, regional and local agencies and has coordinated with them through the Advance Notification (AN) process during the Programming Screening event of the ETDM process in accordance with the PD&E Manual, Part 1, Chapter 3, Preliminary Environmental Discussion and Advanced Notification. A contact list was developed including the Environmental Technical Advisory Team (ETAT) Members and federally recognized Native American Tribes.

Local, state, and other interest groups or organizations having a direct or expressed interest in the project study were also identified and contacted by FDOT. As other concerned public interest organizations were identified throughout the study process, they also were listed and contacted.

During the PD&E Study, the project team met and discussed the project and issues with the following agencies, cities, committees, and stakeholders:

- U.S. Coast Guard
- Florida Inland Navigation District
- Florida Department of Environmental Protection, Division of State Lands
- Florida Department of Environmental Protection, Florida Park Service
- Sebastian Inlet District Commission
- Indian River County Metropolitan Planning Organization
- Indian River County

- Space Coast Transportation Planning Organization
- Brevard County
- St Johns River Water Management District
- Boating/Marina Communities

5.2 OUTREACH ACTIVITIES

Several measures were taken to ensure that the public was informed of the project issues, upcoming meetings, and had a way to communicate their comments to the department. These measures included:

- Newspaper Ads, as required
- Invitational/Information Letters
- Newsletters/Factsheets
- Press Releases
- Public Notices
- Project Website www.fdot.gov/projects/SebastianInletBridge
- Agency/Stakeholder Coordination
- FDOT District Four Press Release
- Florida Administrative Register (FAR)
- FDOT District Four Communication's office social media posts on Facebook

Meeting documents were made available for review prior to the public meetings by posting on the project website. Handouts and display boards developed for the in-person meetings were also uploaded to the project website. A *Comment Form* was made available for the public to provide comments during the in-person meetings and on the project website.

Opportunities to provide comments were made available during all public meetings/hearing, and any time during the PD&E Study via the project website, by email to the FDOT Project Manager, or by mail. The purpose of a public meeting/hearing is to share project information with stakeholders. To collect feedback, such as comments and concerns from stakeholders, the meetings provide an opportunity to interact with the public, discuss the process used to develop alternatives and evaluate solutions.

5.2.1 PUBLIC KICKOFF MEETING

Due to the Covid-19 pandemic, and in compliance with FDOT requirements at the time of the meeting, the Public Kickoff Meeting was conducted in a "virtual" format. A Virtual Public Kickoff

meeting, via the GoTo Webinar platform, was held on Tuesday, May 11, 2021, in accordance with the PIP. The meeting consisted of a virtual PowerPoint presentation and overview of the project followed by a question-and-answer session. A recording of the meeting was uploaded to the project website on May 12, 2021.

The purpose of the meeting was to introduce the study and give local, state, and federal officials, agencies, and the public an opportunity to comment and provide initial input on the future transportation improvements.

Based on information gathered from GoTo Webinar, 140 individuals registered for the Virtual Public Kickoff Meeting and 84 attended the meeting. Five elected and agency officials attended the Virtual Public Kickoff meeting. Thirteen FDOT Staff were in attendance from FDOT District Four and District Five.

Prior to the Virtual Public Kickoff meeting a total of 22 questions/comments were received through the registration link and 30 questions/comments were made during the virtual meeting. All questions and comments submitted via the GoTo Webinar question box were addressed during the meeting.

The questions and comments related to issues such as: bicycle and pedestrian accommodations on the bridge; traffic maintenance patterns during construction; bridge closure; bridge design; bridge vertical clearance; bridge demolition; review of environmental studies; bridge design; bird diversion poles; concerns regarding widening of SR A1A outside the project limits.

More detailed discussion of the Public Kickoff Meeting is included in the *Public Kickoff Meeting Summary Report* (June 2021) in the Project File. It is also found on SWEPT.

5.2.2 ALTERNATIVES PUBLIC WORKSHOP

A Hybrid Alternatives Public Workshop was conducted in accordance with the PIP. A Virtual Alternatives Public Workshop was held on Tuesday, January 11, 2022, via the GoTo Webinar platform and an in-person Alternatives Public Workshop was held on Thursday, January 13, 2022 at the City of Sebastian Community Center, 1805 N. Central Avenue, Sebastian, Florida 32958. The project website was updated to reflect all documentation shown at both Alternative Public Workshops.

5.2.2.1 Virtual Alternatives Public Workshop

The Virtual Alternatives Public Workshop began at 6:00 p.m. with a live presentation and overview followed by a question-and-answer session. The presentation included the project location, FDOT Transportation Delivery and FDOT PD&E Study Processes, project background, project purpose and need, agency coordination, engineering and environmental analyses, alternatives evaluated, schedule, and costs. A recording of the meeting was uploaded to the project website on May 12, 2021

Based on information gathered from GoTo Webinar, 142 individuals registered for the Virtual Alternatives Public Workshop. The Virtual Workshop attendance included one elected and 18 agency officials, nine FDOT Staff from FDOT District Four and District Five, and 73 public attendees.

Prior to the Virtual Alternatives Public Workshop, a total of 16 questions/comments were received through the registration link and 27 questions/comments were asked during the virtual meeting. All questions and comments submitted via the GoTo Webinar question box were addressed during the meeting. The questions and comments regarded issues such as: bike/pedestrian accommodation on the bridge, traffic maintenance/patterns during construction, lane/bridge closure, environmental safeguards, disruptions/limitations to the bridge during construction, bridge design plan, safety for cyclists and pedestrians, consideration of bridge removal, buffered bike lanes, concerns on widening SR A1A, and schedule.

5.2.2.2 In-Person Alternatives Public Workshop

The In-Person Alternatives Public Workshop began at 5:30 pm with an open house where the project team spoke with attendees as they viewed the project display boards. The Alternatives Public Workshop presentation played on a loop for the duration of the workshop.

Based on information gathered from the Alternatives Public Workshop registration, nine individuals registered online for the In-person Alternatives Public Workshop and 26 individuals attend the Workshop. The Workshop attendance included one agency official, one FDOT Staff, and 22 public attendees.

Three written comments were received at the meeting. Two additional comments were received through the registration link from attendees registered for the in-person meeting. The comments and questions submitted through the registration link and during the virtual and in-person meeting regarded issues such as: bicycle and pedestrian accommodations north and south of the bridge; measures to control speed on SR A1A; safety for bicyclists and pedestrians; maintenance of debris on the bridge; concern over widening improvements beyond the bridge project limits and impacts it may have on the environment; height of barriers and visibility; design and aesthetics of bridge features; and costs.

More detailed discussion of the Alternatives Public Workshop is included in the *Public Alternatives Workshop Summary Report* (June 2021) in the Project File. It is also found on SWEPT.

5.2.3 PUBLIC HEARING

A Hybrid Public Hearing was conducted in accordance with the PIP. A Virtual Public Hearing was held on Tuesday, December 13, 2022, via the GoTo Webinar platform and an in-person Public Hearing was held on Thursday, December 15, 2022 at the City of Sebastian Community Center, 1805 N. Central Avenue, Sebastian, Florida 32958. Both hearings began with an open house at 5:30 p.m. followed by a formal presentation at 6:00 p.m. and public comment period.

Because the project involves the historic bridge and is adjacent to the Park, a Section 4(f)

protected property under 23 Code of Federal Regulations (CFR) § 774.17, the public was given an opportunity to participate and provide input on the effect to the historic bridge and the Section 4(f) recreation impacts as part of the public hearing. No comments were received regarding the effects to the historic bridge or impacts to the Section 4(f) recreation resource.

Draft documents were available for public review at the City of Sebastian City Hall, 1225 Main Street, Sebastian, FL 32958 from November 22, 2022 through December 27, 2022.

5.2.3.1 Virtual Public Hearing

The virtual public hearing began at 5:30 pm with a virtual open house where the project team took attendees through the project display boards that were presented as slides and made available for download in the "Handouts Pane" of the GoTo Webinar Control Plane. The project area, Preferred Alternative, project schedule, and options for reviewing the public hearing materials were reviewed. A pre-recorded voiceover presentation was played at 6:00 p.m. for the formal Public Hearing. The formal presentation included the project location, FDOT Transportation Delivery and FDOT PD&E Study Processes, project background, project Purpose and Need, agency coordination, engineering and environmental analyses, the Preferred Alternative, schedule, and costs. The presentation was followed by a formal comment period.

Based on information gathered from GoTo Webinar, 43 individuals registered for the Virtual Public Hearing. The Virtual Public Hearing attendance included three agency officials, five FDOT Staff from District Four, and 28 public attendees. A court reporter was present at the Virtual Public Hearing.

Prior to the Virtual Public Hearing, a total of 4 questions/comments were asked through the registration link and 5 questions/comments asked during the open house portion of the hearing.

The questions and comments regarded issues such as: impacts to navigation during demolition of the old bridge; construction start date; impacts to vehicular traffic; potential detours to the mainland; and the separation of bicycles and pedestrians from traffic.

During the Public Hearing registration, a total of 4 attendees requested to make a statement during the formal comment period. Most provided their statements during the Open House portion of the hearing. One person made a statement congratulating the team on a great design that incorporated the needs and safety of those who use the bridge.

The Virtual Public Hearing ended at 7:01 p.m. More detailed discussion of the Public Hearing is included in the *Public Hearing Summary Report* (January 2023) in the Project File. It is also found on SWEPT.

5.2.3.2 In-Person Public Hearing

The In-Person Public Hearing began at 5:30 pm with an open house where the project team spoke with attendees as they viewed the project display boards. A pre-recorded voiceover presentation was played at 6:00 p.m. for the formal Public Hearing. The formal presentation included the project location, FDOT Transportation Delivery and FDOT PD&E Study Processes,

project background, project Purpose and Need, agency coordination, engineering and environmental analyses, the Preferred Alternative, schedule, and costs. The presentation was followed by a formal comment period.

Based on information gathered from GoTo Webinar, one individual registered for the In-Person Public Hearing. Attendance included one agency official, five FDOT Staff from District Four, and 10 public attendees. A court reporter was present at the In-Person Public Hearing.

A total of one question/comment was asked through the GoTo Webinar registration link from an individual who registered for the In-Person Public Hearing. One written comment was received during the In-Person Public Hearing. During the open house portion, questions and comments regarded issues such as: maintenance of traffic and bridge closure; bicycle/pedestrian access during construction; potential park closure; and construction phasing. Several asked about the PD&E process. One attendee asked what the most challenging part of the project was. They also asked about the dump trucks used for beach renourishment and the safety of using the bridge to get to the beach areas farther north. An attendee asked if a suspension bridge was considered for the replacement. Another attendee asked about wetland mitigation

Four verbal statements were made during the formal comment period of the In-Person Public Hearing. Statements supported the overall project with two comments specifically stating the improved bicycle and pedestrian facilities. One statement indicated concern for 12-foot wide shared use paths extending south along SR A1A outside the project area, and another questioned why the bridge vertical clearance is not being increased to 65-feet.

The In-Person Public Hearing ended at 6:56 p.m. More detailed discussion of the Public Hearing is included in the Public Hearing Summary Report (January 2023) in the Project File. It is also found on SWEPT.

5.3 PUBLIC INVOLVEMENT SUMMARY REPORT

A Public Involvement Summary Report was produced at the conclusion of the PD&E Study, containing, at a minimum, all documentation regarding public participation performed throughout the study period. This summary includes all comments and responses received from the public and coordination with local officials and agencies. Other items in the summary include proof of advertisements, meeting notes and sign-in sheets, verbatim transcript from the public hearing, public hearing certification, and all public correspondence. The Public Involvement Summary Report is in the Project File. It is also found on SWEPT.

6.0 DESIGN FEATURES OF THE PREFERRED ALTERNATIVE

The engineering and environmental analysis, agency coordination, and public involvement phases of this PD&E Study resulted in the selection and identification of the Alternative 2 (East) as the preferred alternative. Details of the preferred alternative are described in this section of the report. Concept plans for the Preferred Alternative are included in **Appendix A**.

6.1 ENGINEERING DETAILS OF THE PREFERRED ALTERNATIVE

6.1.1 TYPICAL SECTIONS & DESIGN SPEED

The Preferred Alternative bridge typical section is shown in **Figure 6-1** and the *Typical Section Package* (May 2022) is included in **Appendix C**. Based on the C1-Natural / C2-Rural context classification, within the project limits, the allowable range of design speeds is 55 -70 miles per hour (mph) for these classifications (FDOT Roadway Design Bulletin 21- 08, FDM table 201.5.1 Design Speed).

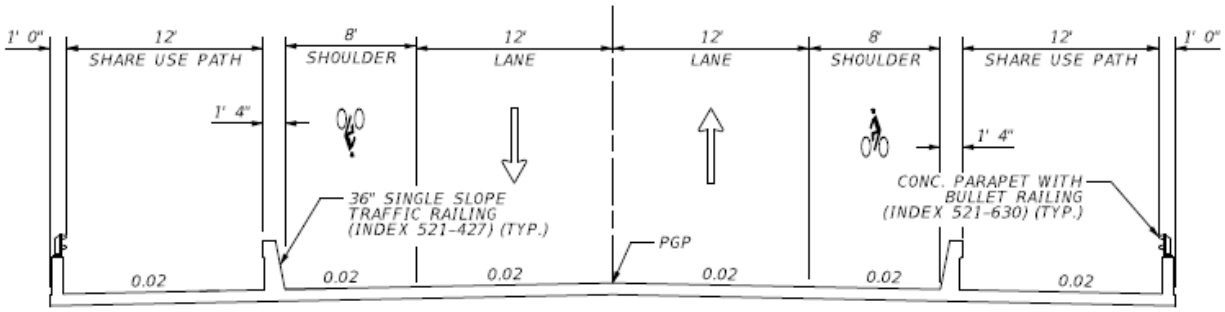


FIGURE 6-1: PREFERRED ALTERNATIVE BRIDGE TYPICAL SECTION

The PD&E Study *Target Speed Recommendation* (October 2021) concluded that due to the nature of the project area being surrounded by the Park, the high number of Park visitors, the high number of bicycle and pedestrian users, and the anticipated increase in bicycle and pedestrian users that will result from the bridge and roadway bicycle and pedestrian improvements, a reduced target speed is warranted. The recommended target, design, and posted speeds are presented in **Table 6-1**.

TABLE 6-1: TARGET, DESIGN, AND POSTED SPEEDS

Speed	Existing	Recommended
Target Speed	N/A	45
Design Speed	45 on bridge and approaches (55 on roadway outside project limits)	50
Posted Speed	45 on bridge and approaches (50 south of the bridge, 55 north of the bridge)	45

6.1.2 RIGHT-OF-WAY AND RELOCATIONS

Additional ROW required for the Preferred Alternative does not result in any relocations. Approximately 3.46 acres of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, shared use path improvements, and stormwater management. The location of the required ROW is shown on the concept plans included in **Appendix A**.

6.1.3 BRIDGES AND STRUCTURES

The Preferred Alternative will replace the existing structure (Bridge No. 880005) with a fixed bridge with navigational clearances of 51-feet vertical and 150-feet horizontal (**Appendix D**). The structure design for the PD&E Study is based on the following elements:

6.1.3.1 Bridge Environmental Classification

The bridge is located in an area classified as a marine environment and is extremely aggressive for both substructure and superstructure.

6.1.3.2 Bridge Superstructure

The superstructure consists of precast concrete FIB-84 girders at the main span and FIB-63 girders on the approach spans. The 180-foot length of the main span is near the practical limit for simple span precast girders and will require careful evaluation of delivery methods and routes. With approach span lengths of 140-feet, the weight of these beams is below the weights that require special coordination through the Department's Permit Office for transportation.

6.1.3.3 Bridge Substructure

The substructure will consist of dual hammerhead columns with added aesthetic detailing. Piers located in the water will utilize waterline footings and land based piers will have footings buried below ground. Repetitive details are utilized to enhance the feasibility of using precast elements for the footings and columns. The use of precast elements for the substructure will significantly reduce construction time.

6.1.3.4 Bridge Foundation

Based on the limited project geotechnical data, 60-inch diameter drilled shafts are proposed including low vibration casing installation to avoid disturbing existing piles – side friction + end bearing (tip post grouting) to increase overall capacity. The proposed approach piers have been located as far away as possible from existing foundations. This minimizes the potential for vibration impacts from installation of bridge pilings and avoids potential conflicts with the existing piles, allowing them to remain in place and be cut off a minimum of 2-feet below the groundline.

The proposed channel piers are essentially in the same place as the existing channel piers. The potential for conflict between the existing and proposed pier locations will need to be carefully evaluated during the design phase. Following the VE Study, the Preferred Alternative has incorporated part of VE Recommendation #5 which shifts the bridge alignment to the east

crossing the channel to provide for further separation of the existing and proposed pier locations. The location of the foundations will control the span lengths and superstructure type, Removal of the existing piles may be required but will be avoided if at all possible. The foundation types and location will be further evaluated during the design phase and documented in the Bridge Development Report (BDR)

6.1.3.5 Under Bridge Observation/Fishing Pier

The under bridge observation/fishing piers will be supported on the main vehicular bridge foundations. The span length of these structures is dictated by the vehicular bridge above. FIB 36 beams are proposed for the superstructure using fiber-reinforced polymer (FRP) with corrosion resistant materials. Installation of the observation/fishing pier bridge beams could be completed prior to phase 2 construction This will facilitate the girder erection and minimize the conflict with the proposed substructure in phase 2.

6.1.3.6 Bridge Aesthetics

Bridge aesthetics include two hammerhead piers placed side-by-side to form an arch with strut at the bottom to support the observation/fishing pier.

6.1.3.7 Bridge Constructability

As shown in **Figure 6-2**, the Preferred Alternative locates the southbound side of the proposed bridge over the location of the existing bridge. This necessitates use of phased construction. The northbound side of the proposed bridge will be constructed first, while traffic is maintained on the existing bridge. A single hammerhead pier will support each phase of construction.

Spans over water will require construction of a temporary trestle on both east as well as west side of the existing bridge to support a crane and allow delivery of materials for the bridge construction. When the northbound portion of the new bridge is complete traffic will be shifted to the new bridge. After the existing bridge is demolished the southbound portion of the new bridge will be constructed. Sufficient space will be left between the NB and SB bridges to allow for a full lap splice of reinforcing steel in the closure pours that will connect the piers and complete the closure of the deck slab.

The final step in construction of the bridge will be adding the observation bump-outs, which cannot be constructed with the deck pour due to constraints of the deck finishing machine. The channel pier footing is exactly at the same location of the existing piers. Opportunity exists to move the proposed piers further away from the existing piers using the FIB 96 and increase the channel span length without impacting the established minimum vertical clearance of 51-feet. The channel pier is anticipated to be at a skew to maximize the distance of existing foundation with the proposed foundation. The constructability shall be further evaluated in the BDR based on the selection of the foundations and superstructure type.

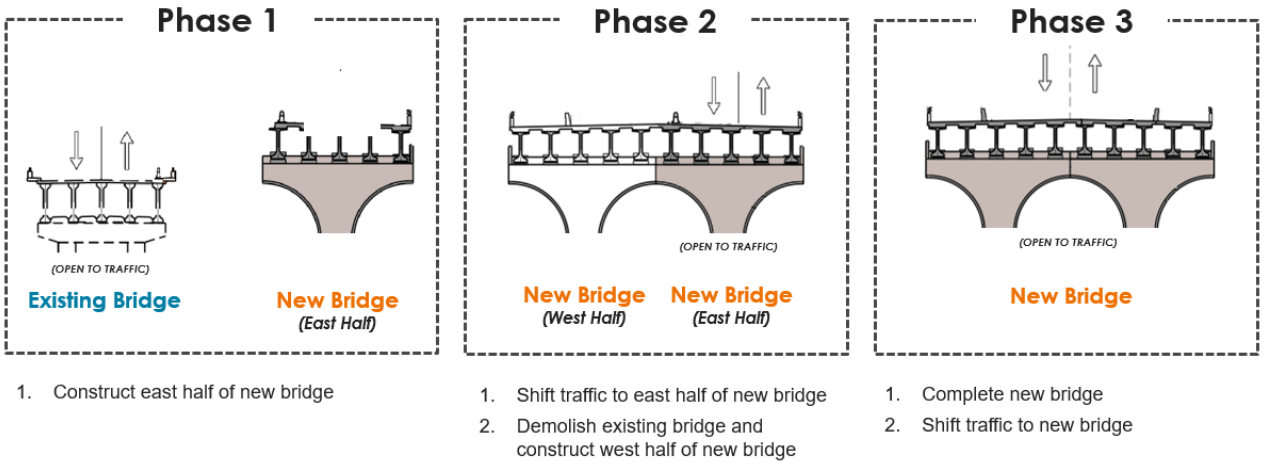


FIGURE 6-2: PREFERRED ALTERNATIVE BRIDGE CONSTRUCTION PHASING

6.1.4 HORIZONTAL AND VERTICAL GEOMETRY

The horizontal and vertical geometry for the Preferred Alternative is discussed below and shown on the Concept Pans included in **Appendix A**.

6.1.4.1 Bridge Geometry

The span arrangement of the new bridge is based on maintaining a 150-feet horizontal clearance between bridge fenders to meet the reasonable needs of navigation for a bridge crossing the Inlet. The matches the 180-feet channel span length, with five 140-feet spans on either side. The length of the side spans was chosen to maximize distance to existing bridge foundations and to minimize bridge hydraulics impacts.

6.1.4.2 Bridge and Roadway Horizontal Alignment

For the Preferred Alternative, the roadway horizontal alignment follows the existing roadway alignment with the new bridge on curvature to the east of the existing bridge to minimize foundation conflicts with the existing bridge during construction.

6.1.4.3 Bridge Vertical Alignment

Vertical alignment is based on a vertical clearance evaluation that considered the purpose and need for the project, impacts to the north and south Park entrances, character of the Inlet, inlet bottom topography, surrounding resources, maintenance of the Inlet and adjacent waterways, and connectivity to the ICW. The preliminary clearance determination received from the USCG (November 2021) stated a minimum vertical clearance of 51-feet above MHW for a fixed bridge will meet the reasonable needs of navigation for a bridge crossing the Inlet and minimize impacts at the Park entrances (**Figure 6-3**).

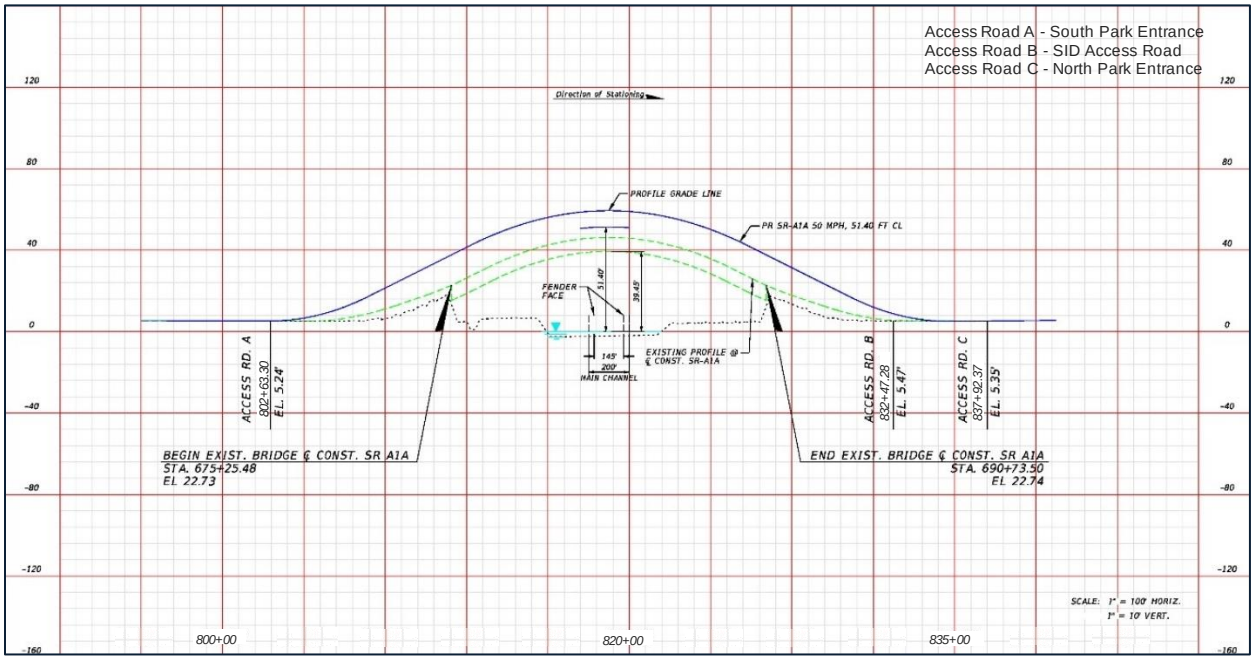


FIGURE 6-3: PREFERRED ALTERNATIVE BRIDGE PROFILE

6.1.5 BICYCLE AND PEDESTRIAN ACCOMMODATIONS

The Preferred Alternative features 12-foot shared use paths on both sides of the bridge and approaches along with 8-foot shoulders that may be used as bicycle lanes. The shared use paths continue north and south of the bridge. On the west side of SR A1A, the shared use path connects to the existing shared use path located along SR A1A. On the east side, the shared use path terminates at the north and south Park entrances. Crosswalks at the Park entrances are provided. The location and type of pedestrian hybrid beacon to be installed at the crosswalks will be coordinated with District Four and District Five during final design.

6.1.6 MULTI-MODAL ACCOMMODATIONS

There are no existing transit routes, truck routes, or railroads located within or along the project limits.

6.1.7 ACCESS MANAGEMENT

SR A1A has an access management classification of Access Class 4 – Non-Restrictive Median which has a standard connection spacing of 440’ and minimum signal spacing of 2,640’ for 45 mph or less speed limit. There is limited direct access to SR A1A from adjacent land uses due to the nature of the surrounding area as a state park. The Preferred Alternative maintains the undivided two-lane bridge and roadway, does not propose any median barriers, and meets all access management guidelines established by the Department.

6.1.8 INTERSECTION AND INTERCHANGE CONCEPTS

Two stop controlled intersections, one at the north Park entrance and one at the south Park entrance are accommodated with exclusive turn lanes from SR A1A. A secondary intersection is created by the SID access road which is relocated to the east side of SR A1A north of the bridge.

The Preferred Alternative (**Appendix A**) includes intersection improvements at the north and south Park entrances including:

- Reconfiguration of the Park entrances to include the addition of a right turn lane exiting the Park
- Lengthened storage of the southbound right turn lane into the Park
- Addition of a crosswalk crossing SR A1A at the Park entrances

The existing SID Access Road is relocated from its existing location on the west side of SR A1A north of the bridge to the east side of SR A1A. The relocated intersection includes adequate turning radius for larger vehicles used to haul sand as part of the south beach renourishment program.

There are no interchanges located within the project limits.

6.1.9 DRAINAGE AND STORMWATER MANAGEMENT FACILITIES

The project is within the jurisdiction of the St. Johns River Water Management District (SJRWMD). The FDEP Central District will be the lead agency for project stormwater permitting per an existing operating agreement with SJRWMD. The FDEP Southeast District, which includes Indian River County, has agreed to defer to FDEP Central District for project permitting.

The stormwater management systems are sized for stormwater pollution abatement criteria. This project will make significant improvements to the water quality along the project limits. The stormwater runoff from both the new and existing impervious areas will be treated in proposed stormwater facilities. The stormwater runoff will be collected by storm sewer systems and roadside ditches. The water quality treatment will be achieved through construction of offsite ponds.

6.1.9.1 Stormwater Management Alternatives

The project area is physically constrained by the Park, Atlantic Ocean, and Indian River Lagoon. The types of stormwater management facilities considered were driven by environmental impacts, required ROW, and maintenance costs including wetlands, floodplain, threatened and endangered species, contamination, historical and archaeological resources, and utility impacts, and constructability.

An evaluation of stormwater management alternatives was completed including dry retention ponds, treatment swales, exfiltration trenches, injection well, wetland stormwater ponds and wet detentions ponds

Factors including soil type, soil permeability, exfiltration and infiltration rates, and the SHWT elevation are directly related to the feasibility of using exfiltration trenches to meet water quality and water quantity standards. In-situ soil conditions must promote sufficient hydraulic capacity in order for an exfiltration trench to meet standards. Preliminary data indicates Type A/D soils with poor conductivity within the project area along with a SHWT elevation (el.) 1-foot NAVD.

Since seasonal high water elevations were not determined for the project area, a conservative SHWT elevation was used based on soil type and the existing permit for Sebastian Inlet Concession Stand (SJRWMD Permit No. 75850-5). The Sebastian Inlet Concession Stand project is located at a higher elevation (el. 10 to 15) than this project (el. 5 to 8) and had a SHWT el. 0. In order to be conservative, a SHWT el. 1-foot NAVD was used.

6.1.9.2 Pond Alternatives

The stormwater management systems were sized for stormwater pollution abatement criteria. Due to the high-water table elevations and the low edge of pavement elevations, alternatives considered were eliminated except for wet detention ponds and compensatory treatment swales. Two alternative pond sites were analyzed and evaluated for both basins based on the following parameters.

- Hydrologic and hydraulic factors such as existing ground elevation, soil types, SHWT, stormwater conveyance feasibility, allowable hydraulic grade line (HGL), and basin outfalls.
- Cultural resource impacts, including archeological and historical
- Environmental resource impacts, including wetlands and threatened or endangered species
- Potential for hazardous materials and contamination
- Floodplain impacts
- Potential for impacts to major utilities
- Estimated ROW acquisition

Stormwater will be routed to the recommended stormwater ponds. The ponds are located within Park lands and will outfall to spreader swales that overflow west into the adjacent wetlands and discharge to OFW and nutrient impaired waters. Based on the results of the pond site evaluation, Pond 1A (South) and Pond 2B (North) were selected. The results of the pond site evaluation are summarized in **Table 6-3** and shown in **Figure 6-4**.

FIGURE 6-4: STORMWATER POND ALTERNATIVES

TABLE 6-2: POND ALTERNATIVES MATRIX							
POND	ROW AREA (ACRES)	WETLAND IMPACTS (ACRES)	T & E	CONTAM	HIST & ARCH	POTENTIAL UTILITY CONFLICT	FINAL RANKING
1A (South)	2.61	0.21	Low	Low	Low	No	1
1B (South)	2.62	2.62	Low	Low	Low	No	2
2A (North)	1.80	0.00	Low	Low	Medium	Yes	2
2B (North)	1.95	0.00	Low	Low	Low	No	1

LEGEND:
ROW: Right of Way
AC: Acres

T & E: Threatened and Endangered Species
Contam: Contamination/Hazardous Materials
Hist & Arch: Historic & Archaeological Resources

6.1.9.3 Pond Size Reduction

Following further coordination with and because the shared use path is exempt from treatment

Following further coordination FDOT Central Office, the following project specific criteria by FDEP supplement or further define the design criteria outlined in the *Pond Siting Report* (August 2022) in the project file. It is also found on SWEPT.

1. Exemption of shared use path
2. Attenuation is not required as long as
    - Nutrient levels are met
    - No discharges east of the CCCL
3. De minimis floodplain impacts
    - Floodplain compensation not required
4. Compensatory treatment for the SR A1A Resurfacing, Restoration, and Rehabilitation (RRR) project (FM 445618.2) immediately adjacent to and south of the bridge replacement project in Indian River County
5. Permitting of the bridge replacement and RRR projects

Applying this criteria, the Pond Reduction Matrix (**Table 6-4**) shows a summary of the pond size reduction and resource impacts for the recommended Pond Alternatives.

TABLE 6-3: POND REDUCTION MATRIX							
POND	R/W AREA	WETLAND IMPACTS	THREAT. OR ENDANG. SPECIES	HAZARDOUS MATERIALS & CONTAM. IMPACTS	ARCHEO. & HISTOR. IMPACTS	MAJOR UTILITY CONFLICT POTENTIAL	FINAL RANKING
1A	1.48 ac	0.21 ac	Low	Low	Low	No	1
2B	1.39 ac	0.00 ac	Low	Low	Low	No	1

6.1.9.4 Compensatory Treatment

The SR A1A RRR project (FM 44561-2) extends from the bridge replacement project south to Sand Dollar Lane in Indian River County. Preliminary calculations show that Pond 1A (south) can be reduced by approximately fifty (50) percent utilizing offsite treatment swales. Potential treatment swale locations and preliminary calculations are included in the *Pond Siting Report* (August 2022). Preliminary research indicates the soils along the east side of SR A1A, north of the bridge and outside the project area, are Type D soils and may not be suitable for compensating treatment that could provide a reduction in Pond 2B (north).

Following further geotechnical investigation and completion of percolation tests during the design phase, suitable soils and locations for exfiltration trenches within or immediately adjacent to the project area may be identified.

The Pond Alternative Matrix with Compensating Treatment (**Table 6-5**) shows a summary of the engineering data and resource impacts for the recommended Pond Alternatives with compensating treatment.

TABLE 6-4: POND ALTERNATIVES MATRIX WITH COMPENSATING TREATMENT

POND	ROW AREA (ACRES)	50% REDUCED POND SIZE (ACRES)	WETLAND IMPACTS (ACRES)	T & E	CONTAM	HIST & ARCH	POTENTIAL UTILITY CONFLICT
1A (South)	1.48	0.74	0.00	Low	Low	Low	No
2B (North)	1.39	1.39	Unknown	Low	Low	Low	No

LEGEND:
ROW: Right of Way
AC: Acres
T & E: Threatened and Endangered Species
Contam: Contamination/Hazardous Materials
Hist & Arch: Historic & Archaeological Resources

6.1.10 FLOODPLAIN ANALYSIS

Since the impacts to the floodplain are considered de minimis and traversable, floodplain compensation is not required.

6.1.11 UTILITIES

The Preferred Alternative will require the relocation of existing utilities within the project limits. Utility owners and contact information is presented in Section 2.19 of this report. The Preferred Alternative was designed to avoid or minimize impacts to existing utilities. Potential utility impacts include relocation of overhead electric, Park well and sanitary utilities, and fiber.

The extent of utility impacts and the need for temporary services for Park operations will be determined during the design phase of the project and further coordination with utility owners will be required. A probable opinion of potential utility impacts cost for the Preferred Alternative

is summarized in **Table 6-2** and is included in the *Utility Assessment Package* (April 2022) in the Project File. It is also found on SWEPT.

TABLE 6-5: PROBABLE UTILITY IMPACT COST ESTIMATE FOR THE PREFERRED ALTERNATIVE

Utility Agency Owner	Description	Conflict With	Quantity	Unit Cost	Total Cost
AT&T	BT-COP-50 BT-COP-25	Roadway Widening New Bridge Alignment	1,600 LF	$100/LF	$160,000
Sebastian Inlet State Park	Water Main	Roadway Widening New Bridge Alignment	1,600 LF	$200/LF	$320,000
Sebastian Inlet State Park	North Well House	Roadway Widening New Bridge Alignment	1 LS	$400,000/ Each	$400,000
FPL - Distribution	1-Phase OH 7.6 kV	Roadway Widening New Bridge Alignment	8 Poles 2,600 LF	$25,000/Pole $200/LF	$720,000
FPL - Distribution	1-Phase BE 7.6 kV	Roadway Widening New Bridge Alignment	300 LF	$200/LF	$60,000
			TOTAL		**$1,660,000**

LF: Lineal Feet
LS: Lump Sum

6.1.12 TRANSPORTATION MANAGEMENT PLAN

Because the bridge is a critically needed regional coastal route, detour routes are limited, and the public expressed an overall common concern regarding maintenance of traffic and potential bridge closure during construction, the project team developed a preferred build alternative that maintained traffic across the bridge during construction.

To maintain traffic, the Preferred Alternative locates the west (southbound) side of the proposed bridge over the general location of the existing bridge. The east (northbound) side of the proposed bridge will be constructed first, while traffic is maintained on the existing bridge during Phase I (**Figure 6-2**). Phase I construction will include one travel lane, one shoulder and a shared use path. Maintenance of traffic commitments require the barrier that separates the shared use path from the travel lane and shoulder to be installed by use of dowels after construction of west half of the bridge. A single hammerhead pier will support each phase of construction.

Once the east side of the new bridge is constructed, traffic will be diverted to the new bridge and the existing bridge will be demolished. Construction of the west half of the new bridge will begin, as shown in Phase 2. Phase 3 includes construction of the west side of the new bridge.

The final step in construction of the bridge will be adding the observation bump-outs, which cannot be constructed with the deck pour due to constraints of the deck finishing machine. The channel pier footing is exactly at the same location of the existing piers. Opportunity exists to move the proposed piers farther away from the existing piers by using the FIB 96 and increasing the channel span length without impacting the established minimum vertical clearance of 51-

feet. The channel pier is anticipated to be at a skew angle to maximize the distance between the existing foundation and the proposed foundation. Constructability will be further evaluated during the design phase and documented in the Bridge Development Report based on the selection of the foundations and superstructure type.

The use of horizonal curves to minimize impacts and maximize the shift of the Preferred Alternative farther east is acceptable and has been incorporated into the Preferred Alternative (**Appendix A**). This shift should occur at the channel with curve transitions that stay within the existing ROW to avoid additional natural resource impacts and dune impacts on the southeast side of the Sebastian Inlet.

Spans over water will require construction of a temporary trestle on both east as well as west side of the existing bridge to support a crane and allow delivery of materials for the bridge construction. Sufficient space will be left between the east and west halves of the bridge to allow for a full lap splice of reinforcing steel in the closure pours that will connect the piers and complete the closure of the deck slab.

A Conceptual Transportation Management Plan (TMP) that will include traffic control and potential work zone management strategies will be developed during the design phase. A traffic control plan that employs the following measures may be considered:

- Advance public notification of potential travel pattern changes through the project area
- Construction during off peak times to minimize travel disruptions
- Signing to indicate travel pattern changes through the project area and additional pavement markings
- Implement construction practices to avoid or minimize impacts

6.1.13 SPECIAL FEATURES

Mechanically Stabilized Earth (MSE) or gravity retaining walls are suitable to retain embankment at the bridge approaches. Additional or replacement lighting will utilize “sea-turtle friendly” lighting.

6.1.14 DESIGN VARIATIONS AND DESIGN EXCEPTIONS

The existing geometric elements for the corridor were evaluated via topographic survey, existing plans, and field reviews. The team conducted this review based on the existing geometry of SR A1A, the bridge, and the unique natural environment that is adjacent to the project limits.

The design team will be responsible for the development of any design variations and exceptions anticipated during the design phase due to inadequate existing conditions or right of way and constraints requiring less than required standard criteria. Certain standard criteria may not be applicable to the site-specific conditions for this project and the environmental or community needs prohibit meeting criteria. The Preferred Alternative balances design impacts

for ROW, environmental impacts, community impacts, and usability by all modes of transportation

Table 6-6 summarizes the potential design variations and exceptions. The processing of other design variations for non-critical design elements will require the decision from the District Design Engineer.

TABLE 6-6: SUMMARY OF DESIGN VARIATIONS AND EXCEPTIONS

Design Element	Location	Details of Design	Variation or Exception	Current Status
Design Speed	Project Limits	Table 3-1 PD&E Study *Target Speed Recommendation* (October 2021)	Exception	This will be completed during the design phase
Vertical Grade (Bridge)	Bridge	Maximum Grade Table 3-1	Variation	This will be completed during the design phase
Marked Shoulders with Helmeted Bicycle Symbol	Bridge	Marked Shoulders Table 3-1	Exception	Non-critical element Processing of this design variation will be decided by District Design Engineer

6.1.15 COST ESTIMATES

The estimated cost of the Preferred Alternative is approximately $100,523,875 (**Table 6-7**), which includes design, bridge and roadway construction, CEI, and contingency costs. Required mitigation costs will be determined during final design and may include Section 4(f) recreational, wetland, and ARC mitigation. The construction costs were estimated using the unit costs per centerline mile for new roadway construction found in the FDOT Long Range Estimating (LRE) system. A copy of the PD&E Study LRE is provided in **Appendix E**.

TABLE 6-7: PREFERRED ALTERNATIVE ESTIMATED COST

Description	Cost (millions)
Design	6,217,175
Bridge and Roadway Construction	89,040,000
TOTAL PROJECT	**95,257,175**

6.2 SUMMARY OF ENVIRONMENTAL IMPACTS OF THE PREFERRED ALTERNATIVE

This section provides a summary of issues and features that affect development of detail design of the Preferred Alternative. Individual subsections reference corresponding technical reports for detailed description of the issues and are incorporated by reference.

6.2.1 FUTURE LAND USE

The future land use adjacent to and surrounding the project area consists of recreational and conservation land uses associated with the Park. Indian River County classifies the adjacent and surrounding area land uses as recreation and Brevard County as recreation and public conservation (**Figure 6-5**).

The Preferred Alternative is anticipated to have minimal effect on the land use within the area. The physical improvements associated with the bridge replacement project are located within FDOT ROW. The character of the area will remain unchanged and will continue to support the existing and future land uses.

6.2.2 CULTURAL RESOURCES

A *Cultural Resource Assessment Survey* (CRAS, Feb 2022) was completed as part of this PD&E Study to identify cultural resources within the project Area of Potential Effect (APE). The CRAS was completed in in accordance with FDOT's PD&E Manual, Part 2, Chapter 8 and applicable federal and state regulations, agreements, and standards.

6.2.2.1 Archaeological Resources

One previously recorded archaeological site and one archaeological occurrence were identified within the project APE. One previously recorded archaeological site could not be relocated. Seventy-two (72) shovel tests were excavated within the archaeological APE, six of which identified an expansion of the Micco Beach Site (8BR125) and one of which was considered an archaeological occurrence. Some portions of the archaeological APE, including the recorded location of an unnamed archaeological site (8IR34), could not be subjected to subsurface testing due to the presence of existing roadways, berms, pavement, sidewalks, swamps or marshes with standing water, and buried utilities. There is insufficient information to evaluate the National Register eligibility of the Micco Beach Site (8BR125), most of which is outside of the archaeological APE. There is also insufficient information to evaluate the National Register eligibility of Site 8IR34 due to the paucity of the available information and the inability to conduct archaeological testing in the area.

6.2.2.2 Historic Resources

The architectural survey resulted in the identification and evaluation of four Resources. The bridge (8BR3148/8IR1493) was determined individually National Register–eligible in 2012 by the Florida SHPO as a result of the 2010 Historic Highway Bridges of Florida study (ACI 2010a)

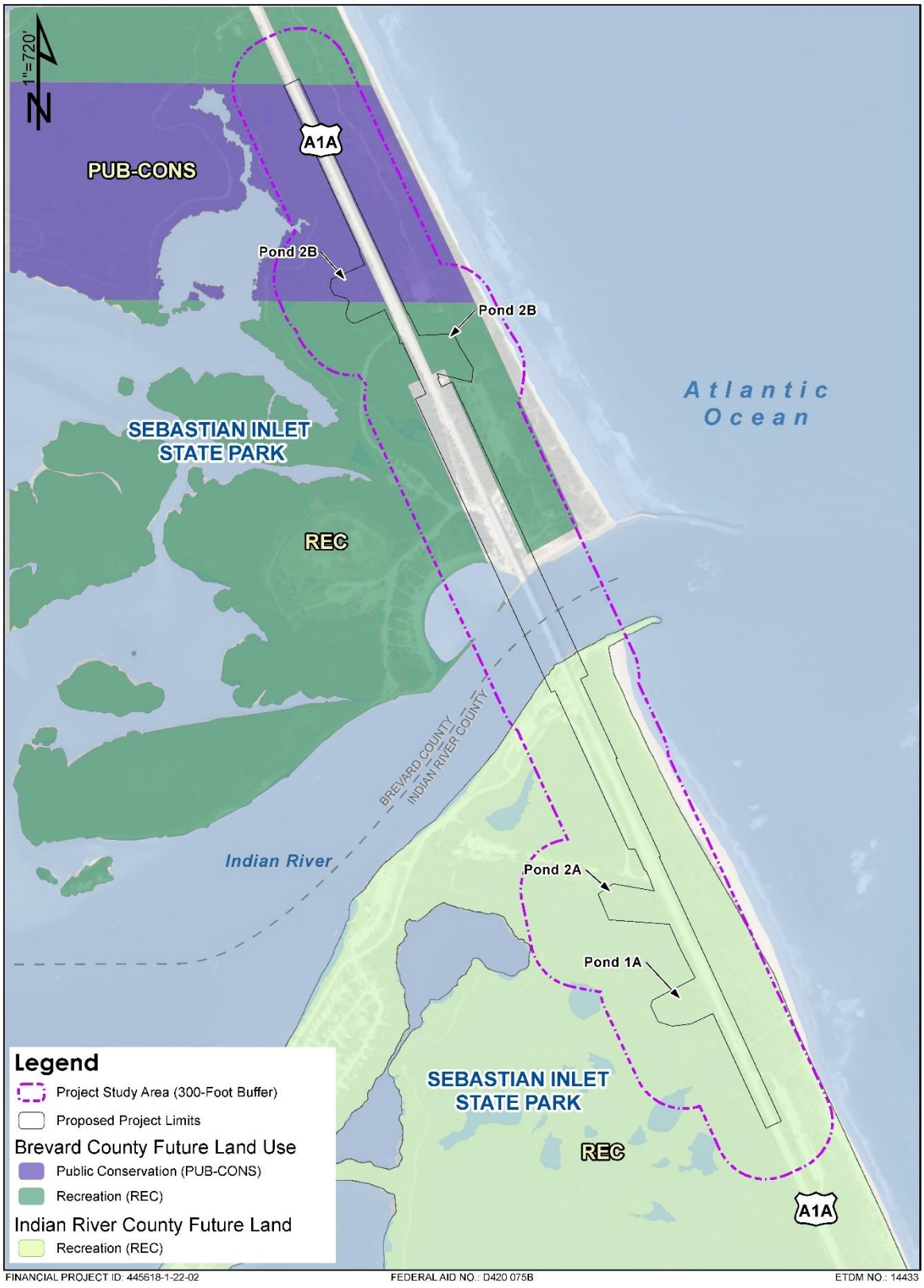


FIGURE 6-5: FUTURE LAND USE MAP

conducted by Archaeological Consultants, Incorporated (ACI) on behalf of the FDOT Office of Environmental Management. The bridge was determined National Register–eligible under Criterion C for its Engineering. The bridge is an early example of the use of prestressed concrete in Florida. An updated FMSF form was not completed for the bridge as its eligibility has not changed and it has not been altered since its most recent recordation.

The current study finds that the bridge remains eligible for the National Register. The previously identified SR A1A historic roadway (8IR1500) in Indian River County was determined ineligible by the SHPO in 2010 (ACI 2010b). A portion of the Brevard County section of SR A1A (8BR2544) in Brevard County was determined ineligible by the SHPO in October 2020. Two newly identified historic landscapes (Sebastian Inlet State Park, 8BR4206/8IR1877; and Swimming Lagoon, 8BR4433) were determined ineligible for the National Register, both individually and as contributing resources, to a historic district based on the lack of historical associations.

The FDOT submitted the CRAS report along with the District's determination that the proposed project will have an adverse effect on the NRHP-eligible historic bridge to the State Historic Preservation Office (SHPO). Since the Preferred Alternative evaluated will require the demolition of the National Register bridge (8BR3148/8IR1493) it was determined that the proposed project will have an adverse effect to historic properties. The remaining resources are ineligible for the National Register. Since the bridge is NRHP-eligible, it has also been evaluated as a Section 4(f) resource and is discussed in the Section 4(f) section below

6.2.3 SECTION 4(F)

In compliance with the Department of Transportation Act of 1966 and in accordance with the FDOT PD&E Manual, Part 2, Chapter 7, *Section 4(f) Resources*, the project was evaluated for potential Section 4(f) impacts. A Programmatic Section 4(f) evaluation which identifies and describes existing Section 4(f) resources within and adjacent to the project limits, assesses potential impacts and evaluates avoidance, minimization, and potential mitigation options is in the Project File. It is also found on SWEPT.

6.2.3.1 Recreational Resources

One publicly owned park/recreational resource, the Sebastian Inlet State Park, is adjacent to the project study area and was identified for potential Section 4(f) involvement (**Table 6-8**). Highlights of the Section 4(f) and Section 106 resources are shown in **Figures 6-6** and **6-7**.

TABLE 6-8: LIST OF SECTION 4(F) RESOURCES - RECREATIONAL		
Parcel Number	30392000000003000000.0	30-39-20-00-1
County	Indian River	Brevard
Resource Name	Sebastian inlet State Park	Sebastian inlet State Park
Facility Type	State Park	State Park
Location	9700 South A1A Melbourne Beach FL, 32951	9700 South A1A Melbourne Beach, FL 32951
Owner/Official with Jurisdiction	Florida Department of Environmental Protection	Florida Department of Environmental Protection

TABLE 6-8: LIST OF SECTION 4(F) RESOURCES - RECREATIONAL		
Distance to Project Area	Adjacent	Adjacent
Size (Acres)	971	971
Access Change	No	No
Approval Option	To Be Determined	To Be Determined

An approximate total of 3.46 acres (0.38%) of park property is required by FDOT for necessary ROW to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, park entrances, shared use path improvements and stormwater management (one pond site is required for the south basin and one for the north basin).

A final *de minimis* request for concurrence for the Sebastian Inlet State Park was submitted to the Official with Jurisdiction (OWJ), FDEP, on January 17, 2023. The request for concurrence includes several recreational mitigation measures that have been incorporated into the project commitments, including:

- Replacement of the existing perimeter fence around the bridge on the north side of the Park
- Repaving of both the south and north parking lots within the FDOT ROW under the bridge
- Providing funding through a Joint Participation Agreement (JPA) for installation of electronic gates at both the south and north Park entrances

On May 9, 2023, the OWJ concurred with the FDOT's *de minimis* finding that the permanent impacts to the Park, including all measures to mitigate and minimize harm, will not adversely affect the activities, features, or attributes of the Park.

6.2.3.2 Recreational Areas and Protected Lands

Because the Park is a state-owned conservation land, all unavoidable impacts to these lands are subject to approval by the ARC. FDOT coordination with the OWJ and the FDEP Division of State Lands is ongoing for mitigating all unavoidable impacts to state-owned conservation land subject to ARC approval and will be finalized during the Design Phase.

FDOT will evaluate the parking lot layouts under the bridge (south and north of the Inlet) to determine if the number of available parking spaces can be increased.

6.2.3.3 Cultural Resources

One Section 4(f) historic resource, the bridge, is identified for potential Section 4(f) and Section 106 involvement for effects to historic resources (**Table 6-0**). Highlights of the Section 4(f) and Section 106 resources are shown in **Figures 6-6** and **6-7**.

TABLE 6-9: LIST OF SECTION 4(F) RESOURCES - HISTORIC	
County	Indian River
Resource Name	Sebastian Inlet Bridge – Bridge #880005
Facility Type	Bridge
Location	SR A1A over the Sebastian Inlet
Owner	Florida Department of Transportation
Distance to Project Area	Within
Length	1,548-feet
Eligibility	National Register of Historic Places eligible resource – Criterion C Engineering
Effect	Adverse Effect

The State Historic Preservation Officer (SHPO) concurred with the adverse effect to the historic bridge on March 30, 2022. Through a Cultural Resource Committee (CRC) FDOT consulted with multiple local, state, and federal agencies as well as local and state governments and organizations regarding the effects of the project on the historic bridge. The CRC assisted with developing ideas on how to address potential impacts to the historic aspect resulting from the future bridge construction. An Advisory Council on Historic Preservation (ACHP) e106 submission was made notifying the ACHP of adverse effect to the historic bridge inviting them to participate in Section 106 Consultation. Based on e106, the ACHP did not participate in consultation.

Through a Memorandum of Agreement (MOA) executed between the FDOT and the SHPO on April 21, 2023, measures have been identified to document the historic resource, and educate the public through historic markers or educational resources, and archaeological monitoring. A Programmatic Section 4(f) Evaluation form was submitted to OEM for the replacement of the historic bridge May 2023.

FIGURE 6-6: SECTION 4(F) AND SECTION 106 IMPACTS - SOUTH

FIGURE 6-7: SECTION 4(F) AND SECTION 106 IMPACTS - NORTH

6.2.4 WETLANDS

The wetland evaluation, included in the *Natural Resources Evaluation* (NRE, August 2022), was completed in accordance with FDOT's PD&E Manual, Part 2, Chapter 9, Wetlands and Other Surface Waters (June 2020) and conducted pursuant to the Presidential Executive Order (EO) 11990 of 1997 as amended. The evaluation identifies and describes existing wetlands and surface waters within and adjacent to the project limits, assesses potential impacts and evaluates avoidance, minimization, and potential mitigation options. The NRE is in the Project File. It is also found on SWEPT.

A wetland field review of the project study area was completed in September 2021 by biologists familiar with south Florida animals and plants and all documented wetland boundaries were delineated in accordance with the *U.S. Army Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1), Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region (ERDC/ED TR-10-20)* and *Chapter 62-340 of the Florida Administrative Code, Delineation of the Landward Extent of Wetlands and Surface Waters*. Two wetland types were identified within the project study area: Bays and Estuaries and Mangrove Swamp.

Development of the Preferred Alternative implemented measures to avoid and/or minimize impacts to wetlands and surface waters. Wetland impacts from the Preferred Alternative result in approximately 0.11 acres of impacts to mangrove areas. Wetland mitigation for unavoidable impacts will be provided to satisfy the state and federal regulatory program guidelines.

Impacts to the Inlet are also anticipated although they are generally minor and not subject to mitigation since the bridge is elevated well above the water level and the pilings and fender system have a very small footprint. Approximately 0.81 acres of impacts result from the footprint of the bridge deck.

The UMAM was developed to establish a consistent assessment method to determine the amount of mitigation needed to offset adverse impacts to wetlands. It is designed to assess the functions provided by wetlands, the amount that those functions are reduced by a proposed impact, and the amount of mitigation necessary to offset these functional losses. This method is also used to determine the degree of improvement in ecological value created by mitigation activities.

The UMAM assessment includes a Qualitative Characterization (Part 1) as well as a Quantitative Assessment and Scoring (Part 2). An overall assessment of the wetlands that occur within the project study area was undertaken to provide an estimate of quality as well as mitigation needs. A UMAM assessment of the surface water impacts was not undertaken as impacts to these systems do not typically require mitigation.

The mangroves are of high quality and perform an important functional role for the ecosystem. The UMAM score reflects this high quality, and the 0.11 acres results in a functional loss of 0.096 UMAM units. Appropriate mitigation to offset these impacts will be provided via credits from an approved mitigation bank serving Basin 22 such as CGW or Basin 22 MB which both currently have credits, or via projects providing restoration at the Indian River Lagoon Preserve State Park which the Department has participated in the past to offset impacts.

The Preferred Alternative meets the purpose and need of the project while minimizing environmental impacts. Additional measures including staging restrictions, proper erosion control measures and Best Management Practices (BMPs) will be evaluated during the design phase and implemented during construction to further minimize wetland impacts.

6.2.5 PROTECTED SPECIES AND HABITAT

6.2.5.1 Agency Coordination

An ETDM screening was conducted, as a part of the FDOT PD&E Study for this project which produced feedback from regulatory and service agencies identifying and documenting the potential impacts to features/resources under each agencies' purview. Comments were received from representatives of the National Marine Fisheries Service (NMFS), USFWS, SJRWMD, FDEP, USACE, and the Florida Fish and Wildlife Conservation Commission (FWC). No response has been received from FWC. Additional coordination also included the FDEP, who is responsible for the day-to-day operations of Park.

Coordination with the USFWS and FWC also was conducted in relation to the bird diverters that are currently on the bridge structure. Based upon this coordination, new bird diverters will be incorporated into the replacement bridge.

The NRE was transmitted to USFWS and NMFS on August 11, 2022 with a request to initiate informal Section 7 consultation under the Endangered Species Act (ESA). The NRE was

transmitted to FWC on August 18, 2022. USFWS concurred with FDOT's effect determinations on August 12, 2022. The USFWS concurrence letter is in the Project File. It is also found on SWEPT. The NMFS responded on September 19, 2022 requesting additional information to complete informal Section 7 consultation. FDOT correspondence dated February 7, 2023 provided the requested information to NMFS.

The NMFS followed with a request to include the North Atlantic right whale to the ESA Section 7 analysis for the project. On February 8, 2023, FDOT provided NMFS with an analysis of potential project impacts to the North Atlantic right whale, along with an associated effect determination of "May Affect not Likely to Adversely Affect" based upon the proposed work, the conditions within the Sebastian Inlet, the potential for vessel strikes or entanglements, and the likelihood of encountering the whale. On February 23, 2023, FDOT submitted a request for reasonable assurance to the NMFS, since pertinent design details are not yet available. NMFS agreed in a Reasonable Assurance letter dated February 24, 2023, that consultation for the project will be completed prior to construction. NMFS requested that FDOT commit to performing in-water pile driving activities during daylight hours only. FDOT will evaluate the feasibility of this request during the design phase and coordinate the pile driving approach with NMFS prior to construction.

All agency correspondence is in the Project File. It is also found on SWEPT.

6.2.5.2 Federal and State Listed Species

The NRE report, completed as part of this PD&E Study, focused on the subset of federal listed species where suitable habitat is present within the project study area. The following subset of species falls under the jurisdiction of the NMFS or USFWS. Any involvement with these species or designated critical habitat would require consultation under Section 7 of the Endangered Species Act. A “May Affect, but not Likely to Adversely Affect” determination was made for the following:

- wood stork
- Kemp's ridley sea turtle
- green sea turtle
- loggerhead sea turtle
- Atlantic salt marsh snake
- West Indian manatee
- Southeastern beach mouse
- smalltooth sawfish
- giant manta ray

Johnson’s seagrass, previously listed as Federally Threatened, has just been removed from the Endangered Species Act effective May 16, 2022. No Johnson’s seagrass was observed during the benthic survey.

The subset of state listed species where suitable habitat is present within the project study area. The following subset of state-listed plant and animal species have the potential to occur within Indian River and Brevard Counties. A "No Adverse Effect Anticipated" determination was made for the following:

- black skimmer
- little blue heron
- reddish egret
- roseate spoonbill
- tricolor heron
- gopher tortoise
- West Coast prickly apple
- red stopper
- beach star
- inkberry
- Curtiss' hoary pea
- sea lavender
- coastal vervain

The project is within the USFWS's designated critical habitat for the West Indian Manatee, and adjacent to an area of critical habitat for the loggerhead sea turtle. The project does not extend into the areas designated as critical habitat for the loggerhead sea turtle and no impacts are anticipated. The bridge is located within the designated manatee critical habitat though the only impacts will likely come from the substructure and fender system. Construction techniques will be required to follow standard in-water work practices and any Special Provisions for manatees, sea turtles, and smalltooth sawfish will be followed for pile driving and the use of construction barges should these be required when the construction techniques have been established and will not result in any significant impacts to the critical habitat.

6.2.5.3 Additional Species Note

The bridge currently has bird flight diverters installed to deter birds in flight from vehicles traveling over the bridge. After coordination with resource agencies, the bridge replacement project is proposing the inclusion of flight diverters on the new bridge to provide the same service. Agency correspondence regarding the diverter pole specifications is included in the Project File. It is also found on SWEPT.

6.2.5.4 Essential Fish Habitat

Within the project study area, the Inlet has the potential to support protected marine resources, such as seagrasses and corals, provide habitat for threatened and/or endangered species, and contain Essential Fish Habitat (EFH) for species within federally managed fisheries.

The NMFS EFH mapper tool did not identify any distinct EFH within the Inlet. However, based on the results of the benthic survey, EFH is present in the project study area for species within the following fisheries which are federally managed by the South Atlantic Fisheries Management Council (SAFMC) including:

- Snapper-Grouper Complex
- Penaeid Shrimp
- Spiny Lobster
- Coastal Migratory Pelagics
- Red Drum
- North Atlantic right whale
- Coral, Coral Reefs and Live/Hardbottom

As the project has the potential to impact protected marine resources and EFH, a benthic resource survey was conducted to determine the presence/absence, along with the general limits of any natural resources, and identify existing EFH located within the project study area.

The benthic survey was completed within the scientific seagrass survey window on June 4, 2021, during incoming and outgoing tidal cycles. The benthic substrate within the survey area is primarily rocky hard bottom with scattered patches of sand with shell fragments.

Minor impacts/disturbance to EFH resources from the Preferred Alternative are anticipated within open water of the inlet, which would be expected to naturally recover post construction.

6.2.6 HIGHWAY TRAFFIC NOISE

A highway traffic noise study was completed in accordance with FDOT's PD&E Manual, Part 2, Chapter 18, *Highway Traffic Noise* (July 2020) and Title 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010). A *Noise Study Report* (NSR, June 2022) was prepared for the project and is in the Project File. It is also found on SWEPT.

FHWA has established Noise Abatement Criteria (NAC) for seven land use activity categories (**Table 6-10**). These criteria determine when an impact occurs and when consideration of noise abatement is required. Maximum noise level thresholds have been established for five of these activity categories. These maximum thresholds, or criteria levels, represent acceptable traffic noise level conditions. Noise abatement measures must be considered when predicted noise levels approach or exceed the NAC levels or when a substantial noise increase occurs. FDOT defines "approach" as within one dB(A) of the FHWA criteria. A substantial noise increase is

defined as when the existing noise level is predicted to be exceeded by 15 dB(A) or more as a result of the transportation improvement project.

TABLE 6-10: NOISE ABATEMENT CRITERIA

Activity Category	Activity Leq(H)[1]		Evaluation Location	Description of Activity Category
	FHWA	FDOT		
A	57	56	Exterior	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B[2]	67	66	Exterior	Residential
C[2]	67	66	Exterior	Active sports areas, amphitheaters, auditoriums, campgrounds, cemeteries, day care centers, hospitals, libraries, medical facilities, parks, picnic areas, places of worship, playgrounds, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, recreational areas, Section 4(f) sites, schools, television studios, trails, and trail crossings.
D	52	51	Interior	Auditoriums, day care centers, hospitals, libraries, medical facilities, places of worship, public meeting rooms, public or nonprofit institutional structures, radio studios, recording studios, schools, and television studios.
E2	72	71	Exterior	Hotels, motels, offices, restaurants/bars, and other developed lands, properties or activities not included in A-D or F.
F	–	–	–	Agriculture, airports, bus yards, emergency services, industrial, logging, maintenance facilities, manufacturing, mining, rail yards, retail facilities, shipyards, utilities (water resources, water treatment, electrical), and warehousing.
G	–	–	–	Undeveloped lands that are not permitted.

(Based on Table 1 of 23 CFR Part 772)

[1] The Leq(h) Activity Criteria values are for impact determination only and are not a design standard for noise abatement measures.

[2] Includes undeveloped lands permitted for this activity category.

Note: FDOT defines that a substantial noise increase occurs when the existing noise level is predicted to be exceeded by 15 decibels or more as a result of the transportation improvement project. When this occurs, the requirement for abatement consideration will be followed.

Project study area land uses fall under FHWA NAC land use activity categories residential units (Category B), other noise sensitive areas including parks, picnic areas, recreational areas, Section 4(f) sites (Category C) and certain commercial properties (Category E). Noise sensitive sites within the project study area are all associated with the Park. These include outdoor park areas such as beaches, picnic tables, benches, and fishing areas. Other areas include interior areas of the Sebastian Fishing Museum (fishing museum), and outdoor eating areas at the Inlet Grill restaurant. Vacant, undeveloped lands (Activity Category G) that do not have any specific outdoor uses make up the remainder of the project study area.

Sixteen (16) areas within the Park that have the highest potential to be impacted by the proposed improvements were identified along SR A1A within the project study area. These include beaches, picnic tables, benches and fishing areas, inside the fishing museum and an outdoor patio at the Inlet Grill restaurant. Under the existing conditions, the primary source of noise at the nearby noise sensitive sites is traffic on SR A1A.

Existing noise levels were measured at three sites along the project corridor during nine, 10-minute-long sampling periods. Traffic noise levels were found to range from 53.7 to 65.2 dB(A) at the near meter locations and 49.6 to 61.1 dB(A) at the far meter locations. In all cases, traffic noise from SR A1A was the predominant source of noise at the monitoring sites.

Site conditions and traffic data gathered during the field measurements were used to develop inputs to the FHWA's TNM 2.5 for computer models representative of the existing conditions. Models were then developed for the existing year (2019) conditions, and the design year (2045) No Build Alternative and Preferred Build Alternative. The weekend peak-hour traffic volumes were predicted to be the overall worst-case condition and the roadway was expected to operate at well below its LOS C capacity.

Representative receptor sites were used in the TNM model inputs to estimate noise levels associated with existing and future conditions within the project study area. Existing worst-case traffic noise levels along this segment of SR A1A are predicted by TNM to range from 35.7 dB(A) inside the fishing museum to 55.8 dB(A) at the beach along the south side of the inlet west of SR A1A. Design year worst-case traffic noise levels with the No Build Alternative are predicted to range from 35.2 dB(A) inside the fishing museum to the same beach. These levels are lower than existing levels due to slightly lower peak-hours traffic volumes. Design year worst-case traffic noise levels with the preferred Build Alternative are predicted to range from 26.3 dB(A) inside the fishing museum to 47.8 dB(A) at the patio at the Inlet Grill. These levels are also predicted to be lower than the existing worst-case noise levels.

The proposed improvements do not result in any substantial noise increases [i.e., greater than 15 dB(A) over existing levels] at any of the nearby sites and do not approach or exceed NAC criteria. Therefore, based on the FHWA and FDOT methodologies used to evaluate traffic noise levels for this study, proposed project improvements were determined to not generate noise impacts at any of the nearby noise sensitive sites within the project study area and consideration of noise abatement is not required.

6.2.7 AIR QUALITY

This project is not expected to create adverse impacts to air quality. The project is located in an area that is in attainment for all National Ambient Air Quality Standards (NAAQS). Proposed improvements will not change the LOS and no change or increase in delay or congestion is anticipated within the study area.

Construction activities may cause short-term air quality impacts in the form of dust from earthwork and unpaved roads. These impacts will be minimized by adherence to applicable state regulations and to applicable FDOT Standard Specifications for Road and Bridge Construction.

6.2.8 CONTAMINATION

A *Contamination Screening Evaluation Report* (CSER) was completed in accordance with FDOT PD&E Manual Part 2, Chapter 20, Contamination (July 2020). The contamination screening evaluation of SR A1A was conducted to identify and evaluate properties with known or potential contamination issues within or adjacent to the project area using a 500-foot buffer. The CSER is in the Project File. It is also found on SWEPT.

As part of the contamination screening evaluation to identify any potential contamination sources within or adjacent to the project area, the following activities were completed: review of regulatory files; review of historic and current aerial photography; and field survey.

Only one potential contamination site, a maintenance yard for the Park, was identified within the study area as a potential contamination concern (**Table 6-11**). An investigation of site history, which included a review of agency regulatory files, was performed for the identified site to determine its potential degree of risk for contamination involvement with the proposed project. Although the parcel boundary for this site encroaches into the project area, the area of concern is located approximately 650 feet west of the project area.

TABLE 6-11: POTENTIAL CONTAMINATION SITES

Site ID	Site name (Facility ID)	Address	Risk Type	Risk Rating	Soil/ Ground-water	Contamination Type	Distance from Improvements
1	Sebastian Inlet State Park (87434859)	9700 South A1A Melbourne Beach Florida 32951	Hazardous Waste and Petroleum Storage	Low	N/A	N/A	Park maintenance yard 650 feet west of south Park entrance

This contamination screening evaluation revealed zero (0) **No** risk sites, one (1) **Low** risk site, zero (0) **Medium** risk sites and zero (0) **High** risk sites. A Level II contamination assessment is not recommended for sites with a low risk rating.

Previous surveys for asbestos containing materials (ACM) were completed by FDOT in 2012 and 2014. None of the materials sampled were defined as ACM. An evaluation for Lead Based Paint (LBP) or Metal Based Coatings (MBC) will be completed during the project design phase.

APPENDIX A

Preferred Alternative Concept Plans

CONTRACT PLANS COMPONENTS

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

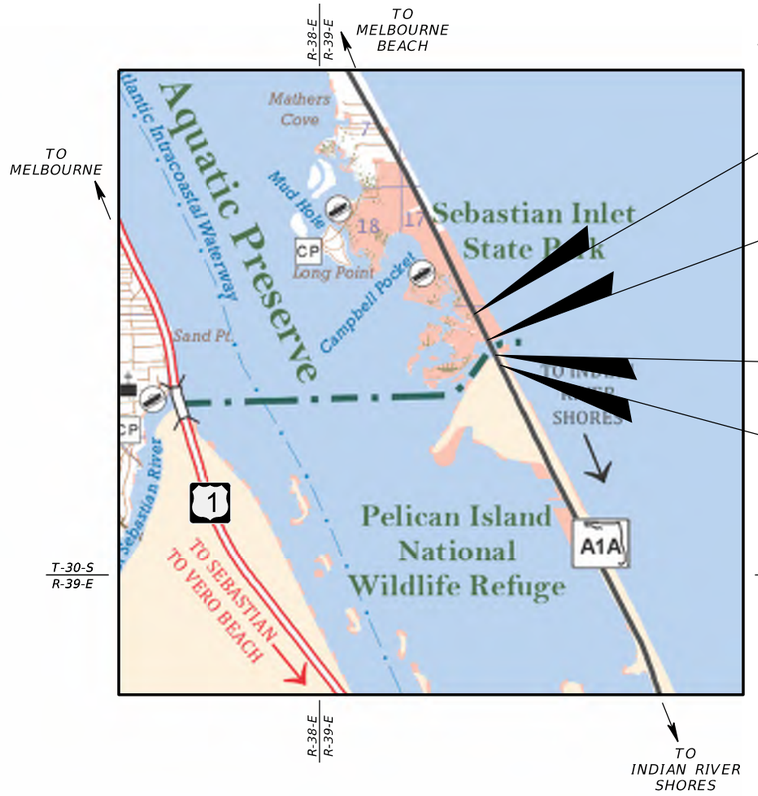
CONTRACT PLANS

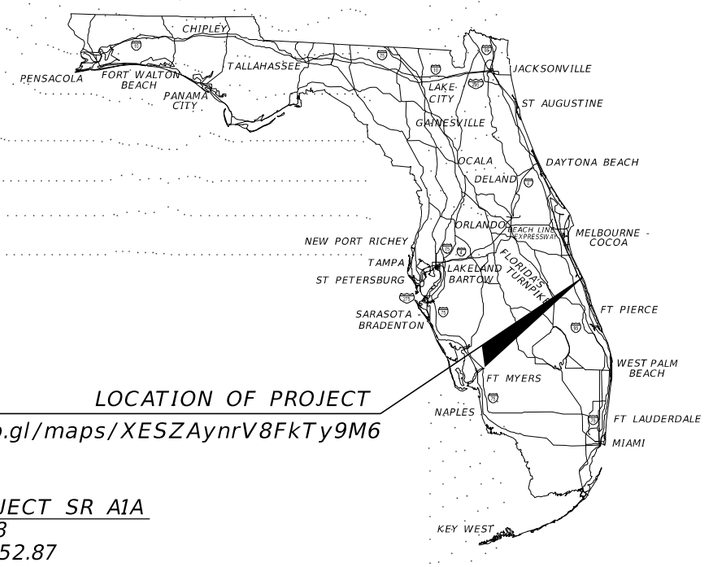
FINANCIAL PROJECT ID 445618-1-22-02

INDIAN RIVER COUNTY (88070) &
BREVARD COUNTY (88070)

STATE ROAD NO. A1A

INDEX OF ROADWAY PLANS





LOCATION OF PROJECT
https://goo.gl/maps/XESZAynrV8FkTy9M6

END PROJECT SR A1A
M.P. 0.338
STA 158+52.87

END BRIDGE #880005
M.P. 22.665
STA 141+20.27

BEGIN BRIDGE #880005
M.P. 22.364
STA 125+39.48

BEGIN PROJECT SR A1A
M.P. 21.945
STA 103+75.96

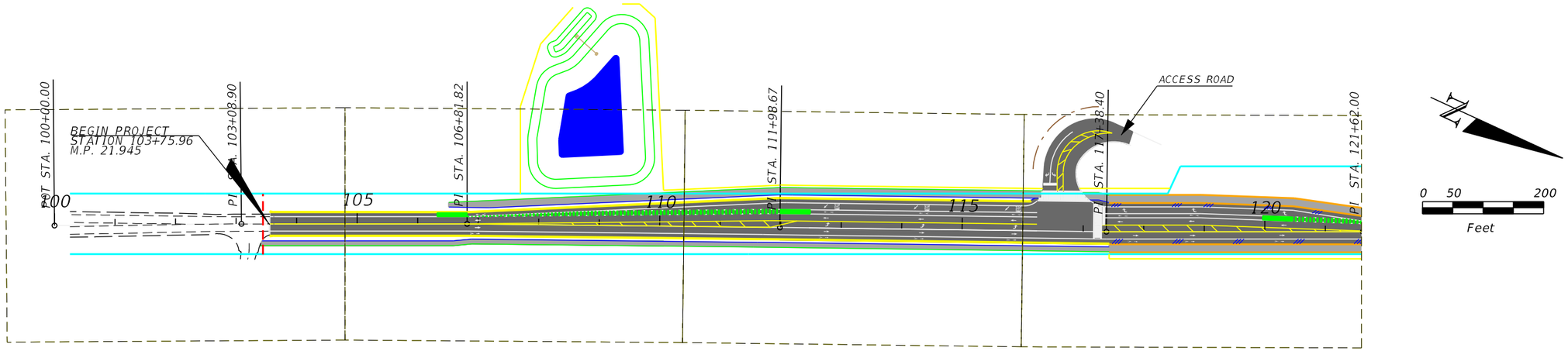
ROADWAY PLANS
ENGINEER OF RECORD:

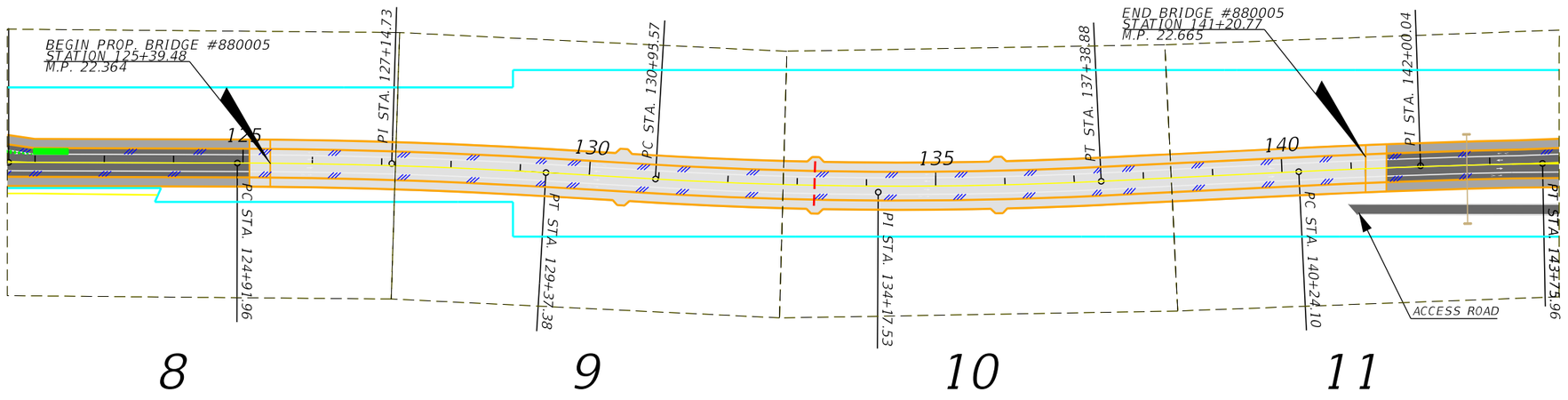
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134
VENDOR NO. 112-167-170

FDOT PROJECT MANAGER:

BINOD BASNET, P.E.

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
		1





REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

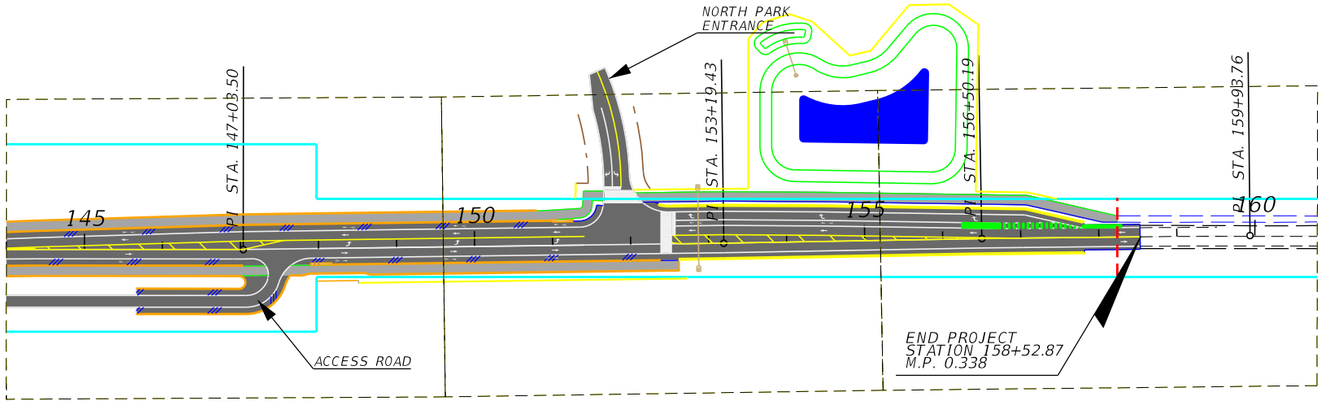
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

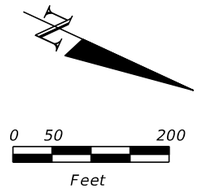
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PROJECT LAYOUT

SHEET NO. 2





12 13 14

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

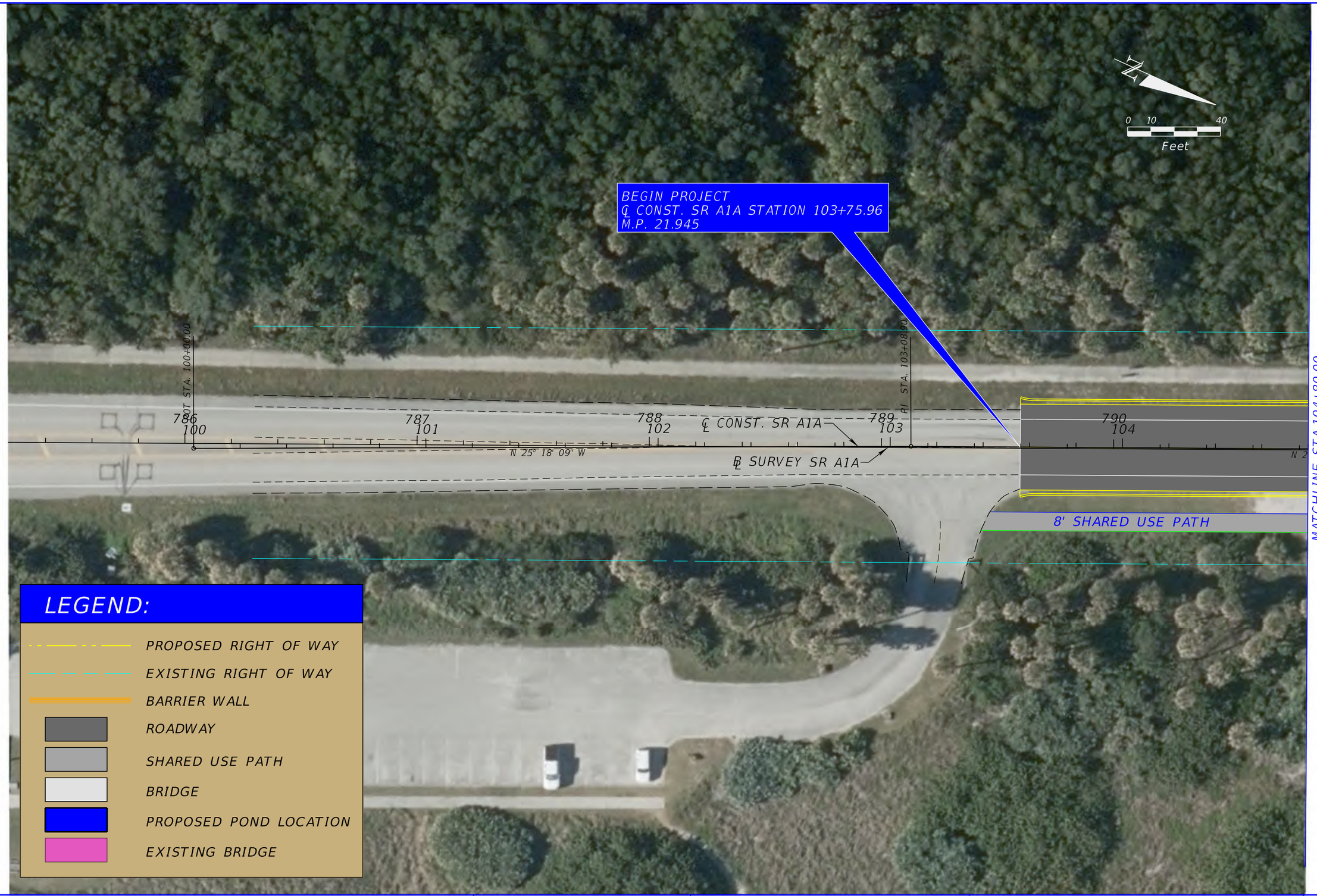
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PROJECT LAYOUT

SHEET NO. 3



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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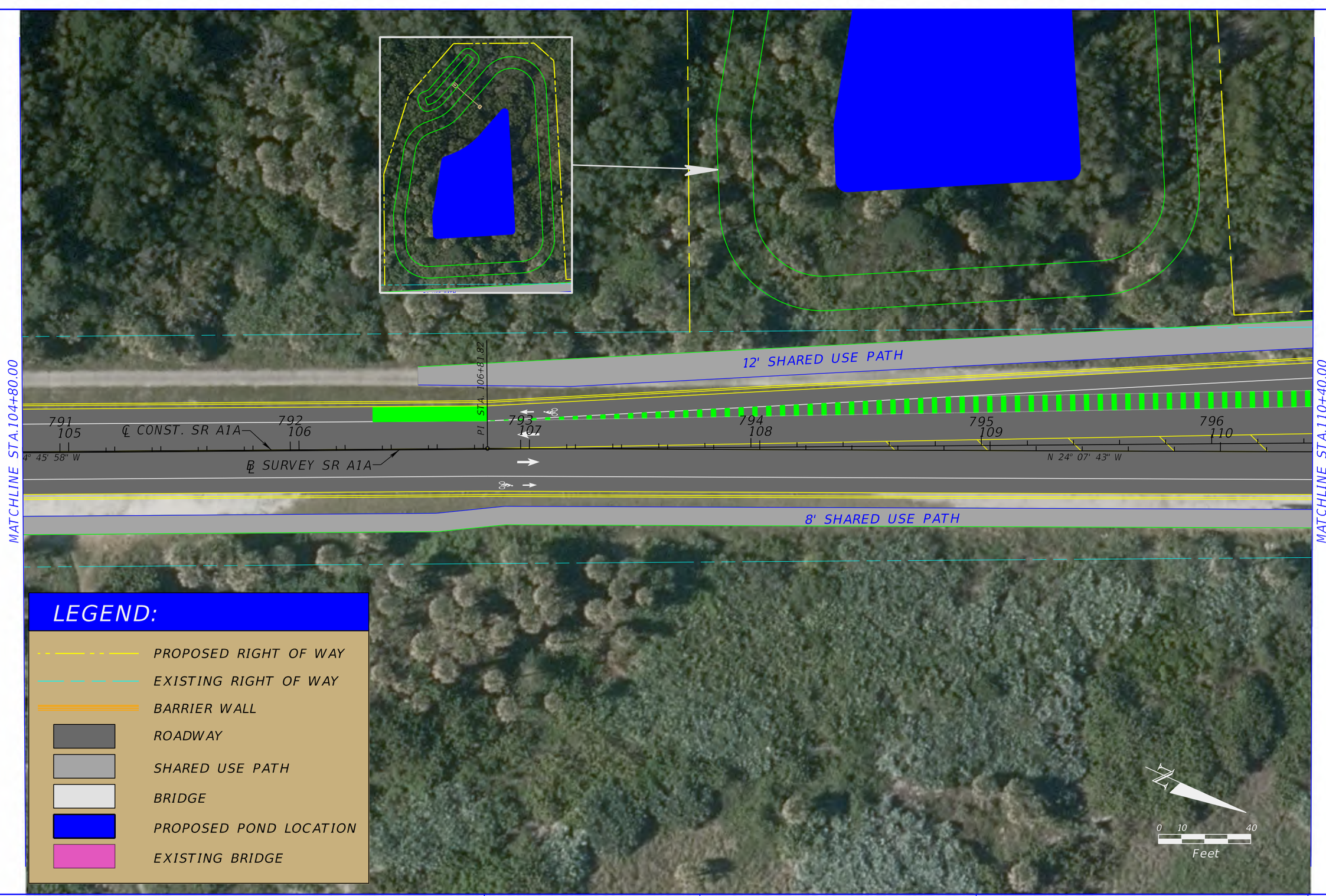
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 4



REVISIONS			
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ROBERTO C. GUTIERREZ, P.E.
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STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 5

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

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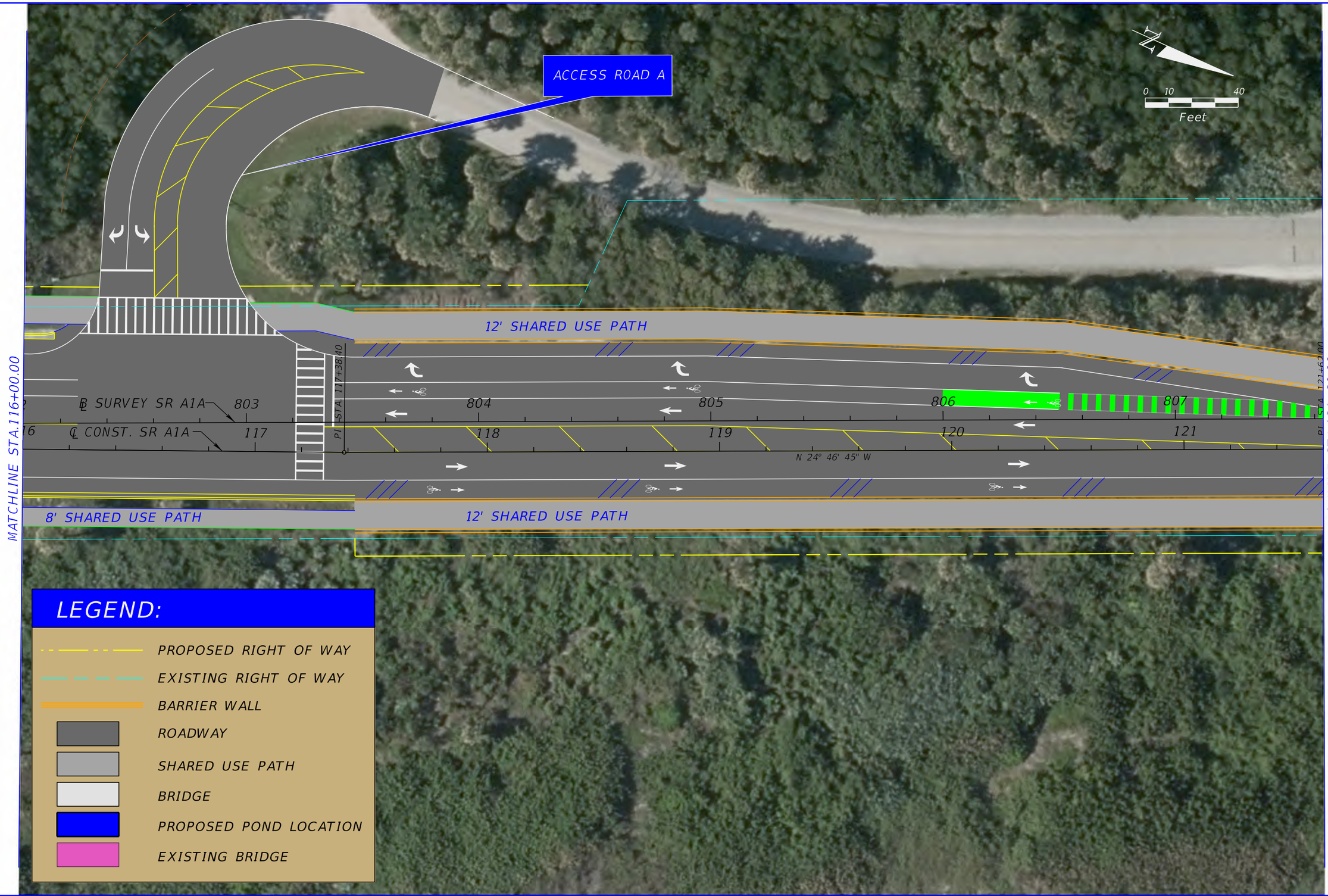


REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

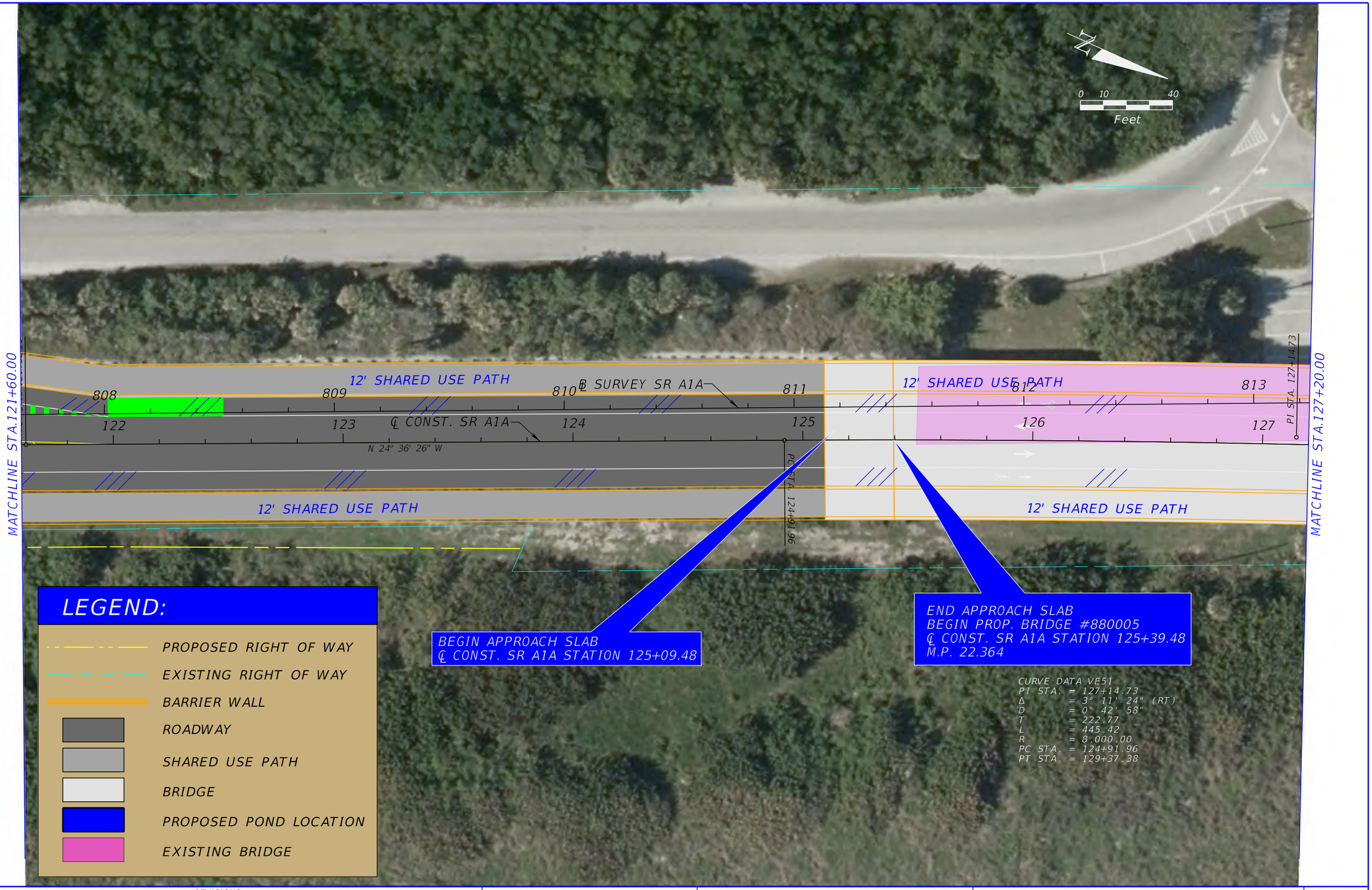
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 7



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

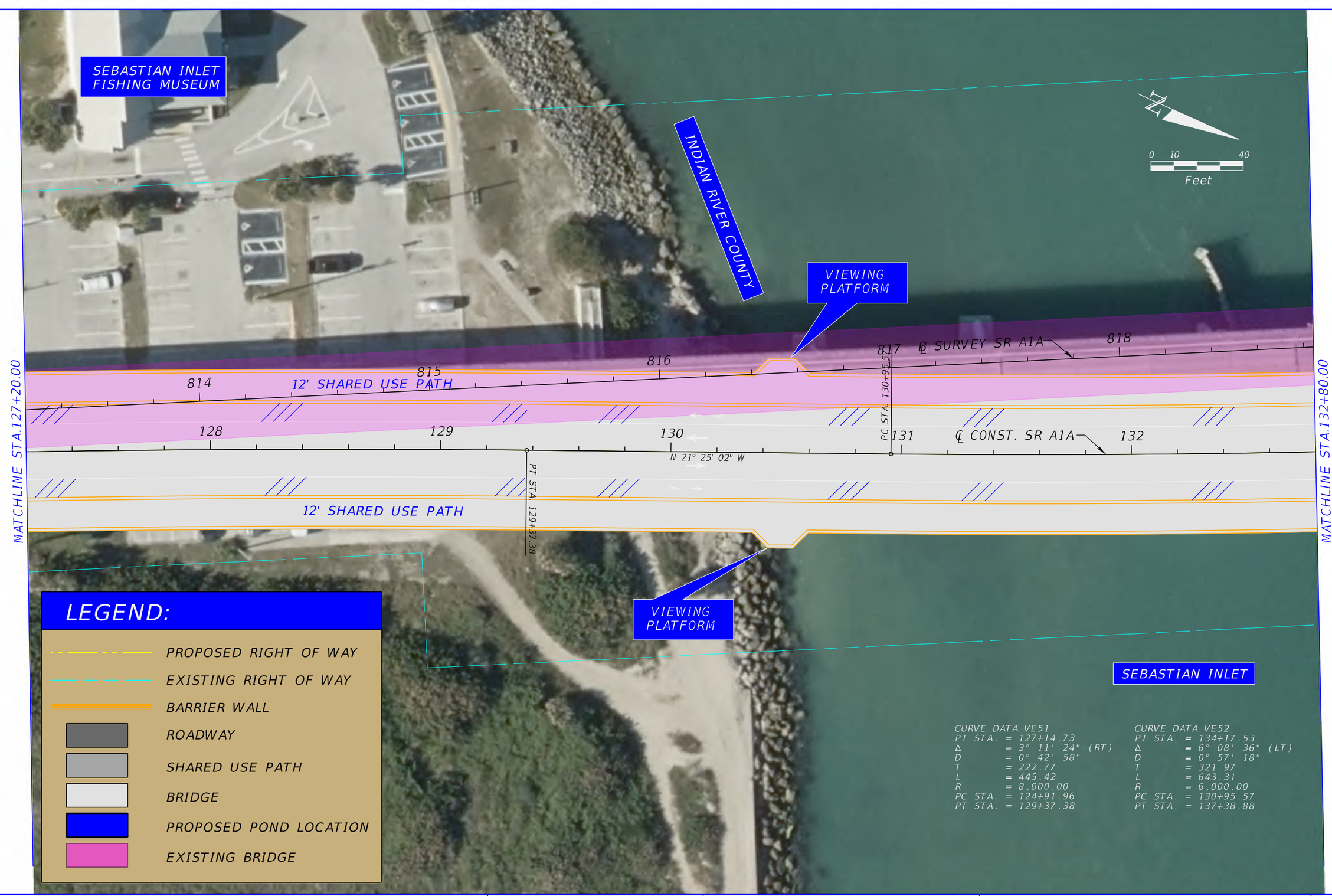
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 8



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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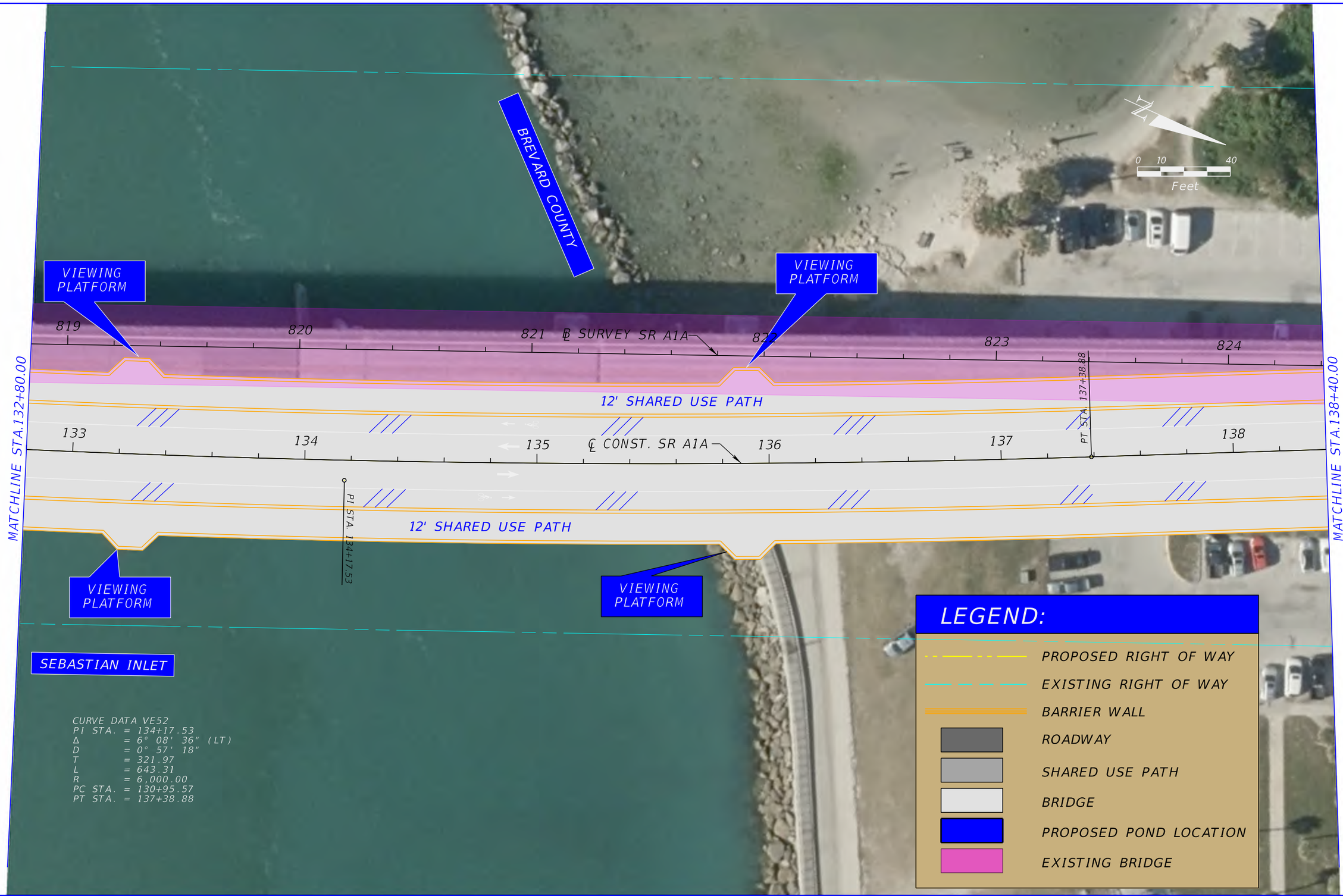
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 9



REVISIONS			
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P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 10

END PROP. BRIDGE #880005
BEGIN APPROACH SLAB
℄ CONST. SR A1A STATION 141+20.77
M.P. 22.665

END APPROACH SLAB
℄ CONST. SR A1A STATION 141+50.77

0 10 40
Feet

MATCHLINE STA.138+40.00

825 826 827 828 829 830

139 140 141 142 143 144

℄ CONST. SR A1A

℄ SURVEY SR A1A

PI STA. 142+00.04

N 27° 33' 37" W

PC STA. 140+24.10

PT STA. 143+75.96

12' SHARED USE PATH

12' SHARED USE PATH

12' SHARED USE PATH

12' SHARED USE PATH

MATCHLINE STA.144+00.00

ACCESS ROAD B

CURVE DATA VE53
PI STA. = 142+00.04
Δ = 1° 40' 48" (RT)
D = 0° 28' 39"
T = 175.95
L = 351.87
R = 12,000.00
PC STA. = 140+24.10
PT STA. = 143+75.96

LEGEND:

- PROPOSED RIGHT OF WAY
- EXISTING RIGHT OF WAY
- BARRIER WALL
- ROADWAY
- SHARED USE PATH
- BRIDGE
- PROPOSED POND LOCATION
- EXISTING BRIDGE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ROBERTO C. GUTIERREZ, P.E.
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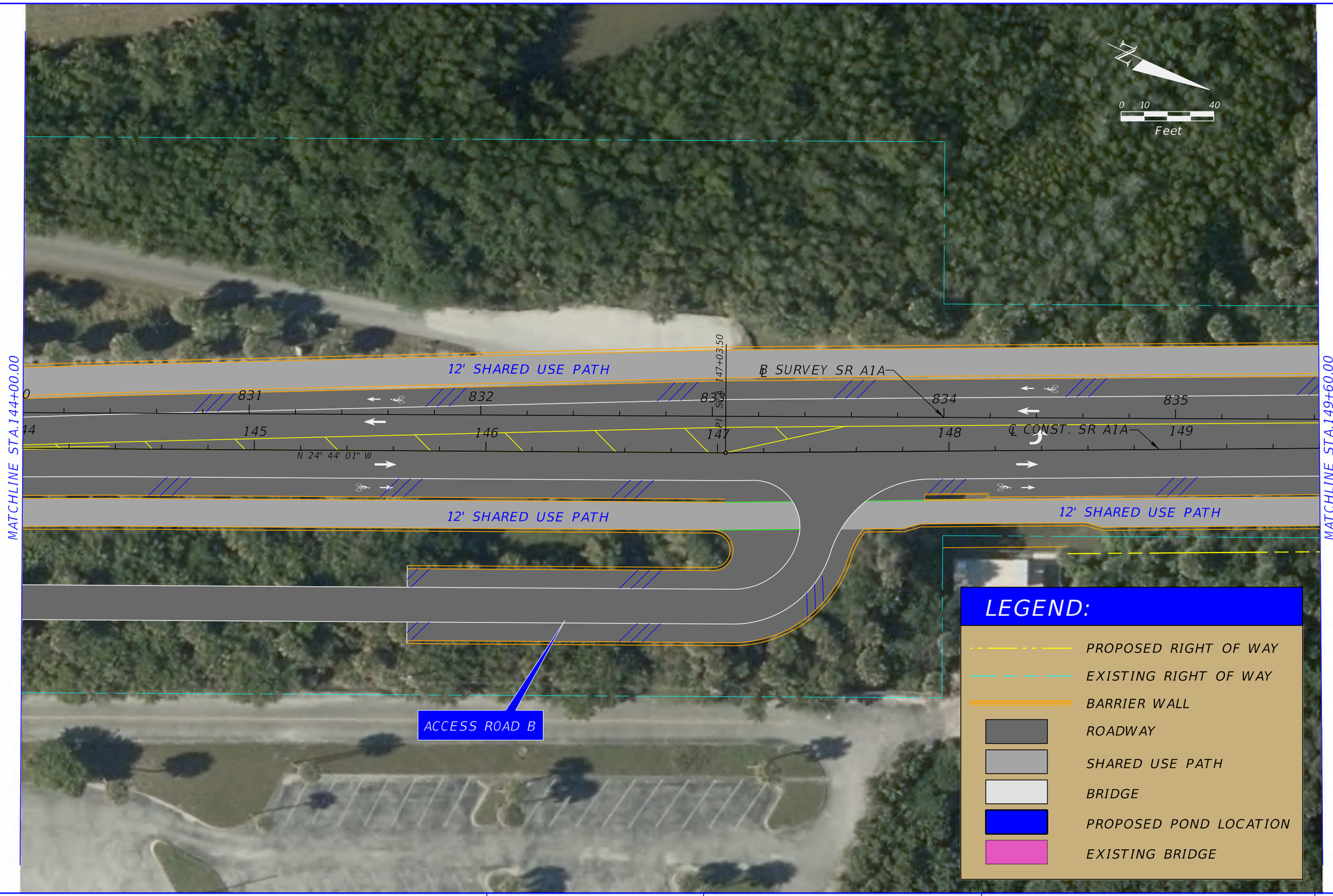
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 11



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

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SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

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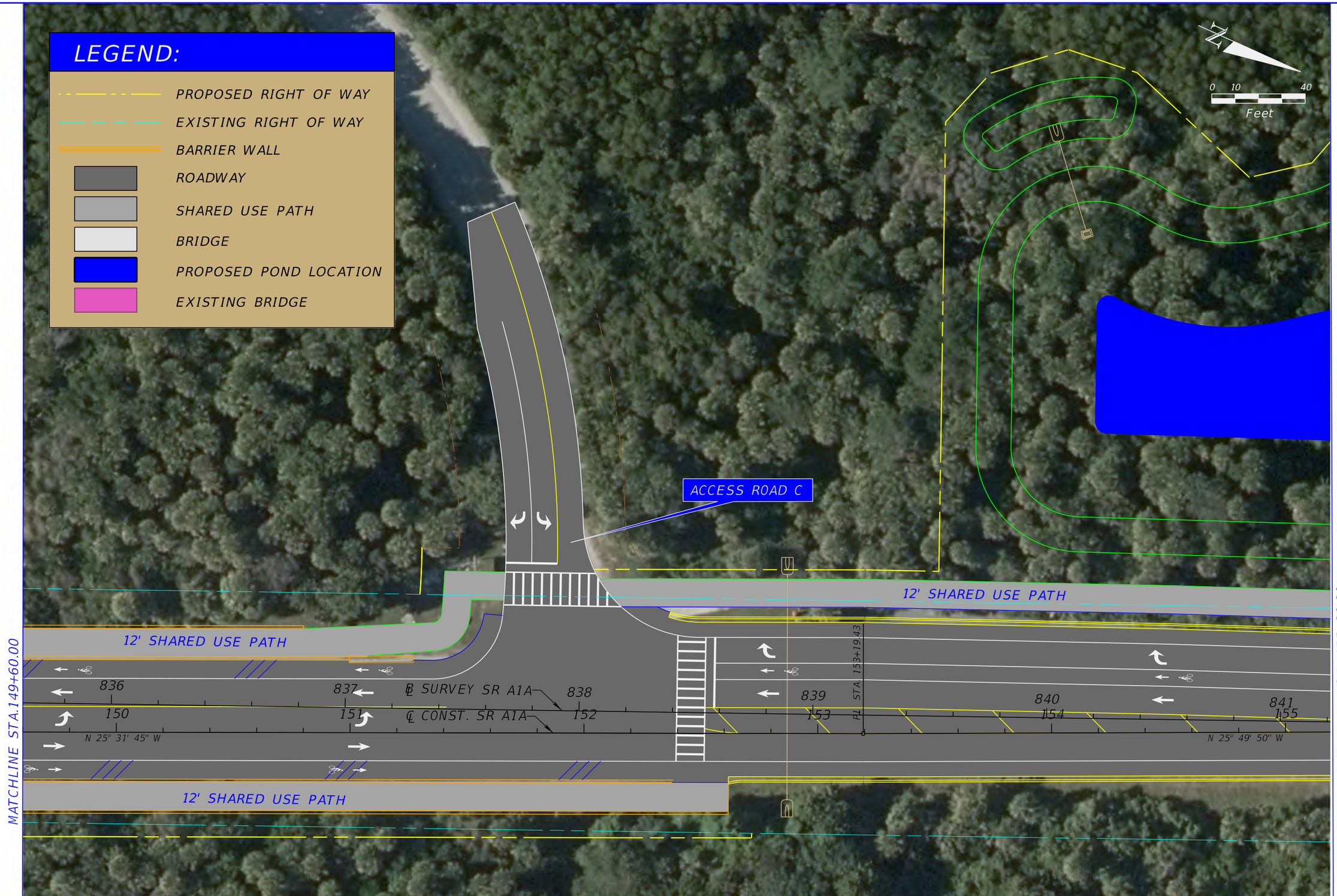

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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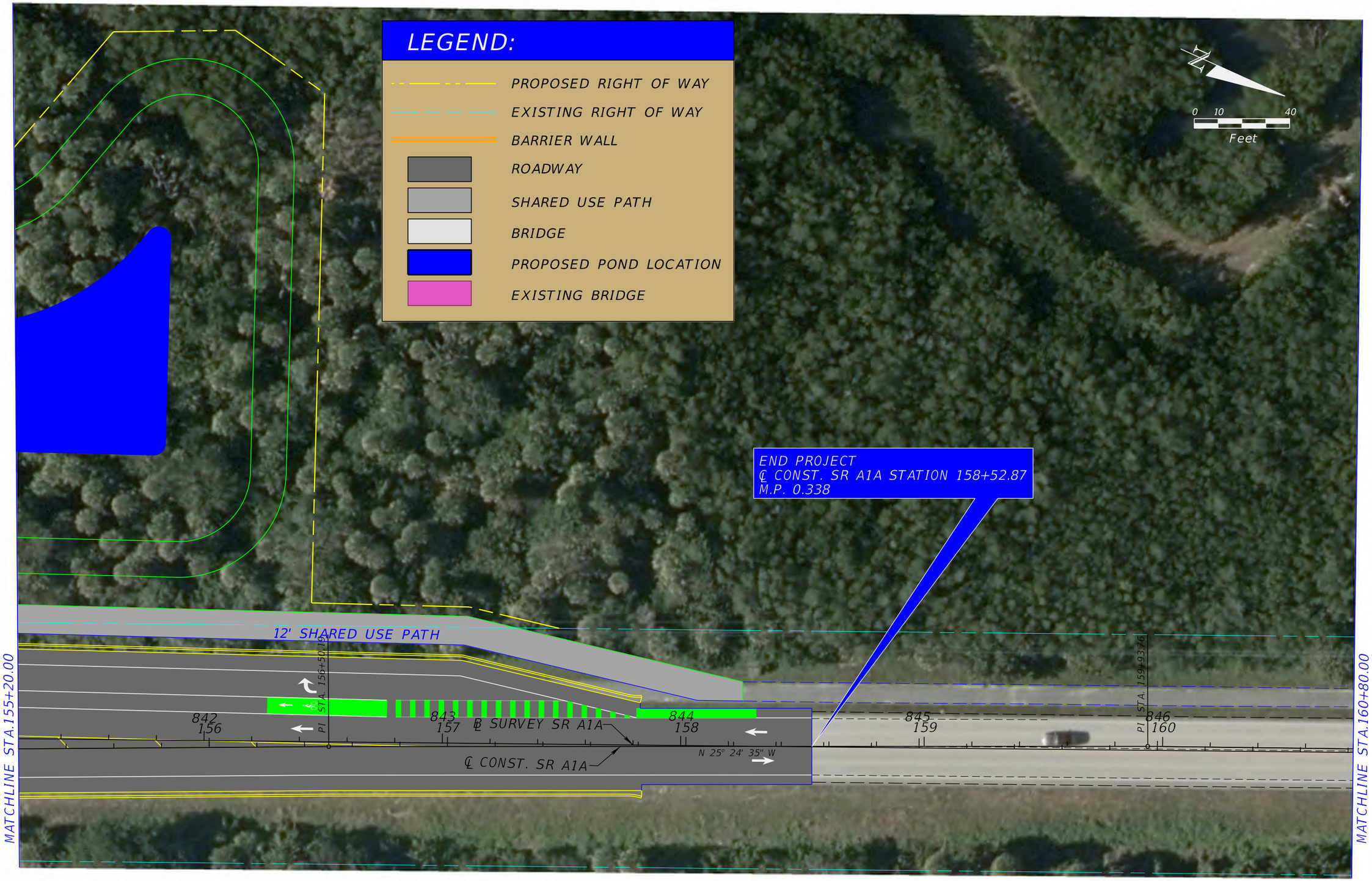
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 13



REVISIONS			
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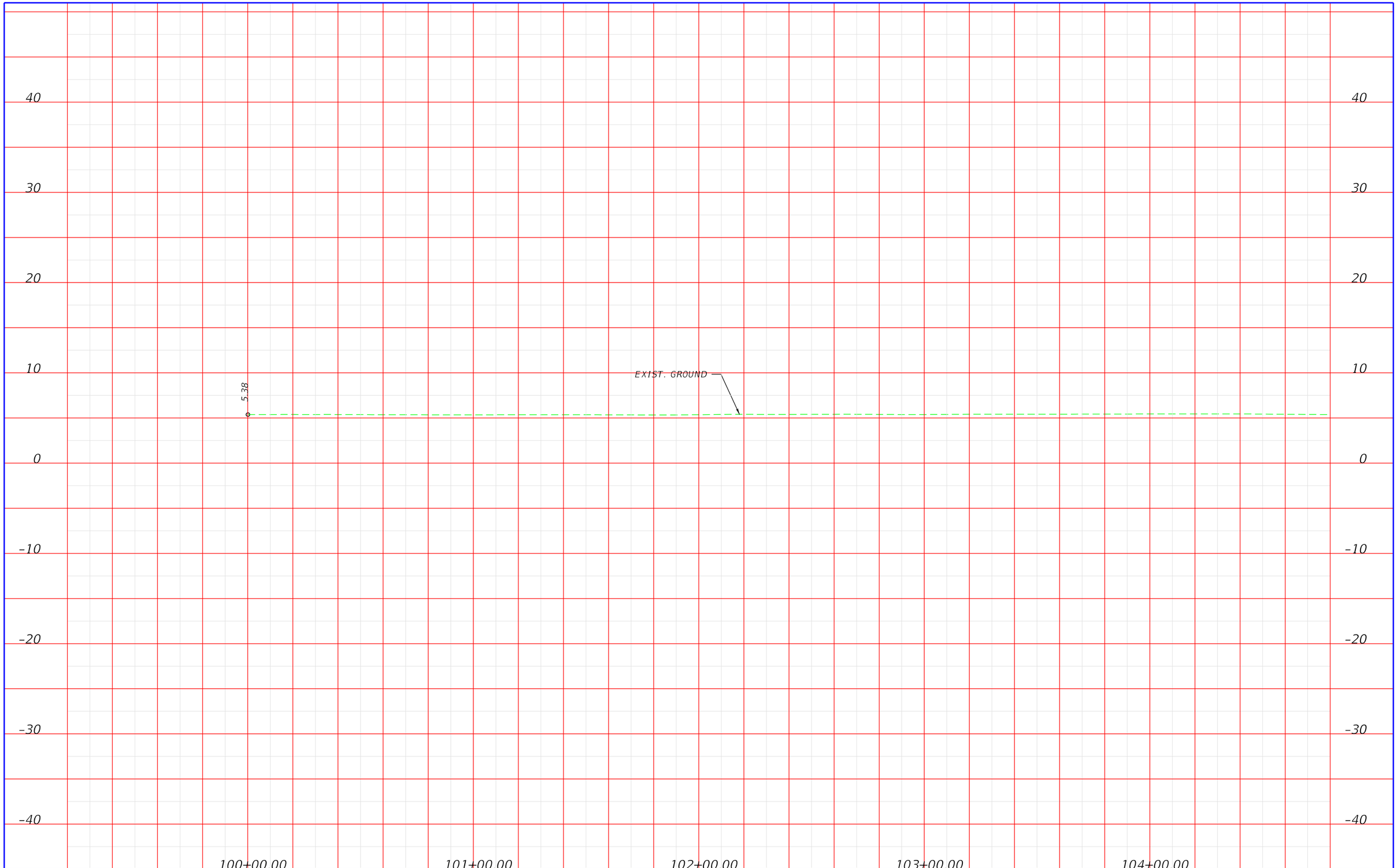
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

CONCEPT PLAN

SHEET NO. 14



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

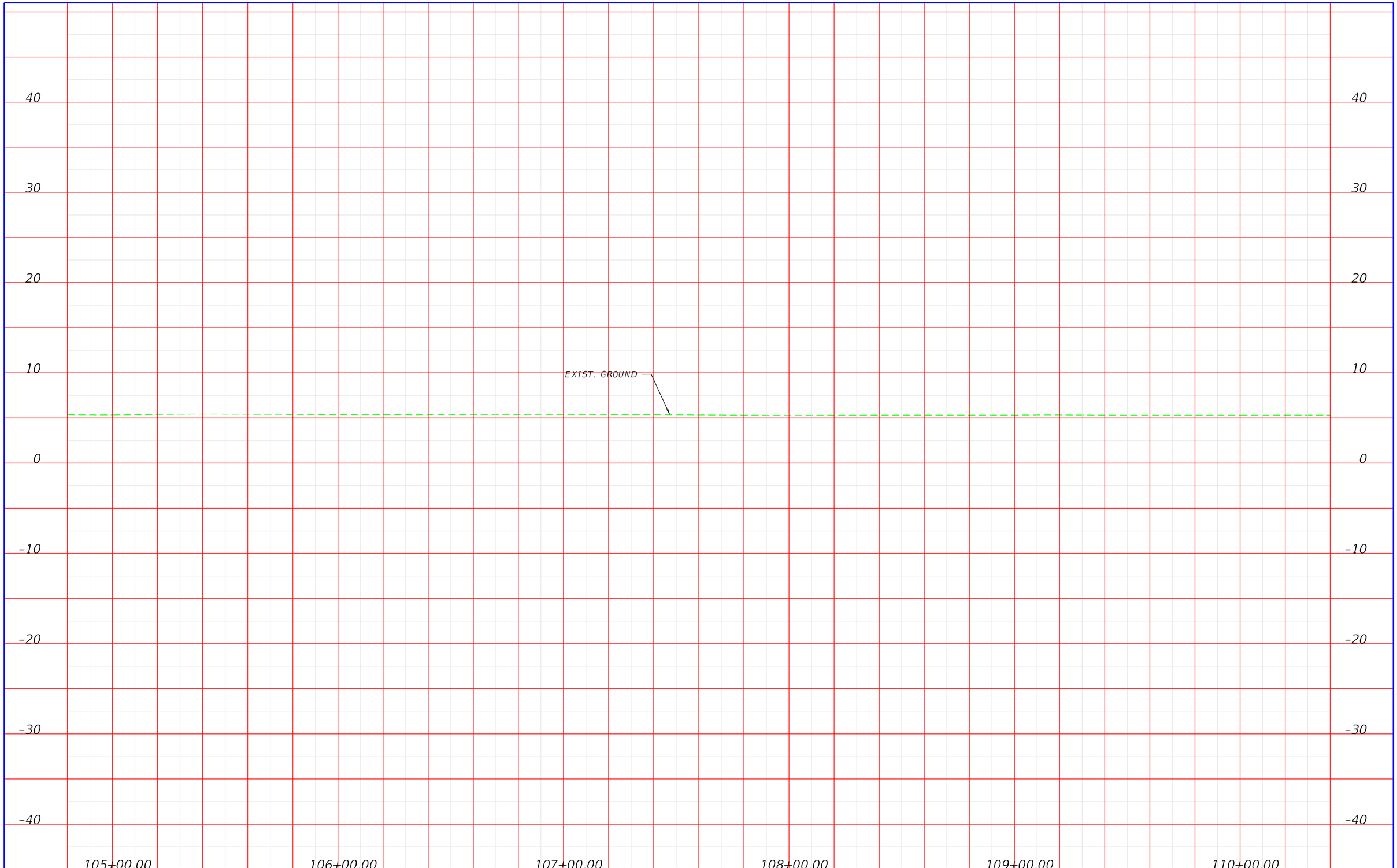
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 15



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 16

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

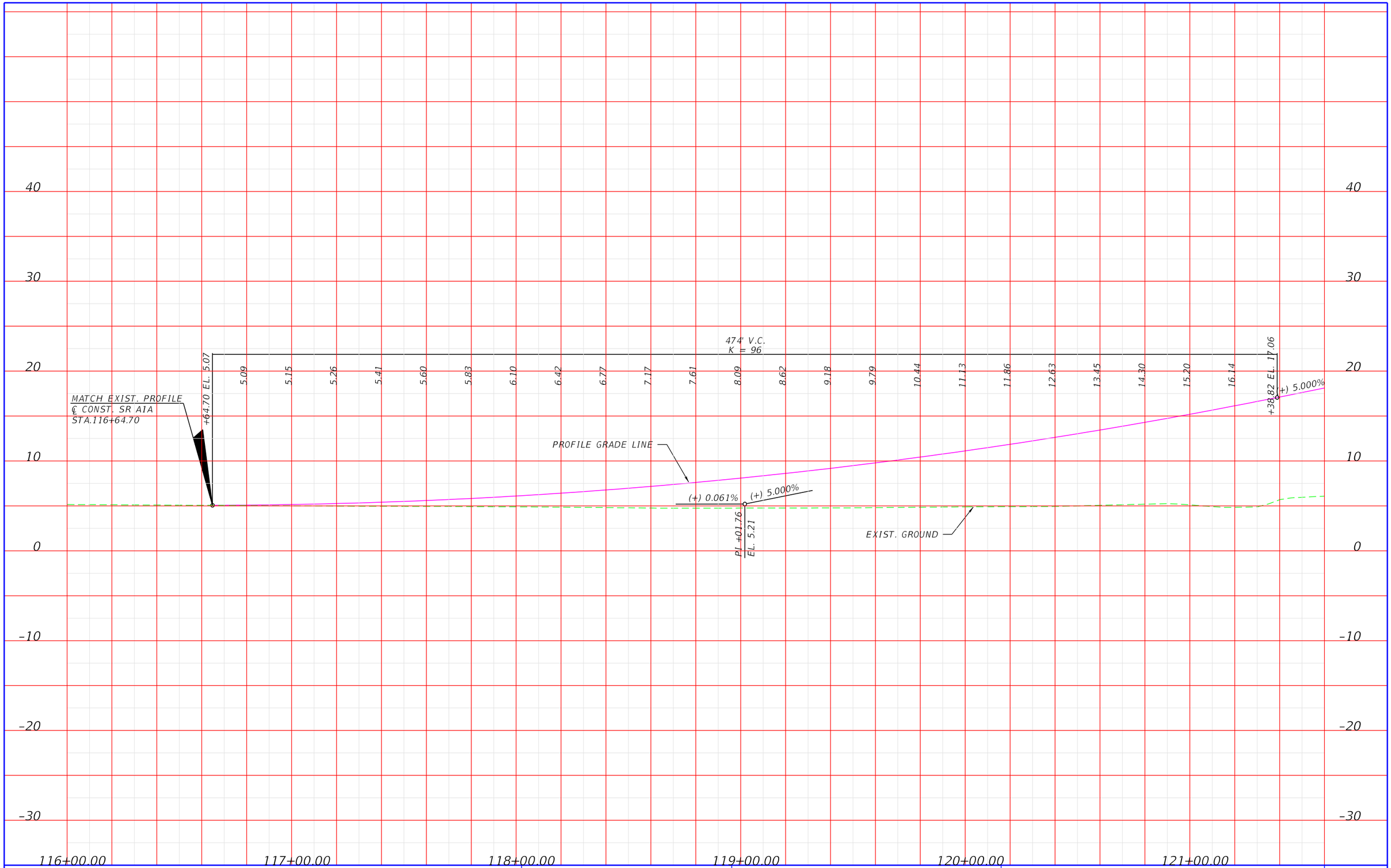
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 17



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 18

60
50
40
30
20
10
0
-10

BEGIN BRIDGE #880005
℄ CONST. SR A1A
STA.125+39.48, EL. 37.10

PROFILE GRADE LINE

(+) 5.000%

+45.13 EL. 42.38

43.12 44.08 45.01 45.92

1,360' V.C.
K = 136

EXIST. GROUND

122+00.00 123+00.00 124+00.00 125+00.00 126+00.00 127+00.00

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

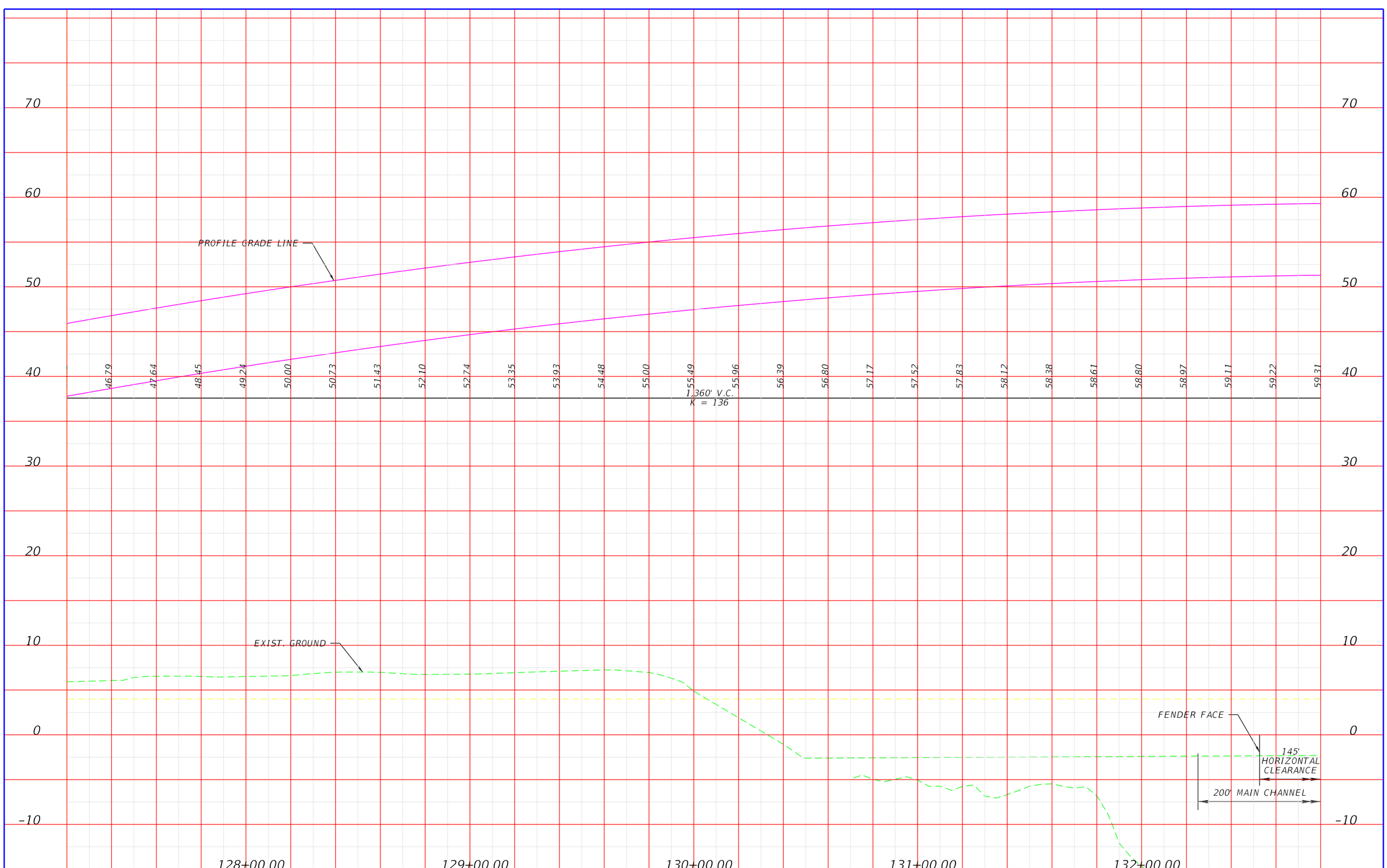
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 19



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

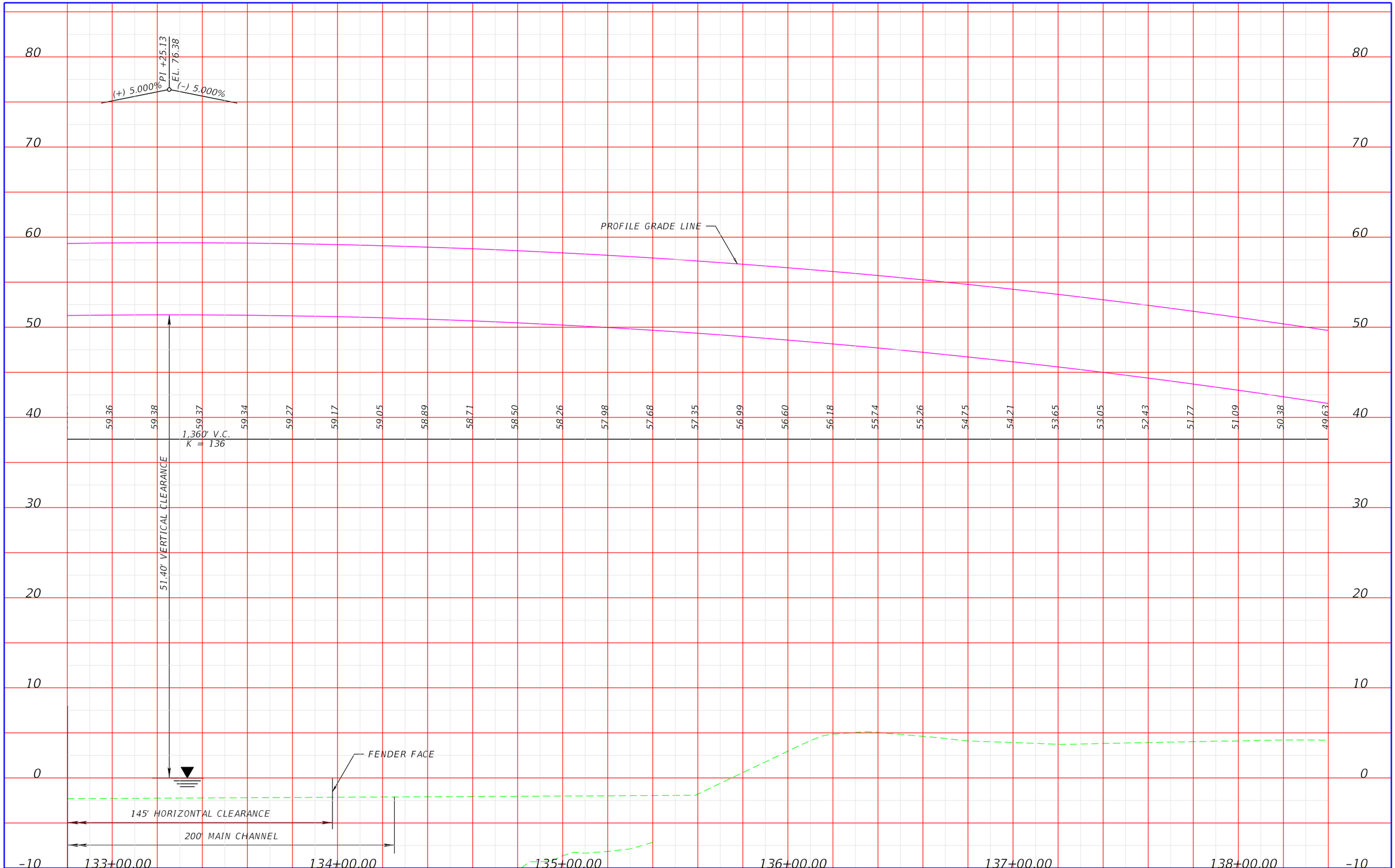
ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 20



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ROBERTO C. GUTIERREZ, P.E.
P.E. LICENSE NUMBER 71043
STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 21

70
60
50
40
30
20
10
0

END BRIDGE #880005
℄ CONST. SR A1A
STA.141+20.77, EL. 36.60

48.86
48.06
47.23
46.37
45.48
44.56
43.61
42.64
+05.13 EL. 42.38

1,360' V.C.
K = 136

(-) 5.000%

PROFILE GRADE LINE

(-) 5.000%

EXIST. GROUND

139+00.00
140+00.00
141+00.00
142+00.00
143+00.00
144+00.00

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ROBERTO C. GUTIERREZ, P.E.
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STANTEC CONSULTING SERVICES, INC.
901 PONCE de LEON, SUITE 900
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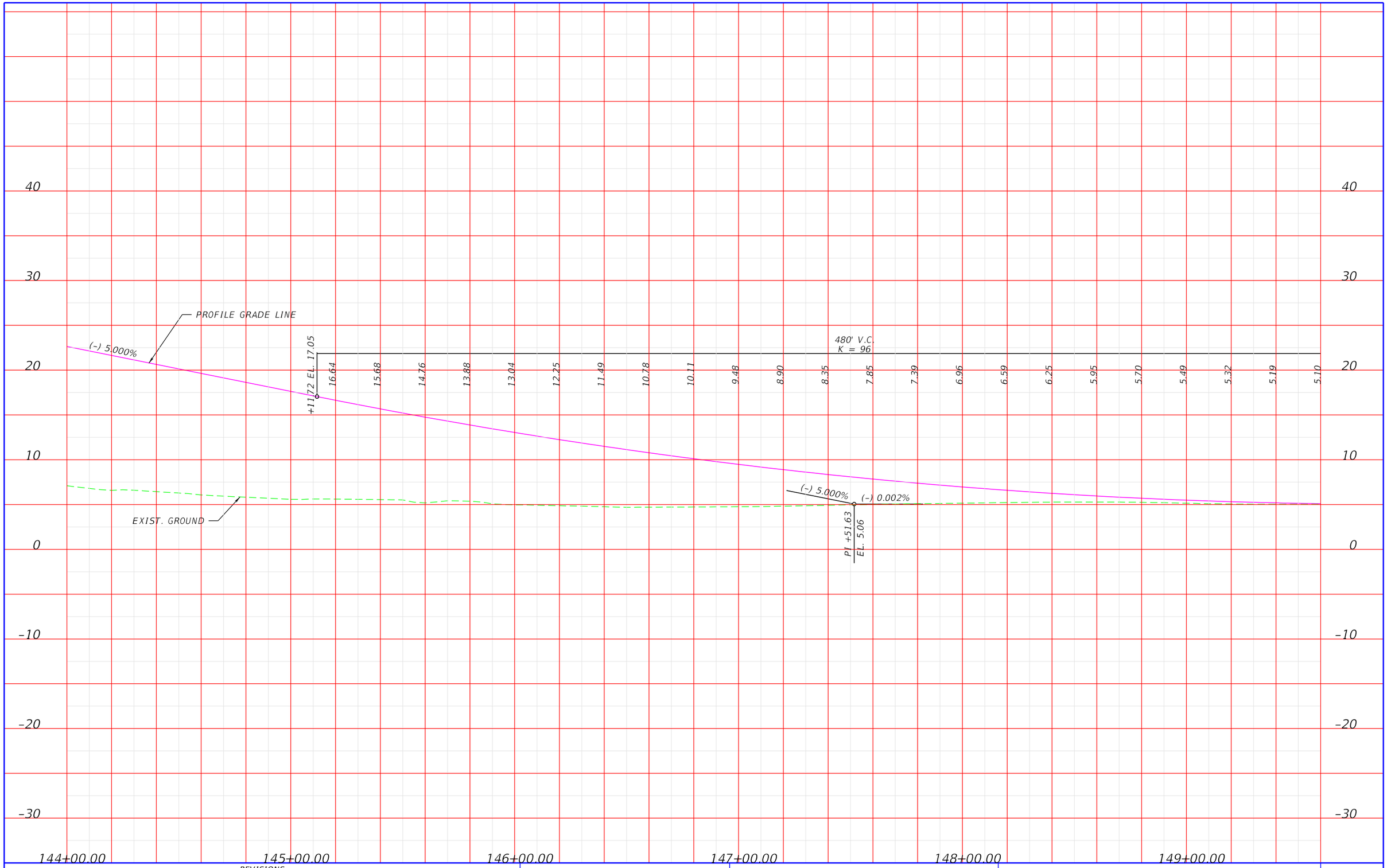
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO.
22



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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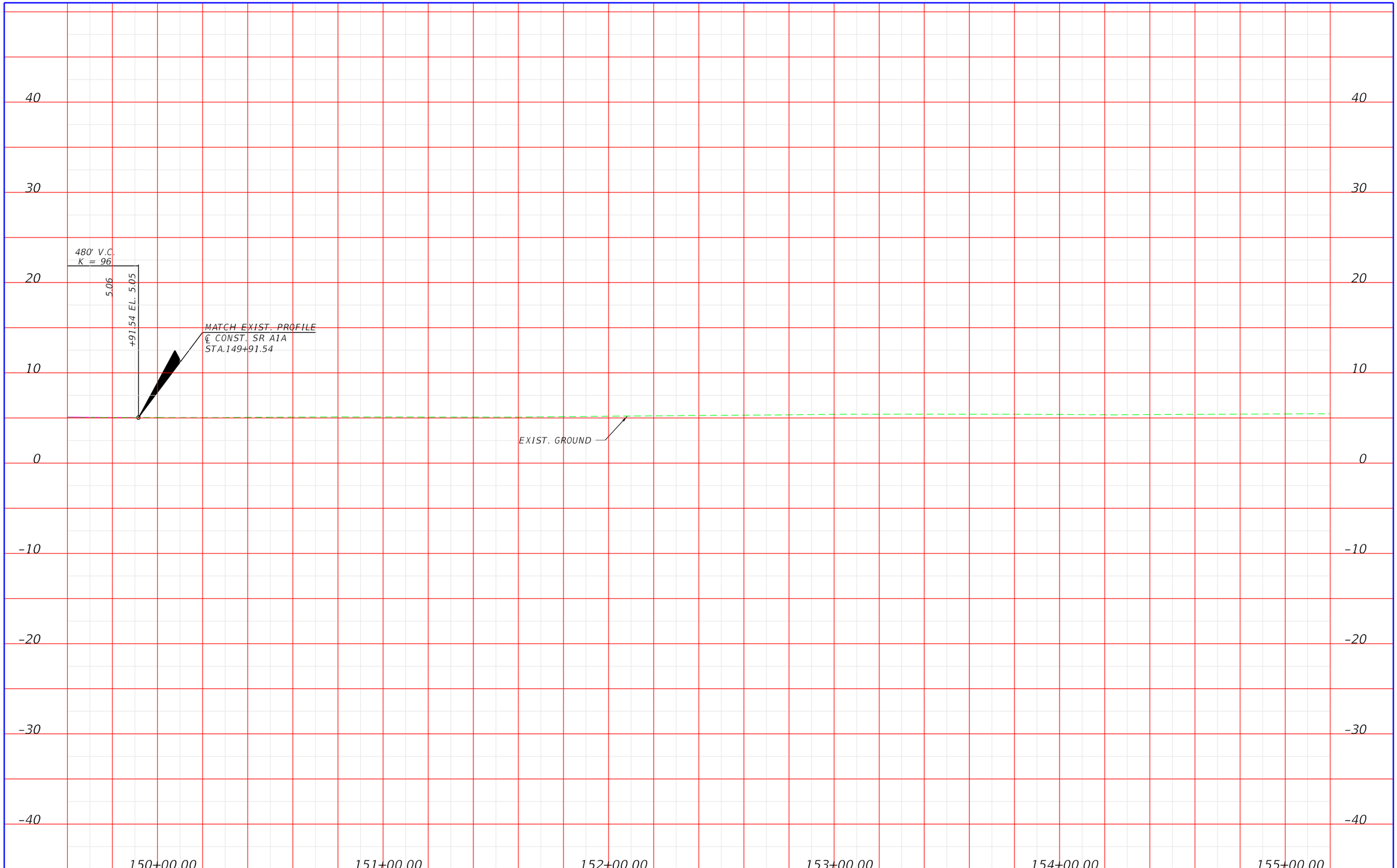
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 23



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DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 24

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR A1A	INDIAN RIVER BREVARD	445618-1-52-01

PRELIMINARY PROFILE

SHEET NO. 25

APPENDIX B

Vertical Clearance Evaluation Memorandum Prepared for the U.S. Coast Guard

MEMORANDUM

To:	Andy Maris Bridge Management Specialist US Coast Guard Seventh District	**From:**	Binod Basnet, PE Project Manager FDOT District Four
Date:	October 1, 2021		
Project:	Project Development & Environment Study SR A1A Over Sebastian Inlet Bridge 880005 - Bridge Replacement Indian River County and Brevard County		
FPID No.:	445618-1-22-02		
SUBJECT:	**VERTICAL ALTERNATIVES EVALUATION**		

INTRODUCTION

The Florida Department of Transportation (FDOT or Department) District Four is conducting a Project Development & Environment (PD&E) Study to evaluate the replacement of the Sebastian Inlet Bridge (No. 880005) crossing the Sebastian Inlet (Inlet) located at the Indian River County and Brevard County boundary (Figure 1). The purpose of and need for this project is to address the structural and functional deficiencies of the existing Sebastian Inlet Bridge (Bridge) and the gap in system linkage for bicyclists and pedestrians.

A navigation needs analysis memorandum was submitted to the U.S. Coast Guard (USCG) on June 9, 2021. Comments received were responded to and a revised memorandum resubmitted on June 14, 2021. A preliminary clearance determination was received from the USCG on July 12, 2021 (Attachment A) which stated a desired minimum vertical clearance of 65-feet above mean high water (MHW) for a fixed bridge and 125-feet minimum horizontal clearance.

Based on the USCG response, a vertical clearance evaluation has been completed to demonstrate a bridge vertical clearance of less than 65-feet, as preliminarily determined by the USCG, provides for reasonable needs of navigation at the Inlet. Also considered were the Purpose and Need for the project, character of the Inlet, bathymetry, surrounding resources, maintenance of the Inlet and adjacent waterway, and connectivity to the Intracoastal Waterway (ICW).

PROJECT LOCATION

The Sebastian Inlet Bridge (Bridge) is a 1,548-foot long concrete structure with two-lanes carrying State Road (SR) A1A over the Sebastian Inlet (Inlet). The Bridge is located within FDOT and Sebastian Inlet District (SID) right-of-way (ROW) and is adjacent to the Sebastian Inlet State Park (Park). Currently the bridge provides access for vessels between the Indian River Lagoon and the Atlantic Ocean through the Inlet. The Inlet is a tidally influenced waterway approximately 525-feet wide at the Bridge. The channel alignment is skewed 70 degrees ENE from the centerline of SR A1A (Figure 1).

SEBASTIAN INLET

The SID currently owns the submerged lands under the Bridge. This area was former uplands that were dredged to create the Inlet. The Inlet is a tidally influenced waterway initially constructed to relieve flooding and improve water quality in the Indian River Lagoon. This led to erosion of downdrift beaches in

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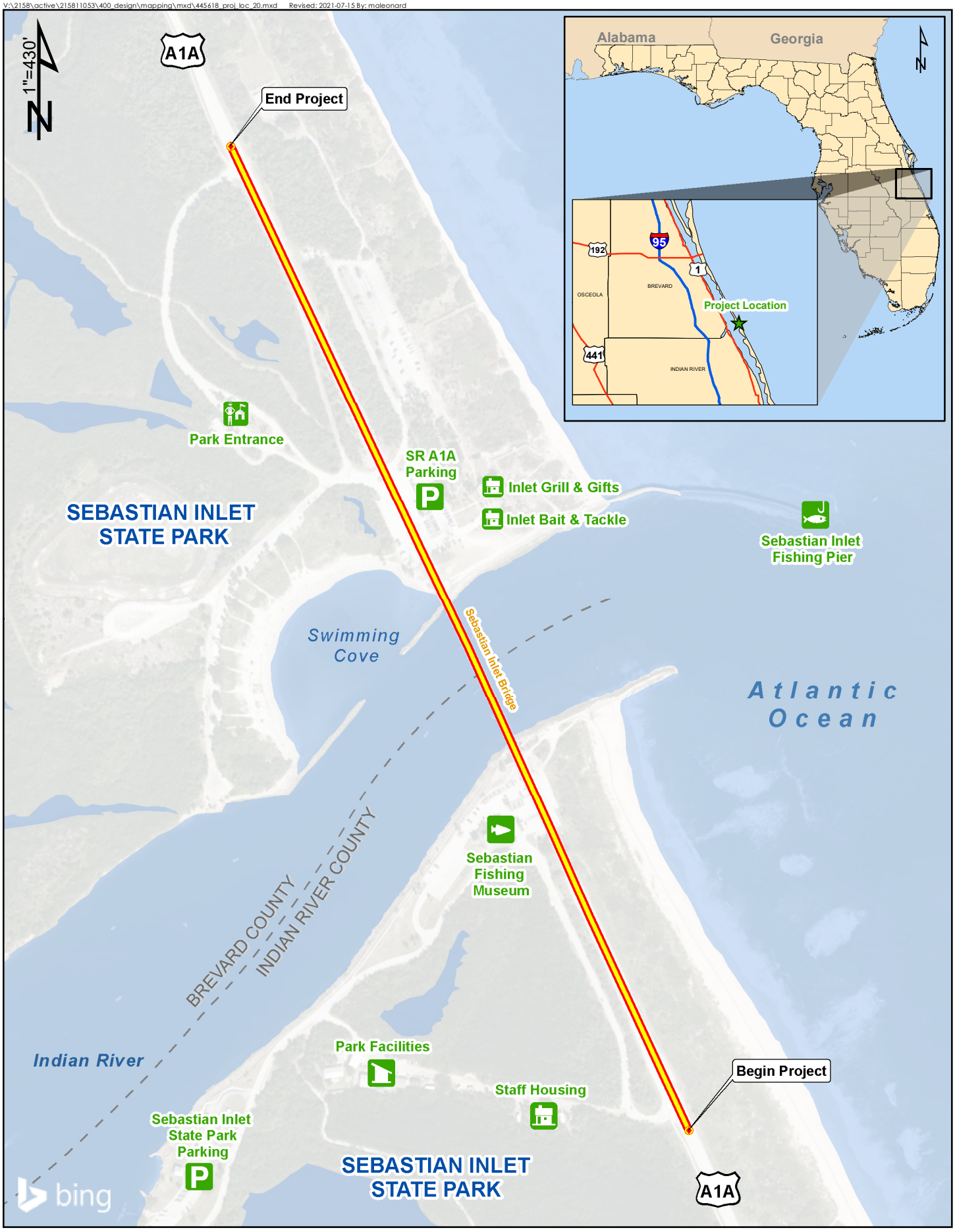


PROJECT LOCATION

FIGURE 1

PROJECT DEVELOPMENT AND ENVIRONMENT (PD&E) STUDY
SR-A1A OVER SEBASTIAN INLET - BRIDGE 880005 - BRIDGE REPLACEMENT
INDIAN RIVER COUNTY AND BREVARD COUNTY, FLORIDA

FINANCIAL PROJECT ID: 242592-4-52-01 | FEDERAL AID NO.: D420 075B | ETDM NO.: 14433

Indian River County and shoaling west of the Bridge in the Indian River Lagoon. The Inlet was eventually stabilized by the construction of the north and south jetties located east of the Bridge and by the creation of the 42-acre sand trap west of the bridge. The sand trap was excavated to reduce shoaling and captures and that is transported via the Inlet into the Indian River Lagoon. In 1988, the SID adopted the first *Sebastian Inlet District Comprehensive Management Plan* (Plan) that outlined maintenance dredging with a commitment to natural resource preservation and environmental protection. In March 2000, the 1988 Plan was reviewed by the Florida Department of Environmental Protection (FDEP) and the current Sebastian Inlet Management Implementation Plan (IMP) was developed (Attachment B). The IMP provides strategies for the maintenance of the inlet and adjacent eroding beaches. The recommended strategies are intended to replicate natural sand drift processes that have been altered by the Inlet which result in downdrift beach erosion. The IMP is consistent with the policies set forth in Section 161.142 Florida Statutes, Beach and Shore Preservation. In 2007, a channel was dredged from the sand trap west to the ICW by the SID (Figure 2).

The Inlet, under the Bridge, is located approximately 2 nautical miles east of the ICW. In August 2007 the SID completed dredging of a navigation channel connecting the Inlet westward to the ICW within an easement granted to the SID from the Florida Division of State Lands which oversees the management of Florida's public lands. The purpose of this 3,120-ft long channel extension was to provide the maritime community with a safe, clearly designated passage to/from the Atlantic Ocean as a matter of public safety and for the future protection of associated aquatic resources Maintenance of these features must continue to prevent shoaling caused by the Inlet velocities, which would otherwise prevent navigability from the Inlet to the ICW through the shallow waters.

The SID entered into a Memorandum of Agreement (MOA) with the FDEP November 5, 2018 (Attachment C) which expires November 5, 2028. This MOA outlines the respective agencies duties and responsibilities regarding the Park and Inlet and their maintenance, management, and safety. The FDEP operates the Park which surrounds the Inlet and includes the north and south jetties. The MOA requires the SID to obtain easements from the Division of State Lands for maintenance, construction, or reconstruction of the following:

- North and south jetties
- Rocks and revetment
    - north shoreline west beyond the tide pool
    - south shoreline
- Truck access easements from SR A1A to Dredged Materials Management Area (DMMA)
- 42-acre sand trap
- Channel from sand trap to ICW

Per the MOA, the SID has obtained a permit from the US Army Corps of Engineers (USACE) for maintenance dredging of the sand trap and channel from the sand trap to the ICW. The SID does not dredge the Inlet under the Bridge, areas east of the Bridge, or west of the Bridge to the sand trap. Due to the velocity of the currents that flow through the Inlet, deposition of sediment under, east, and west of the Bridge does not occur. Benthic surveys of the Inlet and adjacent areas confirm that the Inlet is characterized as scoured, hard bottom with no sediment materials or benthic resources present.

SEBASTIAN INLET BATHYMETRY

The SID completes a bathymetric survey of the inlet system and adjacent areas of the Indian River Lagoon and beaches twice a year. The most recent bathymetric survey (Figure 3) shows the depth under

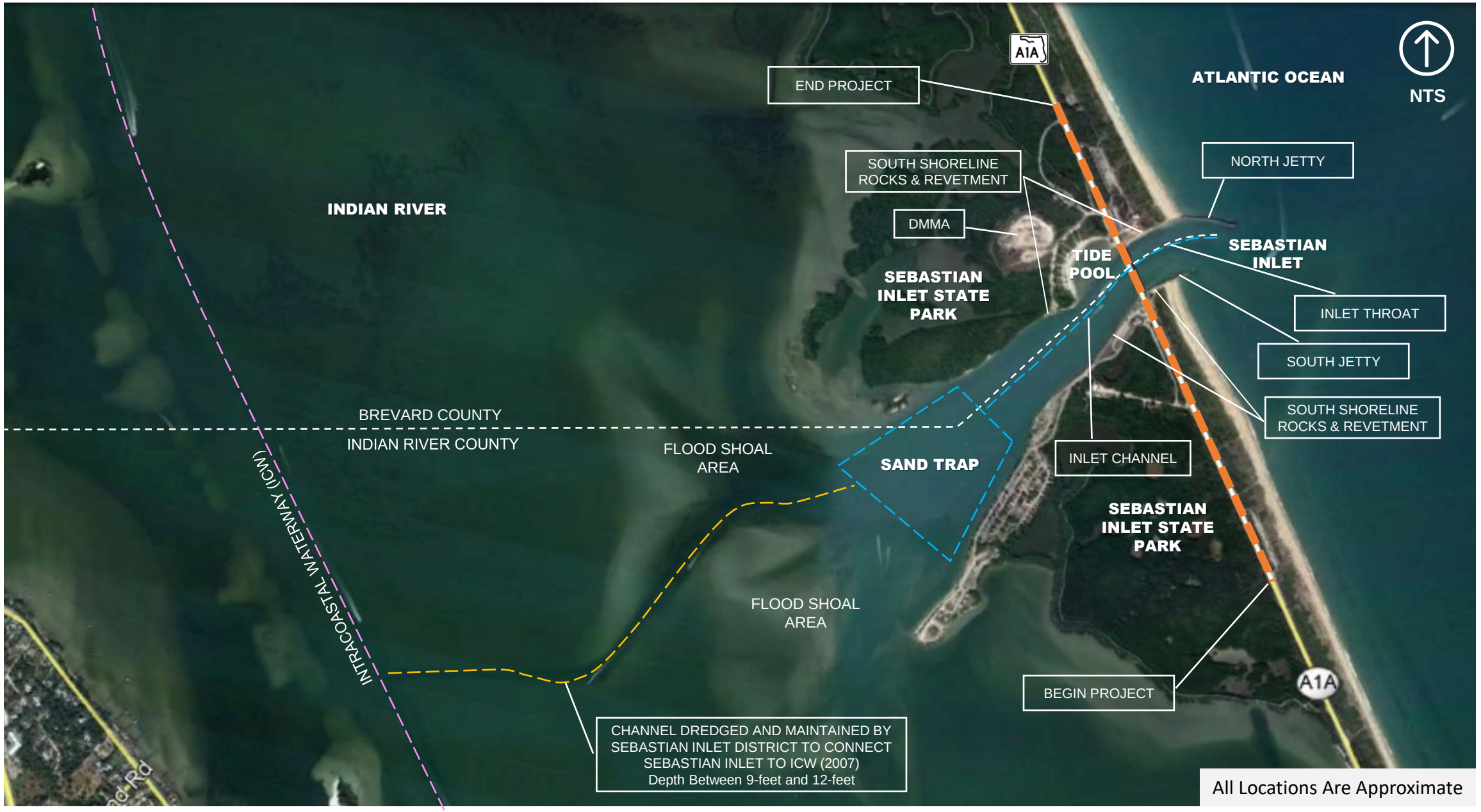
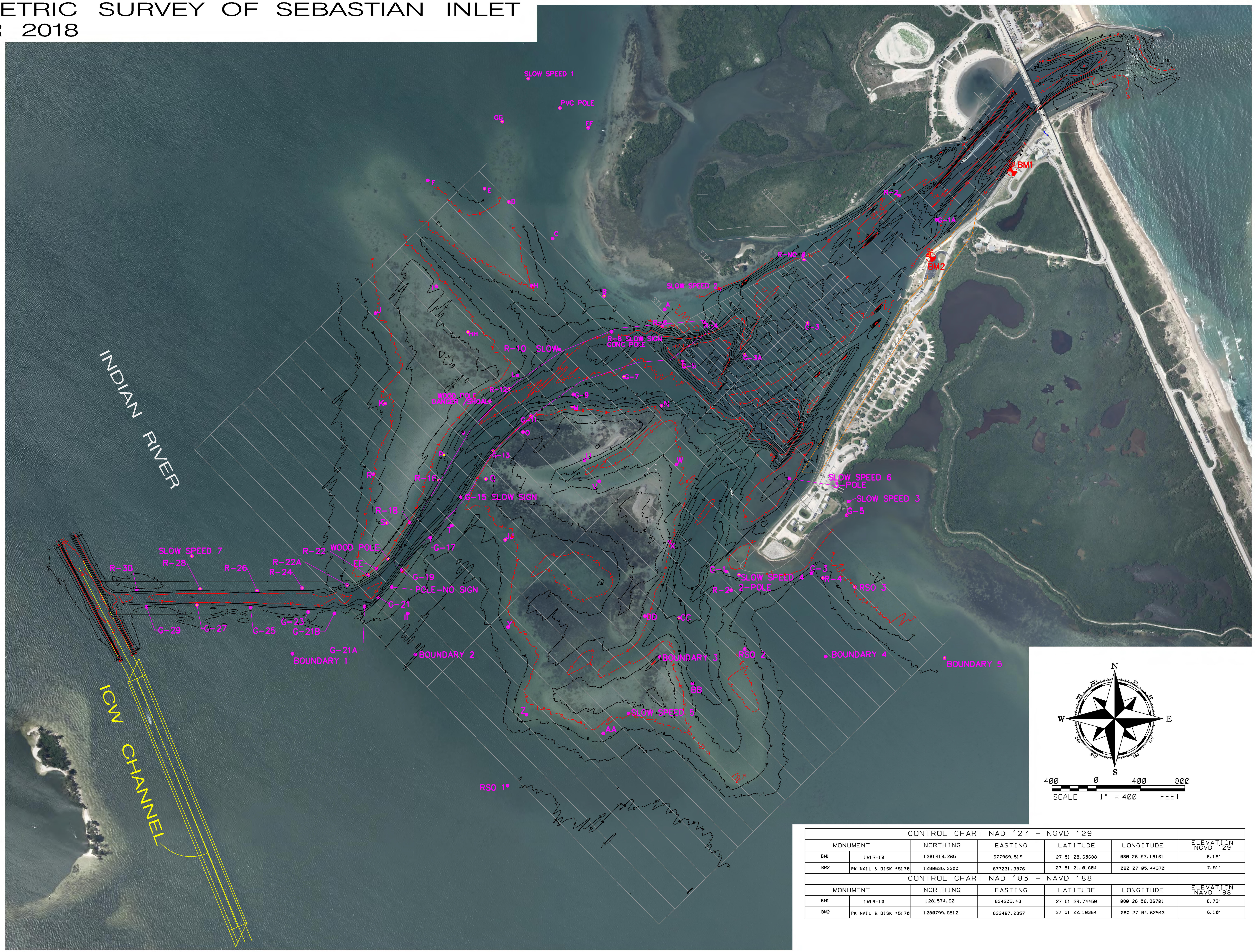


Figure 2.
Sebastian Inlet and Surrounding Waterways Features

PROJECT DEVELOPMENT AND ENVIRONMENT (PD&E) STUDY
SR-A1A SEBASTIAN INLET BRIDGE 880005 - BRIDGE REPLACEMENT
INDIAN RIVER COUNTY AND BREVARD COUNTY, FLORIDA

FDOT

PLAN VIEW
BATHYMETRIC SURVEY OF SEBASTIAN INLET
SUMMER 2018



CONTROL CHART NAD '27 – NGVD '29						
MONUMENT		NORTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION NGVD '29
BM1	IWIR-10	1281410.265	677969.519	27 51 28.65688	080 26 57.18161	8.16'
BM2	PK NAIL & DISK *5170	1280635.3300	677231.3876	27 51 21.01604	080 27 05.44370	7.51'

CONTROL CHART NAD '83 – NAVD '88						
MONUMENT		NORTHING	EASTING	LATITUDE	LONGITUDE	ELEVATION NAVD '88
BM1	IWIR-10	1281574.60	834205.43	27 51 29.74450	080 26 56.36701	6.73'
BM2	PK NAIL & DISK *5170	1280799.6512	833467.2857	27 51 22.10384	080 27 04.62943	6.10'

REVISIONS	BY	DATE

SCALE: 1" = 400'
DATE: 08-16-18

SURVEY FOR: SEBASTIAN INLET TAX DISTRICT

BATHYMETRIC SURVEY OF SEBASTIAN INLET SUMMER 2018

LAND & SEA SURVEYING CONCEPTS, INC.
LAND BUSINESS #6447
PHONE: 321-454-6310
FAX: 321-454-6998
E-MAIL: TCSI70@AOL.COM
1605 CHASE HAMMOCK RD.
MERRITT ISLAND, FL 32953
WWW.LAND-AND-SEA-SURVEYING.COM

SHEET: 2 OF 22
JOB NUMBER: 2018-069
FILE NAME: SEBASTIAN

the Bridge to be -15 (negative fifteen) to -16 feet rising to a depth of -11 feet at the sand trap. The depths across the sand trap vary from -6 feet at the north and south edges and -9 feet to -12 feet across. Holes in the sand trap are located in the north and southwest corners reaching depths of -16 feet. Areas to the west of the sand trap range in depth from -2 feet to -9 feet. The channel leading west from the sand trap to the ICW ranges in depth from -8 feet to -10 feet. This data is supported by information presented in the National Oceanic and Atmospheric Administration's (NOAA) Nautical Chart 11472 (Attachment D).

The depth of the Inlet at the throat east of the Bridge, under the Bridge, and the channel west of the Bridge averages between -15 to -16 feet due to the high velocity of the current that passes through the Inlet. Once west of the bridge, the depth quickly rises to the sand trap and the shallow areas west of the sand trap. Mariners must be certain they can navigate their vessel to the east or west once through the Inlet. This includes consideration of the vessel clearance required above the water surface and draft of the vessel below the water surface. The draft below the surface is more critical to the west of the inlet based on the variance in water depth across the waterbody.

SEBASTIAN INLET HYDRODYNAMIC CONDITIONS

In 2003, a tidal model report for the Sebastian Inlet was completed for FDOT District 4. The *Tidal Model Report – Sebastian Inlet* was part of a series of reports completed that summarize the development of the FDOT District 4 ICW Tidal Model used to assess scour risk of tidally influenced state owned bridges. The Sebastian Inlet model centered on the Sebastian Inlet Bridge and included five additional bridges from US 1 over the Sebastian River (Bridge Nos. 700011 and 700001) south to SR 656 (17th Street) over the Indian River (Bridge No. 880077).

The Tidal Model shows the velocity conditions for the study bridges under normal conditions (spring tide). Figure 4 shows velocity magnitude contours and velocity vectors during the time of maximum velocity at the Bridge. Red contours indicate areas of high velocity and the blue areas of lower velocity. The velocity maximums at the Inlet occur at the center of the Bridge.

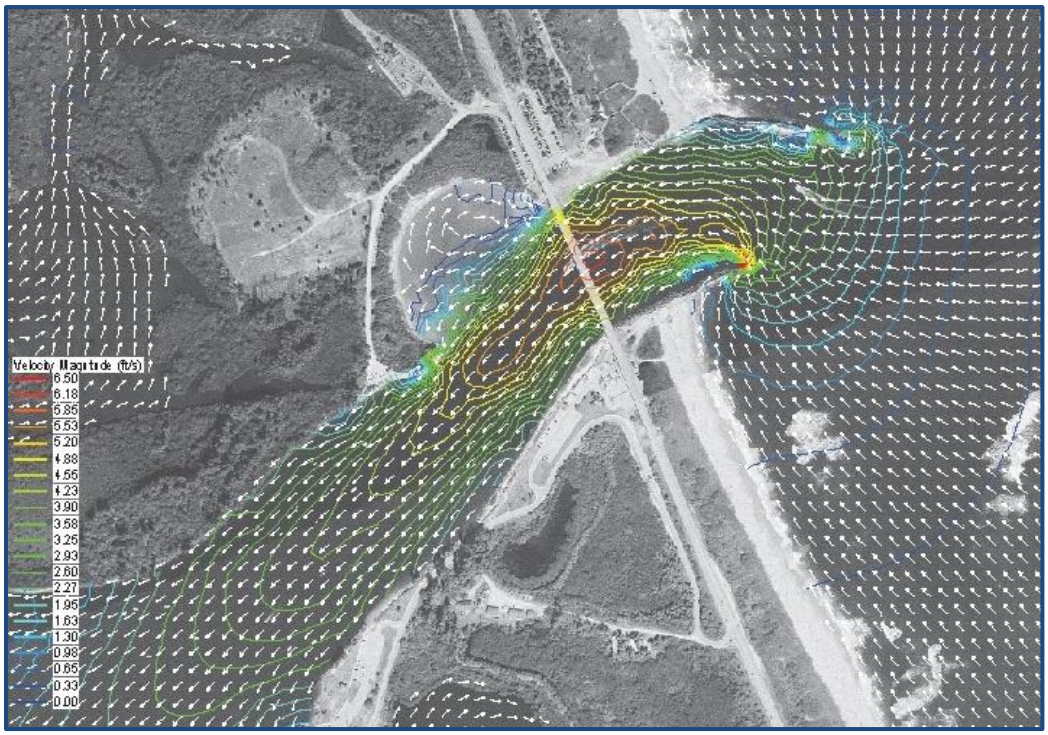


Figure 4. Velocity Magnitude Contours and Velocity Vectors at Bridge No. 880005 at the Time of Maximum Velocity during Spring Tides (*FDOT District Four Tidal Model Report – Sebastian Inlet*, 2003)

The Tidal Model results also demonstrate the velocity conditions for the study bridges under storm surge conditions for the 50-Year, 100-Year, and 500-Year events (Tables 1 – 4). Because the Inlet is relatively small in terms of cross sectional area, spring tide and storm surge is attenuated resulting in maximum velocities. Tables 1 – 4 show that the Inlet velocities are significantly higher at the Bridge than surrounding area bridges under all storm surge events.

These conditions support local knowledge of the adverse conditions at the Inlet and the hazard to navigation for all vessel types. This is also supported by the NOAA chart 11472 (Attachment D) caution for the Inlet stating that "Passage through the inlet is not recommended without local knowledge of all hazardous conditions affecting this area."

Table 1. Maximum Velocity Conditions during Spring Tides (Normal Conditions)

Bridge	Maximum Velocity (ft/s)
Bridges No. 700011 / 700001 US 1 over Sebastian River	0.23
Bridge No. 880005 SR A1A over Sebastian Inlet	**6.5**
Bridge No. 880051 CR 510 over Indian River	0.32
Bridge No. 880053 CR 510 over the ICW	0.51
Bridge No. 880087 SR 60 over Indian River - Merrill Barber Bridge	0.7
Bridge No. 880077 SR 656 over Indian River	0.26

Source: *Tidal Model Report – Sebastian Inlet (November 2003)*

Table 2. Conditions during the 50-year Storm Surge Event

Bridge	Maximum Velocity (ft/s)
Bridges Nos. 700011 / 700001 US 1 over Sebastian River	0.63
Bridge No. 880005 SR A1A over Sebastian Inlet	**15.51**
Bridge No. 880051 CR 510 over Indian River	1.22
Bridge No. 880053 CR 510 over the ICW	1.71
Bridge No. 880087 SR 60 over Indian River - Merrill Barber Bridge	3.09
Bridge No. 880077 SR 656 over Indian River	1.18

Source: *Tidal Model Report – Sebastian Inlet (November 2003)*

Table 3. Conditions during the 100-year Storm Surge Event	
Bridge	**Maximum Velocity (ft/s)**
Bridges Nos. 700011 / 700001 US 1 over Sebastian River	0.63
Bridge No. 880005 SR A1A over Sebastian Inlet	**16.47**
Bridge No. 880051 CR 510 over Indian River	1.31
Bridge No. 880053 CR 510 over the ICW	1.83
Bridge No. 880087 SR 60 over Indian River - Merrill Barber Bridge	3.33
Bridge No. 880077 SR 656 over Indian River	1.26

Source: *Tidal Model Report – Sebastian Inlet (November 2003)*

Table 4. Conditions during the 500-year Storm Surge Event	
Bridge	**Maximum Velocity (ft/s)**
Bridges Nos. 700011 / 700001 US 1 over Sebastian River	0.73
Bridge No. 880005 SR A1A over Sebastian Inlet	**18.28**
Bridge No. 880051 CR 510 over Indian River	1.49
Bridge No. 880053 CR 510 over the ICW	2.05
Bridge No. 880087 SR 60 over Indian River - Merrill Barber Bridge	3.63
Bridge No. 880077 SR 656 over Indian River	1.47

Source: *Tidal Model Report – Sebastian Inlet (November 2003)*

VERTICAL ALTERNATIVES ANALYSIS

In response to the USCG's preliminary determination of the FDOT's PD&E Study, the project team completed a vertical alternatives analysis for the Bridge including the No Build Alternative and fixed-span bridge alternatives at vertical clearances of 39-feet (existing) and 65-feet (preliminary USCG determination). The following key criteria were used to determine a vertical clearance between 39-feet and 65-feet:

- The ability to maintain no fill over the Park public entrances north and south of the Bridge
- The ability to maintain traffic and Park access during construction

Based on the application of the above criteria, a vertical clearance of 51.40-feet was determined. This vertical clearance number was rounded to 51-feet for evaluation purposes.

All bridge vertical clearances were evaluated at the recommended design speed of 50 miles per hour (mph). The target speed is determined in accordance with FDOT's Roadway Design Bulletin 21- 08, FDM table 201.5.1 Design Speed. Per the bulletin, an allowable range of design speeds is determined based on roadway context classification. Additional factors considered include posted speed, land use, vehicular

traffic, transit, bicycle and pedestrian usage, safety, roadway access management, future development, and local input.

Specific parameters used to develop the vertical clearance alternatives included the following:

Vertical Clearance

- Posted Speed
  - 45 mph
- Design Speed
  - 50 mph
- Vertical Clearance (at 50 mph design speed)
  - 39-feet
  - 51-feet
  - 65-feet
- Superstructure Height
- Maximum Grade
- Depth of Fill
  - South Park Entrance
  - SID Access Road
  - North Park Entrance

Horizontal Alignment

- Context Classification
  - C1 Natural/C2 Rural
- Horizontal Alignment
  - Center (existing)
    - 39-feet vertical clearance
    - 150-feet horizontal clearance
  - East
  - West
- Vertical Clearance
  - 39-feet
  - 51-feet
  - 65-feet
- Physical, Cultural, Natural Resource Impacts

The bridge profiles for the vertical clearance evaluation are presented in Figures 5 – 7 and the results of the evaluation are summarized in Table 5. Bridge horizontal alignments evaluated include center (existing), east, and west. At any vertical clearance, the center alignment requires a temporary bridge structure.

The vertical alternatives evaluation completed was qualitative in nature. Additional quantitative evaluations will be completed as part of the PD&E's alternatives development process.

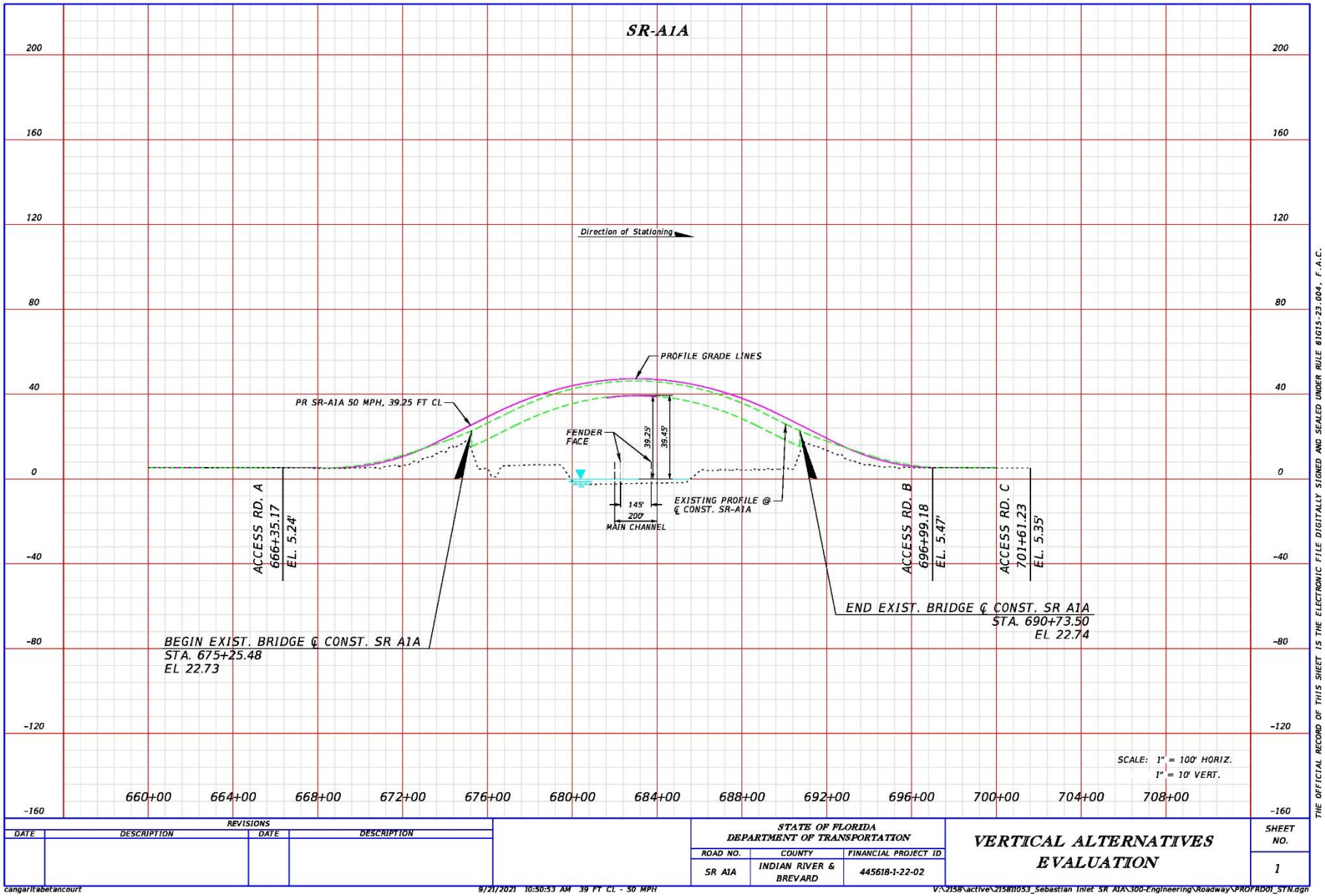


Figure 5. Bridge Profile at 39-Feet Vertical Clearance and 50 MPH Design Speed

Access Rd. A - South Park Entrance
Access Rd. B - SID Access Road
Access Rd. C - North Park Entrance

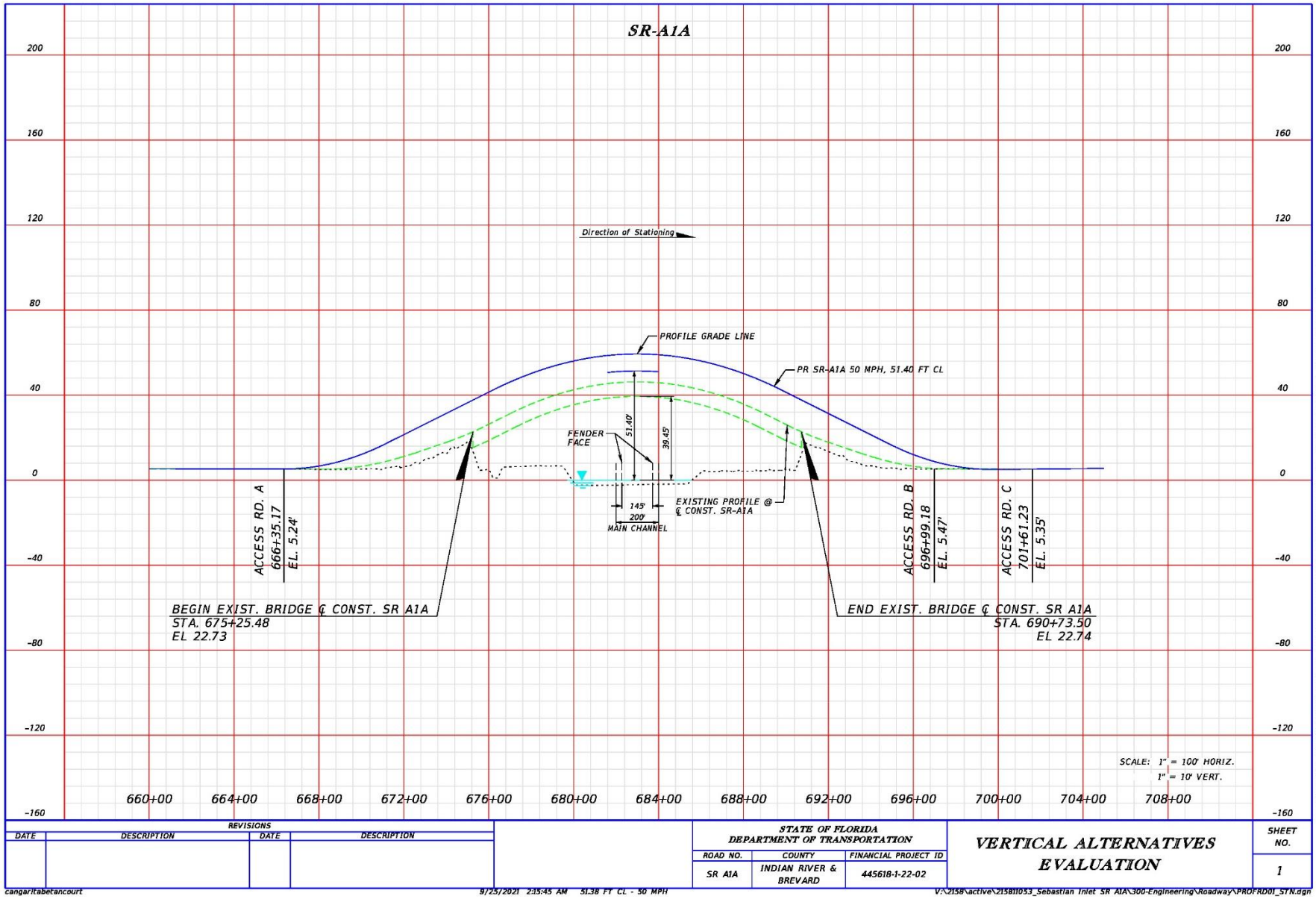


Figure 6. Bridge Profile at 51-Feet Vertical Clearance and 50 MPH Design Speed

Access Rd. A - South Park Entrance
Access Rd. B - SID Access Road
Access Rd. C - North Park Entrance

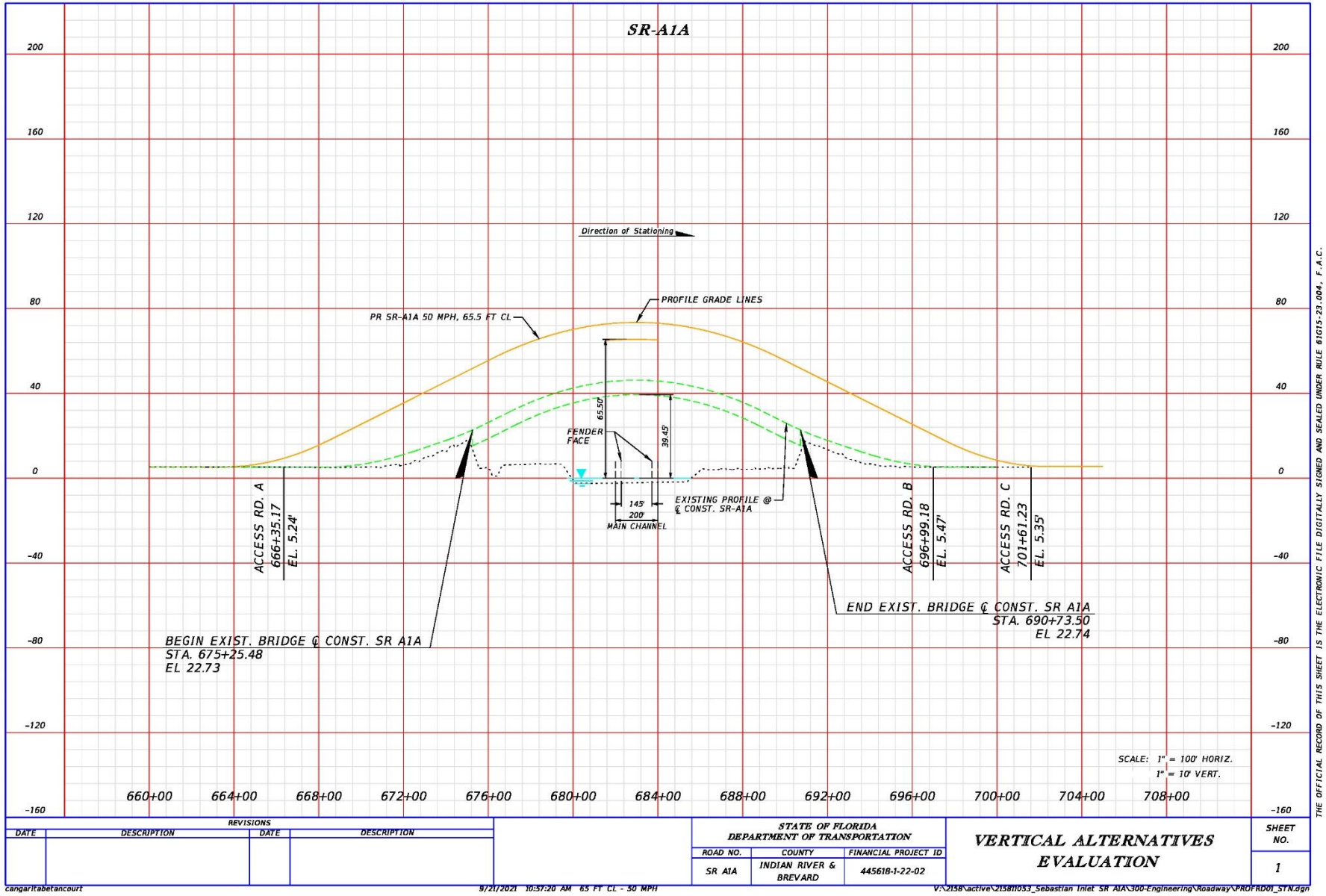


Figure 7. Bridge Profile at 65-Feet Vertical Clearance and 50 MPH Design Speed

Access Rd. A - South Park Entrance
Access Rd. B - SID Access Road
Access Rd. C - North Park Entrance

Table 5. Bridge Vertical Clearance Evaluation Results

Road	Superstructure Height (Feet)	Vertical Clearance (Feet)	Design Speed (mph)	Maximum Grade (%)	FILL AT 'ACCESS ROAD' / STATION (STA.)				South Landing STA.	North Landing STA.
					'A' STA. 666+99.18 (Feet)	'B' STA. 696+99.18 (Feet)	'B-2' STA. 697+42.05 (Feet)	'C' STA. 701+61.23 (Feet)		
SR A1A	6.80	39 Existing Bridge	45	5.00	N/A	N/A	N/A	N/A	668+25.00	697+76.46
SR A1A	8.00	39 Proposed	50	5.00	N/A	N/A	N/A	N/A	668+77.32	697+21.00
SR A1A	8.00	51 Proposed	50	5.00	0.00	3.30	2.25	0.00	665+58.40	700+39.82
SR A1A	8.00	65 Proposed	50	5.00	4.13	15.05	12.95	0.56	663+56.59	702+40.58

Access Road A - South Park Entrance
Access Road B - SID Access Road
Access Road C - North Park Entrance
Access Road B-2 represents the realigned SID access road at SR A1A

Criteria used to evaluate the ability of the vertical clearance alternatives to meet the project Purpose and Need included bridge and roadway design criteria, context criteria, and social, cultural, natural, and physical resource criteria as identified and described in Tables 6 - 7.

Table 6. Vertical Evaluation Criteria

Criteria	Description
Benefit to Marine Traffic	Factors influencing this rating include the change in number or type of vessel that could pass under the bridge based on vertical clearance and reasonably navigate east or west of the bridge.
Benefit to Vehicular Traffic	Existing vertical clearance has no direct effect to vehicular traffic. Benefit to vehicular traffic results from the addition of shoulders to the bridge and approaches.
Impact to Sebastian Inlet State Park North Entrance	The vertical geometry for the 65-foot clearance will impact the north Park entrance requiring realignment and/or resulting in fill required ranging from 0 to 21-feet over the entrance (Figure 7). Environmental impacts are anticipated.
Impact to Sebastian Inlet State Park South Entrance	The vertical geometry for the 65-foot clearance will impact the south Park entrance requiring realignment and/or resulting in fill required ranging from 0 to 4-feet over the entrance (Figure 7). Environmental impacts are anticipated.
Impact to Sebastian Inlet District (SID) North Access Road	The vertical geometry for the alternatives at 39-feet, 51-feet and 65-feet will impact the SID access road requiring realignment of the access road at SR A1A. The alternatives result in fill required ranging from 0 to 19-feet over the entrance (Figure 7). Environmental impacts are anticipated.
Bicycle and Pedestrian Facilities	Vertical clearance has no direct effect to bicycle and pedestrian traffic. Benefit results from providing bicycle and pedestrian facilities on the Bridge which may be potentially located on both sides. These facilities eliminate the gap in system linkage.
Community Support	Community support is indicated for new bridge. In particular provision of bicycle and pedestrian facilities. Vertical clearance matters to a small number.
Evacuation/Emergency Response	Vertical clearance does not affect evacuation/emergency response.
Traffic Operations	Depending on vertical clearance, a range of impacts may result to intersecting Sebastian Inlet State Park entrances and the SID access road.
Bridge Length (Feet)	An increase in bridge length from the existing 1,548-feet will have a range of impacts including impacts to intersecting Park entrances and the SID access road due to fill requirements and environmental impacts.
Constructability	Fixed-span bridges utilizing conventional construction methods and no temporary bridge are rated higher.
Bridge Construction Cost	This rating reflects the cost difference between a fixed-span bridge at vertical clearances of 39-feet, 51-feet, and 65-feet and an alternative that requires a temporary bridge. The cost for the three vertical clearances does not vary significantly. The higher vertical clearance will result comparatively in a greater cost.

Table 7. Horizontal Alignment Evaluation Criteria	
Criteria	**Description**
Benefit to Marine Traffic	Horizontal alignment has no direct effect to marine traffic.
Benefit to Vehicular Traffic	Benefit to traffic is realized in the functional improvements associated with an improved typical section for the bridge and bridge approaches and associated improvements to park entrances.
Requires Additional Right-of-Way (ROW)	The need for additional ROW is directly related to additional impacts to resources.
Impact to North Approach	Independent of vertical clearance, a horizontal alignment to the east or west will impact Park improvements (parking, entrances), natural resources, and potentially require additional ROW. A center (existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts associated with a new bridge.
Impact to South Approach	Independent of vertical clearance, a horizontal alignment to the east or west will impact Park improvements (parking, entrances), natural resources, and potentially require additional ROW. A center (existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts.
Impact to Sebastian Inlet State Park North Entrance	Independent of vertical clearance, a horizontal alignment to the east or west will impact the Park north entrance, natural resources, and potentially require additional ROW. A center (existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts.
Impact to Sebastian Inlet State Park South Entrance	Independent of vertical clearance, a horizontal alignment to the east or west will impact the Park north entrance, natural resources, and potentially require additional ROW. A center (existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts.
Impact to Sebastian Inlet State Park North Parking Area Under Bridge	Independent of vertical clearance, a horizontal alignment to the east or west will impact the Park north parking area under the bridge. A center (existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts.
Impact to Sebastian Inlet State Park South Parking Area Under Bridge	Independent of vertical clearance, a horizontal alignment to the east or west will impact the Park south parking area under the bridge. A center (existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts.
Impact to Sebastian Inlet District (SID) Access Road	Independent of vertical clearance, a horizontal alignment to the east or west will impact the SID access road entrance, natural resources, and potentially require additional ROW. A center

Table 7. Horizontal Alignment Evaluation Criteria	
Criteria	**Description**
	(existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts.
Impacts to Wetlands	Minor to significant wetland impacts are anticipated due to park entrance improvements, turn lanes, shared use path, the SID access road realignment park entrance realignment/reconfiguration and ROW requirements.
Impacts to Wildlife	Minor to moderate impacts are anticipated based on horizontal alignment and vertical clearance associated with reconstruction of the park entrances, impacts to the dune community along the east side of SR A1A south of the bridge, and wetlands north and south of the Bridge.
Impacts to Section 4(f) Resources	Minor to significant impacts to Section 4(f) lands are anticipated based on horizontal alignment and vertical clearance. Additional right of way is required from for turn lane improvements near the park entrances, shared use path on the west side of SR A1A north and south of the Bridge.
Impacts to Archaeological Resources	Archaeological field investigation identified two prehistoric scatter sites, one prehistoric occurrence, and one historic artifact scatter. Sites are not considered eligible for the National Register of Historic Places and should impact project design
Bicycle and Pedestrian Facilities	Alignment has no direct effect to bicycle and pedestrian traffic. Benefit results from providing bicycle and pedestrian facilities on the Bridge which may be potentially located on both sides. These facilities eliminate the gap in system linkage.
Community Support	Community support is indicated for a new bridge. In particular provision for bicycle and pedestrian facilities.
Evacuation/Emergency Response	With the addition of inside/outside shoulders, evacuation/emergency response is improved.
Traffic Operations	Benefit to traffic is realized in the functional improvement of the bridge, bridge approaches, park entrances, and bicycle/pedestrian facilities.
Maintenance of Traffic	East and west horizontal alignment utilize the existing bridge to maintain traffic during construction. Temporary improvements/walls would be utilized at the approaches to allow construction of approach roadways. A temporary bridge is required for a center alignment. The temporary bridge must be built first and then the existing bridge removed before construction of the new bridge can begin.
Temporary Bridge Required	A center (existing) alignment requires a temporary bridge to maintain traffic creating temporary impacts in addition to permanent impacts.
Constructability	Fixed-span bridges utilizing conventional construction methods and procedures and no temporary bridge are rated higher. A temporary bridge adds to the construction cost, increases

Table 7. Horizontal Alignment Evaluation Criteria	
Criteria	**Description**
	impacts, and increases the time for construction since the temporary bridge must be built before demolition of the existing bridge can begin.
Bridge Construction Cost	This rating reflects the cost difference between a fixed-span bridge at vertical clearances of 39-feet, 51-feet, and 65-feet, and horizontal alignments at center (existing), east, and west along with one alternative that requires a temporary bridge. Generally, the alignment requiring a temporary bridge will result in a greater cost.

EVALUATION MATRIX RESULTS

Ratings of the evaluation criteria used include 0 if the alternative has no effect or provides some benefit to the evaluation criteria/category; + if the alternative meets or has a positive response to the evaluation criteria/category; and - if the alternative has a poor or negative response to the evaluation criteria/category. The addition of a + or - sign denotes a greater impact positively or negatively. Alternatives are compared to one another relative to their ability to meet study Purpose and Need. The evaluation matrices were separated into vertical clearance alternatives and horizontal alignment alternatives. The positive and negative results were then tabulated and are presented in Tables 8 - 9 and the complete matrices are included in Attachments E - F.

In summary, the vertical evaluation results indicate, at a project design speed of 50 mph, the following evaluation scores based on vertical clearance:

Vertical Clearance	Score
39-feet	-2
51-feet	-5
65-feet	-11

These results indicate, at a project design speed of 50 mph, a bridge vertical clearance of 39-feet is the best alternative. With a total vertical clearance score of -2 this bridge clearance provides reasonable means of navigation based on the characteristics of the Inlet and adjacent waterways and results in the least impacts to the natural, physical, cultural, and social environments. This bridge vertical clearance also provides the least impacts based on bridge and roadway design criteria.

These results are supported by the data collected during the April 2021 Navigation Survey where the tallest vessel reported passing under the Bridge is 34-feet. Less than 6 percent of respondents stated that they do not use the Inlet due to vertical clearance requirements above 39 feet. Inlet and adjacent channel depths and hazardous Inlet conditions were factors mariners also reported.

Secondly, a vessel survey completed during FDOT's Planning Phase for the project showed several different types of power boats were observed within the Inlet and adjacent area including jet skis, cabin cruisers, catamarans, center consoles, pilothouse, cigarette, jon boats, bowriders and pontoon boats. The majority of boats observed during the field surveys included recreational vessels and commercial fishing charter boats 30 feet or less in length and 15 feet or less in height. Most vessels remained within the Inlet, although some traveled east into the Atlantic Ocean.

Table 8. Vertical Alternatives Evaluation Matrix - Vertical Clearance Summary				
Evaluation Criteria / Category	**No Build Alternative**	**Vertical Clearance at 50 MPH Design Speed**		
		39-Feet Fixed Bridge (Existing)	**51-Feet Fixed Bridge**	**65-Feet Fixed Bridge**
Positive Points	0	+ 2	+ 3	+ 3
Negative Points	- 4	- 4	- 8	- 14
TOTAL POINTS VERTICAL ELEVATION / DESIGN SPEED	**- 4**	**- 2**	**- 5**	**- 11**

Table 9. Vertical Alternative Evaluation Matrix - Horizontal Alignment Summary										
Criteria / Category	**No Build Alternative**	**39-Feet Fixed Bridge** Existing Bridge Vertical Clearance			**51-Feet Fixed Bridge**			**65-Feet Fixed Bridge**		
		Alignment			**Alignment**			**Alignment**		
		Center	**East**	**West**	**Center**	**East**	**West**	**Center**	**East**	**West**
Positive Points	0	+ 4	+ 4	+ 4	+ 5	+ 5	+ 5	+ 5	+ 5	+ 5
Negative Points	- 3	- 17	- 15	- 17	- 15	- 21	- 23	- 18	- 26	- 29
TOTAL POINTS HORIZONTAL ALIGNMENT	**- 3**	**- 13**	**- 11**	**- 13**	**- 10**	**- 16**	**- 18**	**- 13**	**- 21**	**- 24**

Symbol Description
+ The alternative meets or has a positive response to the evaluation criteria/category
0 The alternative has no effect or provides some benefit to the evaluation criteria/category
- The alternative has a poor or negative response to the evaluation criteria/category
NOTE: +++ or - - - denote greater impact positively or negatively

CONCLUSION

Taking into consideration the Purpose and Need for the project, character of the Inlet, Inlet and surrounding bathymetry, surrounding resources, maintenance of the Inlet and adjacent waterway, and connectivity to the Intracoastal Waterway (ICW), the results of the vertical alternatives evaluation show:

- A vertical clearance greater than 39-feet offers no significant benefit to marine traffic based on the following:
  - The channel alignment is skewed 70 degrees ENE from the centerline of SR A1A.
  - The Inlet is stabilized by the north and south jetties located east of the Bridge and by the 42-acre sand trap west of the bridge.
  - Because the Inlet is relatively small in terms of cross sectional area, normal and storm surge conditions are attenuated resulting in maximum velocities through the Inlet. Inlet velocities are significantly higher at the Bridge than surrounding area bridges under normal and all storm surge events. These conditions support local knowledge of the adverse conditions at the Inlet and the hazard to navigation for all vessel types.
  - The depth of the Inlet at the throat (east), under the Bridge, and the channel west of the Bridge average between -15 (negative fifteen) to -16 feet due to the high velocity of the current that passes through the Inlet. Once west of the bridge, the depth quickly rises to the sand trap with depths varying from -6 feet to -12 feet across. Areas to the west of the sand trap range in depth from -2 feet to -9 feet. The Inlet, under the Bridge, is located approximately 2 nautical miles east of the ICW. The channel leading west from the sand trap to the ICW ranges in depth from -8 feet to -10 feet.
  - The SID maintains the sand trap and channel connecting the sand trap to the ICW under an MOA with the FDEP through a lease from the Division of State Lands. Maintenance of these features must continue to prevent shoaling caused by the Inlet velocities, which would otherwise prevent navigability from the Inlet to the ICW through the shallow waters.
  - Mariners must be certain that they can navigate their vessel to the east or west once through the Inlet. This includes consideration of the vessel clearance required above the water surface and draft of the vessel below the water surface.

The vertical clearance and horizontal alignment evaluation completed indicates, at a project design speed of 50 mph, a bridge vertical clearance of 39-feet is the best alternative providing reasonable means of navigation. The evaluation results show a total vertical clearance score of -2 for this bridge clearance, which provides reasonable means of navigation based on the characteristics of the Inlet and adjacent waterways and results in the least impacts to the natural, physical, cultural, and social environments. This bridge vertical clearance also provides the least impacts based on bridge and roadway design criteria.

The results of the vertical alternatives evaluation are supported by the data collected during the April 2021 Navigation Survey and the February 2020 Vessel Survey.

ATTACHMENT A

US Coast Guard Correspondence

Preliminary Clearance Determination

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

Commander
United States Coast Guard
Seventh District

909 S. E. 1st Avenue (Rm 432)
Miami, FL 33131
Staff Symbol: (dpb)
Phone: (305) 415-6743
Fax: (305) 415-6763
Email: Andi.Maris@uscg.mil

16591/3099
July 12, 2021

Binod Basnet, P.E.
Project Manager
Florida Department of Transportation – District Four
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309
Via email: Binod.Basnet@dot.state.fl.us

Dear Mr. Basnet:

The Coast Guard has completed its review of the Navigation Impact Report (NIR), dated June 15. The project proposes a replacement of the Sebastian Inlet Bridge (SR A1A), which crosses the Sebastian Inlet and is located at the Indian River County and Brevard County boundary. The navigational impact report technical memorandum for the Sebastian Inlet Bridge project was prepared by the Florida Department of Transportation (FDOT) District Four.

Thank you for presenting a comprehensive and professional study. Based on the review of the NIR and information presently available, we have made a preliminary clearance determination for the bridge structure associated with the proposed project. We have determined that navigational clearances, which are congruent with the AICW in this area, will meet the reasonable needs of navigation for a bridge crossing Sebastian Inlet (replacement bridge); to wit, a minimum vertical clearance of 65 feet above mean high water (MHW) for a fixed or vertical lift bridge or 21 feet (closed) above MHW for a swing or bascule bridge, as well as a minimum horizontal clearance of. The guide clearance for the AICW in this location is available online at Bridge Guide Clearances (uscg.mil) by selecting 'Guide Clearances' on the left side of the webpage.

A note regarding guide clearances from the U.S. Coast Guard Office of Bridge Programs' webpage: *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.*

Please note that this preliminary determination does not constitute an approval or final agency action. In accordance with regulation, the Coast Guard can only make a final determination after processing a complete bridge permit application.

To complete the Bridge Permit Application, please refer to the Coast Guard Bridge Permit Application Guide located at https://go.usa.gov/xRFk2 (case sensitive). If you should have any questions, please email Andi.Maris@uscg.mil. We look forward to continuing to work with you and the FDOT to move this project forward.

Sincerely,

RANDALL D. OVERTON, MPA
Director, District Bridge Program
U.S. Coast Guard
By Direction

eCopy: USCG Sector Miami Waterway Management: : Omar.Beceiro@uscg.mil; Erik.J.Watson@uscg.mil

ATTACHMENT B

Sebastian Inlet Management Plan

SEBASTIAN INLET MANAGEMENT STUDY
IMPLEMENTATION PLAN

CERTIFICATE OF ADOPTION

WHEREAS, the Department of Environmental Protection ("Department"), in conjunction with the Sebastian Inlet Tax District Commission, Brevard County and Indian River County, established a Technical Review Committee ("TRC") to review information and make recommendations as to the adequacy of supporting studies and reports, under the provisions of Section 161.161, Florida Statutes, for the purposes of evaluating the erosive impact of Sebastian Inlet on adjacent beaches, and

WHEREAS the Department has developed an implementation plan to meet the Requirements of Chapter 161, Florida Statutes, and

WHEREAS the implementation plan is consistent with the Department's program objectives under Chapter 161, Florida Statutes,

The Department does hereby adopt the following implementation actions:

1) **Continue to bypass suitable sediment to the downdrift beaches.** Periodic maintenance dredging activities, including dredging of the channel and sand trap, will be conducted with placement of all beach compatible material on the downdrift beaches. Supplemental material from alternative sources will be used to meet, or exceed, an average annual placement objective of 70,000 cubic yards ("cy"). As a first priority, material should be placed on the beach in areas of greatest need based upon a plan approved by the Department. Areas of placement may be further refined based upon results from long term monitoring of the inlet and adjacent beaches. The bypassing objective of 70,000 cy is adopted as an interim measure and will be formally validated or redefined in subsequent revisions of the plan, based on a comprehensive monitoring plan, within 5 years of adoption of the Inlet Management Plan.

2) Restore the downdrift beaches designated by the Department as experiencing critical erosion. Downdrift beach restoration will be pursued in conjunction with implementation of shore protection activities under the Indian River County Beach Preservation Plan (IRCBPP) and be considered an integral part of both plans. The restoration of these beaches as stated in the IRCBPP, will be considered to meet state objectives for restoration of any possible adverse effects of the inlet. The activities under both plans will jointly maintain the restored shorelines.

3) **Evaluate possible alternatives to facilitate sediment bypassing.** Specific alternatives to be investigated include modifications to the

trapping capacity of the sand trap, structural changes to the south jetty to minimize backpassing of material into the inlet, and identification and use of possible sources of trapped littoral sediments (i.e. floodshoal and north shore) for bypassing to the downdrift beaches.

4) **Implement a comprehensive beach and offshore monitoring program.** Monitor inlet shoals and shoreline change, identify beach placement locations for future bypassing efforts and revalidate the sediment budget The program will be coordinated with monitoring activities associated with the Indian River County shore protection projects.

This plan is based on the findings and recommendations of the Sebastian Inlet Technical Review Committee and comments provided by public agencies and the citizenry of Brevard and Indian River counties. Each implementation action contained in this plan is subject to further evaluation, and subsequent authorization, as part of the Department's environmental permitting and authorization process.

It is the intent of the Department to assist in the implementation of the plan through the provision of funds granted under the Florida Beach Erosion Control Program. The Department's financial obligations shall be contingent upon sufficient legislative appropriations. The level of state funding shall be determined based upon the activity being conducted and Department policy. The Department may choose not to participate financially if the proposed method for implementation is not cost effective or fails to meet the intent of Section 161.142, Florida Statutes.

Nothing in this plan precludes the evaluation and potential adoption of other alternatives or strategies for management at Sebastian Inlet.

APPROVED FOR ADOPTION

Kirby B. Green, Deputy Secretary
Department of Environmental Protection

10 Mar 00
Date

SEBASTIAN INLET MANAGEMENT STUDY
SUMMARY OF FINDINGS REPORT
and
RECOMMENDED IMPLEMENTATION PLAN

Introduction

The Department of Environmental Protection, in conjunction with the Sebastian Inlet Tax District Commission, Brevard County and Indian River County, established a Technical Review Committee ("TRC") to review information and make recommendations as to the adequacy of supporting studies and reports for adoption of an Inlet Management Plan pursuant to Section 161.161, Florida Statutes. The TRC reviewed the 1988 Sebastian Inlet District Comprehensive Management Plan, as amended, and the 1997 Survey-Based Sediment Budget Analysis for Sebastian Inlet.

The findings and recommendations of the TRC have been evaluated by the staff of the Office of Beaches and Coastal as they relate to the Office's statutory responsibilities and program objectives. As a result of that evaluation, the Office has developed a recommended implementation plan to meet those responsibilities and objectives. Adoption of the plan will enable governmental entities to seek financial assistance from the Department for the conduct of management activities authorized in the plan.

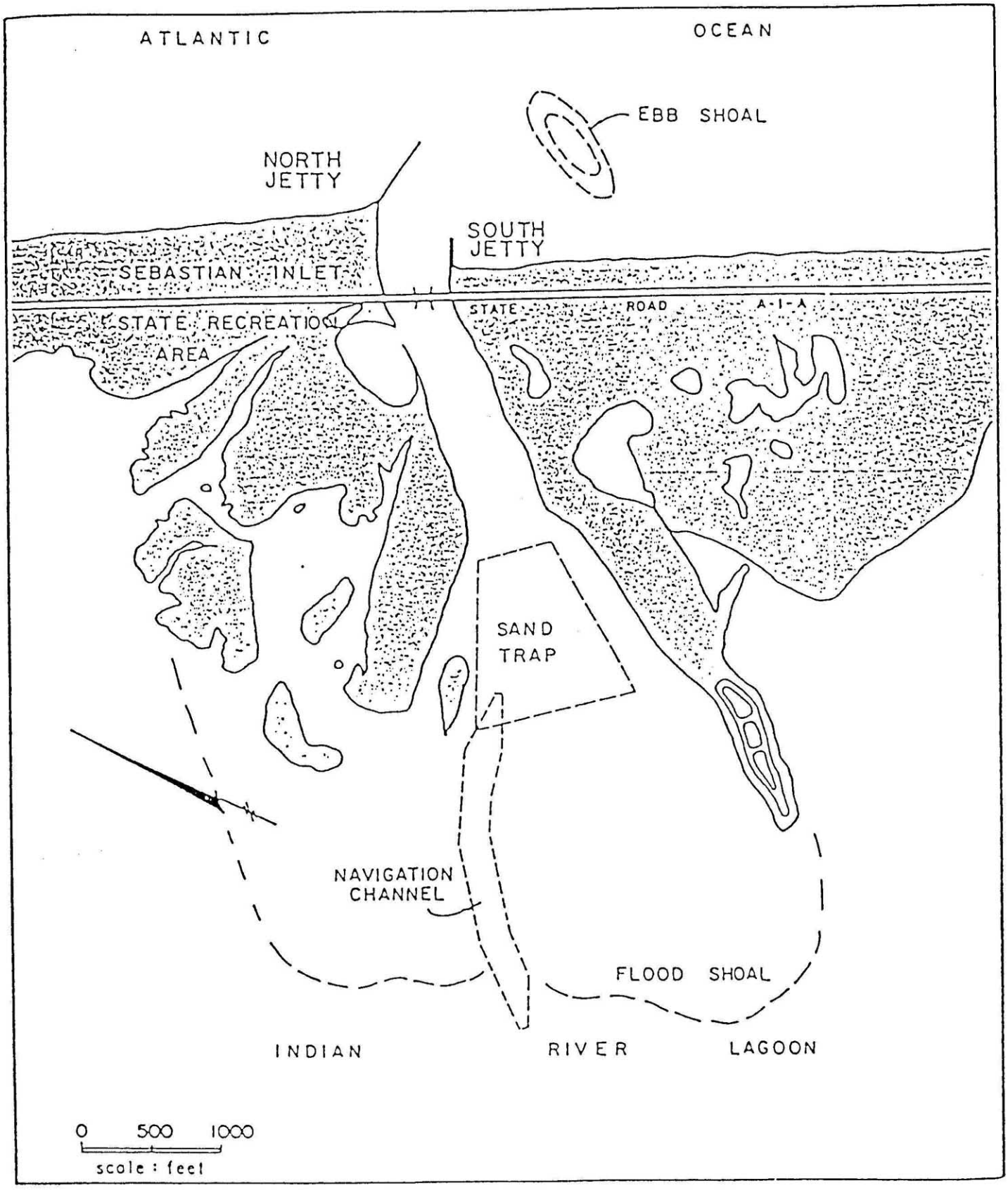
This report contains a brief history of Sebastian Inlet, a summary of the TRC's findings, and recommendations, and the recommended implementation plan.

History of Sebastian Inlet

Sebastian Inlet forms the border between Brevard and Indian Counties. The first attempt to cut a man-made inlet in the Sebastian area was made in 1886, but a hurricane closed the inlet. Since that time, numerous efforts to establish and stabilize the inlet for navigation have occurred over the years resulting in the construction of jetties and a sand trap. The current structural configuration consists of a north jetty approximately 1600 feet in length, and a southern jetty of approximately 1200 feet. The sand trap has a design capacity of 180-190,00 cubic yards (cy).

The inlet channel, sand trap and associated structures are maintained by the Sebastian Inlet Tax District Commission. Maintenance dredging of the channel and sand trap occur periodically, with placement of suitable material on the downdrift beaches located south of the inlet.

Previous studies of the inlet suggest the need to bypass between 70,000 and 75,000 cy of material annually to offset the impacts of the inlet, In an effort to meet the bypassing


ATLANTIC
OCEAN
EBB SHOAL
NORTH JETTY
SOUTH JETTY
SEBASTIAN INLET
STATE RECREATION AREA
STATE ROAD A-1-A
SAND TRAP
NAVIGATION CHANNEL
FLOOD SHOAL
INDIAN RIVER LAGOON
0 500 1000
scale : feet

objective, the District places material from an upland source on the downdrift beaches when sufficient material is not available from the sand trap.

Technical Review Committee Findings and Recommendations

1. Annual Bypassing Volume - Several reference sources reported annual bypassing volumes. There is some variation in the reported bypassing volumes, but most of them consistently report values of 70-75,000 cy/yr. The TRC agreed that a minimum of 70,000 cy/yr should be adopted in the inlet management plan with further refinement to be made following adoption of the Inlet Management Plan (IMP).

2. Flood Shoal - The TRC agreed that further study of long-term effects of the flood shoal on the inlet-related sediment budget should be performed. The position of the TRC was that existing studies do not provide sufficient information to answer questions regarding sand losses to the flood shoal. However, it was agreed that the IMP should move forward for adoption before additional studies are considered.

3. Historic Impacts - The consensus position of the TRC is that identification of the long-term impacts associated with the inlet in terms of impoundment of sand and sediment volume deficit to downdrift areas is incomplete and should be given priority in the implementation phase of the IMP. The TRC acknowledged that there is a high degree of interest from areas downdrift of the inlet with regard to the long-term impact of the inlet. The TRC agreed that there is a lack of sufficient information currently available to establish the long-term inlet impact The TRC agreed that the long-term impact determination would require further study following adoption of the IMP.

4. Area of Inlet Influence - This item is closely linked to item three above. The TRC position is that there is variation in existing numbers and that there is a lack of sufficient analysis and information existing to establish a consensus position on the area of influence. The TRC agreed that this item should be given high priority for determination following adoption of the IMP.

5. Methods of Calculating Sand Budget - The consensus position of the TRC was that continued refinement of the sand budget formulation methodology is desired.

6. Sources of Supplemental Fill - Supplemental sand fill is sand that is placed in addition to the annual sand bypassing needed to maintain the annual sand budget. The supplemental sand would be placed in order to restore eroded beaches downdrift of the inlet. Indian River County is initiating sand search activities for supplemental sand for restoration work with a focus on offshore sand sources. The TRC agreed that cooperative sand search studies should be conducted for the supplemental sand following adoption of the IMP.

7. Sand Bypassing and Placement - Sand bypassing has been performed at Sebastian nlet by either dredging of sand from the Inlet's sand trap and transfer by pipeline or by truck haul to downdrift beaches within the Sebastian Inlet State Recreation Area. The bypassing is per-formed generally on a 2-year cycle rather than on an annual basis, so that larger sand volumes can be transferred in a more economical manner, Currently, the inlet sand trap has a 180-190,000 cy capacity and is dredged when the sand volume reaches 150,000 cy. The TRC agreed that any further consideration of modifications to the inlet sand trap should be a subject of future study. Sand placement utilizing material from the sand trap starts at a distance of 3,000 feet south of the inlet and extends southward. The TRC agreed that sand placement should be in the downdrift area of greatest need within the area of influence of the inlet and be placed in an environmentally sensitive manner.

8. Environmental - The TRC identified and discussed a number of environmental issues relevant to sand management and sand bypassing at Sebastian Inlet. Environmental concerns discussed by the TRC included impacts to nearshore hardbottom areas, nesting marine turtles, dune vegetation, sea grasses, beach mouse habitat, and turbidity impacts. The TRC acknowledged that further environmental studies would likely be required in relation to larger mitigative fill projects or other components of the IMP in the permitting process for those projects, The TRC agreed that no further environmental studies should be required prior to adoption of the IMP.

9. Structural - Technical studies conducted to analyze structural improvements at Sebastian Inlet, particularly studies conducted by the University of Florida for the District, included recommendations to extend the south jetty. A jetty extension would prevent bypassed sand placed on the downdrift beaches from being transported back into the inlet and promote more efficient bypassing. A north jetty extension was also addressed in the studies. The TRC does not support a north jetty extension.

10. Public Resources – The Sebastian Inlet area is heavily used for a number of recreational and public interest activities, including boating, fishing, surfing, etc. The TRC concurred that all public resources associated with the inlet should not be addressed by the TRC or be included in the IMP, but be considered prior to implementation of any IMP components.

Recommended Implementation Plan

The Office of Beaches and Coastal Systems recommends the following implementation plan be adopted to meet the requirements of Chapter 161, Florida Statutes:

1. Continue to bypass suitable sediment to the downdrift beaches. Periodic maintenance dredging activities, including dredging of the channel and sand trap, will be conducted with placement of all beach compatible material on the

Nothing in this plan precludes the evaluation and potential adoption of other alternatives or strategies for management at Sebastian Inlet.

APPENDIX C

Correspondence

Florida Department of Transportation

RON DESANTIS
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

JARED W. PERDUE, P.E.
SECRETARY

May 9, 2023

Mr. Daniel Alsentzer, Bureau Chief, Office of Park Planning
Florida Department of Environmental Protection
Division of Recreation and Parks
3800 Commonwealth Blvd
Tallahassee, Florida 32399-3000

Subject: Final *De minimis* Request for Concurrence on Sebastian Inlet Park
Sebastian Inlet Bridge Replacement Project
Financial Management Number: 445618-1-22-01
Limits: Roadway ID 88070000 from MP 21.945 to MP 22.665
Roadway ID 70060000 from MP 0.000 to MP 0.395
Indian River and Brevard Counties, Florida

Dear Mr. Alsentzer:

As part of the ongoing Project Development and Environment (PD&E) Study for the above referenced project, the Florida Department of Transportation (FDOT) has identified your agency as the Official with Jurisdiction (OWJ) over Sebastian Inlet State Park (Park). This park qualifies for protection as a Section 4(f) resource because it is a publicly owned, recreational resource, 49 U.S.C. §303. In analyzing the project's effects upon the Park with respect to its ability to continue providing public recreational opportunities, FDOT wishes to notify you that our evaluation supports a *de minimis* finding based on park operations. As discussed previously with Florida Department of Environmental Protection (FDEP) state and local park staff, this Section 4(f) process is necessary because of the project's proposed impact to park property for transportation related improvements.

Through coordination with Mr. Ken Torres, Park Manager, and Ms. Jennifer Roberts, Assistant Bureau Chief, both FDEP and FDOT have discussed the activities, features, and attributes that qualify the park for protection as well as measures to minimize harm through avoidance, mitigation and enhancement. Impacts to these identified qualities, along with proposed avoidance and minimization measures relating to location of the proposed ponds sites as well as reduction in footprint along with betterments for the Park, form the basis for the *de minimis* impact determination. The project plans, including the proposed impacts to the Park, were available for public comment during Public Hearings held on December 13, 2022 (Virtual) and December 15, 2022 (in-person). After reviewing all public comments from the hearings, FDOT documented that there were no public comments on the impacts to the Park.

Through our coordination, we collectively identified the following mitigation measures as part of the *de minimis* process that FDOT commits to providing as part of the project:

- Replacing the existing perimeter fence around the bridge on the north side of the park.
- Repaving both the south and north parking lots within the FDOT right of way (ROW) under the bridge.

- Providing funding through a Joint Participation Agreement (JPA) for installation of electronic gates at both the south and north park entrances.
- Continue efforts to further reduce, and not increase, the total amount of park acreage needed to be converted to FDOT ROW for inclusion as stormwater management facilities during the final design phase from the estimated 2.87 acres shown in the proposed Pond Reduction Alternative Matrix.

In addition to the Section 4(f) consultation, FDOT recognizes there are additional processes which require agency coordination to further consider and minimize impacts to natural resources within the Park. As the project transitions to the final design phase, FDOT will continue working with the Division of State Lands to address the Acquisition and Restoration Council (ARC) process and will embark on the environmental permitting process as well.

To conclude the *de minimis* consultation process in accordance with 23 CFR §774.5(b), FDOT requests your signature below as concurrence from the OWJ with FDOT's *de minimis* finding. As the project moves to design, FDOT will continue to coordinate with your staff to further refine these mitigation measures.

If there are any questions, please feel free to contact me at (954) 777-4325 or Christie Pritchard at (954) 777-4147.

Sincerely,

Ann Broadwell

Ann Broadwell
Environmental Administrator
FDOT - District 4

Concurrence: The Florida Department of Environmental Protection (FDEP) as the Official with Jurisdiction concurs that the permanent impacts to the Sebastian Inlet State Park as a result of the Sebastian Inlet Bridge Replacement Project, including all measures to mitigate and minimize harm (which shall include, but not be limited to the four commitment bullets in the letter above), will not adversely affect the activities, features, or attributes that qualify the property for protection under Section 4(f) [49 U.S.C. §303] and concurs with FDOT's Section 4(f) *de minimis* finding. In addition, FDEP recognizes that FDOT will continue its coordination to minimize impacts to the Park (which may include further minimization of park natural area conversion to stormwater features to support the expanded roadway which would ultimately be finalized through acquisition of those potentially smaller areas as FDOT ROW) and address proprietary matters through the ARC process.

Daniel Alsentzer, Chief, Office of Park Planning
Digitally signed by Daniel Alsentzer, Chief, Office of Park Planning
Date: 2023.05.09 16:12:10 -04'00'

Daniel Alsentzer, Bureau Chief, Office of Park Planning
Florida Department of Environmental Protection

May 9, 2023
Date

cc:

Mr. Ken Torres, FDEP Park Manager
Ms. Jennifer Roberts, FDEP Assistant Bureau Chief
Mr. Brad Richardson, FDEP Division of State Lands
Mr. Binod Basnet, P.E., FDOT Project Manager
Ms. Beth Beam, Consultant Project Manager, Stantec Inc.
Ms. Christie Pritchard, Pritchard Environmental Inc.

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

Commander
United States Coast Guard
Seventh District

909 S. E. 1st Avenue (Rm 432)
Miami, FL 33131
Staff Symbol: (dpb)
Phone: (305) 415-6743
Fax: (305) 415-6763
Email: Andi.Maris@uscg.mil

16591/3099
October 20, 2021

Binod Basnet, P.E.
Project Manager
Florida Department of Transportation – District Four
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309
Via email: Binod.Basnet@dot.state.fl.us

Dear Mr. Basnet:

The Coast Guard has completed its review of the vertical alternatives evaluation, dated October 1, 2021. The vertical alternatives evaluation technical memorandum for the Sebastian Inlet Bridge project was prepared by the Florida Department of Transportation (FDOT) District Four; a meeting was held by FDOT on October 12, 2021 to discuss its findings. The project proposes a replacement of the Sebastian Inlet Bridge (SR A1A), which crosses the Sebastian Inlet and is located at the Indian River County and Brevard County boundary.

Thank you for presenting a comprehensive and professional study. Based on the review of the vertical alternatives evaluation, meeting presentation, and the information presently available, we have made a revised preliminary clearance determination for the bridge structure associated with the proposed project. We have determined that a minimum vertical clearance of 51 feet above mean high water (MHW) for a fixed or vertical lift bridge or 21 feet (closed) above MHW for a swing or bascule bridge, as well as a minimum horizontal clearance of 125 feet, will meet the reasonable needs of navigation for a bridge crossing the Sebastian Inlet (replacement bridge).

The guide clearance for the AICW in this location is available online at Bridge Guide Clearances (uscg.mil) by selecting 'Guide Clearances' on the left side of the webpage. A note regarding guide clearances from the U.S. Coast Guard Office of Bridge Programs' webpage:
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.

Please note that this preliminary determination does not constitute an approval or final agency action. In accordance with regulation, the Coast Guard can only make a final determination after processing a complete bridge permit application.

To complete the Bridge Permit Application, please refer to the Coast Guard Bridge Permit Application Guide located at https://go.usa.gov/xRFk2 (case sensitive). If you should have any questions, please email Andi.Maris@uscg.mil. We look forward to continuing to work with you and the FDOT to move this project forward.

Sincerely,

RANDALL D. OVERTON, MPA
Director, District Bridge Program
U.S. Coast Guard
By Direction

eCopy: USCG Sector Miami Waterway Management: Omar.Beceiro@uscg.mil; Erik.J.Watson@uscg.mil

Florida Department of Transportation

RON DESANTIS
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

KEVIN J. THIBAULT, P.E.
SECRETARY

February 9, 2022

Timothy A. Parsons, Ph.D.
Director, Division of Historical Resources, and
State Historic Preservation Officer
R.A. Gray Building
500 S. Bronough Street
Tallahassee FL 32399-0250

Attn: Marsha K. Welch, Transportation Compliance Review Program

Re: Cultural Resource Assessment Survey (CRAS) and Effects Finding: State Road (SR) A1A Sebastian Inlet Bridge (FDOT Bridge No. 880005) Project Development and Environment (PD&E) Study
FM No. 445618-1-22-02
ETDM No. 14433
Brevard County and Indian River County, Florida

Dear Ms. Welch,

The *Cultural Resource Assessment Survey (CRAS) of the State Road (SR) A1A Sebastian Inlet Bridge (FDOT Bridge No. 880005) Project Development and Environment (PD&E) Study, Brevard and Indian River counties, Florida* was undertaken by Janus Research at the request of the Florida Department of Transportation (FDOT), District 4. This survey and report were also prepared under 1A-32 Archaeological Research Permit No. 2021.50, issued by the Bureau of Archaeological Research (BAR) on May 5, 2021. The project limits are approximately one mile long. The purpose of the CRAS of the SR A1A Sebastian Inlet Bridge was to locate and evaluate potential archaeological and historic resources within the Area of Potential Effect (APE) and to assess eligibility for inclusion in the *National Register of Historic Places* (National Register) according to criteria set forth in 36 CFR Section 60.4.

All work was conducted in accordance with Section 106 of the *National Historic Preservation Act (NHPA) of 1966* (Public Law 89-665, as amended), as implemented by 36 CFR 800 -- *Protection of Historic Properties* (incorporating amendments effective August 5, 2004); Stipulation VII of the *Programmatic Agreement among the Federal Highway Administration (FHWA), the Advisory Council on Historic Preservation (ACHP), the Florida Division of Historical Resources (FDHR),*

the State Historic Preservation Officer (SHPO), and the FDOT Regarding Implementation of the Federal-Aid Highway Program in Florida (Section 106 Programmatic Agreement, effective March 2016, amended June 7, 2017); Section 102 of the *National Environmental Policy Act (NEPA) of 1969*, as amended (42 USC 4321 et seq.), as implemented by the regulations of the Council on Environmental Quality (CEQ) (40 CFR Parts 1500–1508); Section 4(f) of the *Department of Transportation Act of 1966*, as amended (49 USC 303 and 23 USC 138); the revised Chapters 267 and 373, *Florida Statutes (F.S.)*; and the standards embodied in the FDHR's *Cultural Resource Management Standards and Operational Manual* (February 2003), Chapter 1A-46 (*Archaeological and Historical Report Standards and Guidelines*), *Florida Administrative Code (FAC)*, and Rule 1A-32 (*Archaeological Research*), *FAC*. In addition, this report was prepared in conformity with standards set forth in Part 2, Chapter 8 (*Archaeological and Historical Resources*) of the FDOT *PD&E Manual* (effective July 1, 2020). All work also conforms to professional guidelines set forth in the *Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716, as amended and annotated).

The FDOT District 4 is conducting a PD&E Study to evaluate the replacement of the Sebastian Inlet Bridge (FDOT Bridge No. 880005) crossing the Sebastian Inlet located at the Indian River County and Brevard County boundary. The Sebastian Inlet Bridge, also known as the James H. Pruitt Memorial Bridge, was constructed in 1964 to carry SR A1A across the Sebastian Inlet. The bridge is approximately 1,500 feet long with 19 spans, the longest of which is approximately 180 feet long. The bridge vertical clearance is 39 feet and horizontal clearance is 150 feet between the bridge fenders. The Inlet provides access for vessels between the Indian River Lagoon and the Atlantic Ocean and is approximately 525 feet wide at the bridge. The bridge is located within FDOT and Sebastian Inlet District (SID) right-of-way (ROW) and is adjacent to the Sebastian Inlet State Park. The Inlet was created from privately owned uplands. In 1919 the SID was formed to maintain the Inlet and owns the submerged lands under the bridge.

The existing bridge has two 12-foot travel lanes and 2-foot shoulders. The approach roadway has two 12-foot travel lanes. North and south of the bridge, paved shoulders are 2- to 4-feet wide. South of the bridge, shoulders are marked as designated bicycle lanes. There are currently no pedestrian or bicycle facilities located within the bridge approaches or on the bridge, creating a gap in the multimodal network along SR A1A. An 8-foot shared use path, separated from SR A1A, is located on the west side of the roadway north and south of the bridge.

This project was evaluated through FDOT's Efficient Transportation Decision Making (ETDM) process as project No. 14433. An ETDM Programming Screen Summary Report containing comments from the Environmental Technical Advisory Team (ETAT) was published on June 3, 2020. The ETAT evaluated the project's effects on natural, physical, cultural, social, and economic resources.

Two archaeological sites, 8IR34 and the Micco Beach Site (8BR125), have been recorded within the archaeological area of potential effect (APE) for the project, which encompasses all areas of potential ground disturbing improvements for each project alternative, as well as areas proposed for ROW acquisition. The SHPO has not previously evaluated these sites for their National

Register eligibility. Additionally, one archaeological occurrence was identified during the field review.

The field review identified no remnants of previously recorded 8IR34 archaeological site, a pre-Columbian midden, within the archaeological APE. However, due to the presence of a paved parking lot, a paved park road, bridge berms, and underground utilities serving a guard house, no subsurface testing was possible within the vicinity of this site. Therefore, there is insufficient information to determine the National Register eligibility of 8IR34.

A small part of the previously recorded Micco Beach Site (8BR125), a pre-Columbian midden that potentially contains Archaic, Malabar I/St. Johns I, and Malabar II/St. Johns II components, was relocated within the archaeological APE in seven (7) shovel tests. The portion of the site within the archaeological APE lacks intact midden or features and contains a sparse artifact assemblage. Much of it is disturbed and potentially redistributed from the main part of the site to the east, closer to the beach. Previous research on the main portion of the site outside the current archaeological APE has identified more extensive archaeological material and intact human burials. Because of the limited testing of the site for this project, there is insufficient information to assess the eligibility of the larger Micco Beach Site (8BR125). However, if the site were to be determined National Register–eligible in the future, the small portion of the site contained within the current archaeological APE would not contribute to its significance.

Due to the archaeological sensitivity of the area, the previous identification of human remains at the Micco Beach site (8BR125), and the inability to test portions of the APE with elevated archaeological potential, such as within the 8IR34 archaeological site, a professional Archaeologist will conduct monitoring of this project during construction. The resultant report will be provided to your office once it is available.

Historical research and field survey resulted in the identification and evaluation of four resources comprised of one previously identified historic bridge (James H. Pruitt Memorial Bridge, 8BR3148/8IR1493), one previously identified historic roadway (SR A1A, 8BR2544/8IR1500) and two newly identified historic landscapes (Sebastian Inlet State Park, 8BR4206/8IR1877; and Swimming Lagoon, 8BR4433). The James H. Pruitt Memorial Bridge (8BR3148/8IR1493) was constructed in 1964 and was determined individually National Register–eligible in 2012 by the Florida SHPO as a result of the 2010 *Historic Highway Bridges of Florida* study conducted by Archaeological Consultants, Incorporated (ACI) on behalf of the FDOT Office of Environmental Management. The James H. Pruitt Memorial Bridge was determined National Register–eligible under Criterion C for its Engineering. The bridge is an early example of the use of prestressed concrete in Florida. The current study finds that the bridge remains eligible for the National Register.

The portion of SR A1A (8BR2544/8IR1500) within the current project area is similar to other portions determined ineligible in 2010 and 2020. Historical research and field survey did not revealed any additional information to suggest the resource is eligible for the National Register, therefore, the portion of SR A1A within the current project area is considered National Register ineligible.

The newly identified Sebastian Inlet State Park (8BR4206/8IR1877) and Swimming Lagoon (8BR4433) are associated with the post-World War II development of publicly owned recreational areas that occurred throughout the state of Florida. Based on the lack of significant historical associations, both the Sebastian Inlet State Park and the Swimming Lagoon are considered ineligible for the National Register both individually and as contributing resources to a historic district.

Effects Discussion:
The Criteria of Effects established by Section 106 of the NHPA in 36 CFR 800.5 was applied to the project. The current PD&E included evaluation of Build and Rehabilitation alternatives for the bridge and the No-Action (No-Build) alternative, replacement of the existing under deck observation/fishing piers, and the addition of bicycle and pedestrian facilities across the bridge. The underdeck observation/ fishing piers are located under the north and south portions of the bridge. Build alternatives will include evaluation of the bridge vertical clearance as required by the US Coast Guard (USCG). A navigation needs analysis memorandum was submitted to the USCG and a preliminary clearance determination was received which stated a desired minimum vertical clearance of 65-feet above mean high water (MHW) for a fixed bridge and 125-feet minimum horizontal clearance.

The alternatives analysis resulted in the conclusion that the rehabilitation option did not meet the purpose and need for the project and the bridge remains structurally and functionally deficient. Based on the results of the rehabilitation alternative analysis, this alternative was removed from further consideration.

The three build alternatives considered alignments in the current bridge location (Build Alternative 1), an alignment east of the current bridge (Build Alternative 2), and an alignment to the west of the current bridge (Build Alternative 3). All of the build alternatives require the demolition of the current bridge. There currently is not a chosen Preferred Alternative.

Since all of the build alternatives will require the demolition of the National Register eligible James H. Pruitt Memorial Bridge (8BR3148/8IR1493) it was determined that the proposed project will have an adverse effect to historic properties. The remaining resources are ineligible for the National Register. As a result of this adverse effect, further consultation with your office and project stakeholders to minimize and mitigate the adverse effect will occur.

We kindly request that this letter be reviewed, and concurrence provided by your office. This information is provided in accordance with the provisions contained in 36 CFR, Part 800, as well as the provisions contained in the revised Chapter 267, *F.S.* If you have any questions regarding the subject project, please contact me at ann.broadwell@dot.state.fl.us or Lynn Kelley at lynn.kelley@dot.state.fl.us.

Sincerely,

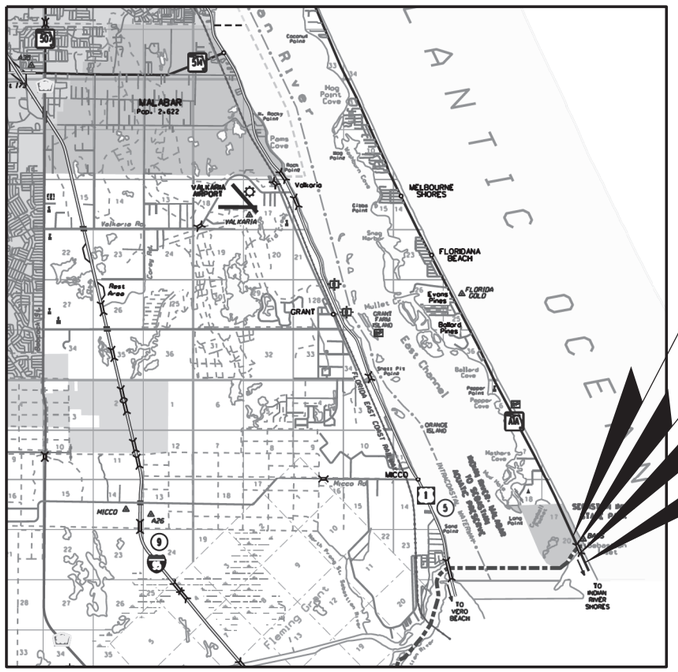
DocuSigned by:
Ann Broadwell
1942EE83B10D4E7...

Ann Broadwell
Environmental Administrator
FDOT District 4 Planning & Environmental Management

The Florida State Historic Preservation Officer ☑ concurs/ ☐ does not concur with the recommendations and findings provided in this cover letter for SHPO/FDHR Project File Number 2019-8223C. Or, the SHPO finds the attached document contains _____ insufficient information.
SHPO Comments:
3/30/2022
Timothy A. Parsons, Director, and State Historic Preservation Officer Florida Division of Historical Resources [DATE]

APPENDIX D

Typical Section Package



STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION PACKAGE

FINANCIAL PROJECT ID 445618-1-22-02

INDIAN RIVER COUNTY (88070) &
BREVARD COUNTY (70060)
STATE ROAD NO. A1A

APPROVED BY:

ROBERTO C. GUTIERREZ
No 71043

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY

Gutierrez, Roberto
Digitally signed by Gutierrez, Roberto
Date: 2022.04.08 17:03:16-04'00'

ON THE DATE ADJACENT TO THE SEAL

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

STANTEC CONSULTING SERVICES, INC.
901 PONCE DE LEON BOULEVARD, SUITE 900
CORAL GABLES, FL 33134-3070
ROBERTO C. GUTIERREZ, PE NO. 71043

MOHIT D. SONI
No 65204

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY

Mohit Soni
Mohit Soni
2022.04.08 16:55:08 -04'00'

ON THE DATE ADJACENT TO THE SEAL

PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED AND THE SIGNATURE MUST BE VERIFIED ON ANY ELECTRONIC COPIES.

STANTEC CONSULTING SERVICES, INC.
901 PONCE DE LEON BOULEVARD, SUITE 900
CORAL GABLES, FL 33134-3070
MOHIT D. SONI, PE NO. 65204

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004, F.A.C.

TYPICAL SECTION PACKAGE

SHEET NO	SHEET DESCRIPTION	RESPONSIBLE EOR
1	COVER SHEET	ROBERTO C. GUTIERREZ, P.E.
2	TYPICAL SECTION NO. 1	ROBERTO C. GUTIERREZ, P.E.
3	TYPICAL SECTION NO. 2	ROBERTO C. GUTIERREZ, P.E.
4	TYPICAL SECTION NO. 3	ROBERTO C. GUTIERREZ, P.E.
5	TYPICAL SECTION NO. 4	MOHIT D. SONI, P.E.

TYPICAL SECTION, DESIGN SPEED, POSTED SPEED, AND TARGET SPEED CONCURRENCE

John Olson
Digitally signed by John Olson
Date: 2022.05.08 11:10:34 -04'00'

JOHN OLSON, PE
FDOT DISTRICT DESIGN ENGINEER

TYPICAL SECTION AND TARGET SPEED CONCURRENCE

Cesar J Martinez
Digitally signed by Cesar J Martinez
Date: 2022.04.12 09:43:39 -04'00'

CESAR J. MARTINEZ, PE
FDOT DISTRITCT PROJECT DEVELOPMENT MANAGER

TYPICAL SECTION CONCURRENCE

Ramon A Otero
2022.04.12 08:32:30 -04'00'

RAMON OTERO, PE
FDOT DISTRICT STRUCTURES DESIGN ENGINEER

DESIGN SPEED, POSTED SPEED AND TARGET SPEED CONCURRENCE:

Mark Plass
Digitally signed by Mark Plass
Date: 2022.04.12 14:00:13 -04'00'

MARK PLASS, PE
FDOT DISTRICT TRAFFIC OPERATIONS ENGINEER

CONTEXT CLASSIFICATION CONCURRENCE:

Lawrence E Wallace
Digitally signed by Lawrence E Wallace
Date: 2022.04.18 12:45:47 -04'00'

LAWRENCE E. WALLACE, PE
FDOT DISTRICT BICYCLE/PEDESTRIAN/COMPLETE STREETS COORDINATOR

SHEET NO.
1

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11/16/2021 3:34:41 PM jaranda
\\Us0231-ppfss01\workgroup\2158\active\215811053 Sebastian Inlet SR A1A\300-Engineering\Typical Sections\TYPDRD01.dgn

PROJECT CONTROLS

CONTEXT CLASSIFICATION

(X)	C1 : NATURAL	( )	C3C : SUBURBAN COMM.
( )	C2 : RURAL	( )	C4 : URBAN GENERAL
( )	C2T : RURAL TOWN	( )	C5 : URBAN CENTER
( )	C3R : SUBURBAN RES.	( )	C6 : URBAN CORE
( )	N/A : L.A. FACILITY		

FUNCTIONAL CLASSIFICATION

( )	INTERSTATE	( )	MAJOR COLLECTOR
( )	FREEWAY/EXPWY.	( )	MINOR COLLECTOR
( )	PRINCIPAL ARTERIAL	( )	LOCAL
(X)	MINOR ARTERIAL		

HIGHWAY SYSTEM

( ) NATIONAL HIGHWAY SYSTEM
( ) STRATEGIC INTERMODAL SYSTEM
(X) STATE HIGHWAY SYSTEM
( ) OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

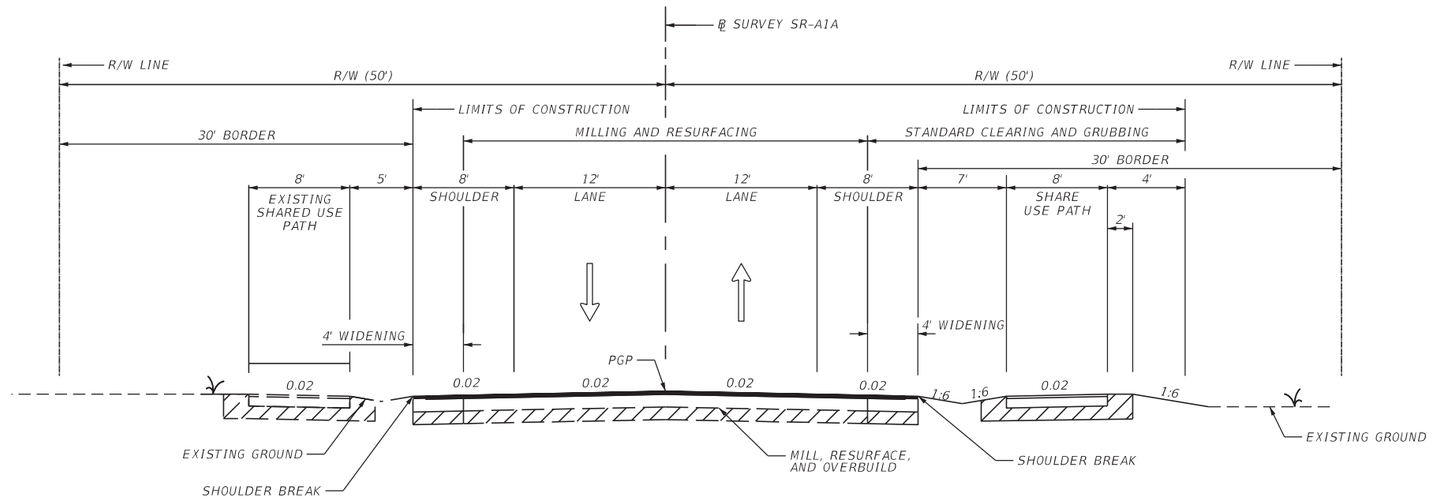
( ) 1 - FREEWAY
( ) 2 - RESTRICTIVE w/Service Roads
( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
(X) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
( ) 7 - BOTH MEDIAN TYPES

CRITERIA

(X) NEW CONSTRUCTION / RECONSTRUCTION
( ) RESURFACING (LA FACILITIES)
( ) RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

TYPICAL SECTION No. 1



SR-A1A
2-LANE SECTION M.P. 21.945 TO M.P. 22.013

TRAFFIC DATA

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ESTIMATED OPENING YEAR = 2025 AADT = 3100
ESTIMATED DESIGN YEAR = 2045 AADT = 3700
K = 9% D = 53.4% T = 7.4% (24 HOUR)
DESIGN HOUR T = 3.7%
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH
TARGET SPEED = 45 MPH

FINANCIAL PROJECT ID	SHEET NO.
445618-1-22-02	2

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

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(X)	C2 : RURAL	( )	C4 : URBAN GENERAL
( )	C2T : RURAL TOWN	( )	C5 : URBAN CENTER
( )	C3R : SUBURBAN RES.	( )	C6 : URBAN CORE
( )	N/A : L.A. FACILITY		

FUNCTIONAL CLASSIFICATION

( )	INTERSTATE	( )	MAJOR COLLECTOR
( )	FREEWAY/EXPWY.	( )	MINOR COLLECTOR
( )	PRINCIPAL ARTERIAL	( )	LOCAL
(X)	MINOR ARTERIAL		

HIGHWAY SYSTEM

( )	NATIONAL HIGHWAY SYSTEM
( )	STRATEGIC INTERMODAL SYSTEM
(X)	STATE HIGHWAY SYSTEM
( )	OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

( )	1 - FREEWAY
( )	2 - RESTRICTIVE w/Service Roads
( )	3 - RESTRICTIVE w/660 ft. Connection Spacing
(X)	4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
( )	5 - RESTRICTIVE w/440 ft. Connection Spacing
( )	6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
( )	7 - BOTH MEDIAN TYPES

CRITERIA

(X)	NEW CONSTRUCTION / RECONSTRUCTION
( )	RESURFACING (LA FACILITIES)
( )	RRR (ARTERIALS & COLLECTORS)

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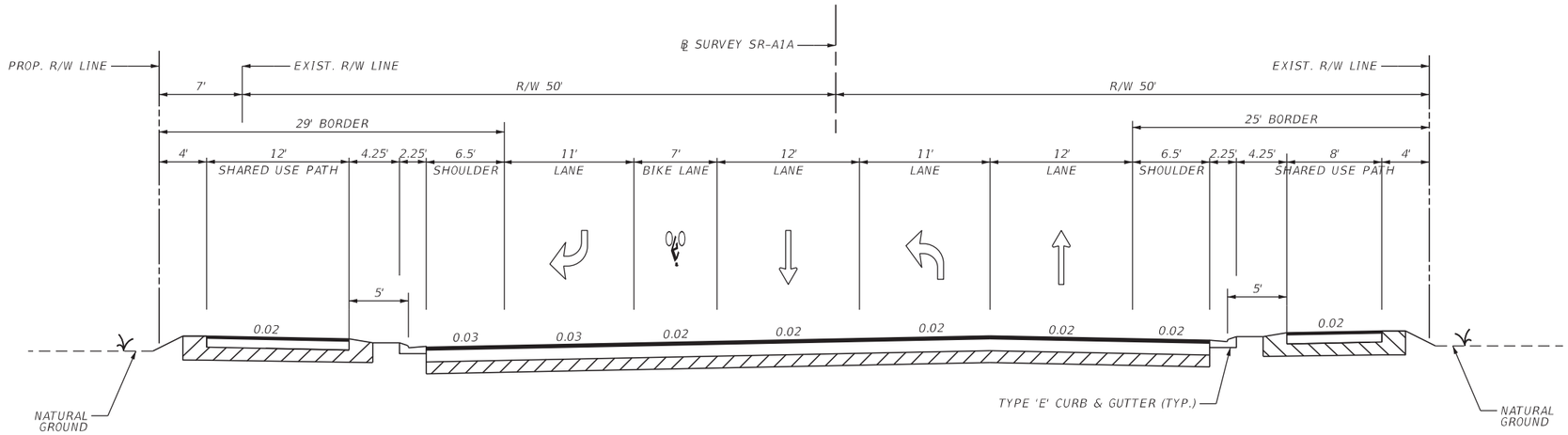

SR-A1A
2-LANE SECTION WITH CENTER TURN LANE & RIGHT TURN LANE
M.P. 22.013 TO M.P. 22.213 (C1)
M.P. 0.192 TO M.P. 0.338 (C2)

TRAFFIC DATA

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DESIGN HOUR T = 3.7%
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH
TARGET SPEED = 45 MPH

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

(X)	C1 : NATURAL	( )	C3C : SUBURBAN COMM.
( )	C2 : RURAL	( )	C4 : URBAN GENERAL
( )	C2T : RURAL TOWN	( )	C5 : URBAN CENTER
( )	C3R : SUBURBAN RES.	( )	C6 : URBAN CORE
( )	N/A : L.A. FACILITY		

FUNCTIONAL CLASSIFICATION

( )	INTERSTATE	( )	MAJOR COLLECTOR
( )	FREEWAY/EXPWY.	( )	MINOR COLLECTOR
( )	PRINCIPAL ARTERIAL	( )	LOCAL
(X)	MINOR ARTERIAL		

HIGHWAY SYSTEM

- ( ) NATIONAL HIGHWAY SYSTEM
- ( ) STRATEGIC INTERMODAL SYSTEM
- (X) STATE HIGHWAY SYSTEM
- ( ) OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

- ( ) 1 - FREEWAY
- ( ) 2 - RESTRICTIVE w/Service Roads
- ( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- (X) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
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- ( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- ( ) 7 - BOTH MEDIAN TYPES

CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

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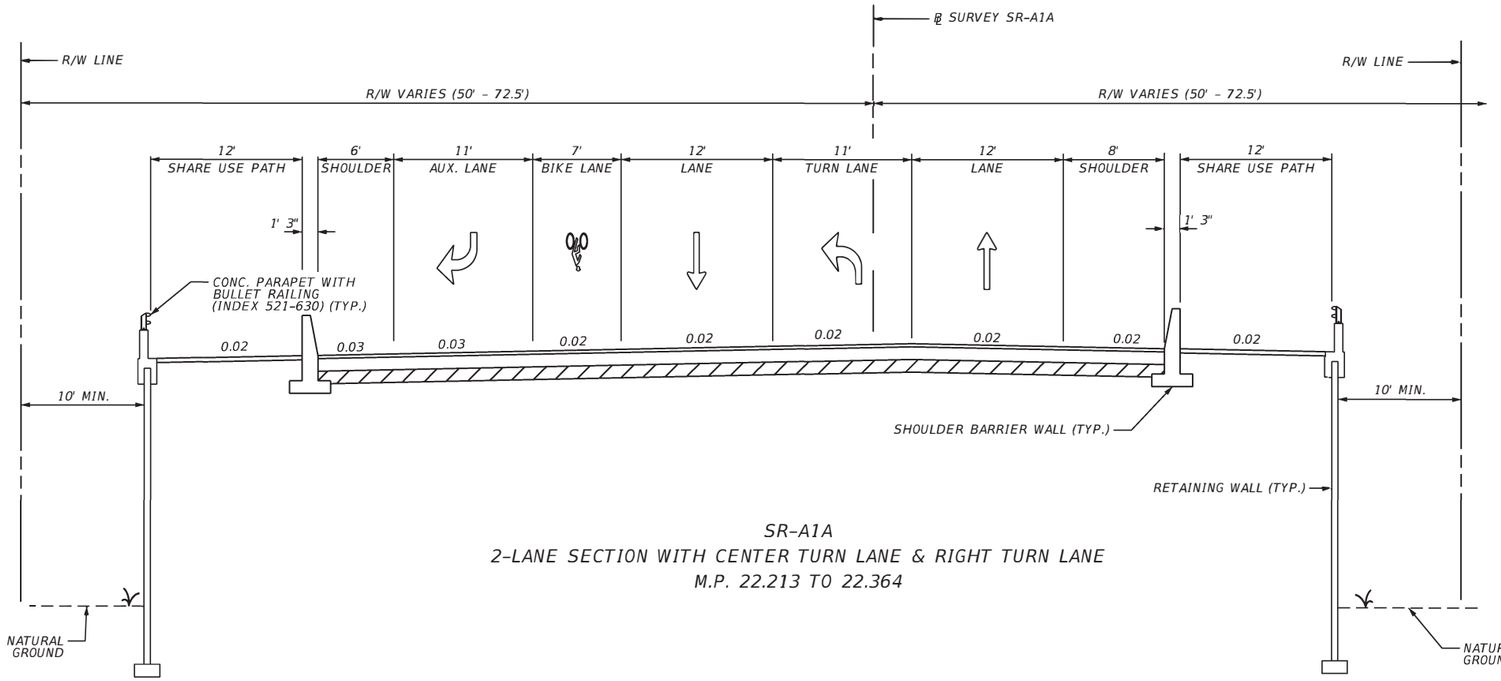

SR-A1A
2-LANE SECTION WITH CENTER TURN LANE & RIGHT TURN LANE
M.P. 22.213 TO 22.364

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TARGET SPEED = 45 MPH

FINANCIAL PROJECT ID	SHEET NO.
445618-1-22-02	4

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

( )	C1 : NATURAL	( )	C3C : SUBURBAN COMM.
(X)	C2 : RURAL	( )	C4 : URBAN GENERAL
( )	C2T : RURAL TOWN	( )	C5 : URBAN CENTER
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FUNCTIONAL CLASSIFICATION

( )	INTERSTATE	( )	MAJOR COLLECTOR
( )	FREEWAY/EXPWY.	( )	MINOR COLLECTOR
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(X)	MINOR ARTERIAL		

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CRITERIA

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- ( ) RESURFACING (LA FACILITIES)
- ( ) RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

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1. MARKED SHOULDERS

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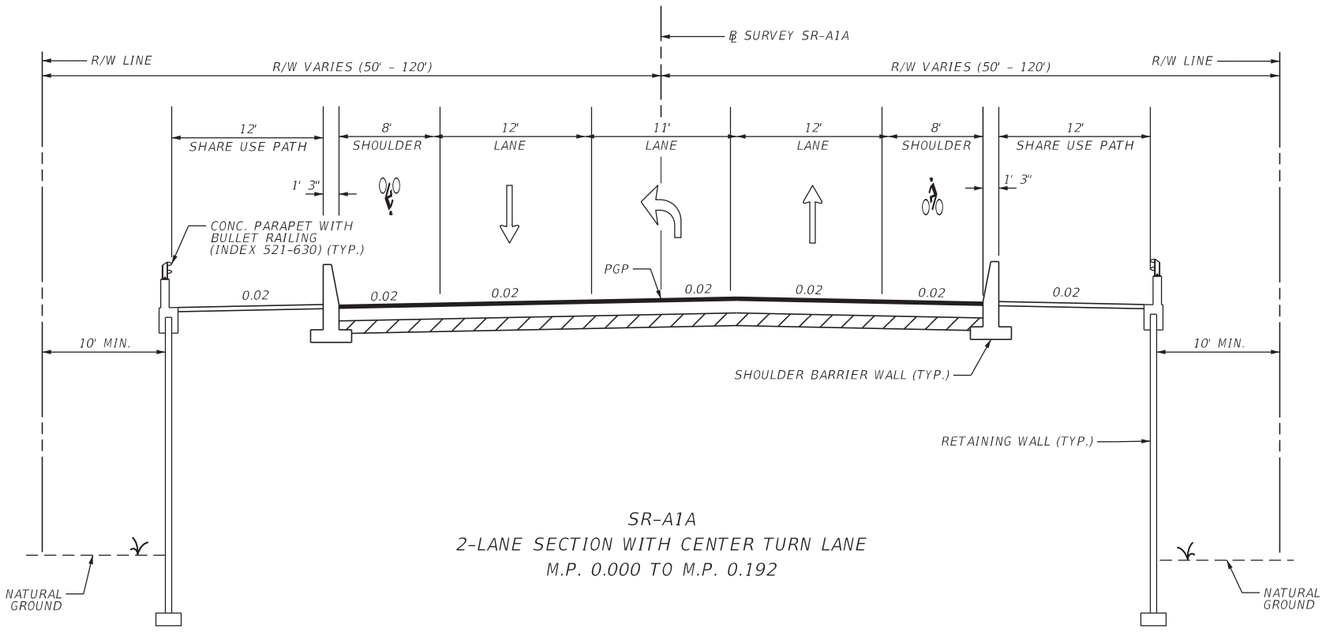

SR-A1A
2-LANE SECTION WITH CENTER TURN LANE
M.P. 0.000 TO M.P. 0.192

TRAFFIC DATA

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ESTIMATED OPENING YEAR = 2025 AADT = 3100
ESTIMATED DESIGN YEAR = 2045 AADT = 3700
K = 9% D = 53.4% T = 7.4% (24 HOUR)
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DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH
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FINANCIAL PROJECT ID	SHEET NO.
445618-1-22-02	5

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

(X)	C1 : NATURAL	( )	C3C : SUBURBAN COMM.
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(X)	MINOR ARTERIAL		

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- ( ) RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

DESIGN VARIATIONS

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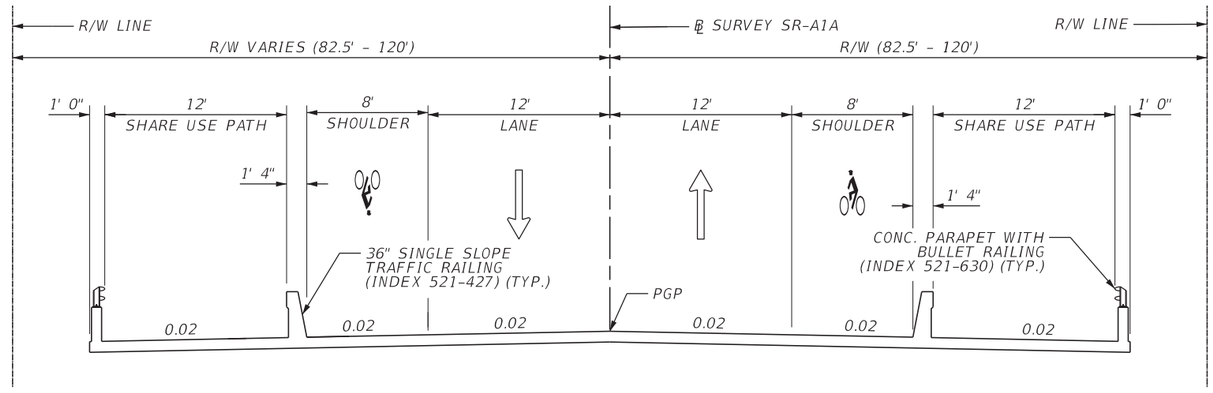

SR-A1A
BRIDGE OVER SEBASTIAN INLET
M.P. 22.364 TO M.P. 22.665

TRAFFIC DATA

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ESTIMATED OPENING YEAR = 2025 AADT = 3100
ESTIMATED DESIGN YEAR = 2045 AADT = 3700
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DESIGN HOUR T = 3.7%
DESIGN SPEED = 50 MPH
POSTED SPEED = 45 MPH
TARGET SPEED = 45 MPH

FINANCIAL PROJECT ID	SHEET NO.
445618-1-22-02	6

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

4/8/2022 2:54:16 PM jorhernandez
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APPENDIX E

Long Range Estimate

Date: 10/26/2022 2:12:28 PM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 445618-1-52-01 **Letting Date:** 10/2025

Description: SR-A1A OVER SEBASTIAN INLET- BRIDGE REPLACEMENT

District: 04 **County:** 88 INDIAN RIVER **Market Area:** 11 **Units:** English

Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 1.108 MI

Project Manager: BASNET

Version 8-P Project Grand Total **$89,039,754.38**

Description: Updated WPUC 2022

Sequence: 1 NUR - New Construction, Undivided, Rural **Net Length:** 0.455 MI 2,400 LF

Description: Replacement of the Sebastian Inlet Bridge. Include roadway reconstruction, MSE Walls, & SUP. Sta. 658+00 to 670+00 = 1,200' Sta. 697+00 to 702+00 = 500' Sta. 702+00 to 709+00 = 700'

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	50.00 / 50.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.180
Top of Structural Course For Begin Section	0.00
Top of Structural Course For End Section	0.00
Horizontal Elevation For Begin Section	0.00
Horizontal Elevation For End Section	0.00
Front Slope L/R	6 to 1 / 6 to 1
Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	5.50 AC	$27,000.00	$148,500.00
120-1	REGULAR EXCAVATION	14,391.87 CY	$15.00	$215,878.05

X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
120-1	REGULAR EXCAVATION	3,000.00 CY	$15.00	$45,000.00
	Comment: Drainage Pond			
120-6	EMBANKMENT	96,296.00 CY	$23.00	$2,214,808.00
	Comment: Fill For MSE Wall. Assume new fill. 0 to 40 foot high wall @ 65 feet wide, 1,000 feet long. X 2 for other side of the bridge.			
	Earthwork Component Total			$2,624,186.05

ROADWAY COMPONENT

User Input Data

Description	Value

Number of Lanes	2
Roadway Pavement Width L/R	39.00 / 32.00
Structural Spread Rate	440
Friction Course Spread Rate	165

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	18,931.44	SY	$20.62	$390,366.29
285-709	OPTIONAL BASE,BASE GROUP 09	19,107.42	SY	$25.00	$477,685.50
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	4,164.92	TN	$150.00	$624,738.00
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	1,561.84	TN	$170.00	$265,512.80

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
521-8-8	CONC BARRIER, W/JUNCT SL, 42 SS	8,126.06	LF	$275.00	$2,234,666.50
	Comment: MSE Lengths = 1149.21 + 560 + 69.33 + 801.38 + 796.79 + 69.32 + 617 = 4,063.03' x 2 = 8,126.06'				
521-72-40	SHLDR CONC BARRIER,38" OR 44" HEIGHT	4,800.00	LF	$280.00	$1,344,000.00
	Comment: Based on typical, then x 2 Sta. 658+00 to 670+00 = 1,200' Sta. 697+00 to 702+00 = 500' Sta. 702+00 to 709+00 = 700' Total = 2,400' x 2 = 4,800'				
999-20-1	DISPUTES REVIEW BD, MEETING- DO NOT BID	24.00	DA	$3,300.00	$79,200.00
999-20-2	DISPUTES REVIEW BD, HEARING- DO NOT BID	2.00	EA	$4,000.00	$8,000.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	Y
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	1
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	1
Skip Stripe No. of Stripes	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-1-3	RAISED PAVMT MARK, TYPE B	61.00	EA	$5.00	$305.00
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.91	GM	$1,150.00	$1,046.50
710-11-231	PAINTED PAVT MARK,STD,YELLOW,SKIP,6"	0.45	GM	$550.00	$247.50
711-15-101	THERMOPLASTIC, STD-OP, WHITE, SOLID, 6"	0.91	GM	$6,150.00	$5,596.50
711-15-201	THERMOPLASTIC, STD-OP,YELLOW, SOLID, 6"	0.91	GM	$5,000.00	$4,550.00
711-16-231	THERMOPLASTIC, STD-OTH, YELLOW, SKIP, 6"	0.45	GM	$1,600.00	$720.00
	Roadway Component Total				$5,436,634.59

SHOULDER COMPONENT

User Input Data

Description	Value
Total Outside Shoulder Width L/R	0.00 / 0.00
Total Outside Shoulder Perf. Turf Width L/R	0.00 / 0.00
Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	220
Friction Course Spread Rate	165
Total Width (T) / 8" Overlap (O)	T
Rumble Strips ï¿½No. of Sides	0

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	7,288.89	SY	$20.62	$150,296.91
	Comment: SHARED-USE PATH: W=12', L = 500 + (2,400*2) = 5,300' --> 5,300*12 = 63,600-ft 2 = 7,066.67-yd 2 Plus 2-ft CZ on either side for M/R limits --> 4'*500' = 2,000-ft 2 = 222.22-yd 2. Total = 7,288.89-yd 2				
285-701	OPTIONAL BASE,BASE GROUP 01	7,066.67	SY	$20.00	$141,333.40
	Comment: SHARED-USE PATH: W=12', L = 500 + (2,400*2) = 5,300' ---> 5,300*12 = 63,600-ft 2 = 7,066.67-yd 2				
334-1-12	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	407.00	TN	$200.00	$81,400.00
	Comment: SHARED-USE PATH: TYPE SP STRCUTURAL COURSE (TRAFFIC B) (1 1/2") [(1.5) (7,066.67)(110)/(2,000)] = 583 TONS				

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	6,239.38	LF	$2.20	$13,726.64
104-11	FLOATING TURBIDITY BARRIER	113.62	LF	$12.00	$1,363.44
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	113.62	LF	$6.00	$681.72
104-15	SOIL TRACKING PREVENTION DEVICE	1.00	EA	$3,000.00	$3,000.00
107-1	LITTER REMOVAL	5.51	AC	$35.00	$192.85
107-2	MOWING	5.51	AC	$70.00	$385.70
	Shoulder Component Total				$392,380.66

DRAINAGE COMPONENT

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
425-1-541	INLETS, DT BOT, TYPE D, <10'	8.00	EA	$4,558.16	$36,465.28
	Comment: 8 EA ? DBI Type D (425-1-541) parking lot drainage				
425-1-701	INLETS, GUTTER, TYPE S, <10'	14.00	EA	$5,500.00	$77,000.00
425-1-921	INLETS, ADJACENT BARRIER, <=10'	32.00	EA	$7,000.00	$224,000.00
425-2-61	MANHOLES, P-8, <10'	8.00	EA	$5,000.00	$40,000.00
430-174-124	PIPE CULV, OPT MATL, ROUND,24"SD	544.00	LF	$136.33	$74,163.52
	Comment: 540 LF 24? Pipe Culvert Opt Matrl (430-174124) quantities for the parking lot drainage				
430-174-218	PIPE CULV, OPT MATL, OTHER,	832.00	LF	$106.83	$88,882.56

	18"SD				
	Comment: 830 LF 18? Pipe Culvert Opt Matrl (430-174-218) quantities for the parking lot drainage				
430-175-118	PIPE CULV, OPT MATL, ROUND, 18"S/CD	1,304.00	LF	$110.00	$143,440.00
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	1,600.00	LF	$120.00	$192,000.00
430-175-130	PIPE CULV, OPT MATL, ROUND, 30"S/CD	1,400.00	LF	$150.00	$210,000.00
430-524-100	STRAIGHT CONC ENDW 24", SINGLE, 0 ROUND	2.00	EA	$3,736.68	$7,473.36
	Comment: 2 EA Straight Conc EW (430-524-100) quantities for the parking lot drainage				
430-984-133	MITERED END SECT, OPTIONAL RD, 30" SD	2.00	EA	$3,200.00	$6,400.00

Retention Basin 1

Description	Value
Size	2 AC
Multiplier	1
Depth	0.00
Description	South Basin #1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	2.61	AC	$27,000.00	$70,470.00
120-1	REGULAR EXCAVATION	13,721.00	CY	$15.00	$205,815.00
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,558.16	$4,558.16
570-1-1	PERFORMANCE TURF	8,180.00	SY	$2.25	$18,405.00

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	9,559.00	CY	$23.00	$219,857.00
430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	104.00	LF	$120.00	$12,480.00
430-982-129	MITERED END SECT, OPTIONAL RD, 24" CD	1.00	EA	$2,200.00	$2,200.00

Retention Basin 2

Description	Value
Size	1.5 AC
Multiplier	1
Depth	0.00
Description	North Basin #2

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	1.97	AC	$27,000.00	$53,190.00
120-1	REGULAR EXCAVATION	8,752.00	CY	$15.00	$131,280.00
425-1-541	INLETS, DT BOT, TYPE D, <10'	1.00	EA	$4,558.16	$4,558.16
570-1-1	PERFORMANCE TURF	6,389.00	SY	$2.25	$14,375.25

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
120-6	EMBANKMENT	6,808.00	CY	$23.00	$156,584.00
	Comment: Basin 2 Embankment				
430-175-124	PIPE CULV, OPT MATL, ROUND,	104.00	LF	$120.00	$12,480.00

	24"S/CD			
430-982-129	MITERED END SECT, OPTIONAL RD, 24" CD	1.00 EA	$2,200.00	$2,200.00
	Drainage Component Total			$2,008,277.29

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	1.00 AS	$425.00	$425.00
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	10.00 AS	$1,400.00	$14,000.00
700-2-14	MULTI- POST SIGN, F&I GM, 31-50 SF	1.00 AS	$4,500.00	$4,500.00
	Signing Component Total			$18,925.00

BRIDGES COMPONENT

Bridge 880005

Description	Value
Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	1,580.00
Width (LF)	68.67
Type	High Level
Cost Factor	3.85
Structure No.	880005
Removal of Existing Structures area	53,019.00
Default Cost per SF	$75.00
Factored Cost per SF	$288.75
Final Cost per SF	**$297.94**
Basic Bridge Cost	**$31,328,970.75**
Description	PROPOSED BRIDGE 880005 BASED ON 51' VERTICAL CLEARANCE

Bridge Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	53,019.00 SF	$85.00	$4,506,615.00
400-2-10	CONC CLASS II, APPROACH SLABS	152.60 CY	$577.30	$88,095.98
415-1-9	REINF STEEL- APPROACH SLABS	26,705.00 LB	$1.50	$40,057.50

Bridge X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
471-3-1	POLYMERIC FENDER SYSTEM, LE 40 KIP-FT	1.00 LS	$800,000.00	$800,000.00
510-1	NAVIGATION LIGHTS- FIXED BRIDGE, SYSTEM	1.00 LS	$69,317.67	$69,317.67
	Bridge 880005 Total			$36,833,056.90

Bridge 880005

Description	Value

Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	250.00
Width (LF)	26.00
Type	Low Level
Cost Factor	2.50
Structure No.	880005
Removal of Existing Structures area	2,091.00
Default Cost per SF	$120.00
Factored Cost per SF	$300.00
Final Cost per SF	**$307.47**
Basic Bridge Cost	**$1,950,000.00**
Description	PROP SOUTH SIDE FISHING PIER

Bridge Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	2,091.00 SF	$85.00	$177,735.00
400-2-10	CONC CLASS II, APPROACH SLABS	57.78 CY	$577.30	$33,356.39
415-1-9	REINF STEEL- APPROACH SLABS	10,111.50 LB	$1.50	$15,167.25
	Bridge 880005 Total			$2,176,258.64

Bridge 880005

Description	Value
Estimate Type	SF Estimate
Primary Estimate	YES
Length (LF)	168.00
Width (LF)	26.00
Type	Low Level
Cost Factor	2.50
Structure No.	880005
Removal of Existing Structures area	1,471.00
Default Cost per SF	$120.00
Factored Cost per SF	$300.00
Final Cost per SF	**$311.11**
Basic Bridge Cost	**$1,310,400.00**
Description	NORTH SIDE FISHING PIER

Bridge Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	1,471.00 SF	$85.00	$125,035.00
400-2-10	CONC CLASS II, APPROACH SLABS	57.78 CY	$577.30	$33,356.39
415-1-9	REINF STEEL- APPROACH SLABS	10,111.50 LB	$1.50	$15,167.25
	Bridge 880005 Total			$1,483,958.64
	Bridges Component Total			$40,493,274.18

RETAINING WALLS COMPONENT

Retaining Wall 1

Description	Value
Length	1,149.21

Begin height	31.70
End Height	4.00
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	20,513.40	SF	$40.00	$820,536.00

Retaining Wall 2

Description	Value
Length	560.00
Begin height	20.80
End Height	7.50
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	7,924.00	SF	$40.00	$316,960.00

Retaining Wall 3

Description	Value
Length	69.33
Begin height	23.24
End Height	31.54
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	1,898.95	SF	$40.00	$75,958.00

Retaining Wall 4

Description	Value
Length	801.38
Begin height	4.25
End Height	29.20
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	13,403.08	SF	$40.00	$536,123.20

Retaining Wall 5

Description	Value
Length	796.79
Begin height	4.75
End Height	23.00
Multiplier	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
548-13	RETAINING WALL SYSTEM,TEMP, EXC BAR.	11,055.46	SF	$25.00	$276,386.50

Retaining Wall 6

Description	Value
Length	69.32
Begin height	25.99
End Height	31.29
Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-13	RETAINING WALL SYSTEM,TEMP, EXC BAR.	1,985.32 SF	$25.00	$49,633.00

Retaining Wall 7

Description	Value
Length	617.00
Begin height	2.83
End Height	2.83
Multiplier	1

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
548-12	RET WALL SYSTEM, PERM, EX BARRIER	1,746.11 SF	$40.00	$69,844.40
	Retaining Walls Component Total			$2,145,441.10

Sequence 1 Total $53,119,118.87

Sequence: 2 WUR - Widen/Resurface, Undivided, Rural **Net Length:** 0.095 MI 500 LF

Description: Accounts for Milling/Resurfacing & Widening from Sta 653+00 to Sta 658+00 = 500ft

EARTHWORK COMPONENT

User Input Data

Description	Value
Standard Clearing and Grubbing Limits L/R	3.00 / 22.00
Incidental Clearing and Grubbing Area	0.00
Alignment Number	1
Distance	0.095
Top of Structural Course For Begin Section	102.00
Top of Structural Course For End Section	102.00
Horizontal Elevation For Begin Section	100.00
Horizontal Elevation For End Section	100.00
Existing Front Slope L/R	6 to 1 / 6 to 1
Existing Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Front Slope L/R	6 to 1 / 6 to 1
Outside Shoulder Cross Slope L/R	6.00 % / 6.00 %
Roadway Cross Slope L/R	2.00 % / 2.00 %

Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-1-1	CLEARING & GRUBBING	0.29 AC	$27,000.00	$7,830.00
120-2-2	BORROW EXCAVATION, TRUCK MEASURE	72.82 CY	$25.69	$1,870.75

Earthwork Component Total	$9,700.75

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	2
Existing Roadway Pavement Width L/R	16.00 / 16.00
Structural Spread Rate	0
Friction Course Spread Rate	165
Widened Outside Pavement Width L/R	3.00 / 3.00
Widened Structural Spread Rate	220
Widened Friction Course Spread Rate	165

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	333.34	SY	$20.62	$6,873.47
285-709	OPTIONAL BASE,BASE GROUP 09	370.01	SY	$25.00	$9,250.25
327-70-6	MILLING EXIST ASPH PAVT,1 1/2" AVG DEPTH	1,777.83	SY	$3.00	$5,333.49
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	36.67	TN	$150.00	$5,500.50
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	146.67	TN	$170.00	$24,933.90
337-7-83	ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	27.50	TN	$170.00	$4,675.00

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	1

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
706-1-3	RAISED PAVMT MARK, TYPE B	13.00	EA	$5.00	$65.00
710-11-101	PAINTED PAVT MARK,STD,WHITE,SOLID,6"	0.38	GM	$1,150.00	$437.00
710-11-231	PAINTED PAVT MARK,STD,YELLOW,SKIP,6"	0.19	GM	$550.00	$104.50

Roadway Component Total	$57,173.11

SHOULDER COMPONENT

User Input Data

Description	Value
Existing Total Outside Shoulder Width L/R	0.00 / 0.00
New Total Outside Shoulder Width L/R	0.00 / 0.00
Total Outside Shoulder Perf. Turf Width L/R	0.00 / 0.00
Existing Paved Outside Shoulder Width L/R	0.00 / 0.00
New Paved Outside Shoulder Width L/R	0.00 / 0.00
Structural Spread Rate	110
Friction Course Spread Rate	80

Total Width (T) / 8" Overlap (O)	T
Rumble Strips ï¿½No. of Sides	0

Erosion Control

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
104-10-3	SEDIMENT BARRIER	1,150.04	LF	$2.20	$2,530.09
104-11	FLOATING TURBIDITY BARRIER	9.47	LF	$12.00	$113.64
104-12	STAKED TURBIDITY BARRIER-NYL REINF PVC	9.47	LF	$6.00	$56.82
104-15	SOIL TRACKING PREVENTION DEVICE	1.00	EA	$3,000.00	$3,000.00
104-18	INLET PROTECTION SYSTEM	1.00	EA	$130.00	$130.00
107-1	LITTER REMOVAL	0.23	AC	$35.00	$8.05
107-2	MOWING	0.23	AC	$70.00	$16.10
	Shoulder Component Total				$5,854.70

DRAINAGE COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
430-174-124	PIPE CULV, OPT MATL, ROUND,24"SD	16.00	LF	$136.33	$2,181.28
430-175-136	PIPE CULV, OPT MATL, ROUND, 36"S/CD	8.00	LF	$180.00	$1,440.00
430-984-129	MITERED END SECT, OPTIONAL RD, 24" SD	1.00	EA	$3,500.00	$3,500.00
570-1-1	PERFORMANCE TURF	38.26	SY	$2.25	$86.08
	Drainage Component Total				$7,207.37

SIGNING COMPONENT

Pay Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
700-1-11	SINGLE POST SIGN, F&I GM, <12 SF	1.00	AS	$425.00	$425.00
700-1-12	SINGLE POST SIGN, F&I GM, 12-20 SF	2.00	AS	$1,400.00	$2,800.00
700-1-50	SINGLE POST SIGN, RELOCATE	1.00	AS	$450.00	$450.00
700-1-60	SINGLE POST SIGN, REMOVE	2.00	AS	$35.00	$70.00
700-2-13	MULTI- POST SIGN, F&I GM, 21-30 SF	1.00	AS	$4,400.00	$4,400.00
700-2-60	MULTI- POST SIGN, REMOVE	1.00	AS	$996.14	$996.14
	Signing Component Total				$9,141.14

Sequence 2 Total $89,077.07

Sequence: 3 WUR - Widen/Resurface, Undivided, Rural **Net Length:** 0.095 MI 500 LF

Description: Project Unknowns

ROADWAY COMPONENT

User Input Data

Description	Value
Number of Lanes	0
Existing Roadway Pavement Width L/R	0.00 / 0.00
Structural Spread Rate	0
Friction Course Spread Rate	165
Widened Outside Pavement Width L/R	0.00 / 0.00
Widened Structural Spread Rate	220
Widened Friction Course Spread Rate	165

X-Items

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
160-4	TYPE B STABILIZATION	11,111.00	SY	$20.62	$229,108.82
	Comment: For North and South Parking Lot Reconstruction 6in subgrade X 100000SF = 11111 SY				
210-2	LIMEROCK-NEW MATERIAL FOR REWORKING BASE	1,852.00	CY	$41.64	$77,117.28
	Comment: For North and South Parking Lot Reconstruction 6in base				
337-7-82	ASPH CONC FC,TRAFFIC C,FC-9.5,PG 76-22	305.00	TN	$194.23	$59,240.15
	Comment: For North and South Parking Lot Reconstruction 1in x 100000 sf /9 x 1/10/2000 = 305 tn				

Pavement Marking Subcomponent

Description	Value
Include Thermo/Tape/Other	N
Pavement Type	Asphalt
Solid Stripe No. of Paint Applications	2
Solid Stripe No. of Stripes	2
Skip Stripe No. of Paint Applications	2
Skip Stripe No. of Stripes	0

Roadway Component Total $365,466.25

BRIDGES COMPONENT

Bridge 880005

Description	Value
Estimate Type	Detailed Estimate
Primary Estimate	YES
Structure No.	880005
Geographic District	04
Segment Count	1
Bridge Length (LF)	15.00
Average Bridge Width (LF)	15.00
Average Skew Angle	0.00
Construction Type	New/Replacement
Typical Section	Rural Undivided
Sidewalk Width Left	0.00
Sidewalk Width Right	0.00
Concrete Traffic Railing	Left/Right
Pedestrian/Bicycle Railing	
Total Design Load Demand Weight	280
Final Bridge Cost	**$5,368,704.00**
Calculated Final Cost per SF	**$23,860.91**
Description	FOUNDATION ALTERNATE

Bridge Deck and Approach Slab Pay Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES	6,835.00 SF	$85.00	$580,975.00

Bridge X-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
455-88-5	DRILLED SHAFT, 48" DIA	3,840.00 LF	$700.37	$2,689,420.80
	Comment: Drilled Shaft Foundations in lieu of piles = 5 piers x 2 foundation per piers x 4 shafts per foundation x 96ft long = 3840			
455-107-5	DRILLED SHAFT CASING, 48" DIA	3,840.00 LF	$361.60	$1,388,544.00
	Comment: Drilled Shaft Foundations in lieu of piles = 5 piers x 2 foundation per piers x 4 shafts per foundation x 96ft long = 3840			
455-122-5	UNCLASSIFIED SHAFT EXCAVATION, 48" DIA	3,840.00 LF	$336.13	$1,290,739.20
	Comment: Drilled Shaft Foundations in lieu of piles = 5 piers x 2 foundation per piers x 4 shafts per foundation x 96ft long =			

BRIDGE SEGMENTS

Segment 1

Segment Position	First/Last
Segment Over	Water
Segment Length (LF)	15
Segment Width (LF)	15
Average Clearance (LF)	25
End Bent Fill Height (LF)	18
Average Pile Length (LF)	75
No. of Intermediate Supports	0
Superstructure / Beam Type	Slab(Cast in Place)
Substructure / Pier Type	Multi Columns
Foundation Type	Pre-stressed Sq. Piles 18"
Design Load Demand Weight	280
Total Segment Cost	**$0.00**

Bridge 880005 Total	$5,949,679.00
Bridges Component Total	$5,949,679.00

MISCELLANEOUS COMPONENT

EX-Items

Pay item	Description	Quantity Unit	Unit Price	Extended Amount
0430175XX	DRAINAGE VAULT	1.00 LS	$10,400,000.00	$10,400,000.00
	Comment: 0.4 acres per vault, 17,424 SQ2 x $300 = $5.2M/vault x 2 =10400000			

Miscellaneous Component Total	$10,400,000.00

Sequence 3 Total	$16,715,145.25

Date: 10/26/2022 2:12:30 PM

FDOT Long Range Estimating System - Production

R3: Project Details by Sequence Report

Project: 445618-1-52-01 **Letting Date:** 10/2025

Description: SR-A1A OVER SEBASTIAN INLET- BRIDGE REPLACEMENT

District: 04 **County:** 88 INDIAN RIVER **Market Area:** 11 **Units:** English
Contract Class: 1 **Lump Sum Project:** N **Design/Build:** N **Project Length:** 1.108 MI

Project Manager: BASNET

Version 8-P Project Grand Total **$89,039,754.38**
Description: Updated WPUC 2022

Project Sequences Subtotal			**$69,923,341.19**
102-1	Maintenance of Traffic	10.00 %	$6,992,334.12
101-1	Mobilization	8.00 %	$6,153,254.02
Project Sequences Total			**$83,068,929.33**
Project Unknowns		7.00 %	$5,814,825.05
Justification for high %:	2 % Potential utility impacts & 5% Inflation/risk		
Design/Build		0.00 %	$0.00

Non-Bid Components:

Pay item	Description	Quantity	Unit	Unit Price	Extended Amount
999-16	PARTNERING (DO NOT BID)	2.00	LS	$3,000.00	$6,000.00
999-25	INITIAL CONTINGENCY AMOUNT (DO NOT BID)		LS	$150,000.00	$150,000.00
Project Non-Bid Subtotal					**$156,000.00**
Version 8-P Project Grand Total					**$89,039,754.38**