NOISE STUDY REPORT

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: 445618-1-22-02
Federal Aid Number: D420 075B
ETDM Number: 14433

PREPARED FOR

Florida Department of Transportation
District Four
3400 West Commercial Boulevard
Fort Lauderdale, Florida 33309

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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Table of Contents

List of Figures

List of Tables

EXECUTIVE SUMMARY

This Noise Study Report (NSR) has been prepared as part of the SR A1A bridge replacement over the Sebastian Inlet Project Development and Environment (PD&E) Study at the border of Brevard / Indian River Counties. The study is evaluating the need for a bridge replacement at this location and an analysis of the potential impacts from the alternatives proposed.

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. The Inlet was created in 1918 from privately owned lands and reopened in 1923. 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. 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.

This traffic noise study was conducted in accordance with Title 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010) and the FDOT PD&E Manual, Part 2, Chapter 18 – *Highway Traffic Noise* (dated July 1, 2020). The primary objectives of this noise study were to: 1) describe the existing site conditions including noise sensitive land uses within the project study area, 2) document the methodology used to conduct the noise assessment, 3) assess the significance of traffic noise levels on noise sensitive sites for the No Build and Build Alternatives, and 4) evaluate abatement measures for those noise sensitive sites that, under the Build Alternative, approach or exceed the Noise Abatement Criteria (NAC) set forth by the FDOT and FHWA. The methods and results of this noise analysis are summarized in this report.

Worst-case traffic noise levels were predicted for noise sensitive locations along the project corridor for the existing conditions and the design year (2045) No Build Alternative and the preferred build alternative (Build Alternative 2 – eastern alignment). Noise sensitive sites within the project study area are all associated with outdoor areas at Sebastian Inlet State Park such as beaches, picnic tables, benches and fishing areas. Other areas include interior areas of the Sebastian Fishing Museum and outdoor eating areas at the Inlet Grill restaurant. Under the existing and design year conditions, the primary source of noise at the nearby noise sensitive sites is traffic on SR A1A.

The proposed typical section for the new bridge will remain two-lanes. The planned improvements will shift the alignment of the bridge 15 to 20 feet eastward and will increase the overall height of the bridge. Along with the addition of a solid traffic railing along the outside edges of the bridge, these improvements are predicted to result in lower noise levels at many of the nearby noise sensitive sites which will remain well below the applicable NAC. Also, 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. Therefore, based on the FHWA and FDOT methodologies used to evaluate traffic noise levels in this study, modifications proposed with this project 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. To aid in promoting land use compatibility, a copy of this NSR, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, will be provided to Sebastian Inlet State Park management.

1.0 PROJECT OVERVIEW

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, 88005 (bridge) crossing the Sebastian Inlet located at the Brevard County and Indian River 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 FDOT pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated December 14, 2016, and executed by the Federal Highway Administration (FHWA) and FDOT.

1.1 PROJECT DESCRIPTION

The 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. The Inlet was created in 1918 from privately owned lands and reopened in 1923. 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, which is approximately 525-feet wide at the bridge, provides access for vessels between the Indian River Lagoon (Lagoon) and the Atlantic Ocean.

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.

This project was evaluated through FDOT's Efficient Transportation Decision Making (ETDM) process as project #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.

The bridge has been determined eligible under Criterion C of the National Register of Historic Places (NRHP) in the area of Engineering for its high-integrity embodiment of a prestressed concrete bridge in Florida. The bridge is also situated within the Park, a Section 4(f) resource.

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

FIGURE 1-1 PROJECT LOCATION

The project includes the evaluation of alternatives including No-Action (No-Build), Transportation Systems Management & Operations (TSM&O), Rehabilitation, and Build, 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 U.S. Coast Guard (USCG).

1.1.1 PROJECT STUDY AREA

The project study area includes the project limits of the bridge and SR A1A, as well as a 300-foot buffer outside of the ROW on both sides of the road and bridge which includes sufficient area for project alternatives and pond site alternatives. The study area is shown on **Figure 1-2**.

1.2 PURPOSE AND NEED

1.2.1 PROJECT PURPOSE

The primary purpose of this project is to address the structural and functional deficiencies of the existing bridge over the Sebastian Inlet. 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. Structurally deficient bridges are not considered unsafe for public use unless the bridge is also closed. Bridges with a health index of less than 85 require repairs or replacement.

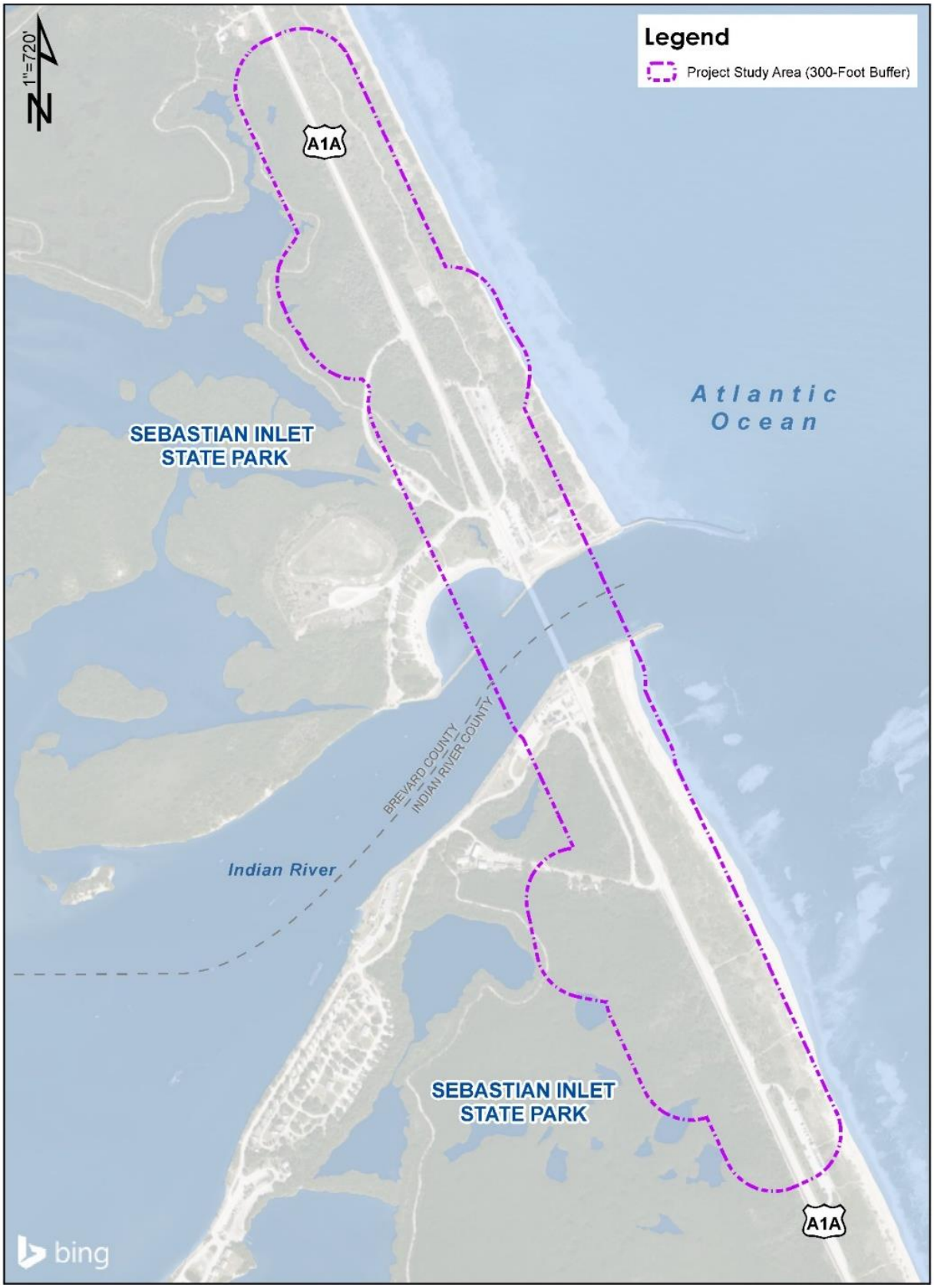
1.2.2.1 Modal Interrelationships

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 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 is a designated 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 ALTERNATIVE 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



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

FIGURE 1-2 PROJECT STUDY AREA

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 summarized in Section 4.2 through Section 4.5. A comparative evaluation of the Alternatives has been evaluated 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.

1.3.1 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). This study conducted evaluations to determine ROW requirements, as well as the feasibility of phased construction of a proposed bridge and the approach to maintenance of traffic during construction. Additional feasibility study activities included:

- Traffic Data
- Operational Analysis
- Benthic Survey of Inlet
- Vessel Survey
- Section 4(f) Research Memo
- Preliminary Geotechnical Review

1.3.2 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). The growth rates were calculated based on analysis of historical traffic counts and 2040 population and employment data.

A 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

1.3.3 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.

1.3.4 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 or health index of the bridge. The TSM&O alternative does not meet the purpose and need for the project.

1.3.5 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
- Project costs
- Avoidance of bridge closure during construction

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 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, in contrast to the previous preliminary determination of a minimum vertical clearance of 65-feet by the USCG, provides for reasonable navigation needs at the Inlet. Also considered were the purpose and need for the project, impacts to the north and south park entrances, character of the Inlet, bathymetry, surrounding resources, maintenance of the Inlet and adjacent waterways, and connectivity to the Intracoastal Waterway (ICW).

The proposed typical section developed during the feasibility study was modified during the PD&E Study. The proposed typical section is shown in **Figure 1-3** and includes:

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

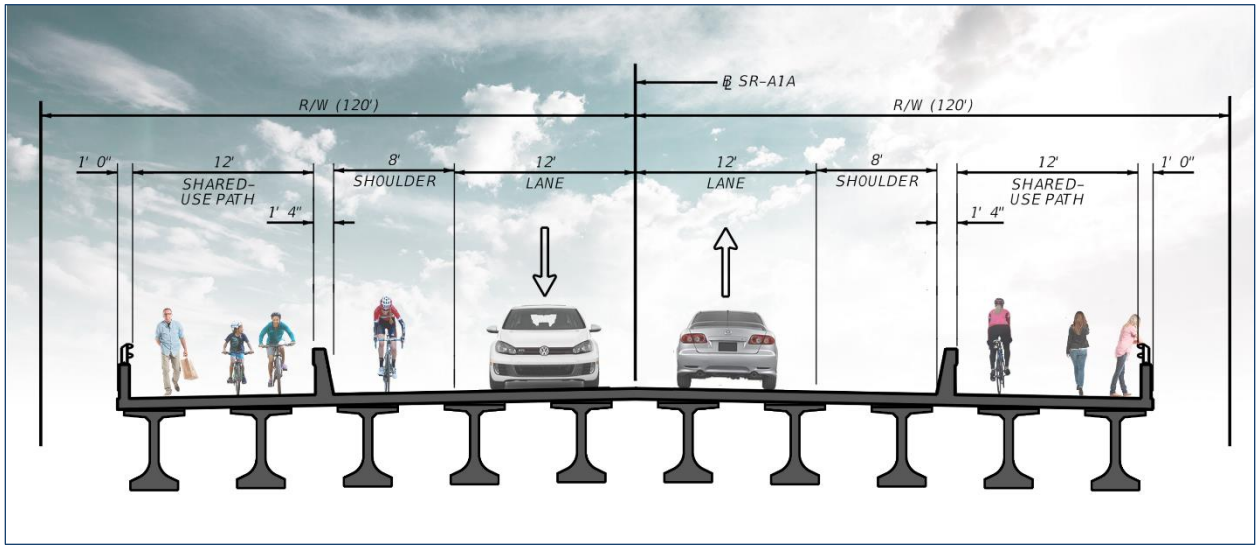


FIGURE 1-3 TYPICAL SECTION

1.3.5.1 Rehabilitation Alternative

Because the bridge is considered an 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.

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 original 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.

1.3.5.2 Build Alternative 1 (Existing)

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 Sebastian Inlet District Access Road

All bridge improvements are located within existing FDOT ROW. Approximately 2.03 acres of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, and shared use path improvements.

1.3.5.3 Build Alternative 2 (East)

Build Alternative 2 includes a new bridge alignment that is shifted to the east of the centerline of the existing bridge. The western limit of the new bridge is generally located near the western limit 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 1.0 acre of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, and shared use path improvements.

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.

1.3.5.4 Build Alternative 3 (West)

Build Alternative 3 includes a new bridge on alignment that is shifted to the west of the centerline of the existing bridge. The eastern limit of the new bridge is generally located near the eastern limit 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 1.22 acres of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, and shared use path improvements.

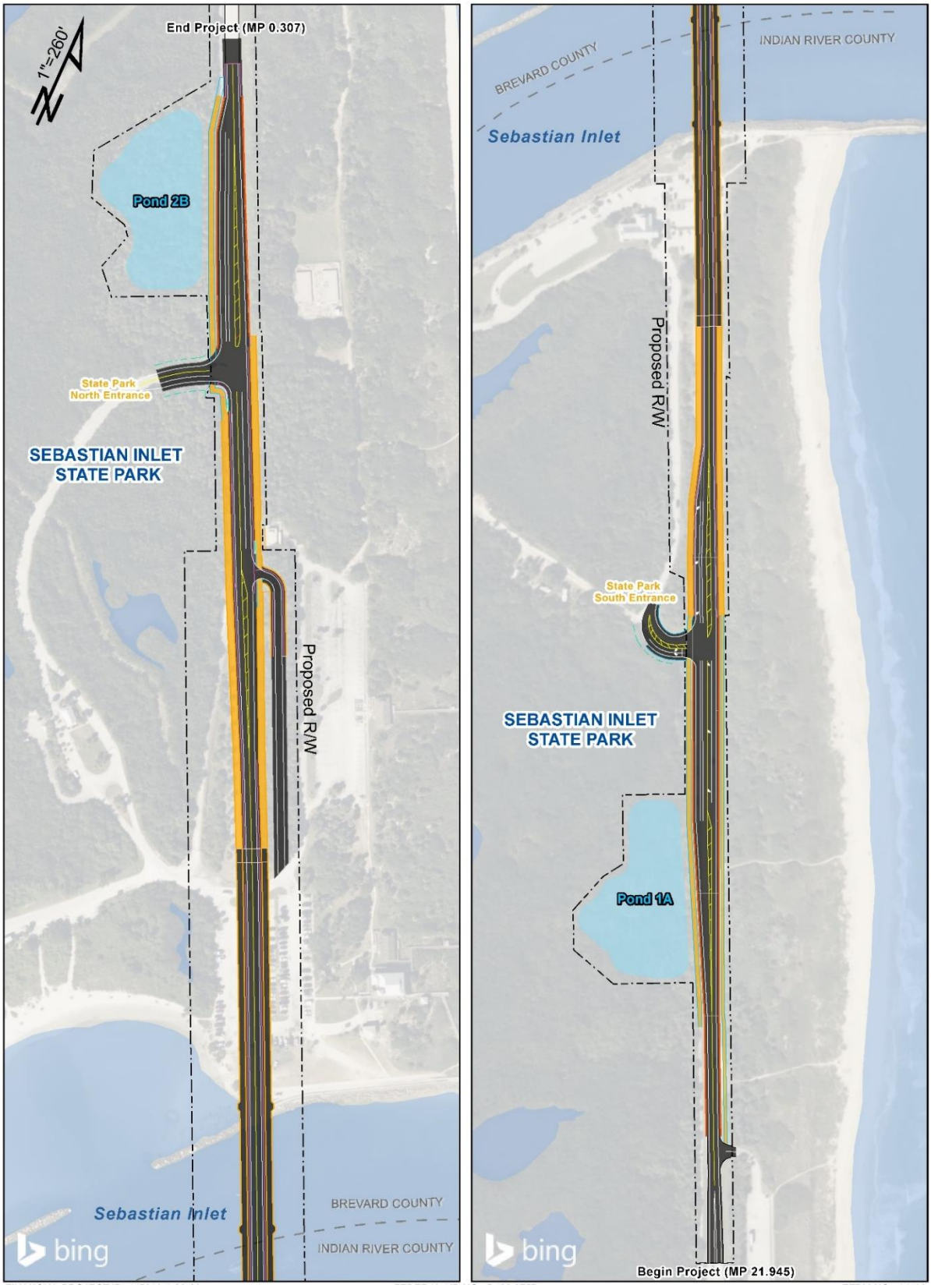
Because the new bridge will be constructed in phases, the existing bridge will remain in place while the west portion of the new bridge is constructed. This new construction will include the shared use path, shoulder, and southbound travel lane.

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.

1.3.5.5 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, **Alternative 2 (East)** was selected as **the Preferred Alternative** (**Figure 1-4**).

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.



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

FIGURE 1-4 PREFERRED ALTERNATIVE

The Preferred Alternative includes a new bridge alignment that is shifted to the east of the centerline of the existing bridge. The western limit of the new bridge typical section is generally located near the western limit of the existing bridge .

South of the bridge, Alternative 2 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 exit
- 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

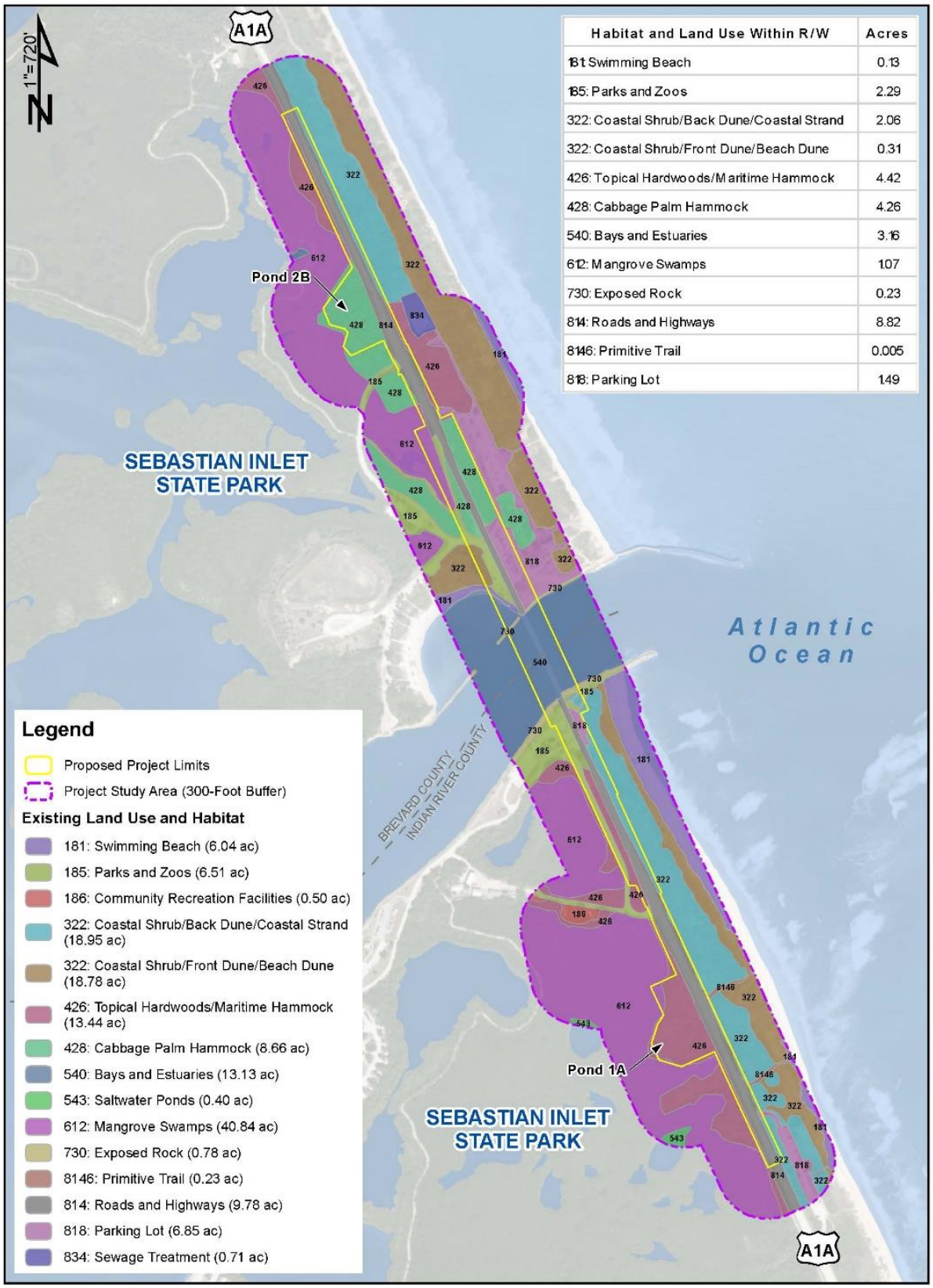
North of the bridge, Alternative 2 improvements include:

- 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 Sebastian Inlet District Access Road
- All bridge improvements are located within existing FDOT ROW. Approximately 1.0 acre of ROW is required to meet current design standards for clear zone and maintenance associated with bridge approaches, roadway, Park entrances, and shared use path improvements.

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.

2.0 LAND USE

The existing land use and habitat cover was developed using the Florida Land Use Cover and Forms Classification System (FLUCCS) (**Figure 2-1**). The data was modified to match the existing conditions within the project study area identified during field reviews.



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

FIGURE 2-1 LAND USE

3.0 TRAFFIC NOISE ANALYSIS

As part of the PD&E Study, a traffic noise study was conducted in accordance with Title 23 CFR 772, *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (July 13, 2010) and the FDOT PD&E Manual, Part 2, Chapter 18 – *Highway Traffic Noise* (dated July 1, 2020). The primary objectives of this noise study were to: 1) describe the existing site conditions including noise sensitive land uses within the project study area, 2) document the methodology used to conduct the noise assessment, 3) assess the significance of traffic noise levels on noise sensitive sites for the No Build and Build Alternatives, and 4) evaluate abatement measures for those noise sensitive sites that, under the Build Alternative, approach or exceed the Noise Abatement Criteria (NAC) set forth by the FDOT and FHWA. Other objectives of this study include consideration of construction noise and vibration impacts and the development of noise level isopleths, which can be used in the future by local municipal and county government agencies to identify compatible land uses. The methods and results of this noise analysis are summarized in this report.

Prior to conducting a detailed noise analysis, a desk-top review of the project area was performed to determine if noise sensitive receptor sites are located within the project area and/or if noise impacts are likely to occur if as a result of the proposed improvements,. This desk-top review indicated that proposed improvements associated with the project may cause design year (2045) traffic noise levels to approach or exceed the FHWA NAC at noise sensitive sites within the project limits. Therefore, in accordance with FDOT policy, a more detailed noise analysis was performed. The methods and results of this traffic noise analysis are summarized within this section and involved the following procedures:

- Identification of noise sensitive receptor sites;
- Field measurement of noise levels and noise model validation;
- Prediction of existing and future noise levels;
- Assessment of traffic noise impacts; and,
- Evaluation of the feasibility and reasonableness of noise abatement.

The preferred build alternative for the project, herein referred to as the “Build Alternative”, is Build Alternative 2 (East).

The FHWA *Traffic Noise Model* (TNM) Version 2.5 (February 2004) was used to predict traffic noise levels and to analyze the effectiveness of noise barriers. This model estimates the acoustic intensity at a noise sensitive site (the receptor) from a series of roadway segments (the source). Model-predicted noise levels are influenced by several factors, such as vehicle speed and distribution of vehicle types. Noise levels are also affected by characteristics of the source-to-receptor site path, including the effects of intervening barriers, obstructions (buildings, trees, etc.), ground surface type (hard or soft) and topography. Elevation data for the existing travel lanes and surrounding ground were obtained from roadway profiles developed for the project and Google Earth data.

Noise levels presented in this report represent the hourly equivalent sound level [Leq(h)]. The Leq(h) is the steady-state sound level, which contains the same amount of acoustic energy as the actual time-varying sound level over a one-hour period. The Leq(h) is measured in A-weighted decibels [abbreviated as dB(A)], which closely approximate the range of frequencies a human ear can hear.

3.1 NOISE SENSITIVE RECEPTOR SITES

The FHWA has established NAC for seven land use activity categories. 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. The NAC levels are presented in **Table 3-1**. Noise abatement measures must be considered when predicted noise levels approach or exceed the NAC levels or when a substantial noise increase occurs. The 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 3-1: 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.

The developed lands along the project corridor were evaluated to identify the noise sensitive receptor sites that may be impacted by traffic noise associated with the proposed improvements. Noise sensitive receptor sites represent any property where frequent exterior human use occurs and where a lowered noise level would be of benefit. This includes residential units (FHWA Noise Abatement Activity Category B), other noise sensitive areas including parks, playgrounds, and schools (Category C) and certain commercial properties (Category E). Noise sensitive sites also include interior use areas where no exterior activities occur for facilities such as auditoriums, day care centers, hospitals, libraries, medical facilities, or places of worship. Noise sensitive sites along the project are shown on **Figure 3-2**.

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.

3.2 FIELD MEASURED NOISE LEVELS

Measurements of sample existing noise levels along the project corridor were performed using procedures defined in the FHWA report Measurement of Highway-Related Noise (FHWA-PD-96-046). Field measurements of existing noise levels were conducted on March 11, 2021, at three locations within the project study area. The locations of the field measurement sites are depicted on **Figure 3-2** and described in **Table 3-2**.

Three repetitions of 10-minute readings were measured at each site to ensure reasonable results. Unusual noises were documented to facilitate identification of any atypical noise sources along the alignment. Rion NC-21 Type-II integrating sound level meters were used to collect noise level data.

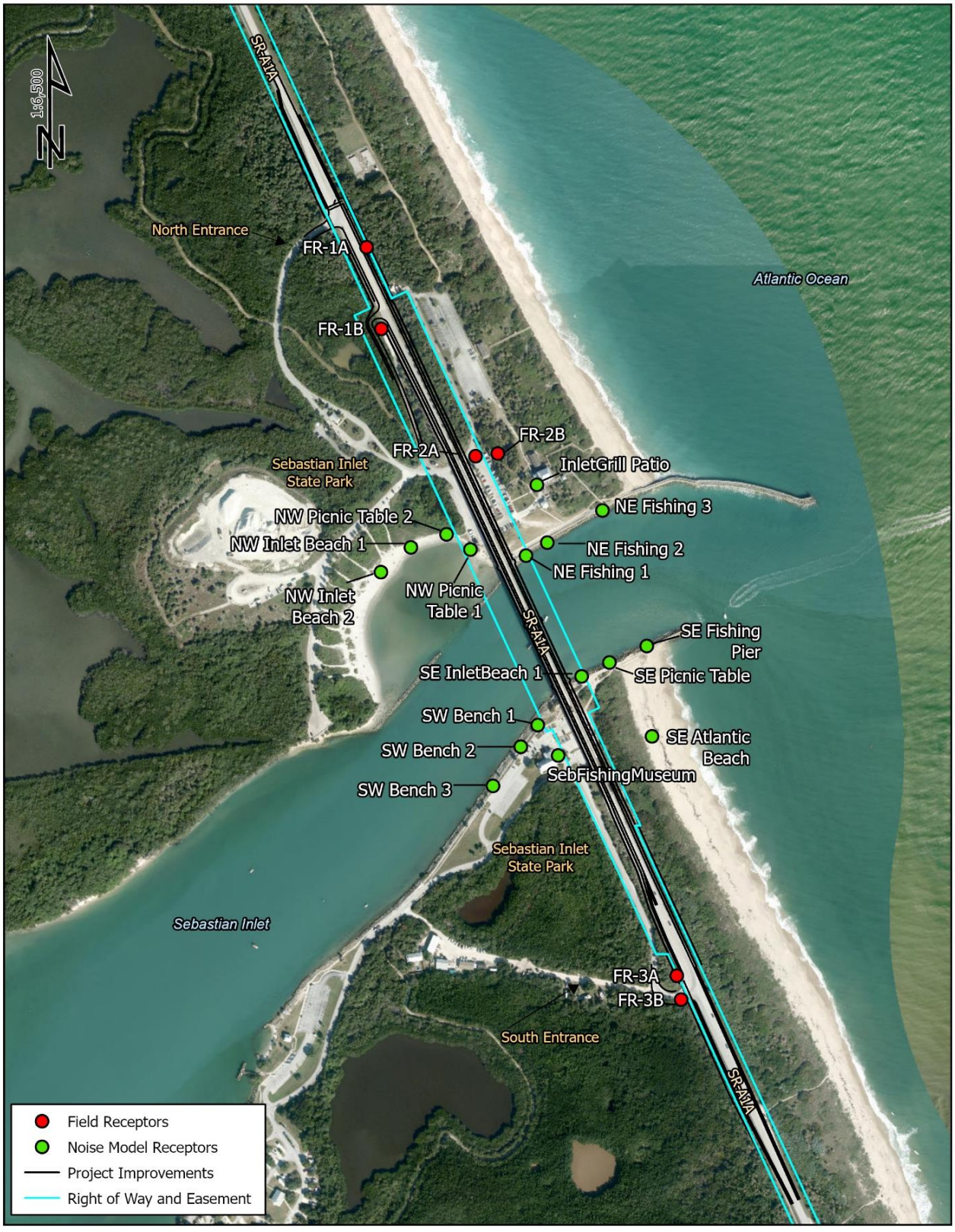
3.2.1 FIELD MEASUREMENT SITES

3.2.1.1 Site FR-1

This measurement site is located along SR A1A, south of the north entrance to the Park. Noise meters were placed on both sides of the road in order to assess noise level drop-off over distance (**Figure 3-2**). Traffic noise levels at this site were measured approximately 22 and 35 feet from the near edge of the traffic lanes. Noise level readings were taken between 10:31 and 11:11 AM. Existing traffic noise levels were found to range from 63.0 to 65.2 dB(A) at the near location and 61.1 to 62.9 dB(A) at the far location.

3.2.1.2 Site FR-2

This measurement site is located along the east side of SR A1A, adjacent to the east parking lot and the Park's restaurant. Traffic noise levels at this site were measured approximately 80 and 175 feet from the near edge of the northbound traffic lanes of the bridge (**Figure 3-2**). Noise level readings were taken between 11:40 AM and 12:35 PM. Existing traffic noise levels were found to range from 53.7 to 56.1 dB(A) at the near location and 49.6 to 55.2 dB(A) at the far location.



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

FIGURE 3-1 NOISE ANALYSIS MAP

3.2.1.3 Site FR-3

This measurement site is located along the west side of SR A1A, at the south entrance to the Park. Traffic noise levels at this site were measured approximately 38 and 61 feet from the near edge of the southbound traffic lanes (**Figure 3-2**). Noise level readings were taken between 1:20 and 2:15 PM. Existing traffic noise levels were found to range from 62.8 to 65.0 dB(A) at the near location and 58.8 to 61.9 dB(A) at the far location.

3.2.1.4 Field Measurement Summary

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.

TABLE 3-2: FIELD MEASUREMENT DATA

Field Receptor	Location	Sample Run	Time/ Date	Measured 10-Minute Traffic Volume (Auto/MT/HT/ B/Mcy)	Distance From Near Travel Lane (Feet)	Measured Traffic Noise Level [dB(A)]	Modeled Traffic Noise Level [dB(A)]	Difference (Measured - Modeled) [dB(A)]
FR-1	East and west side of the road. Approximately 150 and 500 feet south of the north park entrance.	A	10:31 AM / 5-11-21	NB: 14/2/1/0/0 SB: 26/2/0/0/0	22	65.2	64.2	-1.0
					35	62.9	64.4	-1.5
		B	10:46 AM / 5-11-21	NB: 16/0/0/0/0 SB: 15/0/2/0/0	22	63.5	61.6	1.9
					35	61.8	62.8	-1.0
		C	11:01 AM / 5-11-21	NB: 11/1/0/0/0 SB: 17/0/0/0/0	22	63.0	60.5	2.5
					35	61.1	60.8	0.3
FR-2	East side of bridge in east parking lot near restaurant.	A	11:40 AM / 5-11-21	NB: 20/1/1/0/0 SB: 19/1/0/0/1	80	56.1	56.6	-0.5
					175	55.2	53.2	2.0
		B	11:55 AM / 5-11-21	NB: 18/0/1/0/0 SB: 21/0/0/0/0	80	53.7	54.9	-1.2
					175	49.6	51.6	-2.0
		C	12:25 PM / 5-11-21	NB: 18/0/0/0/0 SB: 27/0/0/0/0	80	55.8	53.8	2.0
					175	54.2	51.4	2.8
FR-2	West side of the road, at south park entrance.	A	1:20 PM / 5-11-21	NB: 18/2/0/0/0 SB: 28/1/0/0/0	38	62.8	61.6	1.2
					61	58.8	59.1	-0.3
		B	1:50 PM / 5-11-21	NB: 17/4/0/0/0 SB: 20/4/0/0/1	38	65.0	64.0	1.0
					61	61.9	63.0	-1.1

TABLE 3-2: FIELD MEASUREMENT DATA

Field Receptor	Location	Sample Run	Time/ Date	Measured 10-Minute Traffic Volume (Auto/MT/HT/ B/Mcy)	Distance From Near Travel Lane (Feet)	Measured Traffic Noise Level [dB(A)]	Modeled Traffic Noise Level [dB(A)]	Difference (Measured - Modeled) [dB(A)]
		C	2:05 PM / 5-11-21	NB: 32/2/0/0/0 SB: 24/1/0/0/0	38	64.2	63.3	0.9
					61	61.3	61.4	-0.1

Notes: MT=Medium Trucks, HT=Heavy Trucks, B=Buses, Mcy=Motorcycles, NB=Northbound; SB=Southbound

3.3 COMPUTER NOISE MODEL VALIDATION

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. Additional geometric information necessary for these models was developed from aerial photographs and/or MicroStation files of the existing conditions in the project study area. The TNM results were then compared to the noise level data collected for each field measurement sample. The results of this analysis are shown in **Table 3-2**. The model inputs for the field conditions are deemed to be within an acceptable level of accuracy if the predicted noise levels are within ±3.0 dB(A) of the measured noise levels. These model inputs are then used as a basis for additional model runs used to predict existing and future noise levels at representative nearby noise sensitive locations. The difference for each of the field measurements falls within the ±3.0 dB(A) verification limit in accordance with Chapter 18 of the FDOT PD&E Manual. Thus, further use of TNM on this project is supported.

3.4 NOISE MODEL DEVELOPMENT

After verification of the prediction methodology, computer models were developed for the existing year (2019) conditions, and the design year (2045) No Build Alternative and Preferred Build Alternative. The TNM models for all Alternatives were developed using geometric information from the project's master plans. Traffic data used in the TNM models were derived from traffic data provided in the Project Traffic Analysis Report (PTAR) for the project. These data may be found in **Table 3-3**. According to Chapter 18 of the PD&E Manual, "Maximum peak-hourly traffic representing Level of Service (LOS) "C", or demand LOS of "A", "B", or "C" will be used (unless analysis shows that other conditions create a "worst-case" level)". 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. The posted speed limit along SR A1A (45 MPH) and a Design Hour Truck Factor of 4.0 percent was used.

TABLE 3-3: NOISE ANALYSIS TRAFFIC DATA

Direction	Peak-Hour Volume								Level-of-Service C Capacity (Vehicles/ Hour)
	Weekday				Weekend				
	Existing (2019)		Design Year (2045)		Existing		Design Year (2045)		
	AM	PM	AM	PM	AM	PM	AM	PM	
Southbound	124	103	185	142	166	189	172	174	670
Northbound	101	138	148	188	159	163	162	155	670

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. These sites were chosen based on noise sensitivity, roadway proximity, anticipated impacts from the proposed project, and homogeneity (i.e., the site is representative of other nearby sites). For single-family homes, traffic noise levels were predicted at the edge of the dwelling unit closest to the nearest primary roadway. For other noise sensitive sites that may be impacted, traffic noise levels were predicted where the exterior activity occurs. All receptor sites were modeled five feet above the local ground elevation. Sixteen (16) model receptors representative of the non-residential noise sensitive locations described in Section 3.1 of this report were input into the TNM model. These locations are also described in **Table 3-4** and shown in **Figure 3-1**.

3.5 PREDICTED TRAFFIC NOISE LEVELS

The TNM results for the worst-case traffic conditions for the existing (2019) conditions and the Design Year (2045) No Build and Build alternatives are summarized in the following sections. Predicted noise levels for individual model receptors are presented in **Table 3-4**.

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.

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. Although traffic on SR A1A is expected to remain the primary source of noise at these location during the design year, the proposed improvements will shift the alignment of the bridge approximately 15 to 20 feet east and will increase the overall height of the bridge. Also, peak-hour traffic volumes are considered to be relatively low compared to other sections of SR A1A in more urbanized areas of South Florida. Along with the addition of a solid traffic railing along the outside edges of the

bridge, these factors result in considerably lower noise levels at many of the nearby noise sensitive sites and the predicted traffic noise levels remain well below the applicable NAC in all cases. Also, 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. 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.

4.0 SUMMARY AND CONCLUSIONS

In summary, worst-case traffic noise levels were predicted for noise sensitive locations along the project corridor for the existing conditions and the design year (2045) No Build Alternative and the Preferred Build Alternative (East Alignment).

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 fishing museum and outdoor eating areas at the Inlet Grill restaurant. These sites are presented in **Figure 3-1**.

TABLE 4-1: MODELED NOISE RECEPTOR LOCATIONS AND NOISE ANALYSIS RESULTS

Representative Model Receptor Name	Location	Type	Description (Noise Abatement Activity Category)	FDOT Noise Abatement Approach Criteria [dB(A)]	Location (Station)	Number of Noise Sensitive Sites	Distance To Nearest Traffic Lane* [Existing/No-Build/Build] (Feet)	Predicted Traffic Noise Levels [LAeq1h, dB(A)]		
								Existing (2019)	Design Year (2045)	
									No-Build	Build
West Side										
SW Bench 1	Park Bench	SLU	C	66	679+00	1	130/130/150	54.1	53.6	46.1
SW Bench 2	Park Bench	SLU	C	66	678+40	1	230/230/250	51.4	51.0	47.2
SW Bench 3	Park Bench	SLU	C	66	677+20	1	405/405/425	48.9	48.5	46.4
SebFishingMuseum (interior)	Sebastian Fishing Museum	SLU	D	51	677+40	1	105/105/125	35.7	35.2	26.3
NW Picnic Table 1	Picnic Table	SLU	C	66	686+80	1	80/80/95	53.2	52.5	43.9
NW Picnic Table 2	Picnic Table	SLU	C	66	687+80	1	145/145/160	53.1	52.6	47.1
NW Inlet Beach 1	Beach Area- Sebastian Inlet	SLU	C	66	687+20	1	305/305/320	50.3	49.9	46.0
NW Inlet Beach 2	Beach Area- Sebastian Inlet	SLU	C	66	676+80	1	260/260/275	47.9	47.4	44.7
East Side										
SE InletBeach 1	Beach Area- Sebastian Inlet	SLU	C	66	680+20	1	95/95/75	55.8	55.4	44.4
SE Picnic Table	Picnic Table	SLU	C	66	680+40	1	225/225/205	52.5	52.2	47.2
SE Fishing Pier	Fishing Pier	SLU	C	66	680+40	1	400/400/380	50.1	49.8	46.1
SE Atlantic Beach	Beach Area – Atlantic	SLU	C	66	676+80	1	255/255/235	51.7	51.4	47.1
NE Fishing 1	Fishing Area	SLU	C	66	685+80	1	95/95/80	55.4	55.1	44.2
NE Fishing 2	Fishing Area	SLU	C	66	686+00	1	195/195/180	53.0	52.6	47.5
NE Fishing 3	Fishing Area	SLU	C	66	686+40	1	465/465/450	49.1	48.7	45.2
Inlet Grill Patio	Restaurant Outdoor Seating Area	SLU	E	71	688+40	1	260/260/245	52.1	51.7	47.8

Notes: * = To existing edge-of-pavement of the nearest travel lane (rounded to the nearest 5 foot increment).; SLU = Special Land Use site.

Under the existing and design year conditions, the primary source of noise at the nearby noise sensitive sites is traffic on SR A1A. The proposed improvements will shift the alignment of the bridge approximately 15 to 20 feet east and will increase the overall height of the bridge. Along with the addition of a solid traffic railing along the outside edges of the bridge, these factors result in considerably lower noise levels at many of the nearby noise sensitive sites and the predicted traffic noise levels remain well below the applicable NAC in all cases. Also, 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. Therefore, based on the FHWA and FDOT methodologies used to evaluate traffic noise levels in this study, modifications proposed with this project 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.

5.0 CONSTRUCTION NOISE AND VIBRATION

During construction of the project, there is the potential for noise impacts to be substantially greater than those resulting from normal traffic operations due to the heavy equipment typically used to build roadways. In addition, construction activities may result in vibration impacts. Therefore, early identification of potential noise/vibration sensitive sites along the project corridor is important in minimizing noise and vibration impacts.

The project area is adjacent to areas within the Park that may be affected by noise and vibration associated with construction activities such as pile-driving for the new bridge. Construction noise and vibration impacts to these sites will be minimized by adherence to the controls listed in the latest edition of the FDOT's *Standard Specifications for Road and Bridge Construction*. A reassessment of the project corridor for additional sites particularly sensitive to construction noise and/or vibration will be performed during design to ensure that impacts to such sites are minimized. The contractor will be instructed to coordinate with the project engineer and the District Noise Specialist should unanticipated noise or vibration issues arise during project construction.

6.0 COORDINATION WITH LOCAL OFFICIALS

Agency coordination to obtain noise-related information for this project occurred through the Efficient ETDM Programming Screen (#14433). An ETDM Programming Screen Summary Report containing comments from the ETAT was published on June 3, 2020. No comments were received on noise-related issues.

To aid in promoting land use compatibility, a copy of this NSR, which provides information that can be used to protect future land development from becoming incompatible with anticipated traffic noise levels, will be provided to Sebastian Inlet State Park management. In addition, generalized future noise impact contours for properties in the immediate vicinity of the project have been developed for Noise Abatement Activity Categories B/C and E (i.e., residential/other sensitive land uses and sensitive commercial, respectively). These contours represent the approximate distance from the edge of the nearest proposed travel lane of a roadway to the limits of the area predicted to approach [i.e., within 1 dB(A)] or exceed the NAC in the Design Year (2045).

These contours do not consider any shielding of noise provided by structures between the receiver and the proposed travel lanes. Contours were generally developed for portions of the project that are located away from significant ground features such as existing noise barriers. Within the project corridor, the distance between the proposed edge of the outside travel lane and the contour at two locations are presented in **Table 6-1**. To minimize the potential for incompatible land use, noise sensitive land uses should be located beyond this distance.

TABLE 6-1: DESIGN YEAR (2045) NOISE IMPACT CONTOUR DISTANCES

Location	Distance from Proposed Nearest Travel Lane to Noise Contour Line (Feet)	
	51/71 dB(A) – Activity Category D/E	66 dB(A) – Activity Category B/C
SR A1A South of the Sebastian Inlet Bridge Sta. 663+50	>10 (within the roadway footprint)	12
SR A1A North of the Sebastian Inlet Bridge Sta. 705+00	>10 (within the roadway footprint)	12

7.0 REFERENCES

Florida Department of Transportation, "*Project Development and Environment Manual*, Part 2, Chapter 18-*Highway Traffic Noise*", July 01, 2020.

23 CFR Part 772, "*Procedures for Abatement of Highway Traffic Noise and Construction Noise*", Federal Register, Vol. 75, No. 133, Tuesday, July 13, 2010; pages 39834-39839.

Federal Highway Administration Report FHWA-HEP-10-025, "*Highway Traffic Noise: Analysis and Abatement Guidance*", June 2010 (revised December 2010); 76 pages.

Florida Statute 335.17, "*State highway construction; means of noise abatement*". 1989; 1 page.

Florida Department of Transportation Policy, "*Noise Abatement*". Topic 000-360-005-f; Effective September 20, 2007; 1 page.

Florida Department of Transportation, "*A Method to Determine Reasonableness and Feasibility of Noise Abatement at Special Use Locations*" (July 22, 2009)

Federal Highway Administration Report Number FHWA-PD-18-065, "*Noise Measurement Handbook*" (July 1, 2018); 188 pages.

Florida Department of Transportation, "*Standard Specifications for Road and Bridge Construction*". July 2022; 1,297 pages.

Federal Highway Administration Report FHWA-HEP-06-015, "*FHWA Highway Construction Noise Handbook: Final Report*". August 2006; 185 pages.