Natural Resources Evaluation

Town of Bay Harbor Islands

in cooperation with the

Florida Department of Transportation

District 6 and US Coast Guard

Broad Causeway Bridge Replacement PD&E Study

Town of Bay Harbor Islands Project Number: BC-160

Limits of Project: Broad Causeway Bridge from Broad Causeway Island to East of West Broadview Drive

Miami-Dade County, Florida

Financial Management Number: 452428-1-21-01

ETDM Number: 14520

Date: 4/15/2024

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

EXECUTIVE SUMMARY

The Broad Causeway Bridge Replacement Project Development and Environment (PD&E) Study was initiated to evaluate potential bridge replacement alternatives of the existing Broad Causeway bridge which connects the Town of Bay Harbor Islands with the City of North Miami, in Miami Dade County, Florida. The existing bridge has been determined to be functionally obsolete with fracture-critical components and structurally deficient, and also requires high maintenance costs. The Town of Bay Harbor Islands (Town) is considering replacement of the bridge. The limits of the project are from Broad Causeway Island to East of West Broadview Drive (see **Figure 1-1** in Section 1.1). Of the two bridge alternatives presented in the PD&E study, the Town has identified Build Alternative 1 (High-Level Fixed Bridge), a new 65-foot High-Level Fixed Bridge, as the Preferred Alternative, subject to public review of the Environmental Assessment (EA) and completion of the public comment period after the Public Hearing.

This Natural Resources Evaluation (NRE) document conforms to the Florida Department of Transportation's (FDOT's) *Natural Resources Evaluation Outline and Guidance* (August 2022) and all applicable federal and state laws. The purpose of this analysis is to demonstrate due diligence in accordance with the state and federal regulations regarding wetlands and other surface waters (OSW), protected species and habitat, and essential fish habitat (EFH). This project has been evaluated through the Efficient Transportation Decision Making (ETDM) screening (Project #14520). This document summarizes measures that will be implemented to avoid and minimize potential impacts, as well as compensatory mitigation requirements. This report provides documentation of these processes to supplement the Environmental Document [Type 2 Categorical Exclusion (CE)].

Protected Species and Habitat

A combination of database searches, Geographic Information System (GIS) analysis, and field investigations were conducted to determine the likelihood of occurrence and potential for impact to federally and state listed species and their suitable habitats occurring within the project study area. A total of 26 federally and/or state listed species, or candidate or proposed for listing (3 mammals, 6 birds, 1 insect, 6 reptiles, 3 fish, and 7 corals), were determined to occur or potentially occur within the project study area. Additionally, while not state or federally listed under the Endangered Species Act (ESA), the bald eagle (*Haliaeetus leucocephalus*) was included in the protected species evaluation due to its protection under the Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (BGEPA), the Lacey Act 16 U.S.C. §§ 3371-3378, and under 68A-16.002, F.A.C, and the common bottlenose dolphin (*Tursiops truncatus*) was included in the evaluation due to its protection under the Marine Mammal Protection Act. Furthermore, the tricolored bat (*Perimyotis subflavus*) was included due to its Proposed listing status, and the monarch butterfly (*Danaus plexippus*) was included due to its Candidate listing status. **Table ES-1** shows the federally and state listed wildlife species with the potential to occur within the project study area, along with their corresponding effect determinations, and identifies species with designated critical habitat (CH) in the project area.

Table ES-1 Federally and State Listed Wildlife Species Potentially Occurring within the Project Study Area and their associated Effect Determinations

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination[2]
MAMMALS				
Florida bonneted bat	*Eumops floridanus*	FE	Low[3]	*No effect*
Tricolored bat	*Perimyotis subflavus*	P(E)	Low[3]	*N/A*
West Indian manatee	*Trichechus manatus*	FT	High (CH)[4]	*May affect, not likely to adversely affect*
BIRDS				
Little blue heron	*Egretta caerulea*	ST	Moderate	*No adverse effect anticipated*
Piping plover	*Charadrius melodus*	FT	Low	*No effect*
Reddish egret	*Egretta rufescens*	ST	Low	*No adverse effect anticipated*
Roseate spoonbill	*Platalea ajaja*	ST	Low	*No adverse effect anticipated*
Tricolored heron	*Egretta tricolor*	ST	Low	*No adverse effect anticipated*
Wood stork	*Mycteria americana*	FT	Low	*May affect, not likely to adversely affect*
INSECTS				
Monarch butterfly	*Danaus plexippus*	C	Low	*N/A*
REPTILES				
American crocodile	*Crocodylus acutus*	FT	Low	*No effect*
Eastern indigo snake	*Drymarchon corais couperi*	FT	Low	*May affect, not likely to adversely affect*
Green sea turtle	*Chelonia mydas*	FT	Moderate (PCH)[5]	*May affect, not likely to adversely affect*
Hawksbill sea turtle	*Eretmochelys imbricata*	FE	Moderate	*May affect, not likely to adversely affect*
Leatherback sea turtle	*Dermochelys coriacea*	FE	Low	*No effect*
Loggerhead sea turtle	*Caretta caretta*	FT	Low	*May affect, not likely to adversely affect*
FISH				
Giant manta ray	*Manta birostris*	FT	Low	*May affect, not likely to adversely affect*
Nassau grouper	*Epinephelus striatus*	FT	Low	*No effect*
Smalltooth sawfish	*Pristis pectinata*	FE	Low	*May affect, not likely to adversely affect*
CORALS				
Boulder star coral	*Orbicella franksi*	FT	High	*May affect, not likely to adversely affect*
Elkhorn coral	*Acropora palmata*	FT	Low	*No effect*
Lobed star coral	*Orbicella annularis*	FT	Moderate	*May affect, not likely to adversely affect*
Mountainous star coral	*Orbicella faveolata*	FT	Moderate	*May affect, not likely to adversely affect*
Pillar coral	*Dendrogyra cylindrus*	FT	Low	*No effect*
Rough cactus coral	*Mycetophyllia ferox*	FT	Low	*No effect*
Staghorn coral	*Acropora cervicornis*	FT	Low	*No effect*

[1]FE = Federally Endangered, FT = Federally Threatened, P(E) = Proposed for Listing as Federally Endangered, C = Candidate for Federal Listing, ST = State Threatened
[2]N/A = Not Applicable
[3]Based on findings of the October 2023 Florida Bonneted Bat Survey (see Section 4.5 and **Appendix D** for details).
[4](CH) – the project study area is located within designated CH for the manatee
[5](PCH) - the project study area is located within the proposed CH for the green sea turtle

Wetlands and OSW

The wetlands and OSW evaluation identified a total of 18 wetlands (seagrass beds) and eight OSWs within the project study area. The 18 seagrass beds (Wetlands SA through SR) included three species of seagrass: paddle grass (*Halophila decipiens*), manatee grass (*Syringodium filiforme*), and turtle grass (*Thalassia testudinum*). Permanent impacts to seagrass are anticipated to result from installation of the new bridge piers and shading of the substrate by the new bridge structure and would be substantially lower for Build Alternative 1 (High-Level Fixed Bridge) (0.172 ac) than for Build Alternative 2 (Mid-Level Movable Bridge) (0.332 ac). Temporary impacts to seagrasses (calculated based on a 25-foot construction impact buffer around each alternative alignment) are anticipated to be slightly higher for Build Alternative 1 (High-Level Fixed Bridge) (0.107 ac) than for the Build Alternative 2 (Mid-Level Movable Bridge) (0.085 ac). The total impacts to seagrasses are anticipated to be notably lower for the Build Alternative 1 (High-Level Fixed Bridge) (0.279 ac) than for Build Alternative 2 (Mid-Level Movable Bridge) (0.417 ac). Based on the Uniform Mitigation Assessment Method (UMAM) functional assessment, the total wetland functional loss would be 0.022 for Build Alternative 1 (High-Level Fixed Bridge) and 0.041 for Build Alternative 2 (Mid-Level Movable Bridge). Unavoidable impacts to seagrasses from the proposed project will be mitigated and preliminary mitigation options are under investigation to offset unavoidable impacts to seagrass habitat associated with the Broad Causeway Bridge project.

Eight OSWs (artificial stormwater retention features) were documented within the causeway island portion of the project study area. Permanent direct impacts to all eight OSWs are anticipated in association with construction of the proposed stormwater management ponds and are expected to be the same for both build alternatives (i.e., a total of 0.798 ac). No indirect or temporary impacts are anticipated for the OSWs from the proposed project, and no mitigation is anticipated to be required for impacts to OSWs.

Occasional mangrove propagules and saplings (no mature trees) were noted within the riprap along the causeway island. These mangroves do not constitute a wetland and do not lie within the project footprint. The area of impact to the riprap shoreline from construction activities (i.e., the proposed new seawall installation) will be re-evaluated during the permitting phase and any impacts to mangroves will be addressed. If mangrove saplings are present within the riprap impact area, a Biscayne Bay Environmental Enhancement Trust Fund (BBEETF) contribution will be applied as compensatory mitigation.

EFH

The project will involve in-water work and, therefore, has the potential to directly and indirectly impact benthic resources and habitats that have been designated as EFH by the South Atlantic Fisheries Management Council (SAFMC). Seven EFH types were identified within the project area: Estuarine Water Column; Estuarine and Marine Submerged Aquatic Vegetation (SAV - Seagrass and Macroalgae); Algal Communities (*Laurencia*); Live Bottom; Rough, Hard, Exposed, Stable Substrate; Sponges; and Unconsolidated Estuarine Bottom. The project study area overlaps the boundaries of designated EFH and Habitat Areas of Particular Concern (HAPCs) from five fishery management units: Penaeid Shrimp; Snapper-Grouper Complex; Spiny Lobster (*Panulirus argus*); Coastal Migratory Pelagics; and Coral, Coral Reefs and Live/hard Bottom Habitat. There are three HAPCs occurring

within the project study area: 1) Biscayne Bay, 2) SAV/seagrass, and 3) Coral, Coral Reefs and Live/hard Bottom Habitat. These HAPCs provide EFH for several managed species/groups, including spiny lobster, penaied shrimp, snapper-grouper complex, coastal migratory pelagics, and coral, coral reefs and live/hard bottom habitat.

The proposed project will include the following activities that may impact EFH, HAPCs, and managed species, including installation of the proposed bridge structures (bridge piers and deck), new seawall installation, drainage installation on the causeway island (ponds), and existing bridge demolition. Permanent impacts on EFH and HAPC were calculated based on the footprint of each build alternative alignment and include both impacts from bridge pier installation and shading of habitats from the bridge deck. As shown in **Table ES-2**, which summarizes potential permanent and temporary direct and indirect impacts to the various EFH habitat types associated with each build alternative, both permanent and temporary impacts to EFH are anticipated to be lower for Build Alternative 1 (High-Level Fixed Bridge) than for Build Alternative 2 (Mid-Level Movable Bridge).

Corals were observed within the project study area during the 2022 and 2023 benthic surveys. During the design phase, the Town will attempt to avoid and minimize impacts to corals to the maximum extent practicable. The impacts on corals will be minimized by relocating all colonies of any listed corals to suitable habitat prior to construction. At this time, coral impacts are not fully quantified since the Preferred Alternative has not yet been approved and design is only in the preliminary stages. A future benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area. The Town is currently developing a *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* which will be coordinated with NMFS and FWC. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be reviewed by the regulatory agencies for final approval. BMPs to control turbidity and sedimentation will also be utilized to reduce impacts to corals from turbidity and sedimentation during construction. To minimize impacts to corals from the proposed seawall construction, the new seawalls will be constructed landward of the existing seawalls, the existing seawalls will remain in place, and all seawall construction activities will be conducted from land. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and provided to NMFS for their review and approval. The most likely seawall debris containment method to be utilized is a temporary floating platform that will be repositioned regularly to minimize temporary shading impacts to corals. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and will be provided to NMFS for their review and approval.

Temporary displacements of managed species in the Shrimp, Spiny Lobster, Snapper-Grouper, Coastal Migratory Pelagics, and Highly Migratory Species FMPs, along with other benthic and demersal species, may occur during construction of the build alternatives. However, these species are considered to be motile and are expected to return to the project area once construction is complete since their associated EFH types are anticipated to naturally re-establish within the project area after construction. No significant impacts to these managed species are anticipated from this project.

Table ES-2 Summary of Potential Permanent and Temporary Impacts to EFH and HAPC

Habitat[1]		Impact Type	Build Alternative 1 High-Level Fixed Bridge	Build Alternative 2 Mid-Level Movable Bridge
Estuarine Water Column EFH	Estuarine Water Column	Permanent – Bridge Piers	4,343 cubic feet	67,721 cubic feet[2]
		Temporary	--	--
Estuarine and Marine Submerged SAV EFH	Community 1 SAV (macroalgal beds)	Permanent - Bridge Piers, Shading	2.74 ac	3.03 ac
		Temporary – 25-foot Construction Buffer	1.00 ac	1.64 ac
	Community 2 SAV (seagrass)	Permanent – Bridge Piers, Shading	0.17 ac	0.33 ac
		Temporary – 25-foot Construction Buffer	0.11 ac	0.09 ac
Coral, Coral Reefs, and Live/hard Bottom Habitat EFH	Community 3 Live Bottom	Permanent – Bridge Piers, Shading	0.12 ac[3]	0.02 ac[3]
		Temporary – 25-foot Construction Buffer	0.04 ac	0.07 ac
	Community 4 Coral Habitat Adjacent to Seawalls	Permanent	--	--
		Temporary	--	--
	Community 5 Existing Seawalls and Bridge Piers	Permanent –Bridge Pier Demolition	Remove all 29 bridge piers	Remove all 29 bridge piers
		Temporary	--	--
Total Direct Impacts		**Permanent**	**4,343 cubic feet** (Estuarine Water Column) **3.03 ac** (Communities 1-3) **Remove all 29 bridge piers**	**67,721 cubic feet** (Estuarine Water Column) **3.38 ac** (Communities 1-3) **Remove all 29 bridge piers**
		Temporary	**1.15 ac** (Communities 1-3)	**1.80 ac (Communities 1-3)**

[1]Note that Unconsolidated Estuarine Bottom EFH was not delineated during the 2023 quantitative benthic survey because the extent of non-vegetated sediments within the project study area is minimal and these areas are scattered within the various habitats.
[2]Estuarine water column impacts for Build Alternative 2 is an underestimate of impacts, as they were calculated based on the volume of submerged bascule piers only (dimensions/locations of the mid-level bascule intermediate bridge piers are not available at this time).
[3]Shading impacts to Community 3 - Live Bottom for both Build Alternatives are an overestimate since the non-photosynthetic organisms in this sponges-dominated community would still inhabit the substrate underneath the new bridge.

The submerged portion of the project study area is located within the Biscayne Bay Aquatic Preserve (BBAP), a designated Outstanding Florida Water (OFW), which contains CH for the threatened West Indian manatee. Furthermore, the benthic habitats in Biscayne Bay have been geographically designated as a HAPC for the spiny lobster and for coral, coral reefs and live/hard bottom. No long-term, adverse impacts are anticipated for the BBAP as a result of this project as the proposed work is not expected to promote new development, decrease water quality, or result in land use changes.

On the basis of the avoidance and minimization measures to be implemented for this project, along with the compensatory mitigation to be conducted for impacts to seagrass and corals, the project's impact on EFH is anticipated to be "more than minimal but less than substantial."

TABLE OF CONTENTS

1.0 PROJECT OVERVIEW 1-1

1.1 PROJECT DESCRIPTION 1-1
1.2 PURPOSE AND NEED 1-3
1.2.1 Bridge Deficiencies 1-3
1.2.2 Transportation Demand 1-4
1.2.3 Safety 1-4
1.3 ALTERNATIVES CONSIDERED 1-5
1.3.1 No Build (Repair) Alternative 1-5
1.3.2 Build Alternative 1 (High-Level Fixed Bridge) 1-7
1.3.3 Build Alternative 2 (Mid-Level Movable Bridge) 1-7
1.4 PREFERRED ALTERNATIVE 1-7

2.0 PROJECT STUDY AREA 2-1

3.0 EXISTING CONDITIONS 3-1

3.1 LAND USE 3-1
3.2 SOILS 3-1
3.3 STORMWATER MANAGEMENT SYSTEM 3-4
3.4 BISCAYNE BAY AQUATIC PRESERVE (BBAP) 3-4
3.5 SPECIMEN TREES 3-4

4.0 PROTECTED SPECIES AND HABITAT EVALUATION 4-1

4.1 PROTECTED SPECIES AND HABITAT ASSESSMENT METHODOLOGY 4-1
4.2 AGENCY COORDINATION 4-2
4.2.1 USFWS 4-2
4.2.2 NMFS 4-3
4.2.3 FWC 4-4
4.2.4 DERM 4-4
4.3 FIELD SURVEYS 4-4
4.4 FEDERALLY LISTED SPECIES 4-5
4.5 FEDERALLY LISTED SPECIES EFFECT DETERMINATIONS 4-8
4.5.1 USFWS Purview 4-10
4.5.2 NMFS Purview 4-16
4.6 CRITICAL HABITAT 4-22

4.7 State Listed Species 4-23
4.8 Other Species 4-25

5.0 WETLANDS AND OTHER SURFACE WATERS 5-1

5.1 Agency Coordination 5-1
5.1.1 USACE 5-1
5.1.2 USEPA 5-2
5.1.3 USFWS 5-2
5.1.4 NMFS 5-2
5.1.5 FDEP 5-2
5.1.6 SFWMD 5-3
5.1.7 DERM 5-3
5.2 Wetland Survey Methodology 5-3
5.3 Wetland Characterization 5-4
5.4 Wetland Impacts 5-10
5.4.1 Permanent Impacts 5-10
5.4.2 Temporary Impacts 5-14
5.4.3 Cumulative impacts 5-14
5.5 Avoidance and Minimization of Impacts to Wetlands 5-15
5.6 Functional Assessment 5-16
5.6.1 Methodology 5-16
5.6.2 Functional Assessment Results 5-17

6.0 ESSENTIAL FISH HABITAT 6-1

6.1 Agency Coordination 6-1
6.1.1 USEPA 6-1
6.1.2 NMFS 6-1
6.1.3 FDEP 6-2
6.1.4 SFWMD 6-3
6.1.5 DERM 6-3
6.2 EFH Methodology 6-3
6.2.1 Desktop GIS Data Reviews 6-3
6.2.2 Field Surveys 6-3
6.2.2.1 2022 Preliminary Benthic Survey 6-4
6.2.2.2 2023 Quantitative Benthic Survey 6-4
6.3 EFH and HAPC Present within the Project Study Area 6-6

6.3.1 Community 1 – Macroalgal Beds 6-7
6.3.2 Community 2 – Seagrass Beds/Patches 6-7
6.3.2.1 HAPC - SAV/Seagrass 6-8
6.3.3 Community 3 – Live Bottom 6-8
6.3.3.1 HAPC - Live/Hardbottom 6-9
6.3.4 Community 4 - Coral Habitat Adjacent to the Seawalls 6-9
6.3.4.1 HAPC - Coral 6-9
6.3.5 Community 5 – Existing Seawalls and Bridge Piers 6-9
6.3.6 Estuarine Water Column EFH 6-10
6.3.6.1 HAPC - Biscayne Bay 6-11
6.3.7 Unconsolidated Estuarine Bottom 6-11
6.4 Managed Species Potentially Present in Project Study Area 6-11
6.5 Evaluation of Impacts to EFH, HAPC, and Managed Species 6-14
6.5.1 Permanent Impacts 6-14
6.5.1.1 Estuarine Water Column 6-16
6.5.1.2 Community 1 - Macroalgal Beds 6-16
6.5.1.3 Community 2 - Seagrass 6-16
6.5.1.4 Community 3 – Live Bottom 6-17
6.5.1.5 Community 4 – Coral Habitat Adjacent to Seawalls 6-18
6.5.1.6 Community 5 – Existing Seawalls and Bridge Piers 6-18
6.5.1.7 Unconsolidated Estuarine Bottom 6-18
6.5.2 Temporary Impacts 6-19
6.5.3 Cumulative Impacts 6-22
6.6 Avoidance and Minimization of Impacts to EFH and Managed Species 6-22
6.7 Determination of Effect on EFH 6-25

7.0 COMPENSATORY MITIGATION FOR IMPACTS TO WETLANDS AND EFH 7-1

7.1 Seagrass Mitigation 7-1
7.2 Coral Mitigation 7-2

8.0 ANTICIPATED PERMITS 8-1

9.0 CONCLUSIONS 9-1

9.1 Implementation Measures 9-2
9.2 Commitments 9-4
9.3 Agency Coordination 9-6

10.0 REFERENCES 10-1

11.0 APPENDICES 11-1

APPENDIX A – IPaC RESOURCE LIST AND FNAI BIODIVERSITY MATRIX QUERY RESULTS

APPENDIX B – AGENCY MEETING MINUTES

USFWS Meeting Minutes (1/12/2024)

NMFS Meeting Minutes (7/12/2023)

NMFS Meeting Minutes (12/21/2023)

NMFS Meeting Minutes (2/21/2024)

APPENDIX C – BLASTING INFORMATION

NMFS Blasting Information Email (2/27/2024)

SR 679 Pinellas Bayway Structure E Section 7 Consultation Letter (11/27/2018)

Veterans Memorial Bridge Section 7 Consultation Letter (11/01/2016)

SR 679 Pinellas Bayway Structure E Blasting Plan (12/10/2020)

SR 679 Pinellas Bayway Structure E Imperiled Species and Marine Mammal Watch Plan

SR 679 Pinellas Bayway Structure E Imperiled Species and Marine Mammal Watch Plan Report (5/18/2021)

APPENDIX D – OSW AND MANGROVE PHOTOGRAPHIC LOG

APPENDIX E – 2023 QUANTITATIVE BENTHIC SURVEY REPORT

APPENDIX F – OCTOBER 2023 FLORIDA BONNETED BAT SURVEY REPORT

APPENDIX G – SPECIES PROTECTION MEASURES

Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida

Standard Manatee Conditions for In-water Work

Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office

Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office

Standard Protection Measures for the Eastern Indigo Snake

APPENDIX H – SEAGRASS FUNCTIONAL ASSESESSMENT FORMS (UMAM)

APPENDIX I – SEAGRASS MITIGATION INQUIRY EMAIL

LIST OF FIGURES

Figure 1-1 Project Location Map 1-2

Figure 1-2 Build Alternative Footprints and Project Study Area Map 1-6

Figure 1-3 Proposed High-Level Fixed-Bridge Alternative Typical Section 1-8

Figure 1-4 Conceptual Seawall Design 1-10

Figure 4-1 USFWS's designated Consultation Area for the Florida Bonneted Bat 4-11

Figure 4-2 Audubon Eagle Watch Public Nest Map 4-26

Figure 5-1 FLUCCS Map 5-6

Figure 5-2 Wetlands within the Biscayne Bay Portion of the Project Study Area 5-7

Figure 5-3 OSWs within the Causeway Island Portion of the Project Study Area and the Anticipated Permanent Impacts to OSWs for Both Build Alternatives 5-8

Figure 5-4 Anticipated Permanent and Temporary Impacts to Wetlands for Build Alternative 1 (High-Level Fixed Bridge) 5-12

Figure 5-5 Anticipated Permanent and Temporary Impacts to Wetlands for Build Alternative 2 (Mid-Level Moveable Bridge) 5-13

Figure 6-1 2023 Quantitative Benthic Survey Area and Benthic Community Types within the Project Study Area 6-5

LIST OF TABLES

Table ES-1 Federally and State Listed Wildlife Species Potentially Occurring within the Project Study Area and their associated Effect Determinations ii

Table ES-2 Summary of Potential Permanent and Temporary Impacts to EFH and HAPC v

Table 4-1 Federally Listed Wildlife Species Potentially Occurring within the Project Study Area and their associated Effect Determinations 4-6

Table 4-2 Federally Listed Plant Species and their associated Effect Determinations 4-8

Table 4-3 State Listed Wildlife Species Potentially Occurring within the Project Area 4-23

Table 4-4 State Listed Plant Species 4-25

Table 5-1 Wetlands and Other Surface Waters Identified within the Project Study Area 5-5

Table 5-2 Summary of Permanent Direct and Indirect Impacts to Wetlands and Surface Waters 5-10

Table 5-3 Summary of Temporary Impacts to Wetlands 5-14

Table 5-4 Summary of UMAM Scores 5-17

Table 5-5 Potential Permanent Wetland Impact and Functional Loss for the Build Alternatives 5-18

Table 5-6 Potential Temporary Wetland Impact and Functional Loss for the Build Alternatives 5-18

Table 5-7 Total Wetland Impact and Functional Loss for the Build Alternatives 5-18

Table 6-1 EFH within the Project Study Area 6-6

Table 6-2 HAPC within the Project Study Area 6-7

Table 6-3 Managed Species within EFH in the Project Area 6-12

Table 6-4 Summary of Potential Permanent and Temporary Impacts to EFH and HAPC 6-14

Table 9-1 Summary Federally and State Listed Wildlife Species and their associated Effect Determinations 9-0

Table 9-2 Summary of Permanent and Temporary Impacts to Wetlands and OSWs 9-0

Table 9-3 Summary of Potential Permanent and Temporary Impacts to EFH and HAPC 9-3

ACRONYMS AND ABBREVIATIONS

A	**AC**	acre
	ADA	Americans with Disabilities Act
	AN	Advance Notification
B	**BBAP**	Biscayne Bay Aquatic Preserve
	BBEETF	Biscayne Bay Environmental Enhancement Trust Fund
	BGEPA	Bald and Golden Eagle Protection Act
	BMP	Best Management Practice
C	**C**	Candidate for Federal Listing
	CE	Categorical Exclusion
	CFR	Code of Federal Regulations
	CH	Critical Habitat
	CM	centimeter
	CWA	Clean Water Act
D	**DERM**	Department of Regulatory and Economic Resources Division of Environmental Resource Management
E	**EAA**	Expedited Administrative Authorization
	ECP	Erosion Control Plan
	EFH	Essential Fish Habitat
	EMB	Everglades Mitigation Bank
	EO	Executive Order
	ERP	Environmental Resource Permit
	ESA	Endangered Species Act
	EST	Environmental Screening Tool
	ETAT	Environmental Technical Advisory Team
	ETDM	Efficient Transportation Decision Making
F	**F.A.C.**	Florida Administrative Code
	FBB	Florida bonneted bat
	FDACS	Florida Department of Agriculture and Consumer Services
	FDEM	Florida Division of Emergency Management
	FDEP	Florida Department of Environmental Protection
	FDOT	Florida Department of Transportation
	FE	Federally Endangered

	FESA	Florida Endangered and Threatened Species Act
	FHWA	Federal Highway Administration
	FL	Functional loss
	FLUCCS	Florida Land Use, Cover, and Forms Classification System
	FMC	Fishery Management Council
	FMP	Fishery Management Plan
	FNAI	Florida Natural Areas Inventory
	F.S.	Florida Statutes
	FT	Federally Threatened
	FWC	Florid Fish and Wildlife Conservation Commission
G	**GIS**	Geographic Information Systems
	GPS	Global positioning system
H	**HAPC**	Habitat Area of Particular Concern
I	**ICW**	Intracoastal Waterway
	ID	identification
	IPaC	Information for Planning and Consultation
J		
K		
L		
M	**MBTA**	Migratory Bird Treaty Act
	MOU	Memorandum of Understanding
	mph	miles per hour
	MPP	Miami-Dade County Manatee Protection Plan
	MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
N	**NEPA**	National Environmental Policy Act
	NMFS	National Marine Fisheries Service
	NPDES	National Pollutant Discharge Elimination System
	NRCS	Natural Resources Conservation Service
	NRE	Natural Resources Evaluation
	NTU	Nephelometric Turbidity Unit
	NWI	National Wetlands Inventory
O	**OEM**	Office of Environmental Management
	OFW	Outstanding Florida Water
	OSW	Other Surface Waters

P	**PD&E**	Project Development and Environment
	PER	Preliminary Engineering Report
Q		
R	**ROW**	right-of-way
S	**SAFMC**	South Atlantic Fishery Management Council
	SAV	submerged aquatic vegetation
	SFH	suitable foraging habitat
	SFWMD	South Florida Water Management District
	SR	State Road
	ST	State Threatened
	SWPPP	Stormwater Pollution Prevention Plan
T		
U	**UMAM**	Uniform Mitigation Assessment Method
	USACE	US Army Corps of Engineers
	USCG	US Coast Guard
	USDA	US Department of Agriculture
	USEPA	US Environmental Protection Agency
	USFWS	US Fish and Wildlife Service
V		
W	**WATER**	Wetland Assessment Technique for Environmental Review
X		
Y		
Z		

1.0 PROJECT OVERVIEW

This Natural Resources Evaluation (NRE) Report conforms to the Florida Department of Transportation's (FDOT's) *Project Development and Environment (PD&E) Manual Natural Resources Evaluation Outline and Guidance* (August 2022) and all applicable federal and state laws. The purpose of this analysis is to demonstrate due diligence in accordance with the state and federal regulations regarding wetlands and other surface waters (OSW), protected species and habitat, and essential fish habitat (EFH). This project has been evaluated through the Efficient Transportation Decision Making (ETDM) screening (Project #14520). This document summarizes measures that will be implemented to avoid and minimize potential impacts, as well as compensatory mitigation requirements. This report provides documentation of these processes to supplement the Environmental Document [Type 2 Categorical Exclusion (CE)].

1.1 Project Description

The project involves the potential replacement of the Broad Causeway Bridge connecting the Town of Bay Harbor Islands with the City of North Miami, within Miami-Dade County. The roadway is classified as "Urban Minor Arterial" and extends to the Village of Bal Harbour and Town of Surfside and connects those commuters to the mainland. The limits of the project are from Broad Causeway Island to East of West Broadview Drive. The FDOT bridge Identification (ID) Number is 875101. A graphic depicting the location of the bridge is provided as **Figure 1-1**. The project is approximately 0.97 mile in length.

The existing bridge consists of four lanes (two in each direction); the four travel lanes are 10-foot wide, without a raised median. The outside travel lanes also include shared-use markings to accommodate bicycles. In addition, a raised sidewalk is present on each side of the bridge, with a width that varies from 22 to 36 inches. There are no guardrails separating the sidewalk from the travel lane. Crossing over the Intracoastal Waterway, the bridge has a maximum vertical clearance of 18.00 feet at Mean Low Water and a minimum vertical clearance of 16.00 feet at Mean High Water at the Bascule crossing. The Intracoastal Waterway at the bridge crossing is deemed a navigable waterway by the US Coast Guard (USCG). The bridge bascule is required by the USCG to open at :15 and :45 minutes of each hour to allow boat traffic.

The existing bridge, constructed in 1951, has been determined to be functionally obsolete with fracture-critical components based on a Bridge Inspection Report prepared in January 2023 and determined to be structurally deficient based on a Bridge Inspection Report prepared in January 2024 by the FDOT. In 2017, major structural repairs were performed to the bridge at a construction cost of approximately $17 million. As a result of a 2020 inspection carried out by FDOT, a design to address additional repairs has been completed and it has been determined that the cost to perform these repairs will amount to $3 million. It is expected that major costly repairs will be needed more frequently as the bridge ages to prevent closure or severe damages. Because of the structure type, the number of structural deficiencies, and high maintenance costs, the Town of Bay Harbor Islands is considering replacement of the bridge. Therefore, the PD&E Study will evaluate bridge replacement alternatives. Future bridge concepts will include provisions for new dedicated bicycle lanes and

Figure 1-1 Project Location Map



sidewalks to comply with Americans with Disabilities Act (ADA) requirements and guardrails for the safety of pedestrians.

Additional right-of way is not anticipated to accommodate the replacement bridge. Included in the Town Charter by the 1953 Senate Bill No. 865, the State of Florida surrendered and granted to the Town of Bay Harbor Islands "any claim or control over all tidewaters and other lands, and all bayous and bay bottoms, beaches, waters, waterways and water bottoms, and all riparian rights within and adjacent to the Town limits for municipal purposes only, a strip of 300 feet wide from Kane Concourse, westwardly across Biscayne Bay to approximately 123rd Street in the City of North Miami."

1.2 Purpose and Need

The purpose of this project is to address the structural and functional deficiencies of the existing Broad Causeway Bridge. The feasibility of continued rehabilitation and repair versus replacement of the bridge will be evaluated through the PD&E study. The need for the project is based on the identified bridge deficiencies as presented below.

1.2.1 Bridge Deficiencies

Constructed in 1951, the 71-year-old bridge has been determined to be functionally obsolete and contains fracture-critical components based on a Bridge Inspection Report prepared in January 2023 by the FDOT. According to the Federal Highway Administration (FHWA), functionally obsolete means that the bridge was built to standards that are not used today. The Broad Causeway Bridge does not meet current design standards for lane widths or shoulder widths, nor does it serve current or future traffic demand. The bridge received a Sufficiency Rating of 46.3 [on a scale of 0 percent (poor) to 100 percent (very good)]. The Sufficiency Rating is essentially an overall rating of a bridge's fitness to remain in service. A low Sufficiency Rating may qualify a bridge for state or federal replacement funds.

As part of the inspection process, several components were evaluated and assigned a rank or condition based on the National Bridge Inventory system. The system was established to evaluate existing bridge deficiencies to ensure safety for the traveling public. The ranks/conditions were based on a scale of zero through nine. A rank of zero generally means that the bridge is out of service, beyond corrective action, and in need of replacement; a rank of nine means the bridge is in excellent condition and no deficiencies have been identified. The ranks/conditions for the components examined in the reports are as follows:

Bridge ID Numbers 875101 (FDOT Inspection Date 1/26/23)

- Bridge Railings: 0 (Does not meet currently acceptable standards)
- Transitions: 1 (Meets currently acceptable standards)
- Approach Guardrails: 1 (Meets currently acceptable standards)
- Bridge Guardrails Ends: 0 (Does not meet currently acceptable standards)
- Deck: 5 (Fair)
- Superstructure: 5 (Fair)
- Substructure: 7 (Good)
- Performance Rating: Fair

- Chanel: 7 (Minor Damage)
- Deck Geometry Appraisal: 2 (Intolerable; High Priority Replacement)
- Approach Alignment Appraisal: 4 (Minimum Tolerable)

In 2017, major structural repairs were performed to the bridge at a construction cost of approximately $17 million. As a result of a 2020 inspection carried out by FDOT, a design to address additional repairs identified by the 2020 inspection was completed. Estimated costs to perform these repairs amount to $3 million. As the structure continues to age, frequent, costly repairs will be needed to prevent closure or severe damages.

1.2.2 Transportation Demand

The Broad Causeway and Kane Concourse corridor have high traffic volumes since they connect the beach communities and Bay Harbor Islands to the mainland. The a.m. and p.m. peak hours are times of high congestion and future traffic volumes are anticipated to continue to increase. Since the Intracoastal Waterway at the bridge crossing is deemed a navigable waterway by the USCG, the bridge bascule is required by the USCG to open at :15 and :45 minutes of each hour to allow boat traffic. Having the bridge open twice per hour further compounds traffic congestion. Having free flow of vehicular traffic or infrequent bridge openings will help relieve congestion and facilitate emergency evacuation.

1.2.3 Safety

Broad Causeway Bridge is a high vehicle crash location with many bicycle crashes. Based on information from Signal4 Analytics database, between 2018 and 2023 there were 47 total vehicle crashes occurring within the project limits of which 26 were on the undivided bridge and approach sections. The highest concentration of crashes was near West Broadview Drive. The study area exhibited a majority of the crashes to be sideswipe crashes (28%) and rear end crashes (26%). The high occurrence of rear-end and sideswipe crashes can be indicative of congestion along the corridor. Of the 47 vehicle crashes, none resulted in a fatality, but two resulted in serious injury and 18 resulted in injuries. While vehicle to vehicle crash rate of 1.90 for the undivided bridge section is below the statewide average (7.30) for this type of urban facility, vehicle to bicycle crashes are exponentially higher as explained below. The outside travel lanes on Broad Causeway Bridge include shared-use markings to accommodate bicycles, but there are conflicting signs on each side of the bridge that direct cyclists to get off the bicycle and walk. According to the 2018 FDOT Florida Greenbook, the minimum width of a shared lane is 14 feet. The existing lane width on Broad Causeway Bridge is only 10 feet. Therefore, the bicycles are sharing 30 miles per hour (mph) travel lanes with vehicles on lane widths that don't meet current standards. As a result, there have been nine vehicle crashes involving bicycles. All of these crashes resulted in injury and occurred on the undivided bridge and approach sections. Vehicle to bicycle interactions account for 19% of the crashes in the project corridor. This is 17.8% higher than the 1.2% average representing crashes involving a bicycle in 2022 for Miami-Dade County urban, non-interstate facilities (Source: Signal4 2022).

In addition, a raised sidewalk is present on each side of the bridge, with a width that varies from 22 to 36 inches. There are no guardrails separating the sidewalk from the travel lane. The west side of the bridge has a 6-inch curb to enter the sidewalk. This creates an unsafe condition for pedestrians

particularly if two pedestrians are walking across the bridge in opposite directions and need to pass each other. There are currently no sidewalks on the causeway island west of the bridge.

Serving as part of the emergency evacuation route network designated by the Florida Division of Emergency Management (FDEM) and Miami-Dade County, Broad Causeway Bridge plays a critical role in facilitating traffic between the beaches and the mainland of Miami during emergency evacuation periods. The project is needed to maintain emergency evacuation capabilities to approximately 40,000 residents from the municipalities of Bay Harbor Islands, Bal Harbour, Surfside, Miami Beach, and Sunny Isles Beach. When winds are higher than 35 mph, the USCG requires the bridge to be closed (down position) to avoid damages to the wings. When there is an emergency evacuation situation, the USCG starts closing (down position) the movable bridges from the south and moving north. Typically, the Broad Causeway Bridge remains closed until the USCG contacts the Town of Bay Harbor Islands to open it for certain hours.

The existing structure and some of the mechanical components are over 70 years old and are failing. The Town of Bay Harbor Islands has completed numerous repairs in the recent years to keep the bridge operational. As time passes repairs are needed more frequently and at a higher cost. In addition, the Broad Causeway Bridge only has one emergency generator, which is undersized. When the generator is needed to run the bascule portion of the bridge, the two wings cannot open at the same time, hence delaying the opening-closing cycle. If the bridge is stuck open because of mechanical failure or is damaged due to a hurricane, direct emergency evacuation for these communities will be eliminated. The detour route for those on the east end of the bridge heading north counterclockwise to the west end of the bridge would be 9.4 miles and heading south (clockwise) would be 11.12 miles. The detour route for those on the west end of the bridge heading north clockwise to the east end of the bridge would be 9.26 miles and heading south (counterclockwise) would be 11.29 miles.

1.3 Alternatives Considered

For Type 2 CE projects, typically only the Preferred Alternative is described and discussed in the NRE. However, for this project, additional information is provided on the alternatives that were evaluated during the PD&E Study [i.e., the No Build Alternative, the High-Level Fixed Bridge (Build Alternative 1), and the Mid-Level Movable Bridge (Build Alternative 2)] in order to demonstrate that the project has incorporated avoidance and minimization measures for impacts to benthic resources. In addition, these alternatives are also discussed in the NRE to demonstrate consistency with the information provided in the two technical assistance calls with the NMFS, as well as the technical assistance call with USFWS (see Section 4.2). Brief descriptions of the No Build Alternative and two build alternatives are provided below. For additional information relating to the alternatives analysis, please see the Preliminary Engineering Report (PER). The footprint of the two build alternatives and the project study area are shown in **Figure 1-2**.

1.3.1 No Build (Repair) Alternative

The No Build Alternative assumes the Town would keep the existing bridge and not construct a new bridge. The Town would continue normal maintenance and make minor repairs of the existing bridge

Figure 1-2 Build Alternative Footprints and Project Study Area Map



in its current configuration while keeping the bridge operating in a safe condition and maintaining the existing typical sections. This alternative requires closure of the bridge for an undetermined amount of time based on the repairs needed. An 11-mile detour to the south and a 9-mile detour to the north would have to be utilized if the bridge is decommissioned or closed for extensive repairs. The existing conditions would be maintained within the project limits and there would not be any direct impacts to the physical, natural, and cultural environments. Continuous maintenance and repairs would be performed to make the bridge safe to use. The future lifespan would only be 15 to 25 years. Substandard roadway lane widths and pedestrian accommodations would remain. Although this alternative does not meet the purpose and need for this project, it will remain under consideration and serve as a baseline for comparison against the other alternatives throughout the PD&E Study and EA.

1.3.2 Build Alternative 1 (High-Level Fixed Bridge)

Build Alternative 1 is a High-Level Fixed Bridge Alternative that would replace the existing movable bridge. It would feature a vertical navigational clearance of 65 feet to allow boaters safe passage under the bridge. The new fixed bridge would include widened lane widths and shoulders, and a shared-use path for pedestrians and bicyclists that meet current day standards.

1.3.3 Build Alternative 2 (Mid-Level Movable Bridge)

Build Alternative 2 is a Mid-Level Movable Bridge Alternative that would replace the existing movable bridge with a new bridge with a navigation clearance of 40 ft. Based on data provided by the existing bridge tender house and allowing for tidal fluctuations, this height would allow approximately 70 to 80 percent of the waterway users that currently require the bridge to open to pass without an opening. The new alignment would be located to the south of the existing bridge, allowing for traffic to be maintained along the existing bridge while the proposed bridge is constructed. Demolition of the existing bridge would be phased, so that traffic flow would be maintained within the existing corridor for most of the construction duration and progressively be transferred from the existing bridge to the new bridge. Emergency vehicles would have 24/7 access to pass through the corridor and should a hurricane warning be issued; the corridor would still be used as a Hurricane Evacuation Route during construction as it is today.

The Mid-Level Movable Bridge Alternative meets the purpose and need of the project, but would have a higher impact on EFH, seagrasses, and sovereign submerged lands due to the wider bridge footprint. The movable bridge footprint is wider because there are larger bascule piers that enclose the mechanical elements. Also, the bridge requires maintenance walkways to service the movable bridge components. It also has the highest construction cost of $438.1 million.

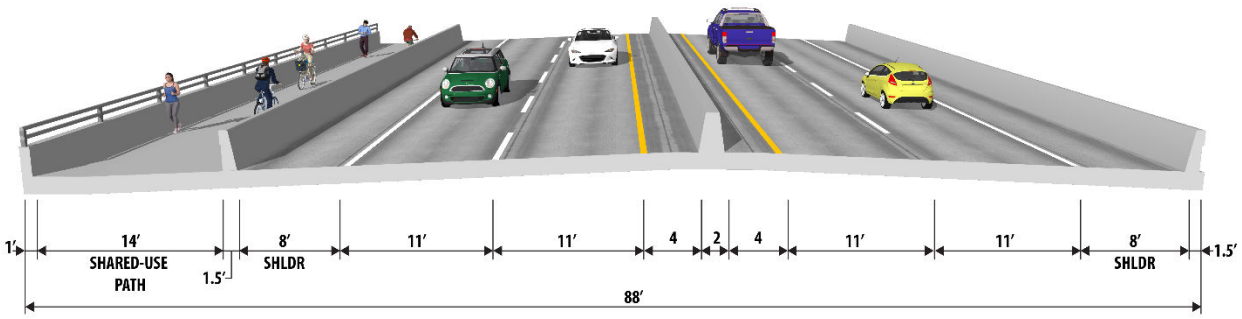
1.4 Preferred Alternative

After comparing and weighting the adverse and beneficial impacts of the No Build Alternative and two feasible build alternatives, the Town identified the 65-foot High-Level Fixed Bridge (Build Alternative 1) as the Preferred Alternative, subject to public review of the EA and completion of the public comment period after the public hearing. As stated in the May 26, 2022 Memorandum of Understanding (MOU) between FDOT and the FHWA, the FDOT Office of Environmental Management (OEM) will approve the final alternative when the environmental review is complete

and a Type 2 CE has been signed by OEM. Below is a general description of the Preferred Alternative followed by a summary of why this alternative addresses the purpose and need for the project and overall Town vision.

The Preferred Alternative (Build Alternative 1 - High-Level Fixed Bridge Alternative) consists of a new 65-foot High-Level Fixed Bridge on a southern alignment that replaces the existing Broad Causeway Bridge. The new bridge includes a 4-lane divided roadway with two, 11-foot lanes in each direction separated by 4-foot inside shoulders and a 2-foot concrete barrier wall. The outside shoulders are 8 feet wide, adjacent to concrete barrier walls. A 14-foot shared use path along the north side of the new bridge accommodates pedestrians and bicycles with a 1.5-foot barrier wall to safely separate travel lanes and the path. See **Figure 1-3** for an image of the proposed bridge typical section. The design and posted speed would be 30 mph, as it is today.

Figure 1-3 Proposed High-Level Fixed-Bridge Alternative Typical Section



On the causeway island, west of the bridge, new access ramps are proposed to and from the existing service station. The Preferred Alternative provides extra greenspace along the north side of the causeway island to provide an opportunity for new park and/or fitness destinations.

The existing median opening east of the bridge on State Road (SR) 922 at Broadview Terrace will remain open for U-turn only movements. A mid-block pedestrian crosswalk is proposed on Kane Concourse (SR 922) between the bridge and the existing median opening. The mid-block crossing will include a push-button crossing to allow pedestrians and bicyclists to cross the roadway. During design the mid-block crossing will be further analyzed to determine what the safest and most efficient option will be for pedestrian and bicycle crossing. Potential design options include Rapid Rectangular Flashing Beacons and overhead pedestrian signals. Extensive wayfinding signs will be included to direct pedestrian and bicycle movement in the vicinity of the bridge.

The proposed stormwater management system will be developed to meet the design and performance criteria established in the SFWMD Environmental Resource Permit (ERP) Applicant's Handbook Volumes I and II for the treatment and attenuation of discharges to impaired waters and Outstanding Florida Waters; the design will make every effort to maximize the treatment of stormwater runoff from the proposed project improvements. It is anticipated that the proposed stormwater improvements for this project will improve water quality by providing treatment where none currently exists or where treatment is currently limited. Additionally, best management practices

(BMPs) will be employed during construction activities. A Stormwater Pollution Prevention Plan (SWPPP) will also be implemented to control the effects of stormwater runoff during construction.

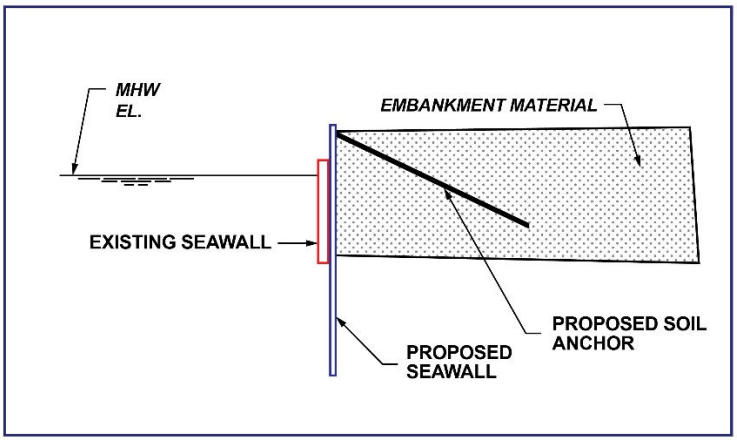
Stormwater runoff will be collected within ponds on the island; if percolation is sufficient, retention will be explored to attain greater water quality treatment. Due to the lack of available ROW for ponds east of the bridge, French drains will be used east of the bridge to the extent that room is available due to existing underground utilities.

In-water construction work is anticipated in association with the installation of the new bridge piers and demolition of the existing bridge. In this preliminary phase of the project design, it is estimated that there will be approximately 320 concrete pilings (each 24-in in diameter) installed in association with the new bridge structure over the water. It is anticipated that the new bridge piers will be installed via impact hammer and that a maximum of six piles will be driven per day with an average of 1,500 strikes per pile. The pile caps for the new bridge piers will be installed at the MHW line without the need for dredging or changes to the mudline. A preliminary barge access analysis has been performed and it is anticipated that the existing water depths will allow barge access required for construction; however, construction barge details (e.g., draw depths and weight/displacement) have not yet been determined. Thus, a final determination as to whether the water depths within the project area will allow for barge movement during the new bridge pier/fender installation are unknown, and it is not yet known whether dredging will be required to allow for barge maneuvering during construction. During design, measures to minimize potential underwater noise impacts from these activities will be examined, such as high-density cushion blocks, bubble curtains, and utilization of the ramp up or vibratory installation methodology for pile driving to warn and allow any listed species to vacate the area.

Dredge and fill will not be required for removal of the existing bridge piers. The existing 27 bridge piers will have the piles cut off at the mudline with the portions below the mudline abandoned in place. Demolition of the two existing bascule piers is anticipated to require the use of explosives/blasting. As described in Section 4.5, a blasting plan will be developed during design to minimize and mitigate potential effects on species.

The existing seawall is 75 years old and is deteriorating beyond repair. New seawalls will be constructed landward of (behind) the existing seawalls on the east and west sides of the bridge, and the existing seawalls will be abandoned in place (**Figure 1-4**). All seawall construction activities will be conducted from land. These construction techniques will minimize impacts to corals and protected/managed species. During construction of the new seawalls, debris containment measures will be employed to prevent materials from entering the water. While the means and methods for the seawall debris containment will ultimately be determined by the construction contractor, the most likely seawall debris containment method to be utilized is a temporary floating platform positioned adjacent to the existing seawall in the area of construction. As described in Section 4.5, a seawall debris containment plan will be developed during the design/permitting phase.

Figure 1-4 Conceptual Seawall Design



Because the project is currently in a preliminary design phase, construction schedules, timelines, and details are not known at this time; however, it is estimated that the construction activities listed above will take approximately four years to complete. The general order of construction operations is anticipated to be initiated with seawall construction in the areas away from the existing bridge, followed by installation of bridge piers on land, installation of bridge piers in the water, roadway work, installation of the new bridge deck, installation of the bridge superstructure components (lighting, barrier, signs), existing bridge demolition, and construction of the seawall in areas beneath the existing bridge.

2.0 Project Study Area

For the purposes of the NRE, the project study area is defined to provide sufficient area for the project alternatives to be evaluated. The land portions of the project study area include the entirety of the causeway island east of the existing toll gantry and the east end of the bridge to the intersection with West Broadview Drive. For the bridge portion of the project area, the project study area extends 100 feet north of the existing bridge and 150 feet south of the proposed new bridge alignments. This survey extent encompasses the entire in-water work area, including the two build alternative footprints as well as the potential barge work areas for construction and demolition. To address the proposed seawall installation, the project study area extends 30 feet north of the edge of the existing seawall on the north side of the causeway island, and 50 feet south of the edge of the existing seawall on the south side of the causeway island. To determine the feasibility of a potential construction dock, an area was evaluated during the 2023 benthic survey located adjacent to the southeast portion of the causeway island, extending 300 feet east-to-west along the causeway island and 150 feet out from the existing seawall. It should be noted that at this time, no construction dock is planned. The project study area, including the potential construction dock area, is depicted in **Figure 1-2**.

This NRE documents the natural resources analysis for potential impacts to wetlands and OSWs, protected species and habitats, and EFH. The terrestrial portion of the project study area contains OSWs (stormwater impoundments) on the causeway island. The submerged portion of the project study area contains submerged wetlands (seagrass beds), suitable habitat for protected species, protected habitats, and EFH. The project study area does not contain terrestrial wetlands. These natural resources are addressed in Sections 4.0, 5.0, and 6.0 of this document.

Stormwater runoff from the bridge will be collected within ponds to be constructed on the causeway island. The location, size, and impacts of the ponds will be determined during the design phase. Due to the lack of available right-of-way (ROW) for ponds east of the bridge, French drains will be used east of the bridge to the extent that room is available due to existing underground utilities.

3.0 Existing Conditions

Assessment of the existing environmental resources began with a desktop review of environmental data available through Geographic Information Systems (GIS) databases, generally provided by federal, state or local agencies. These resources were reviewed to assess existing land uses/vegetative cover, soils, and resources with additional protection (e.g., conservation lands or aquatic preserves) within the project study area. The following data sources were reviewed as part of this evaluation:

- Aerial photographs (ESRI Aerials Data, Bing Aerial Data, Google Earth) (2023)
- FDOT Environmental Screening Tool (EST), accessed March 17, 2023
- FDOT Florida Land Use, Cover, and Forms Classification System (FLUCCS), 4th ed., January 1999
- Miami-Dade Department of Regulatory and Economic Resources Land Use Data (2023)
- US Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey Geographic Database for Florida Data (2021)
- US Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI), Wetlands Online Mapper, reviewed May 2023
- USFWS, Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979)

3.1 Land Use

The project bridge extends Broad Causeway over Biscayne Bay and the Intracoastal Waterway to connect the City of North Miami on the west with the Town of Bay Harbor Island, Village of Bal Harbour, and Town of Surfside on the east, linking the beach communities with US 1 and I-95 to the west. The project traverses the Town of Bay Harbor Islands, a U.S. Census Designated Place in northern Miami-Dade County. The Town consists of two islands: West Island and East Island. The Miami-Dade Department of Regulatory and Economic Resources land use data show that the existing land uses for the project corridor primarily consist of infrastructure and commercial (service station) on the causeway island identified as the Causeway District, and single family residential and parks and recreation land uses on the West Island. The East Island contains a commercial/office district and multi-family residential housing with some public/institutional uses. According to the Town of Bay Harbor Islands Future Land Use Map, the project corridor will continue to support the noted land uses at existing densities. **Figure 3-1** shows the existing land use within the project study area. **Figure 3-2** shows the future land use within the project study area.

3.2 Soils

Based on the soil data obtained from the USDA NRCS for Miami-Dade County, the project study area is comprised of the following mapped soil units:

- 15 - Urban land, 0 to 2 percent slopes
- 9 - Udorthents-Water-Urban land complex, 0 to 60 percent slopes
- 99 - Water

Figure 3-1 Existing Land Use Map

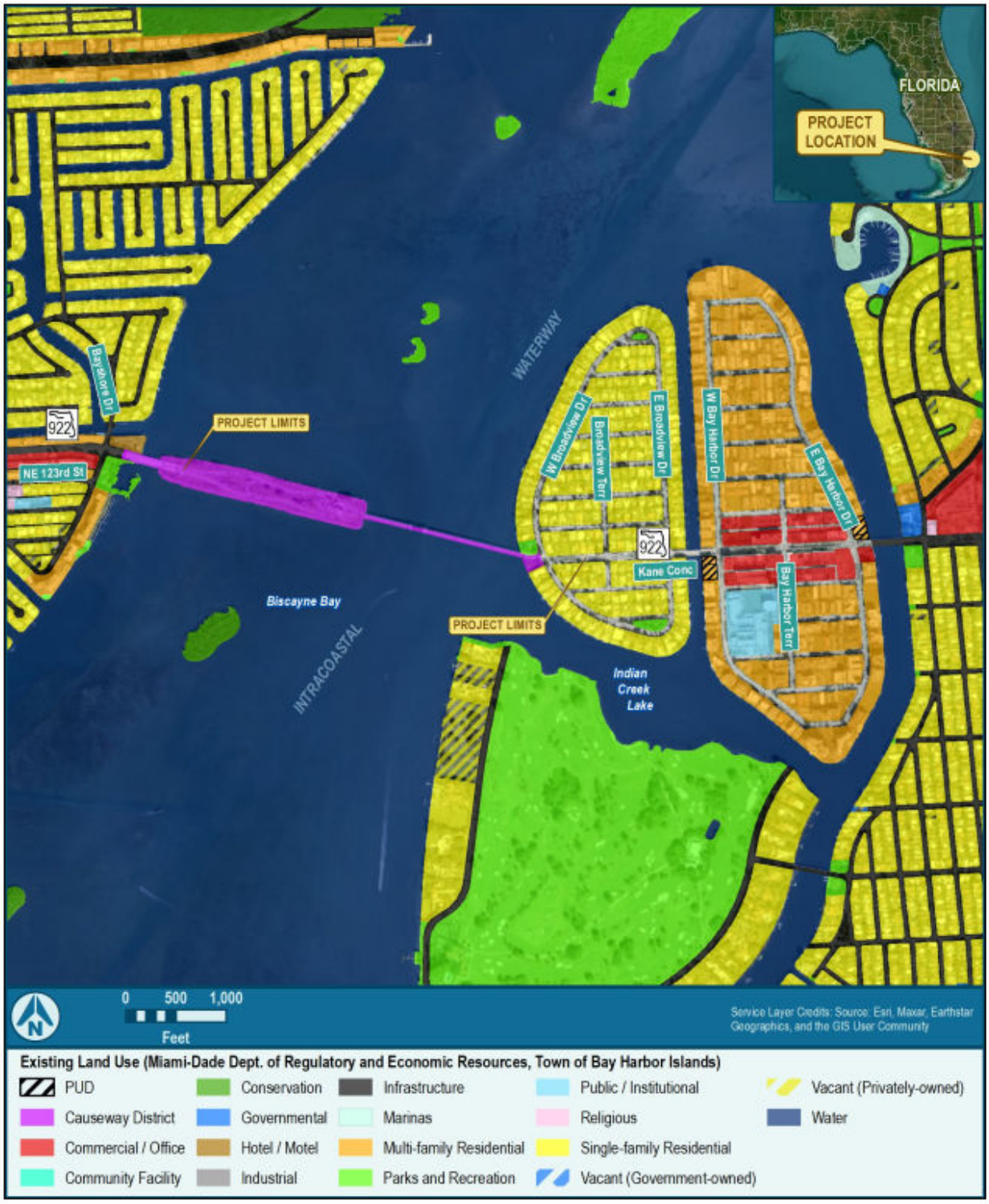


Figure 3-2 Future Land Use Map



Both the Urban Land and the Udorthents-Water-Urban land complex soils are well drained soil types. According to the Hydric Soils of Florida Handbook (Florida Association of Environmental Soil Scientists, 2007), these soils are not classified as hydric. A soils map is provided in **Figure 3-3**.

3.3 Stormwater Management System

The project is located within the jurisdictional boundary of the South Florida Water Management District (SFWMD) and the Miami-Dade County Department of Regulatory and Economic Resources Division of Environmental Resource Management (DERM). There are stormwater impoundments (OSWs) within the project study area, primarily constructed to capture runoff from the existing road features on the causeway island (see Section 5.3 for additional details on the OSWs). In the current condition, stormwater runoff from the land portions of the project drain directly into Biscayne Bay via curb and gutter. Stormwater collected on the existing bridge structure discharges directly into Biscayne Bay through scuppers. There is currently no water quality treatment for these discharges.

3.4 Biscayne Bay Aquatic Preserve (BBAP)

The submerged portion of the project study area is located within the BBAP which was established in 1974 and extends from the Oleta River headwaters south to Card Sound near Key Largo. The BBAP includes approximately 64,607 acres (ac) and was established to preserve and enhance Biscayne Bay and all natural waterways tidally connected to Biscayne Bay in an essentially natural condition so that its biological and aesthetic values may endure for the enjoyment of future generations (Florida Statutes (F.S.) 18-18.001). The BBAP is designated as an Outstanding Florida Water (OFW) and is therefore deemed worthy of special protection because of its natural attributes. Discharges into OFWs are regulated and must not lower background ambient water quality. Furthermore, activities or discharges within an OFW must be clearly in the public interest.

3.5 Specimen Trees

Within their response to the Advance Notification (AN) package, the DERM indicated that the proposed project area may encompass specimen tree resources (i.e., trees with a trunk diameter at breast height of 18 inches or greater) which are protected by Miami-Dade County. To undertake any tree removal or relocation activities outside of the State Highway System within this project area, a Miami-Dade County Tree Permit is mandatory, as per the regulations stipulated in the Code. Furthermore, all plants prohibited by Miami-Dade County must be removed from all sections of the property before development or redevelopment. Additionally, developed parcels must be consistently maintained to prevent the growth or accumulation of species prohibited by the County.

Figure 3-3 NRCS Soils Map



4.0 PROTECTED SPECIES AND HABITAT EVALUATION

Numerous federal laws play a crucial role in safeguarding listed species, but the Endangered Species Act (ESA) of 1973, as amended, serves as the primary guiding document for the conservation and recovery of native animals and plants in the United States and its territories. Administration of the ESA is divided between the Department of the Interior (i.e., USFWS), which oversees terrestrial and freshwater animals and plants, and the Commerce Department [(i.e., the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NMFS)], which focuses on marine wildlife. Additional federal laws designed to protect wildlife, which may or may not overlap with ESA protections, include the Marine Mammal Protection Act, Wild Bird Conservation Act, Bald and Golden Eagle Protection Act, and Migratory Bird Treaty Act. These laws, in conjunction with the Protected Species and Habitat Chapter of the PD&E Manual, were thoroughly reviewed and utilized during the assessment of the project study area to evaluate the potential involvement of federally listed species.

Furthermore, this evaluation encompassed the potential presence of state listed animals and plants within the project study area. Chapter 379 F.S. offers direct protection for wildlife against activities that could harm or jeopardize these species. Specifically, Section 379.2291, F.S., known as Florida Endangered and Threatened Species Act (FESA), delineates the details related to the conservation and management of threatened and endangered species within Florida. Additionally, apart from Chapter 379, F.S., the Division of Plant Industry within the Florida Department of Agriculture and Consumer Services (FDACS), authorized by Rule 5B-40 of the Florida Administrative Code (F.A.C.), holds responsibility for regulating endangered, threatened, and commercially exploited plants in Florida. Lastly, the Marine Life Statute (Sections 379.2401-379.26, F.S.) provides specialized protections for marine (brackish water) species. Various chapters and sections within the F.S. address wildlife-related habitat issues, with examples including The Florida Water Resource Act of 1972 (Chapter 373, F.S.).

4.1 Protected Species and Habitat Assessment Methodology

In order to determine federal and/or state listed animals and plants that have the potential to occur within the project study area, site-specific data were collected and evaluated. The literature reviewed and databases searched as part of this evaluation include:

- FDOT ETDM Programming Screen Summary Report Number 14520
- FDOT EST, accessed March 17, 2023
- FDOT PD&E Manual Protected Species and Habitat Chapter
- USFWS Information for Planning and Consultation (IPaC)
- Florida Natural Areas Inventory (FNAI) Biodiversity Matrix Map Server, accessed October 7, 2023
- USFWS Endangered and Threatened Wildlife and Plants, 50 Code of Federal Regulations (CFR) 17.11 and 17.12, June 2007
- Florida Fish and Wildlife Conservation Commission's (FWC) Florida's Imperiled Species Management Plan, Amended September 2022

- FDACS Florida Forest Service, Florida's Federally Listed Plant Species website, accessed August 8, 2023
- USFWS Wood Stork Florida Active Nesting Colonies and Core Foraging Areas 2010-2019 GIS Data (USFWS 2019)
- NOAA National ESA Critical Habitat Mapper, accessed August 8, 2023
- Audubon Eagle Watch Public Nest Map, accessed October 7, 2023
- eBird Online Database and Species Maps, accessed October 7, 2023
- USFWS Threatened and Endangered Species Active Critical Habitat Report
- FWC Endangered and Threatened Species Management and Conservation Plan Progress Report Fiscal Year 2020-21, December 2021
- FWC Manatee Datasets
- FNAI/FWC Strategic Habitat Conservation Areas GIS Dataset, accessed January 8, 2024

The IpaC Resource List and the FNAI Biodiversity Matrix Query Results for the project study area are provided in **Appendix A.**

4.2 Agency Coordination

In accordance with PD&E guidelines, the FDOT submitted the project into the ETDM EST during the Programming Phase of the study. Comments received from Environmental Technical Advisory Team (ETAT) members are available in the ETDM Programming Summary Report (ETDM Project #14520), published on September 28, 2023. Agencies that provided comments on natural resources during the ETDM process included the US Army Corps of Engineers (USACE), US Environmental Protection Agency (USEPA), USFWS, NMFS, FWC, Florida Department of Environmental Protection (FDEP), and the SFWMD. The Miami-Dade County DERM provided responses to the AN package. Below is a summary of the ETAT comments, AN responses received regarding *protected species and habitat*, along with additional coordination information.

4.2.1 USFWS

The USFWS discusses the presence of federally listed threatened and endangered species within the project study area, specifically the Florida bonneted bat (FBB) (*Eumops floridanus*) and the West Indian manatee (*Trichechus manatus*). The USFWS recommends consulting guidance documents for minimizing the project's impact on the endangered FBB. Similarly, for the West Indian manatee, it outlines measures to protect these marine mammals during construction activities, including maintaining "idle speed/no wake" in the construction area, reporting sightings or collisions with manatees, and other protective actions. The comment also provides guidelines for the use of explosives in underwater construction to mitigate potential harm to marine animals like manatees and sea turtles and outlines specific requirements and calculations for safe blasting zones. It emphasizes compliance with various federal and state regulations, such as the ESA, Marine Mammal Protection Act, Florida Manatee Sanctuary Act, and the Marine Turtle Protection Act, while conducting underwater blasting in Florida waters. The comment emphasizes the importance of thorough planning and careful monitoring to safeguard these protected species and their habitats during construction activities. The USFWS determined the degree of effect for this project on protected species and habitat is "moderate."

Subsequent to the ETDM Screening Process, a technical assistance call was conducted with USFWS on January 12, 2024. The species effect determinations for the manatee and the FBB were discussed. For the manatee, the anticipated seagrass impacts associated with the build alternatives were presented, the proposed construction methodologies for the demolition of the bridge were discussed (i.e., blasting required for removal of the two bascule piers), and the proposed commitments and implementation measures in relation to the manatee were reviewed. For the FBB, the consultation area was presented and the findings of the 2023 FBB survey were summarized, including the FBB acoustic survey and the potential tree roost survey. The results of this call are included in Section 4.5.1 and the meeting minutes from the January 12, 2024 USFWS meeting are provided in **Appendix B**.

4.2.2 NMFS

The NMFS identifies high-importance resources in the project area, including ESA-listed species [corals, sea turtles, smalltooth sawfish (*Pristis pectinata*), giant manta ray (*Manta birostris*)] and EFH (estuarine bottom, seagrass, hardbottom, coral). Seagrass, crucial for shrimp and snapper-grouper species, is a Habitat Area of Particular Concern (HAPC). Coordination is recommended for a biological assessment, Construction Conditions for Protected Species (2021), and a noise study to protect these resources from direct and indirect impacts. The NMFS determined the degree of effect for this project on protected species and habitat as "moderate."

Subsequent to the ETDM Screening Process, a technical assistance call was conducted with NMFS on December 21, 2023. The findings of the 2023 quantitative benthic survey were presented and the proposed construction methodologies for the demolition of the bridge were presented to NMFS. Discussions took place with regard to the proposed commitments and implementation measures for the project, the species effect determinations for certain listed species under NMFS' purview (i.e., sea turtles, giant manta ray, smalltooth sawfish, and corals), and impacts to EFH and managed species. The results of this call are included in Section 4.5.2 and the meeting minutes from the December 21, 2023 meeting are provided in **Appendix B**.

An additional technical assistance call was conducted with NMFS on February 21, 2024. During the meeting, the Town provided additional project information and requested clarification regarding species determinations of effect. The Town noted a potential seagrass mitigation option via a partnership with Biscayne National Park which has identified several seagrass mitigation projects. The Town also presented a proposed seawall design option which would minimize impacts to corals, listed species, and managed species by constructing the new seawalls landward of the existing seawalls and abandoning the existing seawalls in place, with all seawall construction activities to be conducted from land. The Town summarized the blasting information that had been gathered, including information on similar bridge projects that included bascule pier demolition via blasting (i.e., the Pinellas Bayway Structure E project in Pinellas County, Florida and the Veterans Memorial Bridge project in Volusia County, Florida). The results of this technical assistance call are included in Section 4.5.2 and the meeting minutes from the February 21, 2024 meeting are provided in **Appendix B**.

On February 27, 2024, the Town had an email exchange with the NMFS to clarify information on the Pinellas Bayway Structure E blasting project. The email contents are discussed in Section 4.5 and the email exchange is provided in **Appendix C**.

4.2.3 FWC

The FWC highlights the project area's estuarine, urban, and transportation zones, within BBAP, with environmentally sensitive shorelines and seagrass beds. It mentions listed species like American crocodile, FBB, green sea turtle, piping plover, manatee, wood stork, and other birds. The project falls in the consultation area for multiple species and overlaps with manatee zones and critical habitat (CH), raising concerns for wildlife and water quality. Recommendations include wildlife surveys and plans for avoidance, minimization, and mitigation based on survey results, habitat value replacement, and coordination with USFWS. Standard Manatee Conditions are advised for in-water activities. The FWC determined the degree of effect for this project on protected species and habitat is "moderate."

4.2.4 DERM

The DERM commented that the proposed project is situated within the BBAP which is an area that has been designated as Essential Manatee Habitat in accordance with the Miami-Dade County Manatee Protection Plan (MPP). Any work or activities in these shoreline areas must not commence until all the requisite approvals and permits have been secured from both the federal government under the ESA and the State of Florida under Florida's endangered species laws. The MPP mandates that all new or replacement culverts and outfalls accessible to manatees should be designed to prevent manatee entrapment or injury. Development projects are required to utilize turbidity barriers and other containment measures to ensure construction materials do not enter nearby surface waters. It is noted by DERM that the FWC mandates that all work proposed in manatee-inhabited waters adhere to FWC's Standard Manatee Protection Ordinance for In-Water Work in all construction aspects.

4.3 Field Surveys

A pedestrian field survey was carried out in June 2023 to identify wetlands and listed terrestrial plant and wildlife species that may occur within the project study area. The entirety of the upland portions of the project area were observed to have been previously impacted by development (i.e., commercial and transportation facilities) and were occupied by mowed grass, landscape trees, and pavement, offering minimal habitat value for any listed species. Eight OSWs (stormwater treatment areas) were identified on the causeway island portion of the project study area (see Section 5.3 for a description of the OSWs). The following bird species were identified within the project study area during the pedestrian survey: anhinga (*Anhinga anghinga*), yellow-crowned night heron (*Nyctanassa violacea*), and killdeer (*Charadrius vociferus*). No listed plant or animal species were observed within the project study area during the pedestrian field survey.

During the pedestrian field survey, occasional mangrove propagules and saplings (no mature trees) were noted within the riprap along the causeway island. Mangrove and mangrove associate species were present, specifically red mangrove (*Rhyzophora mangle*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). Example photographs are available in **Appendix**

D. These mangroves do not constitute a wetland and do not lie within the project footprint. Avoidance and minimization of impacts to these mangroves is discussed in Section 5.5.

To identify the submerged habitats and associated protected marine/estuarine wildlife species that may occur within the project study area, two in-water benthic surveys were conducted, including a preliminary benthic survey in August 2022 and a quantitative benthic survey in July and August 2023. Seagrasses and corals were observed within the project area during the benthic surveys. The federally threatened coral species, boulder star coral (*Orbicella franksi*), was observed on the benthic substrate within the 2022 preliminary benthic survey area (i.e., in the northwest and southwest quadrants of the bridge). Additional details regarding the results of the benthic surveys are available in Sections 5.3 and 6.3, and in **Appendix E**.

A species-specific survey was conducted for the FBB in accordance with the USFWS' October 2019 *Florida Bonneted Bat Consultation Guidelines*. The FBB survey was conducted in 2023 and included a combination of acoustic and visual surveys (potential roost search). The FBB acoustic survey was conducted for the proposed project in March and April 2023. Acoustic detectors were deployed at three sites within the project study area and call data were collected for 15 complete and 24 partial detector nights. The resulting call files were analyzed using a combination of automated software analysis and visual examination by a bat acoustic identification specialist. In addition, visual surveys to identify potential roost sites in natural and artificial structures were conducted in March and August 2023. Artificial structures (such as abandoned buildings, bridges/culverts, and wooden utility poles) were visually inspected for evidence of bats. The results of the FBB acoustic survey indicate that no diagnostic calls of the FBB were recorded at any of the acoustic detector sites. In addition, no potential roost trees or other roosting structures were identified within the project study area. The October 2023 *Florida Bonneted Bat Survey Report* is provided in **Appendix F**. Based on FBB survey results, the probability of occurrence for the FBB is determined to be "Low."

4.4 Federally Listed Species

According to the findings of the preliminary desktop database review and the USFWS IpaC report, the project study area occurs within the USFWS's designated Consultation Areas for the West Indian manatee, piping plover (*Charadrius melodus*), American crocodile (*Crocodylus acutus*), and FBB. In addition, the project study area is located within USFWS designated CH for the West Indian manatee. Other listed species that could inhabit the project study area include the green sea turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*), Kemp's ridley sea turtle (*Lepidochelys kempii*), hawksbill sea turtle (*Eretmochelys imbricata*), leatherback sea turtle (*Dermochelys coriacea*), smalltooth sawfish (*Pristis pectinata*), and giant manta ray (*Manta birostris*). NMFS and USFWS share jurisdiction for sea turtles, with the NMFS having responsibility for sea turtles in the marine environment, while the USFWS has responsibility for sea turtles on land.

Table 4-1 presents the federally listed wildlife species with the potential to occur within the project study area (based on potential availability of suitable habitat and known species ranges). This compilation is a result of a thorough review of existing literature, field surveys, and considerations of suitable habitat availability, along with confirmed sightings or documented home ranges. These

Table 4-1 Federally Listed Wildlife Species Potentially Occurring within the Project Study Area and their associated Effect Determinations

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination[2]
MAMMALS				
Florida bonneted bat	*Eumops floridanus*	FE	Low[3]	*No effect*
Tricolored bat	*Perimyotis subflavus*	P(E)	Low[3]	*N/A*
West Indian manatee	*Trichechus manatus*	FT	High (CH)[4]	*May affect, not likely to adversely affect*
BIRDS				
Piping plover	*Charadrius melodus*	FT	Low	*No effect*
Wood stork	*Mycteria americana*	FT	Low	*May affect, not likely to adversely affect*
INSECTS				
Monarch butterfly	*Danaus plexippus*	C	Low	*N/A*
REPTILES				
American crocodile	*Crocodylus acutus*	FT	Low	*No effect*
Eastern indigo snake	*Drymarchon corais couperi*	FT	Low	*May affect, not likely to adversely affect*
Green sea turtle	*Chelonia mydas*	FT	Moderate (PCH)[5]	*May affect, not likely to adversely affect*
Hawksbill sea turtle	*Eretmochelys imbricata*	FE	Moderate	*May affect, not likely to adversely affect*
Leatherback sea turtle	*Dermochelys coriacea*	FE	Low	*No effect*
Loggerhead sea turtle	*Caretta caretta*	FT	Low	*May affect, not likely to adversely affect*
FISH				
Giant manta ray	*Manta birostris*	FT	Low	*May affect, not likely to adversely affect*
Nassau grouper	*Epinephelus striatus*	FT	Low	*No effect*
Smalltooth sawfish	*Pristis pectinata*	FE	Low	*May affect, not likely to adversely affect*
CORALS				
Boulder star coral	*Orbicella franksi*	FT	High	*May affect, not likely to adversely affect*
Elkhorn coral	*Acropora palmata*	FT	Low	*No effect*
Lobed star coral	*Orbicella annularis*	FT	Moderate	*May affect, not likely to adversely affect*
Mountainous star coral	*Orbicella faveolata*	FT	Moderate	*May affect, not likely to adversely affect*
Pillar coral	*Dendrogyra cylindrus*	FT	Low	*No effect*
Rough cactus coral	*Mycetophyllia ferox*	FT	Low	*No effect*
Staghorn coral	*Acropora cervicornis*	FT	Low	*No effect*

[1]FE = Federally Endangered, FT = Federally Threatened, P(E) = Proposed for Listing as Federally Endangered, C = Candidate for Federal Listing
[2]N/A = Not Applicable
[3]Based on findings of the October 2023 Florida Bonneted Bat Survey (see Section 4.5 and **Appendix F** for details).
[4](CH) – the project study area is located within designated CH for the manatee
[5](PCH) - the project study area is located within the proposed CH for the green sea turtle

species are categorized by the USFWS or NMFS as either Federally Endangered (FE), Federally Threatened (FT), Candidate for Federal Listing (C), or Proposed for Listing as Federally Endangered [P(E)]. The given likelihood of occurrence of each species' presence within the project study area has been determined based on the aforementioned data and field assessments and rated as low, moderate, or high based on the following criteria:

- **Low** - species that have minimal or marginal suitable habitat within or adjacent to the project study area, but there are no documented occurrences of the species in the vicinity of the project study area and the species was not observed within the project study area during field reviews.
- **Moderate** - species that have suitable habitat within the project study area, but there are no documented occurrences of the species in the vicinity of the project study area and the species was not observed within the project study area during field reviews.
- **High** - species that have suitable habitat within the project study area, have at least one documented occurrence of the species within the project study area, and/or the species was observed during field investigations.

It should be noted that the following federally listed (i.e., threatened, endangered, or candidate) wildlife species may occur within Miami-Dade County and were identified by the IpaC and/or FNAI Biodiversity Matrix Query reports but have no potential to occur within the project study area (based on either a lack of suitable habitat within the project study area and/or a habitat range that is well outside of the project study area), and are not discussed further within this document: Florida panther (*Puma concolor coryi*), Bachman's warbler (*Vermivora bachmanii*), eastern black rail (*Laterallus jamaicensis jamaicensis*), Everglades snail kite (*Rostrhamus sociabilis plumbeus*), Gulf sturgeon (*Acipenser oxyrinchus desotoi*), Bartram's hairstreak butterfly (*Strymon acis bartrami*), Florida leafwing butterfly (*Anaea troglodyta floridalis*), and Miami blue butterfly (*Cyclargus (=Hemiargus) thomasi bethunebakeri*).

Table 4-2 presents the 16 federally listed plant species with the potential to occur within the project study area based on the results of the IPaC and/or FNAI Biodiversity Matrix Query reports. While all of these species have been documented to occur in Miami-Dade County, they have no potential to occur within the project study area or vicinity based on lack of suitable habitat within the project study area and/or habitat ranges that are well outside of the project area. No federally listed plants were observed during the June 2023 pedestrian field survey. Therefore, the project determination of effect for the federally protected plant species listed in **Table 4-2** is ***no effect***. If any federally listed plants are discovered at the project site prior to or during construction, coordination with USFWS will take place to explore measures for avoiding impacts or relocating the plants.

Table 4-2 Federally Listed Plant Species and their associated Effect Determinations

Common Name	Scientific Name	Listing Status[1]	Effect Determination
Beach jacquemontia	*Jacquemontia reclinata*	FE	*No effect*
Blodgett's silverbush	*Argythamnia blodgettii*	FT	*No effect*
Cape Sable thoroughwort	*Chromolaena frustrata*	FE	*No effect*
Carter's mustard	*Warea carteri*	FE	*No effect*
Carter's small-flowered flax	*Linum carteri carteri*	FE	*No effect*
Crenulate lead-plant	*Amorpha crenulata*	FE	*No effect*
Deltoid spurge	*Chamaesyce deltoidea ssp. deltoidea*	FE	*No effect*
Everglades bully	*Sideroxylon reclinatum ssp. austrofloridense*	FT	*No effect*
Florida brickell-bush	*Brickellia mosieri*	FE	*No effect*
Florida pineland crabgrass	*Digitaria pauciflora*	FT	*No effect*
Florida prairie-clover	*Dalea carthagenensis floridana*	FE	*No effect*
Florida semaphore cactus	*Consolea corallicola*	FE	*No effect*
Pineland sandmat	*Chamaesyce deltoidei pinetorum*	FT	*No effect*
Sand flax	*Linum arenicola*	FE	*No effect*
Small's milkpea	*Galactia smallii*	FE	*No effect*
Tiny polygala	*Polygala smallii*	FE	*No effect*
Florida filmy fern	*Trichomanes punctatus ssp. floridanum*	FE	*No effect*

[1]FE = Federally Endangered, FT = Federally Threatened

4.5 Federally Listed Species Effect Determinations

This section discusses the effect determinations for federally listed species where suitable habitat is present and there is a low, moderate, or high likelihood of occurrence within the project study area. A "*no effect*" determination means there will be no effect whatsoever (neither detrimental or beneficial) to a species or CH, in the short term or long term. A "*may affect, not likely to adversely affect*" determination is when the proposed action's effects on listed species are expected to be discountable, insignificant, or completely beneficial. A "*may affect, likely to adversely affect*" determination is when the proposed action's effects to listed species may occur as a direct or indirect result of the proposed action or its interrelated actions or interdependent actions, and the effect is not discountable, insignificant, or beneficial.

The federally listed species fall under the jurisdiction of either USFWS or NMFS, as discussed below. Any involvement with these species or designated CH would require consultation under Section 7 of the ESA. It should be noted that as per the imperiled species rule, established by FWC in 2010, all federally listed species are also considered to be state listed species.

If the No Build Alternative is selected, there will be no permanent or temporary impacts to protected species or habitat. For both proposed build alternatives, minimization of direct impacts to listed species has been incorporated by designing the build alternatives within the existing Town ROW. Measures to minimize or compensate for impacts to protected species are described below and are also included under the relevant species discussions in this section. The Town will incorporate all possible and practicable measures to avoid or minimize impacts to protected species during design.

Avoidance and minimization of impacts to protected species will continue to be evaluated during the final design, permitting, and construction phases of the project.

Bridge Pier Installation. All in-water construction activities will be limited to daylight hours. As described in Section 1.4, it is anticipated that the new bridge pilings/piers will be installed via impact hammer. During design, measures to minimize potential underwater noise impacts from these activities will be examined, including high-density cushion blocks, bubble curtains, and utilization of the ramp up or vibratory installation methodology for pile driving to warn and allow any listed species to vacate the area.

Seawall Construction. The design and construction methodology for the new seawall installation has been tailored to minimize impacts to corals, listed species, and managed species. The existing seawall is 75 years old and is deteriorating beyond repair. Because the existing seawall and the habitat adjacent to the seawall are colonized by corals and octocorals, the removal of the existing seawall would require the relocation of a substantial number of coral and octocoral colonies and would likely result in construction noise impacts to listed and managed species. As described in Section 1.4, in order to minimize impacts from the seawall construction, the new seawall will be constructed landward of (behind) the existing seawall and the existing seawall will be abandoned in place (see **Figure 1-4**). All seawall construction activities will be conducted from land which will avoid the need for in-water seawall construction work and associated in-water noise impacts to listed and managed species. During the February 21, 2024 technical assistance call, the NMFS indicated that this seawall design option would move more easily through the ESA consultation process since noise impacts calculations would not be required for the seawall work.

During construction of the new seawalls, debris containment measures will be employed to prevent materials from entering the water. During the February 21, 2024 technical assistance call, the NMFS requested that the likely seawall debris containment method be documented in the NRE and that the Town include a commitment to reinitiate consultation with NMFS if the contractor selects a different means and methods for seawall debris containment. While the means and methods for the seawall debris containment will ultimately be determined by the construction contractor, the most likely seawall debris containment method to be utilized is a temporary floating platform positioned adjacent to the existing seawall in the area of construction. The use of a floating platform could result in temporary shading impacts to corals; thus, the floating platform will be repositioned regularly to minimize shading impacts to corals. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and provided to NMFS for their review and approval. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and will be provided to NMFS for their review and approval. If the debris containment method differs from a temporary floating platform, the Town commits to reinitiating consultation with the NMFS for the boulder star coral.

Explosives/Blasting. As described in Section 1.4, demolition of the two existing bascule piers is anticipated to require the use of explosives/blasting. During design, the Town will develop a *Conceptual Blasting Plan* which will include general blasting information for the project, including proposed measures to minimize and mitigate potential effects on species. The *Conceptual Blasting Plan* will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting means and methods,

including the blasting design, an impact assessment, a mitigation plan, and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**). Previous bridge bascule pier demolition projects in Florida that successfully employed blasting without impacts to protected species include the Pinellas Bayway Structure E project (SERO-2021-00360) and the Veterans Memorial Bridge project (SER-2016-18141). Both of these projects included blasting plans and marine species watch plans. The NMFS Section 7 Consultation Letters for these projects (provided in **Appendix C**) include species effect determinations of *no effect* or *may affect, not likely to adversely affect* for species under NMFS jurisdiction, including sea turtles and, smalltooth sawfish, and giant manta ray. The blasting plan for the Pinellas Bayway Structure E project is also provided in **Appendix C**.

In the February 27, 2024 email exchange with NMFS (**Attachment C**), the NMFS stated that they have not observed any injured or killed ESA-listed species at any of blasting events and recommended that helicopters are generally recommended over fixed wing planes for aerial species observations. The NMFS also provided a copy of the *Imperiled Species and Marine Mammal Watch Plan Report* for the Pinellas Bayway Structure E project (**Attachment C**) which documented the findings of the blasting event and states that no listed species were impacted by the project blasting. The report indicates that the small pre-blast charge (Fish Scare) was not utilized for this project to prevent nearby turtles or manatees from moving out of position and becoming hidden from view. The report also indicated that hand-held radios and aerial communications via aircraft transceiver were useful for on-site blasting communications and that a siting log and map were useful in preparation of the blasting report.

4.5.1 USFWS Purview

Florida bonneted bat: The very eastern portion of the project study area falls within the USFWS's designated Consultation Area/Urban Development Boundary for the FBB (see **Figure 4-2**). The FBB is the largest bat found in Florida and is listed as federally endangered. Most known FBB records are on managed lands; however, a few records exist on lands under private ownership. The USFWS defines the FBB's general distributable range, or Consultation Area, using confirmed presence data, key habitat features, reasonable flight distances, and home range sizes. The FBB is known to roost in a variety of artificial rooting sites (e.g., structure roofs, utility poles, and bridges) and natural roosting sites (e.g., shrubbery, royal palm shafts, tree cavities, etc.). Habitat with high FBB roosting suitability includes areas with substantial presence of large or mature live trees with various deformities including, but not limited to large cavities, hollows, and sloughing bark.

A FBB survey was conducted in 2023 which included a combination of acoustic and visual surveys (potential roost search). Section 4.3 provides the findings of the FBB survey and the October 2023 *Florida Bonneted Bat Survey Report* is provided in **Appendix F**. Based on lack of FBB calls, lack of potential roost trees, and poor suitability of roosting habitat within the project study area, the project determination of effect for the FBB is ***no effect***. Because the project study area is located within the urban development boundary in Miami-Dade County (as delineated in the October 2019 *Florida*

Figure 4-1 USFWS's designated Consultation Area for the Florida Bonneted Bat



Bonneted Bat Consultation Guidelines), the Consultation Key was not utilized for the proposed project. A technical assistance meeting with USFWS was conducted on January 12, 2024 to present the results of the FBB survey. During the meeting, the USFWS indicated that a ***no effect*** determination for the FBB is supported for the project. The meeting minutes from the January 12, 2024 USFWS meeting are provided in **Appendix B**.

Tricolored bat: The tricolored bat is proposed for listing as federally endangered. This species is known to roost in mature hardwood forests, caves, and manmade structures and forage over open areas and water. No bats were observed during any of the field surveys. A FBB survey was conducted in 2023 which included a combination of acoustic and visual surveys (potential roost search). Section 4.3 provides the findings of the FBB survey and the October 2023 *Florida Bonneted Bat Survey Report* is provided in **Appendix F**. No tricolored bat calls were documented during the acoustic survey. Furthermore, the project study area lacks potential roost trees, and poor suitability of roosting habitat. If the listing status of the tricolored bat is elevated by USFWS to Threatened or Endangered and the Preferred Alternative is located within the consultation area, during the design and permitting phase of the proposed project, the Town commits to reinitiating consultation with the USFWS to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the tricolored bat.

West Indian manatee: The West Indian manatee (hereafter referred to as the "manatee") is listed as federally threatened. Manatees are large herbivorous marine mammals that inhabit marine, estuarine, and freshwater environments. Manatees often inhabit coastal waters, bays, and rivers. During colder weather, they seek warm-water refuges and can be spotted in groups near cooling facilities. In warmer months, they have a broader range, but in winter, they are limited to warm springs and similar warmer areas. The manatee can occur in any coastal or estuarine waters and it is federally protected under the Marine Mammal Protection Act.

Manatees are known to travel through the project study area; however, no manatees were observed during any of the field surveys. The project study area is located within the designated CH for the manatee and foraging habitat (seagrass) is located within the project study area. The project study area is located within a Florida Manatee Protection Area (Slow Speed Zone – All Year). The project study area is not located within an "Important Manatee Area," a "Warm Water Aggregation Area," or a "No Entry Area" for manatees.

To protect manatees during bridge construction, the *Standard Manatee Conditions for In-Water Work*, the *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office,* and the *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. If any manatees (or any other free-swimming mammals) are found within the project area during construction, construction activities will cease and they will be allowed the necessary space and time to leave in accordance with state and federal regulations. The construction methodologies for demolition of the existing bridge structures have not yet been determined; however, demolition via the use of explosives/blasting will be required for the removal of the two bascule piers. The use of blasting may have both direct and indirect impacts on protected species (i.e., fish, sea turtles, marine mammals) and their habitats. During design, the Town will develop a *Conceptual Blasting Plan* which will include general blasting information for the project, including proposed measures to minimize and mitigate potential effects

on species. The *Conceptual Blasting Plan* will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting (i.e., means and methods, blasting design, impact assessment, mitigation plan) and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**).To reduce the risk of entrapment and drowning of manatees, manatee exclusion devices (such as grating) shall be installed and maintained over any existing or proposed pipes or culverts greater than eight inches that are submerged or partially submerged and reasonably accessible to manatees. If horizontal or vertical bars are used, no more than 8-inch gaps on center shall be allowed. Grates shall be in place at the accessible end(s) during all phases of the construction process and as a final design element to restrict manatee access.

According to the USACE and FDEP Effect Determination Key for the Manatee in Florida (April 2013), the proposed project activities would result in a *may affect* determination for the manatee based on the following pathway:

A. Project is not located in open water or salt marsh → *go to B*

B. Project consists of one or more of the following activities, all of which are *may affect*: 1. blasting or other detonation activity for channel deepening and/or widening, geotechnical surveys or exploration, bridge removal, movies, military shows, special events, etc.; → *may affect.*

Because the proposed project will: 1) implement the *Standard Manatee Conditions for In-water Work*, the NMFS *Protected Species Construction Conditions* and the NMFS *Vessel Strike Avoidance Measures* (**Appendix G**) during in-water construction activities; 2) implement BMPs during construction to avoid or minimize unnecessary impacts to seagrasses; 3) mitigate for unavoidable impacts to seagrasses; 4) adhere to the agency-approved *Final Blasting Plan* and *Imperiled Species and Marine Mammal Watch Plan* to minimize impacts from the use of blasting/explosives (blasting plan will adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida*); and 5) install manatee exclusion devices on any drainage culverts (between eight inches and eight feet in diameter) associated with the proposed project, the project determination of effect for the manatee is ***may affect, not likely to adversely affect***. Furthermore, ***the proposed project will not result in the destruction or adverse modification of manatee CH***. During the January 12, 2024 technical assistance call, the USFWS indicated that based on the inclusion and implementation of the *Standard Manatee Conditions for In-water Work*, the NMFS *Protected Species Construction Conditions,* the NMFS *Vessel Strike Avoidance Measures,* and the *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida*, these effect determinations for the manatee and manatee CH are supported for the project. The meeting minutes from the January 12, 2024 USFWS meeting are provided in **Appendix B**.

Piping plover (*Charadrius melodus*): Piping plovers are listed as federally threatened. They do not breed in Florida, but spend the winter in Florida inhabiting sandy beaches, sand flats, and mudflats along coastal areas. Piping plovers primarily feed on insects, spiders, and crustaceans and primary

foraging habitats include sandy mud flats, ephemeral pools, and seasonally emergent seagrass beds with abundant invertebrates. No piping plovers were observed during any of the field surveys. Because the project study area does not contain suitable nesting or foraging habitat for this species, the project determination of effect for the piping plover is ***no effect***.

Wood stork (*Mycteria americana*): The wood stork is listed as federally threatened. Wood storks are large wading birds primarily associated with freshwater and estuarine habitats that are used for nesting, roosting, and foraging. Wood storks typically nest in colonies located in medium to tall trees either in swamps or on islands surrounded by relatively broad expanses of open water with minimal human disturbance. Suitable foraging habitat (SFH) for wood storks include wetlands that typically have shallow-open water areas that are relatively calm and have a permanent or seasonal water depth between 2 and 15 inches. No rookeries or breeding colonies are located in the project study area. However, the project is located within the 18.6-mile radius Core Foraging Area of one previously documented wood stork colony (i.e., Emerald Estates 1 and 2 Griffin - last active 2019) located approximately 18.1 miles northwest of the project study area. As detailed in Section 5.3, the OSWs within the project study area are comprised almost entirely of mowed and maintained St. Augustine grass. OSWs 1, 3, 5, 6, and 8 are not permanently or seasonally flooded and thus do not provide SFH for the wood stork. Because OSW 2 and OSW 7 may hold ponded water year-round, they are considered potential wood stork SFH. Permanent direct impacts to OSW 2 and OSW 7 are anticipated in association with construction of the proposed stormwater management ponds and are expected to be the same for both build alternatives (i.e., a total of 0.236 ac). The project study area also lacks potential perching or roosting trees. No wood storks were observed during any of the field surveys. According to the Effect Determination Key for the Wood Stork in South Florida (May 2010), the project determination of effect for the wood stork is ***may affect, not likely to adversely affect*** based on the following pathway:

A. Project impacts SFH at a location greater than 0.76 km (0.47 mile) from a colony site → *go to* B.

B. Project impact to SFH is less than 0.20 hectare (one-half acre) → *not likely to adversely affect (NLAA)*.

No mitigation is anticipated to be required for impacts to OSWs and wood stork SFH within the proposed project study area. Based on the use of the Effect Determination Key for the Wood Stork in South Florida and the NLAA determination of effect, no further consultation with the USFWS will be required.

Monarch butterfly (*Danaus plexippus*): The monarch butterfly is a candidate species for listing under the ESA. Monarchs migrate yearly from as far north as Canada and across the United States to congregate at overwintering sites in the mountains of central Mexico and coastal California. Monarch butterflies generally inhabit prairies, meadows, grasslands, and roadsides across the majority of North America. The adult butterfly drinks nectar from a variety of flowers and during the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily *Asclepias* spp.). The project study area does not contain suitable habitat for the monarch butterfly. No milkweed or suitable flowering vegetation was observed within the project study area during the pedestrian field survey. Apart from the possibility of individual monarchs traveling through the project study area, it is highly

unlikely that this species would inhabit the project study area. No monarch butterflies were observed during any of the field surveys. While there is a possibility that they could migrate through the proposed project area during construction, the urbanized areas in and around the project study area do not offer habitat for this species. If the listing status of the monarch butterfly is elevated by USFWS to Threatened or Endangered and the Preferred Alternative is located within the consultation area, during the design and permitting phase of the proposed project, the Town commits to reinitiating consultation with the USFWS to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the monarch butterfly.

American crocodile (*Crocodylus acutus*): The American crocodile is listed as federally threatened. It is primarily found in mangrove swamps, low-energy mangrove-lined bays, creeks, and inland swamps. American crocodiles are opportunistic feeders, consuming a variety of animals (e.g., fish, crabs, snakes, small invertebrates, turtles, birds, and small mammals). The project study area does not contain foraging habitat and includes limited basking/nesting habitat due to dense riprap and concrete rubble used to stabilize shorelines. Apart from the possibility of individual crocodiles traveling through the project study area, it is highly unlikely that this species would inhabit the project study area. No American crocodiles were observed during any of the field surveys. While there is a possibility that they could migrate through the proposed project area during construction, the urbanized areas in and around the project study area do not offer suitable foraging, basking, or nesting habitats for this species. Thus, the project determination of effect for the American crocodile is ***no effect***.

Eastern indigo snake (*Drymarchon corais couperi*): The eastern indigo snake is a federally listed threatened species. No individuals were observed during the field surveys. Additionally, no gopher tortoise burrows or other suitable eastern indigo snake refugia were observed during any of the field surveys. Using the USFWS *Eastern Indigo Snake Programmatic Effect Determination Key* (January 25, 2010 and revised July 2017), the project determination of effect for the Eastern indigo snake is ***may affect, not likely to adversely affect*** based on the following pathway:

A. Project is not located in open water or salt marsh → *go to* B

B. Permit will be conditioned for use of the Service's *Standard Protection Measures for The Eastern Indigo Snake* during site preparation and project construction → *go to* C

C. The project will impact less than 25 acres of eastern indigo snake habitat (e.g., sandhill, scrub, pine flatwoods, pine rocklands, scrubby flatwoods, high pine, dry prairie, coastal prairie, mangrove swamps, tropical hardwood hammocks, hydric hammocks, edges of freshwater marshes, agricultural fields, and coastal dunes) → *go to* D

D. The project has no known holes, cavities, active or inactive gopher tortoise burrows or other underground refugia where a snake could be buried, trapped, or injured during project activities → "*may affect, not likely to adversely affect*"

The most recent version of the USFWS' *Standard Protection Measures for The Eastern Indigo Snake* will be implemented during construction. Based on the use of the USFWS *Eastern Indigo Snake Programmatic Effect Determination Key* and the resulting determination of effect of ***may affect, not***

likely to adversely affect, no further consultation is anticipated to be required for the eastern indigo snake.

4.5.2 NMFS Purview

Green sea turtle (*Chelonia mydas*): The green sea turtle is listed as federally threatened. The project study area is located within the proposed CH for the green sea turtle and foraging habitat (seagrass) is located within the project study area. Atlantic populations of green turtles are commonly located in estuarine, marine coastal, and oceanic waters. These turtles are known to nest on sandy Atlantic coastlines spanning from Volusia to Miami-Dade counties. Juveniles are often observed in coastal bays, inlets, lagoons, and offshore reefs. Larger juveniles and adults primarily feed on seagrasses and algae. During the day, green turtles occupy shallow flats and seagrass meadows. In the evening, they return to their sleeping quarters of rock ledges, oyster bars, and coral reefs. The project study area does not contain suitable nesting habitat (i.e., sandy beach habitat) but does contain foraging habitat (i.e., seagrass and algae). The *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. Should any free-swimming turtles be discovered within the project area during construction, the project will adhere to state and federal regulations by providing these animals with the necessary space and time to exit the area safely. While the construction methodologies for demolition of the existing bridge structures have not yet been determined, the use of explosives/blasting will be required for the removal of the two bascule piers. A *Conceptual Blasting Plan* will be developed during design, which will include general blasting information for the project and proposed measures to minimize and mitigate potential effects on species and will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting (i.e., means and methods, blasting design, impact assessment, mitigation plan) and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**). Thus, the project determination of effect for the green sea turtle is ***may affect, not likely to adversely affect***.

Hawksbill sea turtle (*Eretmochelys imbricata*): The hawksbill sea turtle is considered the rarest sea turtle species in Florida and is listed as federally endangered. Hawkbill turtles are known to inhabit reefs in the Florida Keys and along the southeastern Atlantic coast. They are omnivorous (feeding on both plants and other animals), but their preferred food in many areas is sea sponges. They will also eat marine algae, corals, mollusks, tunicates, crustaceans, sea urchins, small fish, and jellyfish. The project study area does not contain suitable nesting habitat (i.e., sandy beach habitat) but does contain foraging habitat (i.e., sponges, algae, corals, invertebrates). The *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. Should any free-swimming turtles be discovered within the project area during construction, the project will adhere to state and federal regulations by providing these animals with the necessary space and time to exit the area safely. A *Conceptual Blasting Plan* will be

developed during design, which will include general blasting information for the project and proposed measures to minimize and mitigate potential effects on species and will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting (i.e., means and methods, blasting design, impact assessment, mitigation plan) and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**). Thus, the project determination of effect for the hawksbill sea turtle is ***may affect, not likely to adversely affect***.

Leatherback sea turtle (*Dermochelys coriacea*): The leatherback sea turtle is listed as federally endangered. The largest of all sea turtle species, the leatherback turtle is known to inhabit Florida's coastal waters, with a limited number nesting along the Atlantic coast. Their diet primarily consists of soft-bodied creatures like jellyfish. The project study area does not contain suitable nesting habitat (i.e., sandy beach habitat) or foraging habitat for leatherback sea turtles, since they spend their lives in oceanic waters and are not known to enter estuaries in southern waters. The *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. Should any free-swimming turtles be discovered within the project area during construction, the project will adhere to state and federal regulations by providing these animals with the necessary space and time to exit the area safely. Based on the lack of suitable habitat within the project study area, the project determination of effect for the leatherback sea turtle is ***no effect***.

Loggerhead turtle (*Caretta caretta*): The loggerhead turtle is listed as federally threatened and is typically located in marine coastal and oceanic environments. Hatchlings and juveniles spend the first 7 - 15 years of their lives in the open ocean, after which the migrate to coastal waters to forage. Adult loggerhead turtles migrate great distances between their foraging grounds and nesting beaches. Loggerhead turtles are omnivorous and feed on a large variety of prey items (e.g., sponges, corals, algae, fish, worms, anemones, jellyfish, urchins, sea cucumbers), but their main food is bottom-dwelling invertebrates (e.g., gastropods, bivalves, decapods, and horseshoe crabs). The project study area does not contain suitable nesting habitat (i.e., sandy beach habitat) but does contain foraging habitat for juvenile loggerhead sea turtles. The *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. Should any free-swimming turtles be discovered within the project area during construction, the project will adhere to state and federal regulations by providing these animals with the necessary space and time to exit the area safely. A *Conceptual Blasting Plan* will be developed during design, which will include general blasting information for the project and proposed measures to minimize and mitigate potential effects on species and will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting (i.e., means and methods, blasting design, impact assessment,

mitigation plan) and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**) Thus, the project determination of effect for the loggerhead sea turtle is ***may affect, not likely to adversely affect***.

Giant manta ray: The giant manta ray, which is listed as federally threatened, is the world's largest ray with a wingspan of up to 29 feet. The giant manta ray is a filter feeder that consumes zooplankton and exhibits a migratory behavior, with populations scattered across the globe in small and highly fragmented groups. Although giant manta rays primarily inhabit offshore waters, they can also be encountered in productive coastlines, estuarine waters, oceanic inlets, and within bays and intercoastal waterways. The project study area does not contain preferred habitat for the giant manta ray and this species would not be expected to inhabit the project study area; however, individual giant manta rays may travel through the project study area. No giant manta rays were observed during any of the field surveys. While there is a possibility that this species could migrate through the proposed project area during construction, and the proposed bridge replacement project will involve in-water construction activities, the project will implement the *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**). A *Conceptual Blasting Plan* will be developed during design, which will include general blasting information for the project and proposed measures to minimize and mitigate potential effects on species and will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting (i.e., means and methods, blasting design, impact assessment, mitigation plan) and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**). Thus, project determination of effect for the giant manta ray is ***may affect, not likely to adversely affect***.

Nassau grouper: The Nassau grouper, listed as federally threatened, is a large reef fish found in tropical and subtropical waters in the Caribbean and western North Atlantic, including south Florida. As juveniles, they are found in nearshore shallow waters in macroalgal and seagrass habitats and they then shift to deeper reef habitats (forereef and reef crest) as they grow. Adults consume a diet of fish, while juveniles consume a variety of fish and invertebrates. During the February 21, 2024 technical assistance call, NMFS indicated that the Nassau grouper should be included in the listed species analysis for this project based on recently gathered documentation of this species by NMFS on a nearshore reef in South Florida. The NOAA August 2022 *Nassau Grouper Consultation Framework NOAA Fisheries Southeast Regional Office* document indicates that this species is not believed to be present north of Government Cut and states that "general coastal construction projects occurring in the southeastern United States, with the exception of those in the Florida Keys (including the Dry Tortugas and Biscayne Bay to Government Cut), will have no effect on the species due to the absence of Nassau grouper in these nearshore locations." Thus, the Nassau grouper is expected to be absent from the Broad Causeway Bridge project study area. No Nassau grouper were observed during any of the field surveys. The *Protected Species Construction Conditions, NOAA*

Fisheries Southeast Regional Office and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. Because the Nassau grouper is expected to be absent from the project study area, the project determination of effect for the Nassau grouper is ***no effect***.

Smalltooth sawfish: The smalltooth sawfish, listed as federally endangered, is one of two types of sawfish found in coastal US waters. Sawfish species are year-round residents in peninsular Florida, with most encounters taking place in southwest Florida, spanning from Charlotte Harbor to the Florida Keys. Smalltooth sawfish inhabit shallow coastal waters and estuaries and are often found in sheltered bays, on shallow banks, or in river mouths. They have also been documented within inland river systems. Juvenile smalltooth sawfish typically inhabit shallow coastal waters and estuaries, river mouths, and bays and have been documented in habitat types with unvegetated, muddy and sandy bottoms, especially along red mangrove shorelines, as well as under docks, bridges, and piers. In contrast, adult smalltooth sawfish are usually found in open water habitats. The project study area consists of various benthic habitat types [i.e., macroalgal beds, seagrass, live bottom, seawalls, and scour protection materials (riprap, rubble, and concrete blocks and slabs)], and contains minimal areas of sand and silt. Since the smalltooth sawfish prefers sandy or muddy substrates, it is not likely to inhabit the project study area; however, individual smalltooth sawfish may travel through the project study area. The *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. A *Conceptual Blasting Plan* will be developed during design, which will include general blasting information for the project and proposed measures to minimize and mitigate potential effects on species and will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting (i.e., means and methods, blasting design, impact assessment, mitigation plan) and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**). Thus, the project determination of effect for the smalltooth sawfish is ***may affect, not likely to adversely affect***.

Boulder star coral (*Orbicella franksi*): Boulder star coral, listed as federally threatened, inhabits the shallow waters of the Caribbean Sea, the Gulf of Mexico, the Bahamas, Bermuda, and Florida. No colonies of boulder star coral were encountered within the survey area during the 2023 quantitative benthic survey event; however, two individual colonies of boulder star coral were previously observed on the benthic substrate within the 2022 preliminary benthic survey area (i.e., in the northwest and southwest quadrants of the bridge), suggesting that this species is potentially present within the project area in extremely low numbers. No colonies of boulder star coral were observed attached to the existing bridge structures or existing seawalls.

A future benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area, including any listed coral colonies. The impacts on corals and listed corals, including boulder star coral, will be minimized by relocating all colonies of any listed corals prior to construction. The Town is currently developing

a *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* which will be coordinated with NMFS and FWC. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project in accordance with the most recent version of the FWC's *Coral and Octocoral Mitigation Relocation Recommendations* and will be reviewed by the regulatory agencies for final approval. To minimize impacts to corals from the proposed seawall construction, the new seawalls will be constructed landward of the existing seawalls, the existing seawalls will remain in place, and all seawall construction activities will be conducted from land. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and provided to NMFS for their review and approval. The most likely seawall debris containment method to be utilized is a temporary floating platform that will be repositioned regularly to minimize shading impacts to corals. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and will be provided to NMFS for their review and approval. If the debris containment method differs from a temporary floating platform, the Town commits to reinitiating consultation with the NMFS for the boulder star coral. Because any colonies of boulder star coral occurring within the project impact area will be relocated prior to construction, the project determination of effect for the boulder star coral is ***may affect, not likely to adversely affect***.

Elkhorn coral (*Acropora palmata*): Elkhorn coral, considered one of the most important corals in the Caribbean based on its vital role in reef formation, is listed as federally threatened**.** These corals are known to create dense groups (thickets) in very shallow waters, offering important habitat for fish and other reef wildlife. The population of elkhorn coral in the Caribbean has also declined by 97% beginning in the 1980s as a result of white band disease. This species inhabits clear, shallow waters (1-15 feet) in the Bahamas, Florida, and the Caribbean, with its range extending as far north as Broward County, Florida, where its occurrence is rare. Elkhorn coral inhabits high-energy zones with substantial wave action. This species has not been documented in the northern portion of Biscayne Bay. The project study area does not provide suitable habitat for this species, and the project determination of effect for the elkhorn coral is ***no effect***.

Lobed star coral (*Orbicella annularis*): The lobed star coral, listed as federally threatened, is a coral species with widespread distribution in the tropical western Atlantic, including the Gulf of Mexico, southern Florida, the Bahamas, the northwest Caribbean, Puerto Rico, the lesser Antilles, Central America, Brazil, and Bermuda. This species represents one of the most prolific reef-building corals within the Caribbean, can inhabit most reef environments (typically between ~1-145 feet deep), and is frequently a dominant species in lagoons and upper reef slopes. No colonies of lobed star coral were observed during any of the field surveys.

Due to the similarity of this species to the boulder star coral, which was observed within the project study area during the 2022 preliminary benthic survey, the potential exists that the lobed star coral could occur within the project impact area. A future benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area, including any listed coral colonies. The impacts on corals and listed corals will be

minimized by relocating all colonies of any listed corals prior to construction. A *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* is currently being developed and will be coordinated with NMFS and FWC. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project in accordance with the most recent version of the FWC's *Coral and Octocoral Mitigation Relocation Recommendations* and will be reviewed by the regulatory agencies for final approval. To minimize impacts to corals from the proposed seawall construction, the new seawalls will be constructed landward of the existing seawalls, the existing seawalls will remain in place, and all seawall construction activities will be conducted from land. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and provided to NMFS for their review and approval. The most likely seawall debris containment method to be utilized is a temporary floating platform that will be repositioned regularly to minimize shading impacts to corals. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and will be provided to NMFS for their review and approval. Thus, because any colonies of lobed star coral occurring within the project impact area will be relocated prior to construction, the project determination of effect for the lobed star coral is ***may affect, not likely to adversely affect***.

Mountainous star coral (*Orbicella faveolata*): The mountainous star coral, listed as federally threatened, is a native species found in the Caribbean Sea, the Gulf of Mexico, southern Florida, the Bahamas, Venezuela, and Bermuda. It is found on both the back reef and fore reef slopes of fringing reefs (depths of up to 131 feet) and it is often the most abundant coral species on fore reef slopes between 33 and 66 feet. No colonies of mountainous star coral were observed during the field surveys.

Due to the similarity of this species to the boulder star coral, which was observed within the project study area during the 2022 preliminary benthic survey, the potential exists that the mountainous star coral could occur within the project impact area. A future benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area, including any listed coral colonies. The impacts on corals and listed corals will be minimized by relocating all colonies of any listed corals prior to construction. A *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* is currently being developed and will be coordinated with NMFS and FWC. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project in accordance with the most recent version of the FWC's *Coral and Octocoral Mitigation Relocation Recommendations* and will be reviewed by the regulatory agencies for final approval. To minimize impacts to corals from the proposed seawall construction, the new seawalls will be constructed landward of the existing seawalls, the existing seawalls will remain in place, and all seawall construction activities will be conducted from land. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and provided to NMFS for

their review and approval. The most likely seawall debris containment method to be utilized is a temporary floating platform that will be repositioned regularly to minimize shading impacts to corals. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and will be provided to NMFS for their review and approval. Thus, because any colonies of mountainous star coral occurring within the project impact area will be relocated prior to construction, the project determination of effect for the mountainous star coral is ***may affect, not likely to adversely affect***.

Pillar coral (*Dendrogyra cylindrus*): Pillar coral, listed as federally threatened, and proposed for listing as endangered, is found in the western Atlantic (southern Florida), Caribbean Sea, and Gulf of Mexico. The pillar coral is considered rare, typically existing as scattered, isolated colonies with infrequent instances of aggregation. This species grows into large colonies on both flat and sloping surfaces at depths of up to 65 feet. This species has not been documented in the northern portion of Biscayne Bay. The project study area does not provide suitable habitat for this species, and the project determination of effect for the pillar coral is ***no effect.***

Rough cactus coral (*Mycetophyllia ferox*): The rough cactus coral, listed as federally threatened, is found in the Caribbean, southern Gulf of Mexico, Florida, and the Bahamas. This species is generally restricted to structurally complex reef communities, including patch reefs, fringing reefs, spur and groove reefs, and deeper intermediate reefs. Existing data strongly suggest that rough cactus coral has undergone significant declines in Florida and recruitment remains low. This species has not been documented in the northern portion of Biscayne Bay. The project study area does not provide suitable habitat for this species, and the project determination of effect for the rough cactus coral is ***no effect.***

Staghorn coral (*Acropora cervicornis*): Staghorn coral, a branching stony coral, is listed as federally threatened. The population of staghorn coral in the Caribbean has significantly declined, primarily due to a 97% reduction in this species caused by white band disease beginning in the 1980s. As a result, these corals now exist generally as isolated colonies or small groups, rather than the vast thickets that once characterized their range. This species typically inhabits clear, shallow water (0-100 feet) on coral reefs throughout the Bahamas, Florida, and the Caribbean. Populations of staghorn coral still exist throughout Florida and the Florida Keys; however, they are small and fragmented. This species has not been documented in the northern portion of Biscayne Bay. The project study area does not provide suitable habitat for this species, and the project determination of effect for the staghorn coral is ***no effect***.

4.6 Critical Habitat

CH designation is determined by either the USFWS or NMFS, depending on their jurisdiction. In the case of listed species, CH comprises either: 1) specific areas within the geographical region inhabited by the species that encompass physical or biological features (constituent elements) that are (a) crucial for the conservation of the species and (b) may necessitate special management considerations or protection, or 2) specific areas located outside the geographical region inhabited by the species that are identified as essential for the conservation of the species. Detailed descriptions of designated critical habitats can be found in 50 CFR 17 and 50 CFR 226.

The project study area falls within the designated CH for the West Indian Manatee and within the proposed CH for the green sea turtle, as defined by the USFWS. The project study area is also located adjacent to an area designated as CH for the loggerhead sea turtle. It's important to note that the project does not extend into the CH areas designated for the loggerhead sea turtle, and no adverse impacts are expected in those areas.

The proposed project includes implementation measures to minimize and mitigate impacts to manatee CH, including compensatory mitigation for unavoidable impacts to seagrasses (see Section 7.1), as well as development of a *Barge Accessibility Plan* and incorporation of BMPs to minimize impacts to benthic resources (see Sections 5.5, 6.6, and 9.1). The potential use of construction barges are not anticipated to result in any significant adverse effects on the CH. Therefore, ***the proposed project will not result in the destruction or adverse modification of manatee CH***. During the January 12, 2024 USFWS technical assistance call, the USFWS indicated that this CH determination of effect is supported for the project. The meeting minutes from the January 12, 2024 USFWS meeting are provided in **Appendix B**.

4.7 State Listed Species

State-protected species were considered in accordance with Chapter 379, F.S., which provides protection for wildlife from activities that could harm or endanger them. Section 379.2291, F.S., also known as the FESA, outlines the conservation and management of threatened and endangered species in Florida. It is noted that as per the imperiled species rule, established by FWC in 2010, all federally listed species are also considered state listed species. The project is not located within a Strategic Habitat Conservation Area, as designated by FNAI and FWC. **Table 4-3** presents the state listed wildlife species with the potential to occur within the project study area (based on potential availability of suitable habitat and known species ranges). These species are categorized by the FWC as State Threatened (ST).

Table 4-3 State Listed Wildlife Species Potentially Occurring within the Project Area

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination
Birds				
Little blue heron	*Egretta caerulea*	ST	Moderate	*No adverse effect anticipated*
Reddish egret	*Egretta rufescens*	ST	Low	*No adverse effect anticipated*
Roseate spoonbill	*Platalea ajaja*	ST	Low	*No adverse effect anticipated*
Tricolored heron	*Egretta tricolor*	ST	Low	*No adverse effect anticipated*

[1]ST = State Threatened

It should be noted that the state listed threatened Florida burrowing owl (*Athene cunicularia floridana*) and gopher tortoise (*Gopherus polyphemus*) were also identified by the FNAI Biodiversity Matrix Query report; however, these species have no potential to occur within the project study area (based on a lack of suitable habitat) and are not discussed further within this document.

The June 2023 field survey identified red and white mangrove propagules and saplings, as well as buttonwood, growing within the riprap surrounding the majority of the causeway island (see Section 4.3 for details). The minimal size of these mangroves and buttonwoods and lack of canopy makes

this habitat unsuitable for nesting by listed birds; however, wading birds may utilize the intertidal areas of the riprap for foraging.

Little blue heron (*Egretta caerulea*): The little blue heron is listed as threatened by the FWC. Little blue herons inhabit both freshwater and saltwater environments, including mudflats, marshes, beaches, mangrove swamps, cypress swamps, hardwood swamps, wet prairies, and bay swamps. This species nests in colonies, often with other wading bird species, in nests located in trees and shrubs on islands, thickets near water, or emergent vegetation over water. No observations of little blue herons were made during any of the field surveys; however, there is potential foraging habitat available within the project study area and the eBird database identified a notable number of occurrences of this species within one mile of the project (outside the project study area). The proposed project is not expected to result in any impacts to nesting areas, rookeries, or foraging habitat. Therefore, the project determination of effect for the little blue heron is ***no adverse effect anticipated***.

Reddish egret (*Egretta rufescens*): The reddish egret, a medium-sized heron, is listed as threatened by the FWC. The reddish egret inhabits shallow, coastal saltwater areas, coastal areas, mainly on estuaries near mangroves, and lagoons, but they can also be found on dredge spoiled islands. This species typically nests on mangrove islands alongside pelicans, other herons, and spoonbills. No observations of reddish egrets were made during any of the field surveys; however, there is potential foraging habitat available within the project study area. The proposed project is not expected to result in any impacts to nesting areas, rookeries, or foraging habitat. Therefore, the project determination of effect for the reddish egret is ***no adverse effect anticipated***.

Roseate spoonbill (*Platalea ajaja*): The roseate spoonbill, a large pink and white wading bird with a spoon-like bill, is listed as threatened by the FWC. It prefers both fresh and saltwater foraging habitats, including shallow waters of varying salinity, tidal flats, coastal marshes, mangrove-dominated areas, and freshwater sloughs. This species nests on coastal islands, man-made dredge spoil islands near foraging grounds, and sometimes in willow heads at freshwater sites, often in colonies with other species. No observations of roseate spoonbills were made during the field surveys; however, there is potential foraging habitat available within the project study area. The proposed project is not expected to result in any impacts to nesting areas, rookeries, or foraging habitat. Therefore, the project determination of effect for the roseate spoonbill is ***no adverse effect anticipated***.

Tricolored heron (*Egretta tricolor*): The tricolored heron is a medium-sized wading bird that is listed as threatened by the FWC. The tricolored heron inhabits fresh and saltwater marshes, estuaries, mangrove swamps, lagoons, and river deltas. It nests in trees or shrubs on salt marsh islands or standing water. No observations of tricolored herons were made during the field surveys; however, there is potential foraging habitat available within the project study area. The proposed project is not expected to result in any impacts to nesting areas, rookeries, or foraging habitat. Therefore, the project determination of effect for the tricolored heron is ***no adverse effect anticipated***.

State Listed Plants – As shown in **Table 4-4**, the FNAI Biodiversity Matrix Query report identified five plant species listed by the state (i.e., FDACS) that could potentially occur within the project area. While the large-flowered rosemary, coastal vervain, and redmargin zephyrlily have been documented

to occur in Miami-Dade County, they have no potential to occur within the project area or vicinity (based on habitat types that are not present within the project area). It should be noted that only vouchered wild specimens of Florida royal palm are protected by the state. No wild specimens of royal palm and no mahogany trees were observed within the project study area during the field reviews. No other state listed plants were observed during the June 2023 pedestrian field survey. Thus, the project determination of effect for these state listed plants is ***no effect anticipated***. If any state listed plants are discovered within the project impact area prior to construction, coordination with FDACS and the Florida Native Plant Society or similar organization will occur to explore measures for avoiding impacts or relocating the plants.

Table 4-4 State Listed Plant Species

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination
Large-flowered rosemary	*Conradina grandiflora*	ST	None	*No effect anticipated*
Coastal vervain	*Glandularia maritima*	SE	None	*No effect anticipated*
Florida royal palm	*Roystonea regia*	SE*	Low	*No effect anticipated*
West Indies mahogany	*Swietenia mahagoni*	ST	Low	*No effect anticipated*
Redmargin zephyrlily	*Zephyranthes simpsonii*	ST	None	*No effect anticipated*

[1] ST = State Threatened, SE = State Endangered
*Note that only vouchered wild specimens of Florida royal palm are protected.

4.8 Other Species

Bald eagle (*Haliaeetus leucocephalus*): The bald eagle is protected under the MBTA, the BGEPA, the Lacey Act 16 U.S.C. §§ 3371-3378, and under 68A-16.002, F.A.C. As shown in **Figure 4-2**, According to the Audubon Eagle Watch Public Nest Map website, the closest documented bald eagle nest (Nest DA011) is located approximately 5.1 miles west-southwest of the project study area. No eagles or their nests were observed during the field reviews. The USFWS and FWC Management Guidelines suggest the protection of a 660-ft habitat buffer around active bald eagle nests. The closest documented eagle nest is located well beyond the 660-ft nest protection buffer requirement. No impacts to the bald eagle are anticipated from the proposed project.

Common bottlenose dolphin (*Tursiops truncatus*): Bottlenose dolphins are not listed under the ESA of 1973; however, they are protected under the Marine Mammal Protection Act. They are found in both offshore and coastal waters, including harbors, bays, gulfs, and estuaries. Bottlenose dolphins feed on a variety of prey items, including crustaceans, fish, and squid. No observations of bottlenose dolphins were made during the field surveys; however, there is potential foraging habitat available within the project study area. The *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities. If any dolphins (or any other free-swimming mammals) are found within the project area during construction, construction activities will cease and they will be allowed the necessary space and time to leave in accordance with state and federal regulations. The construction methodologies for demolition of the existing bridge structures have not yet been determined; however, explosives/blasting will be required for the removal of the two bascule piers. The use of blasting may have both direct and indirect

impacts on protected species (i.e., fish, sea turtles, marine mammals) and their habitats. A *Conceptual Blasting Plan* will be developed during design, which will include general blasting information for the project and proposed measures to minimize and mitigate potential effects on species and will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting (i.e., means and methods, blasting design, impact assessment, mitigation plan) and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**).

Figure 4-2 Audubon Eagle Watch Public Nest Map



5.0 WETLANDS AND OTHER SURFACE WATERS

Executive Order 11990 (EO11990), titled "Protection of Wetlands," was established to support the National Environmental Policy Act of 1969, with the aim of directing federal agencies and actions authorized by them to minimize the negative impacts associated with wetland destruction or modification. It emphasizes the need to avoid new construction in wetlands whenever a practical alternative exists. USDOT Order 5660.1A, titled "Preservation of the Nation's Wetlands," was established to ensure the protection, preservation, and enhancement of wetlands during the planning, construction, and operation of transportation projects. Similarly, Florida's State Constitution, under Article II, Section 7, underscores the state's commitment to conserving and safeguarding its natural resources and scenic beauty. The Florida Water Resource Act (F.S. Ch 373), enacted in 1972, serves to implement the policies outlined in the State Constitution. This act entrusts the FDEP and Water Management Districts with the authority and responsibility to regulate environmental resource permits.

In alignment with EO11990, USDOT Order 5660.1A, state regulations, and Wetlands and Other Surface Waters Chapter of the PD&E Manual, an evaluation of wetlands within the project study area was carried out to identify, map, and assess potential impacts stemming from the project's construction. This section provides insights into the initial data collection, methods employed for delineating wetlands and surface waters, as well as the resources identified within the project study area.

Any wetland impacts resulting from the project's construction are required to be mitigated in accordance with Section 373.4137, F.S., to satisfy all mitigation requirements specified in Part IV of Chapter 373, F.S., and 33 U.S.C. §1344. The project study area underwent a thorough review to identify wetlands and assess potential impacts, utilizing the Uniform Mitigation Assessment Method (UMAM) methodology.

5.1 Agency Coordination

Below is a summary of the ETAT comments and AN package responses received regarding *wetlands and surface waters*.

5.1.1 USACE

The USACE indicates that the project area is in waters associated with the BBAP, an OFW, and contains estuarine wetlands and seagrass habitat important to listed species and which provides EFH. The project is located in retained waters that are also navigable, and authorization from USACE for Section 10 of the Rivers and Harbor Act and Section 404 of the Clean Waters Act is anticipated to be required. The USACE anticipates the bridge replacement project would have substantial impacts to seagrasses and wetlands and encourages focusing on avoidance and minimization efforts for this project. The USACE requests an NRE document, benthic survey results, demonstration of avoidance and minimization measures, and compensatory mitigation for all unavoidable impacts to wetlands and seagrasses. USACE recommends that the proposed bridge design avoid impacts to the maximum extent practicable. Staging areas and the location of temporary work barges and/or trestles should be carefully considered to avoid additional impacts. The project should incorporate other BMPs for

in-water activities, including use of turbidity curtains and erosion barriers. The USACE determined the degree of effect for this project on wetlands and surface waters is "substantial."

5.1.2 USEPA

The USEPA indicates that the project area contains wetlands and seagrass, and is located within the BBAP, an OFW, and the Southern Everglades boundary. The project area is located within retained waters within the USACE 404 Jurisdiction and is mostly within the 100-year floodplain (Flood Zones AE and VE). The project design should meet or exceed flood control requirements and stormwater runoff from the proposed project should be treated to prevent water quality impacts to estuarine and marine habitats within Biscayne Bay. The USEPA assigned a Substantial degree of effect for wetlands, surface waters, and floodplains and recommends avoidance and minimization measures be included to reduce unavoidable impacts to wetlands and surface waters. The USEPA determined the degree of effect for this project on wetlands and surface waters is "substantial."

5.1.3 USFWS

The USFWS emphasizes the significance of wetlands as important habitats for fish and wildlife and recommends avoiding disturbance to wetlands whenever possible. In cases where such impacts are unavoidable, the USFWS suggests the project provide mitigation measures that adequately compensate for the loss of these resources. Additionally, the USFWS highlights the potential effects on mangroves, seagrasses, and benthic marine resources and recommends conducting a comprehensive survey of these resources within the project area. USFWS advocates for proactive measures to avoid disturbing these resources and, if unavoidable, to provide suitable mitigation to fully offset the impact on these valuable resources as well. The USFWS determined the degree of effect for this project on wetlands and surface waters is "substantial."

5.1.4 NMFS

The NMFS suggests addressing avoidance, minimization, and mitigation strategies during the project's PD&E phase to address direct and indirect impacts on wetlands and surface waters. The NMFS stresses the need for early coordination with their staff, recommends habitat surveys, and proposes measures like prohibiting certain activities in seagrass habitats, relocating coral, and preventing debris and sediment discharge to protect aquatic preserves, emphasizing collaboration for conservation during project development. NMFS determined the degree of effect for this project on wetlands and surface waters is "substantial."

5.1.5 FDEP

The FDEP outlines project effects on wetlands and surface waters, emphasizing direct impacts to estuarine wetlands and seagrass beds in a designated OFW and Aquatic Preserve near the Southern Everglades. Recommendations include avoidance, minimization, and mitigation; an alternatives analysis if permitted; and meeting relevant rules. Indirect effects may involve turbid discharge, sedimentation, shading, noise, aesthetics, and lighting during construction, requiring secondary impact analysis in various categories, with an emphasis on minimizing impacts to wetland hydrology and proper erosion controls. The FDEP determined the degree of effect for this project on wetlands and surface waters is "substantial."

5.1.6 SFWMD

The SFWMD indicates that the project area contains wetlands and seagrass, and is located within the BBAP, an OFW, and the Southern Everglades boundary. The project may have potential impacts on wetlands and other surface waters, including seagrasses, and indicates that these impacts will be evaluated during permitting with the SFWMD. The SFWMD recommendations include a pre-application meeting, design modifications to minimize impacts, and a mitigation plan. In addition, the SFWMD mentions standard protection measures for the manatee and lighting design consistence with the FWC Sea Turtle Lighting Guidelines. The SFWMD determined the degree of effect for this project on wetlands and surface waters is "substantial."

5.1.7 DERM

The DERM underscores the necessity of implementing environmental controls and BMPs to prevent any construction-related materials or debris from entering tidal waters and adjacent coastal wetland areas, even on a temporary basis. Any debris that enters these areas must be promptly removed, and any removed materials used for repairs must be contained to prevent fugitive particulates or discharge into surface waters. Disposal of construction and demolition debris should adhere to all regulations. Furthermore, the DERM identifies that the proposed project area is situated over tidal waters and adjacent to mangroves. Any work involving tidal waters or coastal wetlands will require a Miami-Dade County Class I permit. The proposed improvements must implement water quality treatment of stormwater runoff prior to discharge to prevent water quality impacts to estuarine and marine habitats within Biscayne Bay.

5.2 Wetland Survey Methodology

To determine potential jurisdictional wetland area within the project study area, a combination of desktop reviews and field surveys were used. The desktop review included review of the following resources:

- Aerial photographs (ESRI Aerials Data, Bing Aerial Data, Google Earth) (2023)
- FDOT Florida Land Use, Cover, and Forms Classification System (FLUCCS), 4th ed., January 1999
- Miami-Dade County GIS data (2023)
- USDA NRCS Soil Survey Geographic Database for Florida Data (2021)
- USFWS, Classification of Wetlands and Deepwater Habitats of the United States (Cowardin et al., 1979)
- USFWS NWI, Wetlands Online Mapper, reviewed May 2023

These data were utilized as a first step to determine the approximate locations and boundaries of existing upland and wetland communities within the project study area.

A June 2023 pedestrian wetland field survey was carried out within the project study area, including the causeway island and the eastern bridge approach, to document any wetlands and surface water features within the project study area. All documented wetland boundaries were delineated in accordance with the USACE *Wetland Delineation Manual* (Technical Report Y-87-1), the USACE

Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region (ERDC/ED TR-10-20), the *Delineation of the Landward Extent of Wetlands and Surface Waters* (Chapter 62-340, F.A.C.), and the Wetlands and Surface Waters Chapter of the PD&E Manual. The pedestrian survey evaluated the upland and intertidal areas of the project study area. A 2023 quantitative benthic survey was also completed in July and August 2023 for the project area and Sections 5.3 and 6.3 provide information on the subtidal habitat within the project study area.

The wetlands and surface waters identified in the field were delineated and extents were recorded using a Trimble R1 Global Positioning System (GPS) unit with a GPS data collection unit (i.e., a Samsung Galaxy Tab S3 or iPad mini running ESRI Collector Software). The GIS data collected in the field were added to ArcGIS Online and overlaid with conceptual project plans to provide impact estimates to wetlands, surface waters, and seagrasses. All map figures were generated in ArcGIS Pro 2.9.5. Formal wetland delineations, including field flagging and approval by the regulatory agencies, were not conducted, but will occur during the design and permitting phase of the project.

5.3 Wetland Characterization

In accordance with the PD&E Manual, wetlands within the project study area were classified using the FLUCCS and the USFWS Classification System (Cowardin et al., 1979). A map of the existing land use based on the FLUCCS data (FDOT, 1999) is depicted in **Figure 5-1**. The wetland and OSW polygons were individually characterized based on their FLUCCS type and are depicted in **Figures 5-2** and **5-3**, respectively. The June 2023 pedestrian wetland field survey revealed that the project corridor features one bridge connecting the mainland Town of Bay Harbor with a developed spoil island (i.e., Broad Causeway Island) in Biscayne Bay. A seawall lines the West Island on the east side of the bridge, as well as the eastern portion of the causeway island on the west side of the bridge. The remainder of the causeway island shoreline consists of limestone riprap. Throughout the upland portion of the entire corridor, the soil is classified as Urban Land by NRCS (refer to Section 3.2 and **Figure 3-3** for additional details). The Urban Land soil on these islands primarily consists of unconsolidated sand and shell fill material which is generally unsuitable for wetland habitat. A total of 18 wetlands (seagrass beds) and eight OSWs were identified within the project study area (see **Table 5-1)**. The seagrass wetlands and OSWs are depicted in **Figures 5-2** and **5-3**, respectively, and described below.

Table 5-1 Wetlands and Other Surface Waters Identified within the Project Study Area

Wetland/OSW[1]	FLUCCS Code	FLUCCS Description	USFWS Code	Size (ac)
Wetland SA	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.04
Wetland SB	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.01
Wetland SC	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.04
Wetland SD	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.08
Wetland SE	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.008
Wetland SF	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.09
Wetland SG	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.04
Wetland SH	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.29
Wetland SI	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.22
Wetland SJ	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.17
Wetland SK	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.24
Wetland SL	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.06
Wetland SM	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.002
Wetland SN	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.01
Wetland SO	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.04
Wetland SP	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.001
Wetland SQ	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.003
Wetland SR	9111	Seagrass, sparse-medium	E1AB - estuarine subtidal aquatic bed	0.00002
Total				**1.34**
OSW 1	3250	Stormwater treatment areas	N/A	0.054
OSW 2	3250	Stormwater treatment areas	N/A	0.050
OSW 3	3250	Stormwater treatment areas	N/A	0.052
OSW 4	3250	Stormwater treatment areas	N/A	0.035
OSW 5	3250	Stormwater treatment areas	N/A	0.035
OSW 6	3250	Stormwater treatment areas	N/A	0.288
OSW 7	3250	Stormwater treatment areas	N/A	0.186
OSW 8	3250	Stormwater treatment areas	N/A	0.098
Total				**0.798**

[1]Wetland names correspond to the seagrass bed names from the 2023 Quantitative Benthic Survey Report (**Appendix E**).

Figure 5-1 FLUCCS Map



Figure 5-2 Wetlands within the Biscayne Bay Portion of the Project Study Area



Figure 5-3 OSWs within the Causeway Island Portion of the Project Study Area and the Anticipated Permanent Impacts to OSWs for Both Build Alternatives



Wetlands SA-SR: FLUCCS 9111 (Seagrass sparse-medium); USFWS E1AB (estuarine subtidal aquatic bed)

As described in Section 6.2, a 2023 quantitative benthic survey was conducted within the project study area. Biologists identified seagrass in water depths of ~3-13 feet in a total of 18 seagrass beds (representing 5,410.35 m^2 or 1.34 ac) within the project study area located in the northeast, southeast, and southwest quadrants of the bridge, as well as south of the causeway island. These 18 seagrass beds are identified as Wetlands SA through SR to correspond with the seagrass bed names in the 2023 Quantitative Benthic Survey Report (**Appendix E**). Each seagrass bed is identified in **Figure 5-3**.

Three species of seagrass were documented within the survey area: paddle grass (*Halophila decipiens*), manatee grass (*Syringodium filiforme*), and turtle grass (*Thalassia testudinum*). The majority of seagrasses observed within the survey area were located in the southeast quadrant of the bridge (~0.74 ac), followed by the southwest quadrant of the bridge (~0.42 ac), the south side of the causeway island (~0.13 ac), and finally the northeast quadrant of the bridge (~0.05 ac). Paddle grass was, by far, the most common seagrass species observed within the survey area, found within 17 of the 18 documented seagrass beds/patches. Turtle grass and manatee grass were found in only five beds and one bed, respectively. Rhizophytic macroalgae was interspersed with the seagrasses in all of the seagrass beds.

A total of 161 *in-situ* Submerged Aquatic Vegetation (SAV) quadrats (each 1 m^2 in size) were evaluated to determine seagrass densities and other associated data for the seagrass beds within the survey area. The mean percent cover of total seagrass across all 161 SAV quadrats was ~9.61%. Total seagrass densities within the seagrass beds (mean percent cover of total seagrass) ranged from 0.00% (Wetlands SN and SM) to ~44.11% (Wetland SD). When considering all seagrass within the entire survey area, paddle grass had the highest seagrass density (mean total percent cover of ~5.85%), followed by manatee grass (~2.42%), and turtle grass (~1.34%). Light or moderate sediment accumulation was noted within the vast majority (~97.52%) of the SAV quadrats. The mean total percent cover of macroalgae within all 161 SAV quadrats was substantial (~64.88%). Epiphyte presence was very common (present in 92.55% of the SAV quadrats) and cyanobacteria was noted to be present within ~18.63% of the SAV quadrats. The high density of macroalgae and epiphytes within the SAV quadrats suggests the potential for substantial nutrient availability within the survey area. Additional details regarding the seagrass beds within the project study area are provided in **Appendix E**. The seagrass within the project study area are under the jurisdiction of the USACE (within Section 10 waters), the SFWMD, and the DERM.

Other Surface Waters (OSW) 1-8: FLUCCS 3250 (Stormwater treatment areas)

Eight OSWs were identified on the causeway island portion of the project study area, all of which are impoundments constructed primarily to capture runoff from the existing road features on the causeway island. These artificial OSWs retain stormwater and allow it to seep through the soil. These swales are a commonly used feature in transportation systems and resemble shallow ditches alongside roads. The grassy slopes, which are regularly mowed and maintained, filter sediment as stormwater percolates in the ground. Some of the OSWs contained standing water at the time of the June 2023 pedestrian field survey and others exhibited hydrological features such as algal

matting. Only OSW 2 and OSW 7 may hold ponded water year-round. The vegetation in the OSWs was almost entirely mowed and maintained St. Augustine grass (*Stenotaphrum secundatum*), with some marsh pennywort (*Hydrocotyle vulgaris*) and narrowleaf whitetop sedge (*Rhynchospora colorata*). Stormwater features are considered non-jurisdictional and are exempt from the Clean Water Act. Representative photographs of OSWs within the project study area are provided in **Appendix D**.

5.4 Wetland Impacts

5.4.1 Permanent Impacts

The proposed build alternatives were evaluated for permanent impacts to wetlands and surface waters. Permanent direct impacts to the wetlands and surface waters within the project study area are anticipated in association with construction of the proposed bridge structures, construction of the roadway and stormwater improvements on the causeway island, and new seawall installation. If the No Build Alternative is selected, there will be no permanent or temporary impacts to wetlands or surface waters. **Table 5-2** summarizes potential permanent impacts to wetlands and surface waters for each build alternative.

Table 5-2 Summary of Permanent Direct and Indirect Impacts to Wetlands and Surface Waters

		Build Alternative 1 High-Level Fixed Bridge	Build Alternative 2 Mid-Level Movable Bridge
Wetland/OSW	**FLUCCS Code**	**Permanent Impact (ac)**	**Permanent Impact (ac)**
Wetland SF	9111	0.012	0.074
Wetland SG	9111	0.001	0.040
Wetland SI	9111	--	0.003
Wetland SK	9111	0.098	0.120
Wetland SL	9111	0.059	0.052
Wetland SM	9111	--	0.002
Wetland SN	9111	--	0.008
Wetland SO	9111	0.002	0.033
Total Seagrass Wetlands		**0.172**	**0.332**
OSW 1	3250	0.054	0.054
OSW 2	3250	0.050	0.050
OSW 3	3250	0.052	0.052
OSW 4	3250	0.035	0.035
OSW 5	3250	0.035	0.035
OSW 6	3250	0.288	0.288
OSW 7	3250	0.186	0.186
OSW 8	3250	0.098	0.098
Total OSW		**0.798**	**0.798**

[1]Wetland names correspond to the seagrass bed names from the 2023 Quantitative Benthic Survey Report (**Appendix E**).

Seagrass (Wetlands SF, SG, SI, SK, SL, SM, SN, and SO)

Permanent direct impacts to seagrass would result from installation of the new bridge piers and permanent indirect impacts would result from shading of the substrate by the new bridge structure. Seagrass impacts were calculated based on the area of overlap between the footprint of the proposed bridge alternative and the seagrasses delineated during the 2023 quantitative benthic survey. The permanent impact calculations account for both direct impacts to seagrass associated with bridge pier installation and indirect impacts to seagrass in association with shading of seagrass beds from the proposed bridge structure. Because the permanent impact calculation to seagrasses has overlapping direct (bridge pier installation) and indirect impacts (shading), **Table 5-2** presents the permanent impact calculations only in the direct impact column. As shown in **Figure 5-4**, five seagrass beds would be permanently impacted by Build Alternative 1 (High-Level Fixed Bridge): Wetlands SF, SG, SK, SL, and SO. As shown in **Figure 5-5**, eight seagrass beds would be permanently impacted by Build Alternative 2 (Mid-Level Movable Bridge): Wetlands SF, SG, SI, SK, SL, SN, SM, and SO.

The permanent impacts to seagrass would be substantially lower for Build Alternative 1 (High-Level Fixed Bridge) (0.172 ac) than for Build Alternative 2 (Mid-Level Movable Bridge) (0.332 ac). It should be noted that if a new bridge is constructed, removal of the existing bridge structure would also eliminate the existing shading properties of that structure, opening up approximately 1.72 ac of substrate (footprint of the existing bridge) for colonization by seagrass. Unavoidable impacts to seagrasses from the proposed project will be mitigated. Refer to Section 7.1 for a discussion on compensatory mitigation for seagrass impacts.

Because seagrasses in this region are ephemeral and vary annually/seasonally in density and location, re-evaluation of potential seagrass impacts will occur during the design and permitting phases of the project, as well as once construction barge spudding locations and travel routes become available.

OSWs (OSW 1-8)

Eight OSWs (i.e., manmade stormwater retention features) were documented within the causeway island portion of the project study area. All eight OSWs are anticipated to be permanently impacted in their entirety in association with construction of the proposed stormwater management ponds. Thus, the permanent direct impacts to OSWs 1-8 are expected to be the same for both build alternatives (i.e., a total of 0.798 ac; see **Figure 5-3**). The precise extent of these impacts will be determined and quantified during the permitting phase of the project. The implementation of buffers or retaining walls may be utilized to minimize impacts to OSWs in some cases. No indirect or temporary impacts are anticipated for the OSWs from the proposed project. No mitigation is anticipated to be required for impacts to OSWs within the proposed project study area.

Figure 5-4 Anticipated Permanent and Temporary Impacts to Wetlands for Build Alternative 1 (High-Level Fixed Bridge)



Figure 5-5 Anticipated Permanent and Temporary Impacts to Wetlands for Build Alternative 2 (Mid-Level Moveable Bridge)



5.4.2 Temporary Impacts

Seagrass (Wetlands SF, SG, SH, SI, SK, SL, and SO)

Temporary direct impacts to seagrass were calculated based on a 25-foot construction impact buffer established around each alternative alignment. While the construction means and methods will be determined during the design phase, temporary impacts to seagrasses within this temporary impact zone may include impacts associated with maneuvering of vessels and equipment. This temporary impact area around the project footprint would be expected to naturally return to its original condition after construction activities are complete. As shown in **Figure 5-4**, five seagrass beds would be temporarily impacted by Build Alternative 1 (High-Level Fixed Bridge): Wetlands SF, SG, SK, SL, and SO. As shown in **Figure 5-5**, seven seagrass beds would be temporarily impacted by Build Alternative 2 (Mid-Level Movable Bridge): Wetlands SF, SG, SH, SI, SK, SL, and SO. As shown in **Table 5-3**, the temporary impacts to seagrass are anticipated to be slightly higher for Build Alternative 1 (High-Level Fixed Bridge) (0.107 ac) than for the Build Alternative 2 (Mid-Level Movable Bridge) (0.085 ac). Efforts will be made to minimize temporary impacts to these communities through the implementation and maintenance of BMPs and the project implementation measures. See Section 5.5 for a discussion on avoidance and minimization of temporary impacts to seagrass during construction.

Table 5-3 Summary of Temporary Impacts to Wetlands

		Build Alternative 1 High-Level Fixed Bridge	Build Alternative 2 Mid-Level Movable Bridge
Wetland[1]	FLUCCS Code	Direct Impact (ac)	Direct Impact (ac)
Wetland SF	9111	0.030	0.011
Wetland SG	9111	0.021	0.004
Wetland SH	9111	--	0.00005
Wetland SI	9111	--	0.010
Wetland SK	9111	0.046	0.049
Wetland SL	9111	0.001	0.008
Wetland SO	9111	0.009	0.003
Total		**0.107**	**0.085**

[1]Wetland names correspond to the seagrass bed names from the 2023 Quantitative Benthic Survey Report (**Appendix E**).

OSWs (OSW 1-8)

All impacts to OSWs (OSWs 1-8) are considered permanent direct impacts. No temporary impacts to OSWs are anticipated from the proposed project.

5.4.3 Cumulative impacts

Cumulative impacts are defined as impacts on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.

Cumulative effects are largely dependent on the project size, where the project occurs within the landscape, and the condition of the habitats being traversed (pristine versus degraded).

The proposed project includes the replacement of an existing bridge over the Intracoastal Waterway (ICW) in northern Biscayne Bay, installation of new seawalls landward of the existing seawalls, and construction of stormwater management facilities (ponds) within an existing developed area.

The proposed project will not increase traffic capacity on the roadways nor result in increased water-related activities (boating or other recreation). No additional anthropogenic use of natural habitats within the project study area are anticipated. The proposed build alternatives will include improvements to the stormwater management system.

The Broad Causeway Bridge replacement project is located within the Town of Bay Harbor Islands and adjacent to the City of North Miami Beach, both of which are fully developed and virtually built-out with little to no remaining vacant land. Thus, additional future development is likely to be in the form of reconstruction or redevelopment of existing facilities. Therefore, it is anticipated that cumulative impacts to wetlands and surface waters from the proposed action, when combined with other past, present, and future projects, are estimated to be minimal.

5.5 Avoidance and Minimization of Impacts to Wetlands

Efforts to avoid and minimize potential impacts to wetlands (seagrasses) were incorporated throughout the development of the proposed build alternative alignments, where possible. For example, consideration for build alternatives include two bridge types. Minimization of direct impacts to seagrasses has been incorporated by designing the proposed build alternatives within the existing Town ROW. Seagrasses are located adjacent to both the north and south sides of the existing bridge. Both proposed build alignments will have unavoidable permanent impacts to seagrasses from bridge pier installation and shading. Selection of Build Alternative 1 (High-Level Fixed Bridge) as the Preferred Alternative rather than Alternative 2 (Mid-Level Movable Bridge) minimizes direct impacts to seagrasses from 0.332 ac (Build Alternative 2) to 0.172 ac (Build Alternative 1).

During the design phase, a seagrass survey will be conducted during the peak seagrass growing season (i.e., June 1-September 30). The seagrass survey protocol will be coordinated with NMFS prior to completion. If it is determined that there will be unavoidable impacts to seagrasses from the project, coordination with NMFS and USFWS will take place to determine appropriate avoidance and minimization measures to apply during construction.

Barge spudding and staging has the potential to impact seagrass and corals beyond the temporary impact area (i.e., the 25-foot construction impact buffer around the project footprint) during both bridge construction and demolition. Barge spudding and staging locations will be carefully selected to minimize impacts to seagrasses within the project area. Barge spudding, staging, and routes during construction will be further evaluated during the design/permitting phase and a *Barge Accessibility Plan* depicting the locations of barge work channels and barge exclusion zones will be coordinated with the regulatory agencies. Furthermore, BMPs will be implemented to minimize resource impacts during construction.

Prior to construction commencement, seagrasses within the vicinity of the project corridor will be delineated and marked with visible buoys to identify areas that should be avoided by barges and

work boats for construction and staging. Additional seagrass surveys will be conducted prior to the commencement of construction, during construction, and post-construction to assess if impacts to seagrass have occurred as a result of the project.

All necessary measures will be taken to avoid and/or minimize impacts to surface waters during project design and BMPs will be implemented during construction. A *Water Quality/Turbidity Monitoring Plan* will be developed and implemented during construction to ensure turbidity levels beyond containment measures are maintained at 0 Nephelometric Turbidity Units (NTUs) above ambient (background) levels. In addition, all applicable permits will be obtained or modified in accordance with federal, state, and local laws and regulations.

The project has been designed to avoid impacts to the occasional mangrove propagules and saplings present within the riprap along the causeway island. These mangroves fall outside the project footprint. BMPs will be implemented during construction to minimize impacts to mangroves during construction. The area of impact to the riprap shoreline from construction activities (i.e., the proposed seawall installation) will be re-evaluated during the permitting phase and any impacts to mangroves will be addressed. If mangrove saplings are present within the riprap impact area, the square feet of mangrove leaf canopy will be measured to determine a Biscayne Bay Environmental Enhancement Trust Fund (BBEETF) contribution as compensatory mitigation (i.e., using the formula of square feet of canopy x $4 x 2).

The project will incorporate all possible and practicable measures to avoid or minimize impacts to seagrass during design, and avoidance and minimization of impacts to seagrasses will continue to be evaluated during the final design, permitting, and construction phases of the project. Proper implementation of BMPs during construction can avoid or minimize unnecessary impacts to wetlands and seagrasses during construction. Staging areas for the Contractor will be identified and maintained in accordance with FDOT *Standard Specifications for Road and Bridge Construction*.

The proposed project will make every effort to maximize the treatment of stormwater runoff from the proposed project improvements. It is anticipated that the proposed stormwater improvements for this project will improve water quality by providing treatment where none currently exists or where treatment is currently limited. Additionally, BMPs will be employed during construction activities and an Erosion Control Plan (ECP)/SWPPP will be implemented to control the effects of stormwater runoff during construction.

5.6 Functional Assessment

5.6.1 Methodology

As required under EO11990, wetland impacts which will result from the construction of this project will be mitigated pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and 33 U.S.C. §1344. The UMAM was established to fulfill the mandate of subsection 373.414(18), F.S., which requires the establishment of a uniform mitigation assessment method to determine the amount of mitigation needed to offset adverse impacts to wetlands and other surface waters and to award and deduct mitigation bank credits. UMAM scores are based on the total of three categories, scored from zero (0) (lowest) to ten (10) (highest), divided by the total maximum score for the variables (Location and Landscape Support, Water Environment, Community

Structure). The UMAM value is expressed as a number between zero (0) and one (1), with one being assigned to the highest valued/functioning wetlands. UMAM provides a standardized procedure for assessing the ecological functions provided by wetlands and other surface waters, the amount that those functions are reduced by a proposed impact, and the amount of mitigation necessary to offset that loss. This standardized methodology is also used to determine the degree of improvement in ecological value of proposed mitigation bank activities. The UMAM evaluates functions through consideration of an ecological community's current condition, hydrologic connection, uniqueness, location, fish and wildlife utilization, time lag, and mitigation risk.

The UMAM has been an acceptable methodology by the regulatory agencies to determine the amount of mitigation needed to offset impacts to seagrass communities as a result of coastal construction projects. Thus, the UMAM was used to assess the seagrass wetlands to be impacted within the project study area.

5.6.2 Functional Assessment Results

The seagrass wetlands within the project study area were assessed with the UMAM and a summary of their scores is provided in **Table 5-4**. **Table 5-5** summarizes the potential permanent wetland impact and functional loss for the two build alternatives and **Table 5-6** summarizes the potential temporary wetland impact and functional loss for the build alternatives. **Table 5-7** summarizes the total wetland impact and functional loss for the build alternatives.

Table 5-4 Summary of UMAM Scores

Wetland	FLUCCS Code	Location and Landscape Support	Water Environment	Community Structure	UMAM Composite Score
Seagrasses (Wetlands SF and SH)	9111	6	6	6	0.60
Seagrasses (Wetlands SG, SI, SO, SN, SM, SL, and SK)	9111	6	6	4	0.53

The UMAM composite score for Wetlands SF and SH were 0.60 (**Table 5-4**). These seagrass beds consisted of turtle grass with very sparse paddle grass and an average seagrass density of ~21%. The UMAM composite score for Wetlands SG, SI, SK, SL, SN, SM, and SO was lower (0.53; **Table 5-4**). These seagrass beds consisted of paddle grass and turtle grass with a low seagrass density of ~3.2%. Macroalgae is the primary benthic cover component within all seagrass beds. Water quality is impacted by urban drainage canal releases (with large variations in water clarity and salinity within the project area) and signs of eutrophication are evident (e.g., epiphytic and cyanobacterial growth on seagrass blades). On a regional scale, seagrass decline has been reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the assessment area reporting seagrass losses of 63-78%. The UMAM score sheets are included in **Appendix H**.

As shown in **Table 5-5**, Build Alternative 1 (High-Level Fixed Bridge) will have fewer permanent impacts to seagrass in the project study area (0.172 ac) and have a lower functional loss (0.018) than Build Alternative 2 (Mid-Level Movable Bridge) (permanent impact 0.332 ac; functional loss of 0.038). As shown in **Table 5-6**, Build Alternative 1 (High-Level Fixed Bridge) would have slightly higher

Table 5-5 Potential Permanent Wetland Impact and Functional Loss for the Build Alternatives

Build Alternative	Wetland	FLUCCS Code	Permanent Impact (ac)	UMAM	Functional Loss (Permanent)
Build Alternative 1 High-Level Fixed Bridge	Seagrass (Wetland SF)	9111	0.012	0.60	0.002
	Seagrass (Wetlands SG, SO, SL, and SK)	9111	0.160	0.53	0.016
	Total	--	**0.172**	--	**0.018**
Build Alternative 2 Mid-Level Movable Bridge	Seagrass (Wetland SF)	9111	0.074	0.60	0.012
	Seagrass (Wetlands SG, SI, SO, SN, SM, SL, and SK)	9111	0.258	0.53	0.026
	Total	--	**0.332**	--	**0.038**

Table 5-6 Potential Temporary Wetland Impact and Functional Loss for the Build Alternatives

Build Alternative	Wetland	FLUCCS Code	Temporary Impact (ac)	UMAM	Functional Loss (Temporary)
Build Alternative 1 High-Level Fixed Bridge	Seagrass (Wetland SF)	9111	0.030	0.60	0.001
	Seagrass (Wetlands SG, SO, SL, and SK)	9111	0.077	0.53	0.003
	Total	--	**0.107**	--	**0.004**
Build Alternative 2 Mid-Level Movable Bridge	Seagrass (Wetland SF and SH)	9111	0.011	0.60	0.0004
	Seagrass (Wetlands SG, SI, SO, SN, SM, SL, and SK)	9111	0.074	0.53	0.002
	Total	--	**0.085**	--	**0.002**

Table 5-7 Total Wetland Impact and Functional Loss for the Build Alternatives

Build Alternative	Wetland	FLUCCS Code	Total Impact (ac)	Total Functional Loss
Build Alternative 1 High-Level Fixed Bridge	Seagrass (Wetland SF)	9111	0.042	0.003
	Seagrass (Wetlands SG, SO, SL, and SK)	9111	0.237	0.019
	Total	--	**0.279**	**0.022**
Build Alternative 2 Mid-Level Movable Bridge	Seagrass (Wetland SF and SH)	9111	0.085	0.013
	Seagrass (Wetlands SG, SI, SO, SN, SM, SL, and SK)	9111	0.332	0.028
	Total	--	**0.417**	**0.041**

temporary impacts to seagrass in the project study area (0.107 ac) and have a slightly higher functional loss (0.004) than Build Alternative 2 (Mid-Level Movable Bridge) (temporary impact of 0.085 ac; functional loss of 0.002).

As shown in **Table 5-7**, Build Alternative 1 (High-Level Fixed Bridge) (0.279 ac and functional loss of 0.022) has a substantially lower total impact than Build Alternative 2 (Mid-Level Movable Bridge) (0.417 ac; functional loss of 0.041).

In accordance with EO 11990 and USDOT Order 5660.1A, and based on the documentation of existing wetland conditions as presented in this NRE, and inconsideration of the proposed Preferred Alternative and its effects on wetlands, it is hereby determined that:

- The proposed project will have no significant short-term or long-term adverse impacts to wetlands.
- There is no practicable alternative to construction in wetlands.
- Measures have been taken to minimize harm to wetlands.

Wetland impacts which will result from the construction of this project will be mitigated pursuant to Section 373.4137, F.S., to satisfy all mitigation requirements of Part IV of Chapter 373, F.S., and 33 U.S.C. §1344. Refer to Section 7.1 for a discussion on compensatory mitigation for wetland impacts.

6.0 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), as amended in 1996, reflects the Fishery Management Councils' (FMC) authority and responsibilities for the protection of essential marine and anadromous fish habitat. The MSFCMA requires that the NMFS and regional FMCs designate EFH for species managed under federal Fishery Management Plans (FMPs). The MSFCMA defines EFH as "…those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The South Atlantic FMC is responsible for identifying EFH for federally managed species along the east coast of Florida. The FMCs prepare FMPs which present information regarding conservation and management measures for managed fisheries species, along with other provisions required by the MSFCMA. Also, highly migratory species are managed by NMFS and have EFH designations in these areas of the Southeast as well.

The FMPs also designate HAPCs, which are subsets of EFH that provide critically important ecological functions or are especially vulnerable to degradation. A HAPC would include areas that are significant or critical areas/regions/habitats that serve as spawning, nursery, feeding, or refuge areas for managed species.

Federal agencies are required to consult with NMFS when their activities, including permits and licenses they issue, may adversely affect EFH and respond to NMFS recommendations for protecting and conserving EFH. The EFH assessment provided below was prepared in accordance with the Essential Fish Habitat Chapter of the PD&E Manual, along with the FDOT's August 2022 *Natural Resources Evaluation Outline and Guidance*.

6.1 Agency Coordination

Below is a summary of the ETAT comments and AN responses received regarding *water resources* and the *coastal and marine environment.*

6.1.1 USEPA

Regarding water resources, the USEPA focuses on water quality in the BBAP which is currently impaired for mercury and chlorophyll-a. The USEPA anticipates that the proposed project will include stormwater improvements that enhance water quality significantly. Recommendations include implementing best practices for construction and maintenance, reducing runoff and erosion, and improving soil stabilization. The USEPA further recommends a comprehensive analysis to assess potential adverse impacts associated with future operations and maintenance, ensuring a comprehensive approach to resource protection and preservation. The USEPA indicates that a SWPPP and a Sea Level Impact Protection study will be required for the project. The USEPA assigned a "moderate" effect on water resources, suggesting further information is needed for refinement.

6.1.2 NMFS

The NMFS' comments on the coastal and marine environment indicate that the project area may include worm reef (*Phragmatopoma*), unconsolidated estuarine bottom, wetland scrub/shrub (forested wetland), seagrass, hardbottom, and coral. In addition, the HAPCs within the project area may include seagrass (HAPC for penaeid shrimp and species in the snapper-grouper complex) and

the BBAP (HAPC for species in the snapper-grouper complex and migratory pelagic species). Their comment identifies potential project effects on EFH (e.g., filling, shading, and dredging), as well as construction-related impacts on EFH (e.g., prop wash; scour; anchoring, spudding, or grounding of work vessels, unless prohibited). The NMFS recommends that surveys be conducted to assess the distribution of tidal wetland, seagrass, coral, and hardbottom EFH within the project area and suggests implementing avoidance, minimization, and mitigation strategies to address direct and indirect impacts. The NMFS stresses the need for early coordination with their staff and proposes measures like prohibiting certain activities in seagrass habitats, relocating coral, and preventing debris and sediment discharge to protect aquatic preserves. NMFS determined the degree of effect for this project on the coastal and marine environment is "substantial."

Subsequent to the ETDM Screening Process, three meetings were held with NMFS. A coordination meeting was conducted with NMFS with regard to the 2023 quantitative benthic survey. This meeting was held on July 12, 2023, to discuss the survey methodology prior to the field effort. The findings of the August 2022 preliminary benthic survey were summarized and the proposed 2023 quantitative benthic methods were presented to NFMS. NMFS made several recommendations regarding the survey methods for documenting the visual percent cover of seagrass, the coral colony health notes, and the quantitative sampling coverage recommendations for seagrass and coral habitats. The meeting minutes from the July 12, 2023 meeting are provided in **Appendix B**.

A technical assistance call was conducted with NMFS on December 21, 2023 where project information was presented and the NMFS provided input on species effect determinations. A summary of the meeting discussions is provided in Section 4.2.2 and the meeting minutes from the December 21, 2023 meeting are provided in **Appendix B**.

An additional technical assistance call was conducted with NMFS on February 21, 2024 where the Town provided additional project information and requested clarification regarding species determinations of effect. Discussions took place with regard to a potential seagrass mitigation option, a proposed seawall design option, previous blasting projects, and species effect determinations. A summary of the meeting discussions is provided in Section 4.2.2. The results of this technical assistance call are discussed in Section 4.5.2 and the meeting minutes from the February 21, 2024 meeting are provided in **Appendix B**.

On February 27, 2024, the Town had an email exchange with the NMFS to obtain clarification on blasting information. The email contents are discussed in Section 4.5 and the email exchange is provided in **Appendix C**.

6.1.3 FDEP

With regard to water resources, the FDEP expresses concern with the potential for stormwater runoff into the BBAP, affecting nearby wetlands (including seagrasses) and surface waters with increased pollutant loading. FDEP recommends enhancing stormwater treatment to protect ground and surface water quality, maintaining the predevelopment hydroperiod, and evaluating existing and future treatment facilities. Retrofitting of stormwater conveyance systems is advised. The FDEP determined the degree of effect for this project on water resources is "moderate."

6.1.4 SFWMD

The SFWMD's ETAT comments regarding water resources and the coastal and marine environment identify that the project site falls within the BBAP, an OFW, and raise the importance of ensuring the proposed construction activities do not degrade adjacent wetlands and OSW. The SFWMD identifies wetland and marine dependent wildlife and habitat resources (manatees, sea turtles, smalltooth sawfish, crocodiles, seagrasses, and reefs) within the project area. A thorough evaluation will be required during ERP permitting. Recommendations include temporary turbidity control, water quality monitoring, and a debris containment plan for bridge construction to protect surface waters. Recommendations also include an assessment of threatened and endangered species, design adjustments to minimize impacts, a pre-application meeting, manatee protection during in-water work, a mitigation plan, and BMPs for water quality and quantity standards. The SFWMD determined the degree of effect for this project on water resources and the coastal and marine environment is "moderate."

6.1.5 DERM

The DERM suggests the proposed project consider removal of the existing causeway and fill island and replacement with a bridge spanning from the Town of Bay Harbor Islands to the mainland in order to improve water quality conditions. If a build alternative is selected that does not involve removal of the fill island, the Town should consider green infrastructure opportunities (e.g., living shorelines).

6.2 EFH Methodology

The project study area occurs within BBAP which is an estuarine environment with benthic resources and habitats. The project will involve in-water work with the potential to directly and indirectly impact benthic resources and habitats that have been designated as EFH by the South Atlantic Fishery Management Council (SAFMC). A combination of desktop GIS data reviews and field surveys were conducted to determine the type and extent of EFH involvement for the project study area. The ETAT comments from the FDOT ETDM Programming Screen Summary Report Number 14520 were also considered.

6.2.1 Desktop GIS Data Reviews

The following GIS datasets were reviewed to determine the EFH, HAPCs, and managed species occurring within the project study area: the NMFS EFH Mapper Tool for South Atlantic and Atlantic Highly Migratory Species, the NMFS Inland EFH Mapper Tool and NOAA Fishery's Essential Fish Habitat - Data Inventory.

6.2.2 Field Surveys

As described in Section 4.3, a pedestrian field survey was carried out in June 2023 to identify wetlands and protected species that may occur within the land portions of the project study area. Occasional mangrove propagules and saplings (no mature trees) were noted within the riprap along the causeway island. These mangroves are not considered EFH since they are very small and do not provide canopy or any substantial root structure that would provide any significant habitat for

managed species. To identify and characterize the benthic habitats and biological resources to support the PD&E study, benthic surveys were conducted in August 2022 and July-August 2023.

6.2.2.1 2022 Preliminary Benthic Survey

A preliminary benthic survey was conducted on August 8-11, 2022, to identify and qualitatively describe the benthic habitats and biological resources within the survey area. The August 2022 preliminary survey area extended 200 feet north and south of the existing bridge centerline; 30 feet north of the edge of water along the entire length of the north side of the causeway island; and 50 feet south of the edge of water along the entire length of the south side of the causeway island. Biologists conducted transect swims and visual inspections of the existing bridge piers, seawalls, and scour protection materials. The methodology and results of the preliminary benthic survey, including a map of the 2022 survey area, are detailed in the Broad Causeway 2022 Preliminary Benthic Survey Technical Memorandum (dated November 30, 2022), which is provided in **Appendix E** as *Appendix A* of the 2023 Quantitative Benthic Survey Report.

6.2.2.2 2023 Quantitative Benthic Survey

A more detailed quantitative benthic survey was conducted in the summer of 2023. The 2023 quantitative benthic survey field effort occurred from July 17-21 and August 3-4, 2023. The 2023 benthic survey area encompassed the entire in-water work area, including the two proposed build alternative footprints and the potential barge work areas during construction and demolition. To address the proposed seawall installation, the benthic survey area also included the substrate offshore of the existing seawalls. To determine the feasibility of a potential construction dock, an area was evaluated southeast of the causeway island, extending 300 feet along the causeway island and 150 feet out from the existing seawall (shown in **Figure 1-2**). It should be noted that at this time, no construction dock is planned. Prior to the field effort, the NMFS reviewed and approved 2023 quantitative benthic survey methodology during a meeting on July 12, 2023 (see Section 6.1.2 for additional details). The meeting minutes from the July 12, 2023 meeting are provided in **Appendix B**. **Figure 6-1** depicts the limits of the 2023 benthic survey area.

The survey began with qualitative data collection (diver transect swims) to document the presence and locations of benthic habitat types and species. Quantitative methods (i.e., quadrats and belt transects) were then conducted to further characterize and delineate these communities within the survey area. A total of 161 *in-situ* SAV quadrats (each 1 m^2 in size) were conducted to determine seagrass densities and other associated data for the seagrass beds within the survey area.

A total of 19 quantitative coral belt transects were conducted in the live bottom and coral habitats adjacent to the seawalls, and a 100% visual assessment was conducted on the existing seawalls and bridge piers. Coral colony data collection focused on the following colony size criteria for documentation: scleractinian (stony) corals: $\geq$ 5 centimeters (cm) in diameter; octocorals (soft corals): $\geq$ 10 cm in height; and federally listed coral species: all colonies documented regardless of size. During the survey, any colonies of the seven federally threatened coral species (*Acropora cervicornis, Acropora palmata, Mycetophyllia ferox, Dendrogyra cylindrus, Orbicella annularis, Orbicella faveolata*, and *Orbicella franksi*) were documented since all listed coral colonies are typically required to be relocated from an impact site. Because the macroalgal beds within the survey area contained

Figure 6-1 2023 Quantitative Benthic Survey Area and Benthic Community Types within the Project Study Area



only very rare instances of scleractinian corals and octocorals, quantitative coral data were not collected within the macroalgal beds. It should be noted that a future benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area, including any corals that would be impacted within the macroalgal beds. The methodology and results of the 2023 quantitative benthic survey are provided in the 2023 Quantitative Benthic Survey Report (**Appendix E**).

6.3 EFH and HAPC Present within the Project Study Area

The GIS data review indicates that the project study area overlaps the boundaries of designated EFH and HAPC from five Fishery Management Plans: Penaeid Shrimp; Snapper-Grouper Complex; Spiny Lobster (*Panulirus argus*); Coastal Migratory Pelagics; and Coral, Coral Reefs and Live/Hard Bottom Habitat. **Table 6-1** summarizes the EFH types within the project study area, along with the associated benthic community types (Communities 1-5) which are described below.

Table 6-1 EFH within the Project Study Area

EFH Type	FMP	Community Types Present
Estuarine Water Column	Coastal Migratory Pelagics, Highly Migratory Species	1,2,3,4,5
Estuarine and Marine Submerged SAV (Seagrass and Macroalgae)	Shrimp, Snapper-Grouper, Spiny Lobster, Coastal Migratory Pelagics, Highly Migratory Species	1,2,3,4
Algal Communities (*Laurencia*)	Spiny Lobster	1,2
Live Bottom	Snapper-Grouper, Spiny Lobster, Highly Migratory Species, Coral and Coral Reefs	3,4
Rough, Hard, Exposed, Stable Substrate	Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region	3,4
Sponges	Spiny Lobster	1,2,3,4,5
Unconsolidated Estuarine Bottom	Shrimp, Snapper-Grouper	1, 2,3,4

HAPCs are subsets of EFH that exhibit one or more of the following traits: rare, stressed by development, provide important ecological functions for federally managed species, or are especially vulnerable to degradation from human impact. They can cover a specific location (a bank or ledge, spawning location) or cover habitat that is found at many locations (e.g., coral, nearshore nursery areas, or pupping grounds). Based on the GIS desktop review and the 2023 qualitative benthic survey, there are three HAPCs occurring within the project study area (Biscayne Bay, SAV/Seagrass, and Coral, Coral Reefs and Live/Hard Bottom Habitat). **Table 6-2** shows the managed species/groups associated with these HAPCs. It should be noted that while the GIS data indicate that the *Phragmatopoma* (worm reef) HAPC overlaps with the project study area, there are no worm reefs present within the project study area based on the 2022 and 2023 benthic surveys. The HAPCs are described further under their associated EFH type below.

Table 6-2 HAPC within the Project Study Area

HAPC	Managed Species/Group
Biscayne Bay	Spiny Lobster Coral, Coral Reefs and Live/hard Bottom Habitat
SAV / Seagrass	Penaeid Shrimp Snapper-Grouper Complex Spiny Lobster Coastal Migratory Pelagics
Coral, Coral Reefs and Live/Hard Bottom Habitat	Corals Spiny Lobster

Five distinct benthic community types were identified within the survey area and are described below. For additional details on the findings of the 2023 quantitative benthic survey, see **Appendix E**. **Figure 6-1** shows the locations of each of the five benthic community types within the project study area.

6.3.1 Community 1 – Macroalgal Beds

Macroalgal beds are the dominant benthic community type (**Figure 6-1**) within the survey area. They are comprised of sandy substrate primarily colonized by moderate-to-dense calcareous green algae, *Halimeda tuna*, and red algae, *Laurencia* sp. Heavy epiphyte growth and some cyanobacterial overgrowth was observed within the macroalgal beds, suggesting high nutrient loads within this community. The macroalgal beds also contain sponges and corals. Because the macroalgal beds contain only very rare instances of scleractinian corals and octocorals, quantitative coral data were not collected within Community 1. A future benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area.

Macroalgal beds are considered SAV (defined as rooted aquatic/marine plants that grow entirely under the water surface) which, per the SAFMC, is considered EFH for penaeid shrimp, species in the snapper-grouper complex, spiny lobster, and certain species in the coastal migratory pelagic FMP [i.e., Spanish mackerel (*Scomberomorus maculatus*) and cobia (*Rachycentron canadum*)] and Atlantic highly migratory species FMP [i.e., nurse shark (*Ginglymostoma cirratum*)]. The following EFH types were observed within Community 1: Estuarine Water Column; Estuarine and Marine Submerged SAV; Algal Communities (*Laurencia*); Sponges; and Unconsolidated Estuarine Bottom.

6.3.2 Community 2 – Seagrass Beds/Patches

Seagrass beds/patches were observed in the northeast, southeast, and southwest quadrants of the bridge area, as well as along the south side of the causeway island (**Figure 6-1**). Paddle grass, manatee grass, and turtle grass were documented in these seagrass beds and were interspersed with rhizophytic macroalgae, typically *Halimeda* spp. and *Laurencia* sp. These seagrass beds are described in further detail in Section 5.3. Seagrass is considered SAV which, per the SAFMC, is considered EFH for penaeid shrimp, species in the snapper-grouper complex, spiny lobster, and certain species in the coastal migratory pelagic FMP (i.e., Spanish mackerel and cobia) and Atlantic highly migratory species FMP (i.e., nurse shark). The following EFH types were observed within Community 2: Estuarine Water

Column; Estuarine and Marine Submerged SAV; Algal Communities (*Laurencia*); Sponges; and Unconsolidated Estuarine Bottom.

6.3.2.1 HAPC - SAV/Seagrass

The SAFMC identifies seagrass habitat as a HAPC for penaeid shrimp, spiny lobster, coastal migratory pelagics (i.e., Spanish mackerel and cobia), and several species in the Snapper-Grouper FMP: cubera snapper (*Lutjanus cyanopterus*), gag grouper (*Mycteroperca microlepis*), gray snapper (*Lutjanus griseus*), lane snapper (*Lutjanus synagris*); and mutton snapper (*Lutjanus analis*). The seagrass beds observed within the project study area provide EFH for these species and may serve as foraging habitat for sea turtles and manatees (see Section 4.5).

6.3.3 Community 3 – Live Bottom

Areas of live bottom habitat were observed in close proximity to the existing bridge structure in all four quadrants of the bridge area (**Figure 6-1**). The substrate in this habitat consists of sand and shell fragments with scattered small rubble. No extensive exposed hard or rocky substrate was observed (besides rubble). This community is dominated by sponges, which occurred along with macroalgae, hydroids, corals, and tunicates. A total of 33 coral colonies (32 scleractinian coral colonies and one octocoral colony) were documented within the eight belt transects conducted in Community 3, including ten coral species: smooth star coral (*Solenastrea bournoni*), lesser starlet coral (*Siderastrea radians*), massive starlet coral (*Siderastrea siderea*), knobby star coral (*Solenastrea hyades*), blushing star coral (*Stephanocoenia intersepta*), knobby brain coral (*Pseudodiploria clivosa*), mustard hill coral (*Porites astreoides*), diffuse ivory bush coral (*Oculina diffusa*), and sea plume (*Antillogorgia* sp.). In addition, the octocoral, snowflake coral (*Carijoa riisei*), was documented in coral transects in the southwest and northeast quadrants of the study area along the existing bridge. Smooth star coral was the dominant coral species (~48.48% of the 33 colonies), followed by lesser starlet coral (~24.24%), massive starlet coral and knobby star coral (each ~6.06%), and a single colony of each of the other five coral species (~3.03% each).

The mean coral colony density for all of Community 3 is ~0.21 colonies/m^2. With the exception of the live bottom habitat in the southeast quadrant of the bridge area, corals densities appear to be generally low in Community 3, with mean coral colony densities of ~0.00 colonies/m^2, ~0.08 colonies/m^2, and ~0.03 colonies/m^2 in the northeast, northwest, and southwest quadrants of the bridge area, respectively. In comparison, coral colony density is substantially higher in the southeast quadrant of the bridge area (1.30 colonies/m^2) where there is a substantial amount of bridge debris, cables, and other hard structures. The majority (~69.70%) of the 33 coral colonies documented within Community 3 showed visual signs of coral stress, including macroalgal overgrowth, sponge overgrowth, boring organisms, bleaching, partial bleaching, and paling. The most common visual coral stressor at the time of the survey was macroalgal overgrowth which impacted ~48.48% of colonies.

The following EFH types were observed within Community 3: Estuarine Water Column; Estuarine and Marine Submerged SAV (i.e., macroalgae); Live Bottom; Rough, Hard, Exposed, Stable Substrate; Sponges; and Unconsolidated Estuarine Bottom. Per the SAFMC, live bottom is considered EFH for species in the snapper-grouper complex, spiny lobster, certain Atlantic highly migratory species, and corals.

6.3.3.1 HAPC - Live/Hardbottom

The SAFMC has designated live bottom habitat as a HAPC for species within the Spiny Lobster FMP and the Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region FMP. Spiny lobster and several species of corals were documented within the project study area.

6.3.4 Community 4 - Coral Habitat Adjacent to the Seawalls

The scour protection materials located immediately adjacent to the base of the seawalls (e.g., intermittent riprap, rubble, and concrete blocks and slabs) provide suitable substrate for coral colonization and are interspersed with sandy substrate occupied by macroalgae and corals (**Figure 6-1**). A total of 564 coral colonies (557 scleractinian coral colonies and seven octocoral colonies) were documented within the 11 coral belt transects conducted in Community 4, including three scleractinian coral species (i.e., lesser starlet coral, smooth star coral, and diffuse ivory bush coral) and two octocoral genera: sea plumes and sea whips (*Leptogorgia* sp.). The octocoral, snowflake coral, was not observed within any of the coral belt transects within this habitat. Lesser starlet coral was by far the dominant coral species in Community 4, comprising ~96.81% of the documented colonies. The vast majority of the corals documented in Community 4 (536 colonies or ~95%) were located in the western portion of the project study area (adjacent to the seawall along the causeway island).

The mean coral colony density for all of Community 4 was ~4.70 colonies/m^2, and the colony density was higher in the western portion of the survey area adjacent to the causeway island (~5.36 colonies/m^2) than the eastern portion of the survey area adjacent to the eastern seawall (a mean of ~1.4 colonies/m^2). The majority (~70.57%) of the 564 coral colonies documented in Community 4 showed visual signs of coral stress, including macroalgal overgrowth, sponge overgrowth, boring organisms, full bleaching, partial bleaching, and paling. The most common visual coral stressor in Community 4 was macroalgal overgrowth which impacted the majority of colonies (~51.42%).

The following EFH types were observed within Community 4: Estuarine Water Column; Estuarine and Marine Submerged SAV (i.e., macroalgae); Live Bottom; Rough, Hard, Exposed, Stable Substrate; Sponges; and Unconsolidated Estuarine Bottom.

6.3.4.1 HAPC - Coral

The SAFMC has designated coral as an HAPC for species within the Spiny Lobster FMP and the Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region FMP. Spiny lobster and several species of corals were documented within the project study area.

6.3.5 Community 5 – Existing Seawalls and Bridge Piers

Existing sheet pile seawalls are located along the land boundary of the causeway island on the west and east sides of the bridge (**Figure 6-1**). The existing seawalls (wall and associated support pilings) are heavily colonized by sponges and turf algae and provide suitable habitat for corals. In addition, there are 29 individual bridge piers associated with the existing bridge (**Figure 6-1**). The existing bridge piers are heavily encrusted by sponges, hydroids, and tunicates, with occasional corals also present.

Existing Seawalls

A total of 427 coral colonies, comprised of only two scleractinian coral species (lesser starlet coral and diffuse ivory bush coral), were documented to have colonized the seawalls within the entire survey area. Lesser starlet coral was by far the dominant coral species documented, comprising ~95.32% of the colonies. The only octocoral observed to have colonized the seawalls within the survey area was snowflake coral, and it was only observed along the western seawall. On the eastern seawall, a total of 165 scleractinian coral colonies and no octocoral colonies were documented.

When considering the entirety of the seawalls within the survey area (~1,703 linear feet), the mean number of colonies per linear distance of seawall is approximately 0.82 colonies/m. The density of corals is more than double that along the eastern seawall (1.49 colonies/m) than on the western seawall (~0.64 colonies/m). Furthermore, there were nearly twice as many coral colonies documented on the seawall along the south side of the causeway island (~0.83 colonies/m) as on the north side (~0.45 colonies/m). The majority (~70.02%) of the 427 coral colonies documented on the seawalls in Community 5 showed visual signs of coral stress, including macroalgal overgrowth, sponge overgrowth, boring organisms, bleaching, partial bleaching, paling, and predation. The most common visual coral stressor was indicated by colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted nearly half of colonies (~47.08%) attached to the seawalls within the survey area.

Existing Bridge Piers

A total of 11 scleractinian coral colonies were documented on the existing bridge piers, including four colonies of lesser starlet coral (~36.36%), four colonies of diffuse ivory bush coral (~36.36%), and three colonies of smooth star coral (~27.27%). These colonies were found on the outer edges (i.e., areas exposed to sunlight) of only three of the bridge piers: four colonies on the west bascule pier, six colonies on the east bascule pier, and one colony on pier #20 on the east side of the bridge. The majority of these 11 colonies (~81.82%) showed visual signs of coral stress. Eight of the colonies (72.73%) were partially bleached and one colony (9.09%) was fully bleached. The octocoral, snowflake coral, was documented to have colonized 23 of the 29 (~79%) bridge piers. No other octocorals were documented to have colonized the bridge piers. The following EFH types were observed within Community 5: Estuarine Water Column and Sponges.

6.3.6 Estuarine Water Column EFH

The project study area contains Estuarine Water Column EFH. The estuarine water column is the avenue by which nutrients and migrating organisms are transported between river systems and the ocean. Many species that spawn in marine waters enter the estuarine water column during their larval and/or juvenile life stages, where they utilize the abundant food, suitable substrate, and shelter from predators. The water column within the project study area is heavily influenced by the tidal current of the Haulover Inlet, which is located approximately 1.2 miles north of the existing bridge. The ICW runs north/south through the project study area and contains a channel that has been dredged for navigation. During the 2023 quantitative benthic survey, divers reported water depths within the surveyed area ranging from approximately 0-15 feet outside the navigation channel. The maintenance dredging of the ICW has caused steep slopes along the navigation channel. The

estuarine water column is considered EFH for certain species in the coastal migratory pelagic FMP and Atlantic highly migratory species FMP.

6.3.6.1 HAPC - Biscayne Bay

The submerged portion of the project study area is located within Biscayne Bay, the largest estuary in Florida, and is also included within the BBAP which is described in Section 3.4. The benthic habitat(s) in Biscayne Bay are substantially important ecologically and have been geographically designated as a HAPC by the SAFMC for the spiny lobster and for coral, coral reefs and live/hard bottom.

6.3.7 Unconsolidated Estuarine Bottom

Small areas of non-vegetated sediments (areas of the substrate not occupied by seagrass, macroalgae, or live bottom) that consist of a mixture of fine-to-coarse sand and silt were observed in Communities 1-4. The extent of non-vegetated sediments within the project study area is minimal in comparison to the vegetated habitat types (macroalgal beds and seagrass) and these areas are scattered within the various habitats. Thus, this habitat type was not delineated during the 2023 quantitative benthic survey.

6.4 Managed Species Potentially Present in Project Study Area

A list of managed fisheries species and associated life stages likely to occur within the project study area was developed based on a combination of GIS database reviews (see Section 6.2.1), a review of the SAFMC FMPs, and the NMFS ETDM screening comments (see Section 6.1). **Table 6-3** presents the 31 managed species (according to life stage), as well as the Coral FMP, that may be potentially affected by the proposed project. During the 2023 quantitative benthic survey, the following managed species were observed within the survey area: gray snapper (*Lutjanus griseus*), hogfish (*Lachnolaimus maximus*), mutton snapper (*Lutjanus analis*), yellowtail snapper (*Ocyurus chrysurus*), spiny lobster (*Panulirus argus*), and both stony corals and octocorals (the coral species observed are identified in Sections 6.3.3 - 6.3.5).

Table 6-3 Managed Species within EFH in the Project Area

FMP	Common Name	Scientific Name	Life Stages	EFH Type(s) Utilized			
				Estuarine Water Column	SAV / Seagrass	Unconsolidated Estuarine Bottom	Live Bottom
Shrimp FMP	pink shrimp	*Farfantepenaeus duorarum*	J, SA	•	•	•	
	white shrimp	*Litopenaeus setiferus*	PL, J, SA, A	•	•	•	
Snapper-Grouper FMP	black grouper	*Mycteroperca bonaci*	J	•			•
	cubera snapper	*Lutjanus cyanopterus*	J, A	•	•		•
	gag grouper	*Mycteroperca microlepis*	J	•	•		•
	goliath grouper	*Epinephelus itajara*	J	•			•
	gray snapper	*Lutjanus griseus*	PL, J, A	•	•	•	•
	hogfish	*Lachnolaimus maximus*	J	•			•
	Nassau grouper	*Epinephelus striatus*	J, A	•	•		•
	lane snapper	*Lutjanus synagris*	PL, J	•	•	•	•
	mutton snapper	*Lutjanus analis*	J, A	•	•		•
	red grouper	*Epinephelus morio*	J	•			•
	yellowfin grouper	*Mycteroperca venenosa*	J	•			•
	yellowmouth grouper	*Mycteroperca interstitialis*	J	•			•
	yellowtail snapper	*Ocyurus chrysurus*	J	•	•		•
Spiny Lobster FMP	spiny lobster	*Panulirus argus*	PL, J, A	•	•		•
Coastal Migratory Pelagics	Spanish mackerel	*Scomberomorus maculatus*	J, A	•	•		
	cobia	*Rachycentron canadum*	E, L	•	•		
Highly Migratory Species	whale shark	*Rhincodon typus*	All	•			
	bull shark	*Carcharhinus leucas*	J, A	•			
	spinner shark	*Carcharhinus brevipinna*	N	•			
	Caribbean reef shark	*Carcharhinus perezi*	All	•			
	nurse shark	*Ginglymostoma cirratum*	J, A	•	•		•
	lemon shark	*Negaprion brevirostris*	N, J, A	•			
	sailfish	*Istiophorus platypterus*	J, A	•			

FMP	Common Name	Scientific Name	Life Stages	EFH Type(s) Utilized			
				Estuarine Water Column	SAV / Seagrass	Unconsolidated Estuarine Bottom	Live Bottom
	sandbar shark	*Carcharhinus plumbeus*	A	•			
	skipjack tuna	*Katsuwonus pelamis*	A	•			
	great hammerhead shark	*Sphyrna mokarran*	All	•			
	tiger shark	*Galeocerdo cuvier*	J, A	•			
	blacktip shark	*Carcharhinus limbatus*	J, A	•			
	scalloped hammerhead shark	*Sphyrna lewini*	J, A	•			
Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region	Stony Corals and Octocorals	*N/A*	All	•	•		•

6.5 Evaluation of Impacts to EFH, HAPC, and Managed Species

The proposed project will include the following activities that may impact EFH, HAPC, and managed species:

- Installation of the proposed bridge structures (bridge piers and deck)
- Installation of new seawalls
- Drainage installation on the causeway island (ponds)
- Existing bridge demolition

If the No Build Alternative is selected, there will be no permanent or temporary impacts to EFH, HAPC, or managed species. Construction of either of the build alternatives will likely result in permanent and temporary impacts to the EFH habitats, HAPCs, and managed species from construction activities. The following sections discuss the impacts associated with the two build alternatives.

6.5.1 Permanent Impacts

The proposed build alternatives were evaluated for permanent impacts to EFH, HAPC, and managed species. Permanent direct impacts to the EFH and HAPCs within the project study area are anticipated in association with construction of the proposed bridge structures. Permanent indirect impacts to the EFH and HAPCs within the project study area are anticipated in association with shading from the proposed bridge structure. Permanent impacts to EFH and HAPCs were calculated based on the footprint of each build alternative alignment and include both impacts from bridge pier installation and shading of habitats from the bridge deck. **Table 6-4** summarizes potential permanent impacts to the various EFH habitat types and HAPCs for each alternative.

As described in Section 1.4, it is anticipated that the new bridge pilings/piers will be installed via impact hammer. The need for (and extent of) dredging in association within the proposed project has not been defined at this time. The pile caps for the new bridge piers will be installed at the MHW line without the need for dredging or changes to the mudline. The construction barge details (e.g., draw depths and weight/displacement) have not yet been determined. Thus, it is unclear whether the water depths within the project area will allow for barge movement during the new bridge pier/fender installation, and it is not yet known whether dredging will be required to allow for barge maneuvering during construction. Dredge and fill will not be required for removal of the existing bridge piers. The existing bridge piers will have the piles cut off at the mudline with the portions below the mudline abandoned in place.

Table 6-4 Summary of Potential Permanent and Temporary Impacts to EFH and HAPC

Habitat[1]		Impact Type	Build Alternative 1 High-Level Fixed Bridge	Build Alternative 2 Mid-Level Movable Bridge
Estuarine Water Column EFH	Estuarine Water Column	Permanent – Bridge Piers	4,343 cubic feet	67,721 cubic feet[2]
		Temporary	--	--
Estuarine and Marine Submerged SAV EFH	Community 1 SAV (macroalgal beds)	Permanent - Bridge Piers, Shading	2.74 ac	3.03 ac
		Temporary – 25-foot Construction Buffer	1.00 ac	1.64 ac
	Community 2 SAV (seagrass)	Permanent – Bridge Piers, Shading	0.17 ac	0.33 ac
		Temporary – 25-foot Construction Buffer	0.11 ac	0.09 ac
Coral, Coral Reefs, and Live/hard Bottom Habitat EFH	Community 3 Live Bottom	Permanent – Bridge Piers, Shading	0.12 ac[3]	0.02 ac[3]
		Temporary – 25-foot Construction Buffer	0.04 ac	0.07 ac
	Community 4 Coral Habitat Adjacent to Seawalls	Permanent	--	--
		Temporary	--	--
	Community 5 Existing Seawalls and Bridge Piers	Permanent –Bridge Pier Demolition	Remove all 29 bridge piers	Remove all 29 bridge piers
		Temporary	--	--
Total Direct Impacts		**Permanent**	**4,343 cubic feet** (Estuarine Water Column) **3.03 ac** (Communities 1-3) **Remove all 29 bridge piers**	**67,721 cubic feet** (Estuarine Water Column) **3.38 ac** (Communities 1-3) **Remove all 29 bridge piers**
		Temporary	**1.15 ac** (Communities 1-3)	**1.80 ac (Communities 1-3)**

[1]Note that Unconsolidated Estuarine Bottom EFH was not delineated during the 2023 quantitative benthic survey because the extent of non-vegetated sediments within the project study area is minimal and these areas are scattered within the various habitats.
[2]Estuarine water column impacts for Build Alternative 2 is an underestimate of impacts, as they were calculated based on the volume of submerged bascule piers only (dimensions/locations of the mid-level bascule intermediate bridge piers are not available at this time).
[3]Shading impacts to Community 3 - Live Bottom for both Build Alternatives are an overestimate since the non-photosynthetic organisms in this sponges-dominated community would continue to inhabit the substrate underneath the new bridge.

6.5.1.1 Estuarine Water Column

Permanent direct impacts to the estuarine water column for each build alternative were calculated based on the volume of water to be displaced by the proposed bridge piers. For Build Alternative 1 (High-Level Fixed Bridge), the permanent direct impacts were calculated based on the volume of the submerged portions of the 10 bridge piers that would be installed within the waterway. For Build Alternative 2 (Mid-Level Movable Bridge), the permanent direct impacts were calculated based on the volume of the submerged portions of the two large bascule piers that would be installed within the waterway. The permanent impacts to the estuarine water column would be more than 15 times higher for Build Alternative 2 (67,721 cubic feet) than for the Build Alternative 1 (4,343 cubic feet) (**Table 6-4**). It should be noted that because the design of Build Alternative 2 (Mid-Level Movable Bridge) has not progressed enough at this time to determine the location and size of the intermediate bridge piers within the waterway, the permanent direct impacts to the estuarine water column for Build Alternative 2 (Mid-Level Movable Bridge) provided in **Table 6-4** are an underestimate of impacts.

The existing bascule bridge discharges untreated stormwater directly into the BBAP, which is designated as an OFW. From the bridge structure itself, stormwater is discharged directly into the BBAP via the grate of the bascule span or through 4-inch scuppers on the bridge. On the causeway island, stormwater runoff is collected in small ponds and is conveyed via overflow structures to the BBAP. Within the Town of Bay Harbor Islands east of the bridge, roadway runoff is collected in a small sized storm drain system and ultimately flows westward into the BBAP via a 24-inch reinforced concrete pipe outfall. Both build alternatives include the elimination of bridge scuppers and installation of a stormwater runoff collection system within ponds on the island. If percolation is sufficient, retention will be explored to attain greater water quality treatment prior to discharge into the BBAP. On the east side of the bridge, French drains will be used to the extent that room is available due to existing underground utilities. Therefore, both proposed build alternatives will potentially contribute to water quality improvement and result in an overall net benefit to the estuarine water column EFH and the BBAP (an HAPC).

6.5.1.2 Community 1 - Macroalgal Beds

Permanent direct impacts to rhizophytic macroalgae SAV would result from installation of the new bridge piers and permanent indirect impacts would result from shading of the substrate by the new bridge structure. Macroalgal bed impacts were calculated based on the area of overlap between the footprint of the proposed bridge alternative and the macroalgal beds (Community 1) identified during the 2023 quantitative benthic survey. The permanent impacts to macroalgal beds (Community 1) would be lower for Build Alternative 1 (High-Level Fixed Bridge) (2.74 ac) than for Build Alternative 2 (Mid-Level Movable Bridge) (3.03 ac) (**Table 6-4**). It should be noted that if a new bridge is constructed, removal of the existing bridge structure would also eliminate the existing shading properties of that structure, opening up approximately 1.72 ac of substrate (footprint of the existing bridge) for potential colonization by SAV.

6.5.1.3 Community 2 - Seagrass

Permanent direct impacts to seagrass SAV would result from installation of the new bridge piers and permanent indirect impacts would result from shading of the substrate by the new bridge structure.

Seagrass impacts were calculated based on the area of overlap between the footprint of the proposed bridge alternative and the seagrasses delineated during the 2023 quantitative benthic survey. As described in Section 5.4, five seagrass beds have the potential to be impacted by Build Alternative 1 (High-Level Fixed Bridge) and nine seagrass beds have the potential to be impacted by Build Alternative 2 (Mid-Level Movable Bridge). For Build Alternative 1 (High-Level Fixed Bridge), the permanent impacts to seagrass (Community 2) would be nearly half (0.17 ac) as much as the estimated impact for Build Alternative 2 (Mid-Level Movable Bridge) (0.33 ac). As detailed in Section 5.6, a functional assessment of seagrass impacts was conducted for the seagrasses identified within the project study area and impacts were assessed based on the UMAM criteria. It should be noted that, if a new bridge is constructed, removal of the existing bridge structure would also eliminate the existing shading properties of that structure, opening up approximately 1.72 ac of substrate (footprint of the existing bridge) for potential colonization by seagrass.

Because seagrasses in this region are ephemeral and vary annually/seasonally in density and location, re-evaluation of potential seagrass impacts will occur during design and permitting phases of the project, as well as once construction barge spudding locations and travel routes become available.

6.5.1.4 Community 3 – Live Bottom

Permanent direct impacts to the live bottom community would result from installation of the new bridge piers. Because the live bottom habitat within the project study area provides suitable habitat for corals and macroalgae, indirect impacts would result from shading of the substrate by the new bridge structure. Impacts to live bottom habitat were calculated based on the area of overlap between the footprint of the proposed bridge alternative and the live bottom habitat delineated during the 2023 quantitative benthic survey. The permanent impacts to live bottom habitat (Community 3) would be greater for Build Alternative 1 (High-Level Fixed Bridge) (0.12 ac) than for Build Alternative 2 (Mid-Level Movable Bridge) (0.02 ac). It should be noted that these impacts are an overestimation to the live bottom community since the non-photosynthetic organisms (sponges, hydroids, etc.) are the dominant component of this community type and would still inhabit this community underneath the new bridge. In addition, if a new bridge is constructed, removal of the existing bridge structure would also eliminate the existing shading properties of that structure, opening up approximately 1.72 ac of substrate (footprint of the existing bridge) for potential colonization by live bottom organisms, including corals.

Furthermore, all corals and barrel sponges in the area of potential impact within Community 3 will be inventoried in a future benthic survey prior to construction. The potential impacts to coral and managed species within the Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region FMP will be minimized by relocation of corals and barrel sponges prior to construction. A *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* is currently being developed and will be coordinated with NMFS and FWC. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites, will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project in accordance with the most recent version of the

FWC's *Coral and Octocoral Mitigation Relocation Recommendations* and will be reviewed by the regulatory agencies for final approval.

6.5.1.5 Community 4 – Coral Habitat Adjacent to Seawalls

The coral habitat located adjacent to the seawalls is comprised of scour protection materials (e.g., riprap, rubble, and concrete blocks and slabs), as well as sandy substrate and rubble occupied by macroalgae and corals. Because the new seawalls will be constructed landward of the existing seawalls, the existing seawalls will remain in place, and all construction activities for the seawall will be conducted from land (no in-water seawall construction work), no permanent direct or indirect impacts to Community 4 are anticipated.

6.5.1.6 Community 5 – Existing Seawalls and Bridge Piers

The existing seawalls and the habitat adjacent to the seawall is colonized by corals and octocorals. The design and construction methodology for the installation of new seawalls has been tailored to minimize impacts to corals, listed species, and managed species. Because the new seawalls will be constructed landward of the existing seawalls, the existing seawalls will remain in place, and all construction activities for the seawall will be conducted from land (no in-water seawall construction work), no permanent direct or indirect impacts to organisms attached to the existing seawalls are anticipated. Permanent impacts to the organisms (e.g., sponges, hydroids, tunicates, and corals) attached to the existing bridge piers would result from demolition of the existing bridge piers after the new bridge has been constructed. The permanent impacts to existing bridge piers (Community 5) would be the same for both build alternatives.

It should be noted that both build alternatives include installation of new bridge piers; thus, the surface provided by the existing bridge piers would be replaced with new structure available for colonization by sponges, turf algae, tunicates, corals, and other invertebrates after construction is complete.

The potential impacts to corals and managed species in Community 5 within the Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region FMP will be minimized by relocation of corals prior to construction. A *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* is currently being developed and will be coordinated with NMFS and FWC. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project in accordance with the most recent version of the FWC's *Coral and Octocoral Mitigation Relocation Recommendations* and will be reviewed by the regulatory agencies for final approval.

6.5.1.7 Unconsolidated Estuarine Bottom

The unvegetated sediments within the project area are minimal in size and scattered within the various habitat types (i.e., Communities 1, 2, 3, and 4) within the project study area; thus, calculation of permanent impacts to this unconsolidated estuarine bottom is not feasible for this project. Impacts

to this habitat type were not calculated separately and are included within the impact calculations for the other habitat types (**Table 6-4**).

6.5.2 Temporary Impacts

The proposed Build Alternatives were evaluated for temporary impacts to EFH, HAPC, and managed species. Temporary direct impacts to the following EFH types are anticipated due to the project during construction: Estuarine Water Column; Estuarine and Marine Submerged SAV (Seagrass and Macroalgae); Algal Communities (*Laurencia*); Live Bottom; Rough, hard exposed stable substrate; Sponges; and Unconsolidated Estuarine Bottom. Impacts to these EFH types may potentially affect species within the following FMPs: Shrimp, Snapper-Grouper, Spiny Lobster, Coastal Migratory Pelagics, Highly Migratory Species, and Corals.

Temporary Direct Impacts

Temporary direct impacts to the SAV, seagrass, and live bottom communities (Communities 1-3) within the project area are anticipated in association with the construction of the build alternatives. As with the wetland impact analysis described in Section 5.4.2, temporary direct impacts to Communities 1, 2, and 3 were calculated based on a 25-foot construction impact buffer established around each alternative alignment. As shown in **Table 6-4**, the temporary impacts to Communities 1-3 are anticipated to be lower for Build Alternative 1 (High-Level Fixed Bridge) (1.15 ac) than for the Build Alternative 2 (Mid-Level Movable Bridge) (1.80 ac). Efforts will be made to minimize temporary impacts to these communities through the implementation and maintenance of BMPs. See Section 6.6 for details on avoidance and minimization of impacts to EFH, HAPC, and managed species during construction.

Temporary direct impacts from barge spudding (anchoring) and staging are anticipated in association with project construction. Barge spudding and staging has the potential to impact the SAV, seagrass, and live bottom communities (Communities 1-3) beyond the 25-foot construction impact buffer during barge movement bridge construction. The proposed bridge demolition of the concrete components and the steel bascule span of the existing bridge are also anticipated to result in temporary direct impacts to these communities. Barge spudding and staging locations will be carefully selected to minimize impacts to seagrasses and corals within the project area. Barge spudding, staging, and routes during construction will be further evaluated during the design/permitting phase and will be coordinated with the regulatory agencies. Furthermore, BMPs will be implemented to minimize resource impacts from barges during construction.

The Town will also utilize BMPs to minimize resource impacts during construction. Relocation and monitoring of corals, octocorals, and barrel sponges from impact areas will minimize potential impacts associated with barge activity. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project in accordance with the most recent version of the FWC's *Coral and Octocoral Mitigation Relocation Recommendations* and will be reviewed by the regulatory agencies for final approval.

Temporary Indirect Impacts

The two build alternatives are anticipated to have the same temporary indirect impacts to EFH, HAPC, and managed species. Temporary indirect impacts to EFH, HAPC, and managed species resulting from construction of the Build Alternatives may include:

- Disturbance to managed species and EFH associated with construction activities (pile installation, pile removal such as cutting or extraction, and barge operations).
- Increased turbidity and sedimentation during construction.
- Acoustical and vibrational impacts associated with pile driving and/or blasting.
- Water quality impacts associated with runoff, pollutants, and uncured or wet concrete.
- Impacts from bridge demolition debris.
- Temporary shading impacts from seawall debris containment platforms.

Temporary displacements of species in the Shrimp, Spiny Lobster, Snapper-Grouper, Coastal Migratory Pelagics, and Highly Migratory Species FMPs, along with other benthic and demersal species, may occur during construction of either of the build alternatives. However, these species are considered to be motile and are expected to return to the project area once construction is complete since their associated EFH types are anticipated to naturally re-establish within the project area after construction. During the spiny lobster mating season within BBAP (i.e., February through April), all construction activities have the potential to displace individual lobsters within the construction impact area. Although temporary displacements of individual lobsters are anticipated, there is suitable habitat (rocks, rubble, riprap, seawalls, and sponges) located within the adjacent areas. Temporary displacement of individual lobsters would not be expected to interrupt the mating behaviors of this species. Further coordination with the regulatory agencies on construction methodologies is anticipated to occur during the design and permitting phase of the project. No significant impacts to species within the Shrimp, Spiny Lobster, Snapper-Grouper, Coastal Migratory Pelagics, and Highly Migratory Species FMPs are anticipated from this project.

Increased turbidity within the estuarine water column resulting from construction activities (pile driving, bridge construction, and demolition of the existing bridge) can result in short-term impacts on adjacent and downstream habitats and associated species. Increased turbidity could result in the burial of benthic species, re-suspension of potentially contaminated sediments, and physical impairment to estuarine species, such as the clogging of gills from suspended particulates resulting in suffocation or abrasion of sensitive epithelial tissue. However, the juvenile and adult life stages of the managed species are considered to be motile and highly capable of eluding adverse conditions. Temporary indirect impacts from turbidity would be limited to the construction duration and will be addressed through established permit conditions and other BMPs to minimize impacts from construction. As BBAP is an OFW, proper and stringent turbidity control measures will be established and maintained so as to minimize all construction related temporary indirect impacts from turbidity and sedimentation. Water quality impacts to the BBAP will also be minimized by adherence to the ECP/SWPPP for ground-disturbing construction activities. Construction will comply with applicable permit special conditions for use of BMPs such as turbidity curtains in a manner that will not physically interfere with or damage the EFH resources or wetlands.

The construction methodologies for demolition of the existing bridge structures have not yet been determined; however, explosives/blasting will be required for the demolition of the two bascule piers.

The use of blasting may have both direct and indirect impacts on managed species and their habitats. During design, the Town will develop a *Conceptual Blasting Plan* which will include general blasting information for the project, including proposed measures to minimize and mitigate potential effects on species. The *Conceptual Blasting Plan* will be reviewed/approved by the regulatory agencies. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting means and methods, including the blasting design, an impact assessment, a mitigation plan, and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the regulatory agencies. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida* (**Appendix G**). There have been previous bridge bascule pier demolition projects in Florida that successfully employed blasting without impacts to protected species: the Pinellas Bayway Structure E project (SER-2021-00360) and the Veterans Memorial Bridge project (SER-2016-18141). Both of these projects included blasting plans and marine species watch plans. The NMFS Section 7 Consultation Letters for both of these projects (provided in **Appendix C**) include species effect determinations of *no effect* or *may affect, not likely to adversely affect* for species under NMFS jurisdiction, including sea turtles and, smalltooth sawfish, and giant manta ray. The Post-Event Blasting Report (**Appendix C**) for the Pinellas Bayway Structure E project indicates that no protected species were impacted by the project blasting.

A *Bridge Demolition/Debris Containment Plan* will be developed by the contractor during design, as is required by permitting. The Plan will be provided to NMFS and will include disposal of all the bridge materials. The bridge is located within OFW and, as such, the Town will remove debris from the project area, ensuring that it is disposed of in an appropriate manner and location.

During construction of the new seawalls, debris containment measures will be employed to prevent materials from entering the water. While the means and methods for the seawall debris containment will ultimately be determined by the construction contractor, the most likely seawall debris containment method to be utilized is a temporary floating platform positioned adjacent to the existing seawall in the area of construction. The used of a floating platform could result in shading impacts to corals; thus, the floating platform will be repositioned regularly to minimize shading impacts to corals. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and provided to NMFS for their review and approval. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and will be provided to NMFS for their review and approval. If the debris containment method differs from a temporary floating platform, the Town commits to reinitiating consultation with the NMFS for the boulder star coral.

Construction staging areas for the proposed project on or near BBAP that will contain hazardous materials (e.g., paints, adhesives, fuels, solvents, oils, etc.) to be used during construction shall have controlled access. Construction and staging areas will also have appropriate stormwater and erosion control measures in place per the National Pollutant Discharge Elimination System (NPDES) Permit required ECP/SWPPP.

6.5.3 Cumulative Impacts

For the same reasoning detailed in Section 5.4.3, it is anticipated that cumulative impacts to EFH from the proposed action, when combined with other past, present, and future projects, are estimated to be minimal.

6.6 Avoidance and Minimization of Impacts to EFH and Managed Species

Efforts to avoid and minimize potential impacts to EFH and managed species were incorporated throughout the development of the proposed build alternative alignments, where possible. For example, consideration for build alternatives included two bridge types. Minimization of direct impacts to EFH and managed species has been accomplished by designing the proposed build alternatives within the existing Town ROW.

Based on the nature of the proposed project, if the project should proceed with one of the two build alternatives, then complete avoidance of impacts to EFH will not be possible. Both build alternatives will result in unavoidable impacts to EFH, including permanent direct impacts to the estuarine water column, macroalgal beds, seagrasses, and corals as a result of the new bridge piers and shading from the bridge. However, selection of Build Alternative 1 (High-Level Fixed Bridge) as the Preferred Alternative rather than Build Alternative 2 (Mid-Level Movable Bridge) minimizes impacts to estuarine water column EFH, macroalgal beds EFH, and seagrass EFH:

- Direct impacts to estuarine water column EFH are reduced from 67,721 cubic feet (Build Alternative 2 – Mid-Level Movable Bridge) to 4,343 cubic feet (Build Alternative 1 – High-Level Fixed Bridge)
- Direct impacts to macroalgal beds (SAV) EFH are reduced from 3.03 ac (Build Alternative 2 – Mid-Level Movable Bridge) to 2.74 ac (Build Alternative 1 – High-Level Fixed Bridge)
- Direct impacts to seagrass (SAV) EFH are reduced from 0.33 ac (Build Alternative 2 – Mid-Level Movable Bridge) to 0.17 ac (Build Alternative 1 – High-Level Fixed Bridge)

During bridge demolition/removal, the existing bridge piers/pilings will be cut at the mudline to avoid the need for dredging/filling.

Currently, stormwater runoff from the landside portions of the project drain directly into Biscayne Bay via curb and gutter and stormwater collected on the existing bridge structure discharges directly into Biscayne Bay through scuppers. There is currently no water quality treatment for these discharges. The proposed stormwater management system design for both build alternatives will make every effort to maximize the treatment of stormwater runoff from the proposed project improvements. It is anticipated that the proposed stormwater improvements for this project will improve water quality by providing treatment where none currently exists or where treatment is currently limited. Additionally, BMPs will be employed during construction activities and an ECP/SWPPP will be implemented to control the effects of stormwater runoff during construction.

The following avoidance and minimization activities will be implemented to minimize potential impacts to EFH and managed species from the proposed project:

1. All in-water construction activities will be limited to daylight hours.

2. Barge spudding and staging has the potential to impact seagrass and corals beyond the 25-foot construction impact buffer during both bridge construction and bridge demolition. Barge spudding and staging locations will be carefully selected to minimize impacts to seagrasses within the project area. Barge spudding, staging, and routes during construction will be further evaluated during the design/permitting phase and a *Barge Accessibility Plan* depicting the locations of barge work channels and barge exclusion zones will be coordinated with the regulatory agencies.
3. During the design phase, a seagrass survey will be conducted during the peak seagrass growing season (i.e., June 1-September 30). The seagrass survey protocol will be coordinated with NMFS prior to completion. If it is determined that there will be unavoidable impacts to seagrasses from the project, coordination with NMFS and USFWS will take place to determine appropriate avoidance and minimization measures to apply during construction.
4. BMPs will be incorporated during construction to minimize impacts to corals, seagrass, and managed species and provide turbidity, sediment, and erosion control.
5. The *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* and *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* (**Appendix G**) will be implemented during all in-water construction activities.
6. The Town will attempt to avoid and minimize impacts to corals to the maximum extent practicable. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. During final design, a benthic survey will be conducted to identify listed coral species (boulder star coral, lobed star coral, and mountainous star coral) and to inventory corals and barrel sponges suitable for relocation prior to construction. A *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* will be developed and coordinated with the NMFS, USACE, SFWMD, and DERM during the permitting process.
7. The construction methods for the proposed bridge pier installation are not fully known at this time; however, it is estimated that the new bridge pilings/piers will be installed via impact hammer. Measures to minimize potential underwater noise impacts from pile driving and in-water construction will be determined during design and implemented during construction (e.g., high density cushion blocks, bubble curtains, and utilization of the ramp up or vibratory installation methodology) to warn and allow any managed species to vacate the area. Noise abatement measures for the project will be coordinated with, and approved by, the NMFS and the USFWS during design and permitting process of the project.
8. Prior to construction commencement, seagrasses adjacent to (outside of) the impact areas within the vicinity of the project corridor will be delineated and marked with visible buoys to identify areas that should be avoided by barges and work boats for construction and staging.
9. All necessary measures will be taken to avoid and/or minimize impacts to surface waters during project design and BMPs will be implemented during construction. A *Water Quality/Turbidity Monitoring Plan* will be developed and implemented during construction

to ensure turbidity levels beyond containment measures are maintained at 0 Nephelometric Turbidity Units (NTUs) above ambient (background) levels. In addition, all applicable permits will be obtained or modified in accordance with federal, state, and local laws and regulations.

10. To minimize impacts to protected and managed species from the project blasting, a *Conceptual Blasting Plan* will be developed to provide general blasting information for the project, including proposed measures to minimize and mitigate potential effects on species. The *Conceptual Blasting Plan* will be reviewed/approved by the USFWS, NMFS, USCG, USACE, and FWC. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting means and methods, including the blasting design, an impact assessment, a mitigation plan, and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the USFWS, NMFS, USCG, USACE, and FWC. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida*.
11. During the design phase, a *Bridge Demolition/Debris Containment Plan* will be prepared (required as part of the permitting process). The Plan will undergo agency review and will include disposal of all bridge materials. The bridges are located within OFW and thus, all debris will be removed from the project area and disposed of in an appropriate manner and location. Miami-Dade County may accept clean concrete and steel material for its artificial reef program. The Town will coordinate with the County during the design and permitting phase to determine if the material from the existing bridge can be accepted at an artificial reef placement site during future construction. This would be an indirect enhancement to the region as offshore reefs provide significant habitat to many marine species.
12. To minimize impacts to corals, the new seawalls will be constructed landward of the existing seawalls and the existing seawalls will remain in place. All seawall construction activities will be conducted from land. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and reviewed and approved by NMFS. The most likely means and methods for the seawall debris containment is the use of a temporary floating platform which will be repositioned regularly to minimize shading impacts to corals. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and reviewed and approved by NMFS. If the contractor's seawall debris containment method differs from a temporary floating platform, the Town commits to reinitiating consultation with the NMFS for the boulder star coral.

Avoidance and minimization of impacts to EFH and managed species will continue to be evaluated during the design, permitting, and construction phases of the project. The Town will incorporate all possible and practicable measures to avoid or minimize these impacts during design.

6.7 Determination of Effect on EFH

On the basis of the avoidance and minimization measures to be implemented for this project (see Section 6.6), along with the compensatory mitigation to be conducted for unavoidable impacts to seagrass and corals (see Section 7.0), the project's impact on EFH is anticipated to be "more than minimal but less than substantial."

7.0 COMPENSATORY MITIGATION FOR IMPACTS TO WETLANDS AND EFH

The final design of the proposed project will avoid and minimize impacts to wetlands/wildlife and habitat to the greatest extent practicable and appropriate mitigation options will be provided for unavoidable impacts. At this stage of the PD&E process, design plans are not yet available for the proposed project and a full mitigation plan for the project has not yet been developed. However, several mitigation options for unavoidable impacts to wetlands and EFH have been evaluated and are discussed below. The Town will coordinate with the regulatory agencies to ensure that all mitigation requirements are fully satisfied. The specific type and extent of any required mitigation will be finalized during the design and permitting phase of the project.

7.1 Seagrass Mitigation

As described in Section 5.6.2, based on the findings of the 2023 quantitative benthic survey, it is estimated that the High-Level Fixed Bridge alignment (Build Alternative 1) would result in a total seagrass impact of 0.279 ac (0.172 ac of permanent impact and 0.107 ac of temporary impact) with a total functional loss of 0.022. The Mid-Level Movable Bridge alignment (Build Alternative 2) would result in a total seagrass impact of 0.417 ac (0.332 ac of permanent impact and 0.085 ac of temporary impact) with a total functional loss of 0.041.

Preliminary mitigation options are under investigation to offset unavoidable impacts to seagrass habitat associated with the Broad Causeway Bridge project. No seagrass mitigation banks are available to offset the proposed direct and indirect impacts to seagrass as a result of the bridge replacement project. Traditionally, seagrass impacts are mitigated via seagrass restoration projects, such as derelict vessel removal or restoration of dredge-holes, spoil islands, or prop scars to the correct elevations and sediment characteristics. Site restoration is then followed by either natural recruitment or planting of seagrass and monitoring to verify long-term repopulation. These types of restoration projects rely upon adequate light penetration and appropriate sediment for the re-establishment, reproduction, and recruitment of seagrasses into the restored areas. The project is located within Biscayne Bay, where substantial seagrass losses have been documented in recent years. According to a report released by the Biscayne Bay Task Force in 2020, the health of Biscayne Bay is in a state of emergency. Within the northern portion of Biscayne Bay, traditional seagrass restoration projects are not readily available at this time, and/or are not advisable due to poor water quality conditions (primarily high phosphorous or nitrogen concentrations) that stimulate algae, thereby restricting light penetration and oxygen levels in the water. Seagrass planting projects, even with appropriate sediment conditions and elevations, have a high risk of failure in this region due to these poor water quality conditions. Government agencies and non-profit organizations are promoting water quality improvement as a basis for restoring seagrass beds in Biscayne Bay. A similar approach has been utilized elsewhere as mitigation for seagrass impacts, including for transportation projects in Tampa Bay and the Florida Keys. On November 20, 2023, the Town sent a request out to project stakeholders requesting feedback on potential seagrass mitigation options. The email is provided in **Appendix I**.

The Town is currently investigating a potential seagrass mitigation opportunity to partner with Biscayne National Park (BNP) for the Broad Causeway Bridge Replacement project. The BNP has previously identified various potential seagrass restoration projects (primarily vessel grounding sites) within the BNP boundaries that can be restored for seagrass mitigation projects. Because southern Biscayne Bay has not experienced the recent seagrass die-offs that have occurred in northern and central Biscayne Bay, a mitigation project located within southern Biscayne Bay (including BNP) would have a higher potential for seagrass mitigation success than a project in northern Biscayne Bay near the Broad Causeway project area. During the February 21, 2023 technical assistance call, NMFS agreed that a seagrass mitigation project in southern Biscayne Bay would have a higher potential for success than a mitigation project near the Broad Causeway Bridge project area (meeting minutes are provided in **Appendix B**).

During PD&E and design phases, the Town will continue to coordinate with project stakeholders and regulatory agencies to develop a *Seagrass Mitigation Plan* to offset the unavoidable impacts to seagrass from the proposed project. The *Seagrass Mitigation Plan* will be reviewed and approved by the regulatory agencies.

7.2 Coral Mitigation

At this time, coral impacts are not fully quantified since the Preferred Alternative has not yet been approved and design is only in the preliminary stages. A future benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area, including any listed coral colonies. The federally listed threatened coral species, *Orbicella franksi,* was previously observed withing the project study area during the 2022 preliminary benthic survey and is anticipated to occur within the potential project impact area in very low numbers.

During the design phase, the Town will attempt to avoid and minimize impacts to corals to the maximum extent practicable. The impacts on corals and listed corals, including *Orbicella franksi*, will be minimized by relocating all colonies of any listed corals to suitable habitat prior to construction. The Town is currently developing a *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* which will be coordinated with NMFS and FWC. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The details of coral relocation, including methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project in accordance with the most recent version of the FWC's *Coral and Octocoral Mitigation Relocation Recommendations* and will be reviewed by the regulatory agencies for final approval. Furthermore, BMPs to control turbidity and sedimentation will be utilized to reduce impacts to corals from turbidity and sedimentation during construction.

8.0 ANTICIPATED PERMITS

The following permits are anticipated for this project:

- USCG Bridge Permit
- USACE Nationwide 15 Permit (including Section 408 review)
- FDEP NPDES Permit
- FDEP Contamination Stormwater Permit
- SFWMD ERP
- Miami-Dade County Class I Coastal Construction Permit
- Miami-Dade County Class II Permit
- Miami-Dade County Tree Permit

Included in the Town Charter by the 1953 Senate Bill No. 865, the State of Florida surrendered and granted to the Town of Bay Harbor Islands any claim or control over all tidewaters and other lands, and all bayous and bay bottoms, beaches, waters, waterways and water bottoms, and all riparian rights within and adjacent to the Town limits for municipal purposes only, a strip of 300 feet wide from Kane Concourse, westwardly across Biscayne Bay to approximately 123rd Street in the City of North Miami. This information with be included in the SFWMD ERP and Miami-Dade County Class I Permit applications to explain how the sovereign submerged lands are granted to the Town.

Section 24-48 of the Miami-Dade County Code requires that a Miami-Dade DERM Class I Permit be obtained prior to performing any work in, on, over or upon tidal waters or coastal wetlands of Miami-Dade County or of any of the municipalities located within Miami-Dade County.

Since there are no sovereign submerged lands within the project area, an easement will not be required.

Coordination has occurred with environmental regulatory agencies for the proposed geotechnical survey work associated with the PD&E phase of the Broad Causeway Bridge project. The Town is seeking authorization from DERM via an Expedited Administrative Authorization (EAA) and the USACE via Nationwide Permit 6. The proposed geotechnical survey work is exempt from permitting with the FDEP/SFWMD under 62-330.051(11)(d), F.A.C. The EAA was issued on July 31, 2023, and the USACE Nationwide Permit 6 was received on November 2, 2023.

The proposed project will require securing an ERP through the SFWMD to meet requirements in Chapter 62-330, F.A.C. Construction activities will also require the development of a SWPPP and proper coordination for NPDES requirements. Additionally, a parallel permit will be required from DERM.

If dewatering occurs within 500 feet of the service station, a special "Contamination" stormwater Permit will be required from FDEP. The contractor will be held responsible for ensuring compliance with any necessary dewatering permit(s). Any dewatering operations in the vicinity of potentially contaminated areas shall be limited to low-flow and short-term. A dewatering plan may be necessary to avoid potential contamination plume exacerbation. All permits will be obtained in accordance with federal, state, and local laws and regulations.

9.0 CONCLUSIONS

This NRE was prepared to document the analysis performed to support decisions related to the evaluation of the project alternatives and to summarize potential impacts to federal and state protected species, wetlands and surface waters, and EFH for the Broad Causeway Bridge Replacement PD&E Study. This document was prepared in accordance with the FDOT PD&E Manual, as well as FDOT's August 2022 *Natural Resources Evaluation Outline and Guidance*.

Protected Species and Habitat

The project study area was evaluated for the presence of federally and state listed species and their habitats in accordance with Section 7 of the ESA and the FDOT PD&E Manual. **Table 9-1** presents the 27 protected species that may potentially occur within the project area, along with their anticipated effect determinations. The effect determinations are either ***no effect*** or ***may affect, not likely to adversely affect*** for all 27 species.

The project study area is located within the designated CH for the West Indian manatee and suitable manatee foraging habitat (seagrass) is located within the project study area. The total impacts to seagrass from the Preferred Alternative are not anticipated to be substantial (i.e., 0.279 ac). Because the proposed project will: 1) implement the *Standard Manatee Conditions for In-water Work* (**Appendix G**) during in-water construction activities; 2) implement BMPs during construction to avoid or minimize unnecessary impacts to seagrasses; 3) mitigate for unavoidable impacts to seagrasses; 4) adhere to the agency-approved *Final Blasting Plan* and *Imperiled Species and Marine Mammal Watch Plan* to minimize impacts from the use of blasting/explosives (blasting plan will adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida*); and 5) install manatee exclusion devices on any drainage culverts (between eight inches and eight feet in diameter) associated with the proposed project, the project determination of effect for the manatee is ***may affect, not likely to adversely affect***. Furthermore, ***the proposed project will not result in the destruction or adverse modification of manatee CH***. These effect determinations were supported by the USFWS during the January 12, 2024 technical assistance call (meeting minutes in **Appendix B)**.

The federally listed threatened boulder star coral was previously observed withing the project study area during the 2022 preliminary benthic survey and is anticipated to occur within the potential project impact area in very low numbers. Due to the similarity of the lobed star coral and mountainous star coral to the boulder star coral, the potential exists that the former two species could occur within the project impact area. In this phase of the project, coral impacts are not fully quantified; however, a benthic survey will be conducted prior to construction which will include a thorough assessment and identification of coral colonies within the project impact area. During the design phase, the project will attempt to avoid and minimize impacts to corals to the maximum extent practicable and impacts on corals will be minimized by relocating all colonies of any listed corals to suitable habitat prior to construction. The Town is currently developing a *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* which will be coordinated with NMFS. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals, and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. The final details of coral relocation, including

Table 9-1 Summary Federally and State Listed Wildlife Species and their associated Effect Determinations

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination
MAMMALS				
Florida bonneted bat	*Eumops floridanus*	FE	Low[2]	*No effect*
Tricolored bat	*Perimyotis subflavus*	P(E)	Low[2]	*N/A*[4]
West Indian manatee	*Trichechus manatus*	FT	High (CH)[3]	*May affect, not likely to adversely affect*
BIRDS				
Little blue heron	*Egretta caerulea*	ST	Moderate	*No adverse effect anticipated*
Piping plover	*Charadrius melodus*	FT	Low	*No effect*
Reddish egret	*Egretta rufescens*	ST	Low	*No adverse effect anticipated*
Roseate spoonbill	*Platalea ajaja*	ST	Low	*No adverse effect anticipated*
Tricolored heron	*Egretta tricolor*	ST	Low	*No adverse effect anticipated*
Wood stork	*Mycteria americana*	FT	Low	*No effect*
INSECTS				
Monarch butterfly	*Danaus plexippus*	C	Low	*N/A*
REPTILES				
American crocodile	*Crocodylus acutus*	FT	Low	*No effect*
Eastern indigo snake	*Drymarchon corais couperi*	FT	Low	*May affect, not likely to adversely affect*
Green sea turtle	*Chelonia mydas*	FT	Moderate (PCH)[5]	*May affect, not likely to adversely affect*
Hawksbill sea turtle	*Eretmochelys imbricata*	FE	Moderate	*May affect, not likely to adversely affect*
Leatherback sea turtle	*Dermochelys coriacea*	FE	Low	*No effect*
Loggerhead sea turtle	*Caretta caretta*	FT	Low	*May affect, not likely to adversely affect*
FISH				
Giant manta ray	*Manta birostris*	FT	Low	*May affect, not likely to adversely affect*
Nassau grouper	*Epinephelus striatus*	FT	Low	*No effect*
Smalltooth sawfish	*Pristis pectinata*	FE	Low	*May affect, not likely to adversely affect*
CORALS				
Boulder star coral	*Orbicella franksi*	FT	High	*May affect, not likely to adversely affect*
Elkhorn coral	*Acropora palmata*	FT	Low	*No effect*
Lobed star coral	*Orbicella annularis*	FT	Moderate	*May affect, not likely to adversely affect*
Mountainous star coral	*Orbicella faveolata*	FT	Moderate	*May affect, not likely to adversely affect*
Pillar coral	*Dendrogyra cylindrus*	FT	Low	*No effect*
Rough cactus coral	*Mycetophyllia ferox*	FT	Low	*No effect*
Staghorn coral	*Acropora cervicornis*	FT	Low	*No effect*

[1]FE = Federally Endangered, FT = Federally Threatened, P(E) = Proposed for Listing as Federally Endangered, C = Candidate for Federal Listing, ST = State Threatened
[2]Based on findings of the October 2023 Florida Bonneted Bat Survey (see Section 4.5 and **Appendix F** for details).
[3](CH) – the project study area is located within designated CH for the manatee
[4]N/A = Not Applicable
[5](PCH) - the project study area is located within the proposed CH for the green sea turtle

methodologies and recipients sites will be addressed in a *Coral, Octocoral, and Sponge Relocation and Monitoring Plan* which will be developed for the proposed project and will be reviewed by the regulatory agencies for final approval. Furthermore, BMPs to control turbidity and sedimentation will be utilized to reduce impacts to corals during construction. Because any colonies of listed corals occurring within the project impact area will be relocated prior to construction, the project determination of effect is ***may affect, not likely to adversely affect*** for the boulder star coral, lobed star coral, and mountainous star coral.

Wetlands and OSWs

The project study area was evaluated for impacts to wetlands and OSWs in accordance with EO 11990. Wetlands (seagrass beds) and OSWs were documented within the project study area. **Table 9-2** provides a summary of wetlands and OSW impacts anticipated from the two build alternatives.

Table 9-2 Summary of Permanent and Temporary Impacts to Wetlands and OSWs

	Build Alternative 1 High-Level Fixed Bridge			Build Alternative 2 Mid-Level Movable Bridge		
Wetland/ OSW	**Direct Impact (ac)**	**Indirect Impact (ac)**	**Temporary Impact (ac)**	**Direct Impact (ac)**	**Indirect Impact (ac)**	**Temporary Impact (ac)**
Wetland SF	0.012	--	0.030	0.074	--	0.011
Wetland SG	--	--	--	--	--	0.00005
Wetland SI	0.001	--	0.021	0.040	--	0.004
Wetland SO	--	--	--	0.003	--	0.010
Wetland SN	0.002	--	0.009	0.033	--	0.003
Wetland SM	--	--	--	0.008	--	--
Wetland SL	--	--	--	0.002	--	--
Wetland SK	0.059	--	0.001	0.052	--	0.008
Wetland SF	0.098	--	0.046	0.120	--	0.049
Total Seagrass Wetlands	**0.172**	--	**0.107**	**0.332**	--	**0.085**
OSW 1	0.054	--	--	0.054	--	--
OSW 2	0.050	--	--	0.050	--	--
OSW 3	0.052	--	--	0.052	--	--
OSW 4	0.035	--	--	0.035	--	--
OSW 5	0.035	--	--	0.035	--	--
OSW 6	0.288	--	--	0.288	--	--
OSW 7	0.186	--	--	0.186	--	--
OSW 8	0.098	--	--	0.098	--	--
Total OSWs	**0.798**	--	--	**0.798**	--	--

Eighteen seagrass beds were identified within the project study area. Three species of seagrass (paddle grass, manatee grass, and turtle grass) were documented within these seagrass beds. Permanent impacts to seagrass are anticipated to result from installation of the new bridge piers and shading of the substrate by the new bridge structure and would be substantially lower for Build

Alternative 1 (High-Level Fixed Bridge) (0.172 ac) than for Build Alternative 2 (Mid-Level Movable Bridge) (0.332 ac). Temporary impacts to seagrasses (calculated based on a 25-foot construction impact buffer around each alternative alignment) are anticipated to be slightly higher for Build Alternative 1 (High-Level Fixed Bridge) (0.107 ac) than for the Build Alternative 2 (Mid-Level Movable Bridge) (0.085 ac). The total impacts to seagrasses are anticipated to be notably lower for the Build Alternative 1 (High-Level Fixed Bridge) (0.279 ac) than for Build Alternative 2 (Mid-Level Movable Bridge) (0.417 ac). Based on the UMAM functional assessment, the total wetland functional loss would be 0.022 for Build Alternative 1 (High-Level Fixed Bridge) and 0.041 for Build Alternative 2 (Mid-Level Movable Bridge). Preliminary mitigation options are under investigation to offset unavoidable impacts to seagrass habitat associated with the Broad Causeway Bridge project.

Eight OSWs (artificial stormwater retention features) were documented within the causeway island portion of the project study area. All eight OSWs are anticipated to be permanently impacted in their entirety in association with construction of the proposed stormwater management ponds, and the OSW impacts are expected to be the same for both build alternatives (i.e., a total of 0.798 ac). No indirect or temporary impacts are anticipated for the OSWs from the proposed project and no mitigation is anticipated to be required for impacts to OSWs for the proposed project.

It should be noted that occasional mangrove propagules and saplings (no mature trees) were noted within the riprap along the causeway island. These mangroves do not constitute a wetland and do not lie within the project footprint. Furthermore, these mangroves are not considered EFH since they are very small and do not provide canopy or any substantial root structure that would provide any significant habitat for managed species. The area of impact to the riprap shoreline from construction activities (i.e., the proposed seawall installation) will be re-evaluated during the permitting phase and any impacts to mangroves will be addressed. If mangrove saplings are present within the riprap impact area, the square feet of mangrove leaf canopy will be measured to determine a BBEETF contribution as compensatory mitigation (i.e., using the formula of square feet of canopy x $4 x 2). BMPs will be implemented during construction to minimize impacts to mangroves during construction.

EFH

An EFH Assessment was conducted for the project study area to identify impacts to EFH and managed species in accordance with the Essential Fish Habitat Chapter of the PD&E Manual, along with the FDOT's August 2022 *Natural Resources Evaluation Outline and Guidance*. The project study area occurs within the BBAP which is designated as an EFH HAPC and will involve in-water work. Seven EFH types were identified within the project area: Estuarine Water Column; Estuarine and Marine Submerged SAV (Seagrass and Macroalgae); Algal Communities (*Laurencia*); Live Bottom; Rough, Hard, Exposed, Stable Substrate; Sponges; and Unconsolidated Estuarine Bottom. The project study area overlaps the boundaries of designated EFH and HAPC from five fishery management units: Penaeid Shrimp; Snapper-Grouper Complex; Spiny Lobster (*Panulirus argus*); Coastal Migratory Pelagics; and Coral, Coral Reefs and Live/hard Bottom Habitat. It should be noted that the mangroves found within the riprap along the causeway island are only propagules and saplings (no mature trees) and are not considered EFH. There are three HAPCs occurring within the project study area: 1) Biscayne Bay, 2) SAV/seagrass, and 3) Coral, Coral Reefs and Live/hard Bottom Habitat. These HAPCs

provide EFH for several managed species/groups, including spiny lobster, penaied shrimp, snapper-grouper complex, coastal migratory pelagics, and coral, coral reefs and live/hard bottom habitat.

The proposed project will include the following activities that may impact EFH, HAPC, and managed species, including installation of the proposed bridge structures (bridge piers and deck), new seawall installation, drainage installation on the causeway island (ponds), and existing bridge demolition. Permanent impacts on EFH and HAPC were calculated based on the footprint of each build alternative alignment and include both impacts from bridge pier installation and shading of habitats from the bridge deck. **Table 9-3** summarizes potential permanent and temporary direct and indirect impacts to the various EFH habitat types associated with each build alternative. Total permanent impacts to EFH are anticipated to be lower for Build Alternative 1 (High-Level Fixed Bridge) than for the Build Alternative 2 (Mid-Level Movable Bridge) (see **Table 9-3**). Temporary impacts to rhizophytic macroalgae SAV, seagrass SAV, and live bottom within the project study area are anticipated in association with the construction of the build alternatives. Temporary direct impacts were calculated based on a 25-foot construction impact buffer established around each alternative alignment. The temporary impacts to macroalgal beds, seagrass, and live bottom are anticipated to be lower for Build Alternative 1 (High-Level Fixed Bridge) (1.15 ac) than for the Build Alternative 2 (Mid-Level Movable Bridge) (1.80 ac). Mitigation is required to offset unavoidable impacts to seagrass habitat and is identified as an implementation measure for the project.

Temporary displacements of managed species, along with other benthic and demersal species, may occur during construction of the build alternatives. However, these species are considered to be motile and are expected to return to the project area once construction is complete since their associated EFH types are anticipated to naturally re-establish within the project area after construction. No significant impacts to these managed species are anticipated from this project.

The submerged portion of the project study area is located within the BBAP which is designated as an OFW and provides habitat for numerous marine and estuarine species. No long-term, adverse impacts are anticipated for the BBAP as a result of this project as the proposed work is not expected to promote new development, decrease water quality, or result in land use changes.

The EFH Assessment indicates that the Preferred Alternative (Build Alternative 1 – High-Level Fixed Bridge) results in lower permanent and temporary direct impacts to EFH (see **Table 9-3**).

On the basis of the avoidance and minimization measures to be implemented for this project, along with the compensatory mitigation to be conducted for impacts to seagrass and corals, the project's impact on EFH is determined to be "***more than minimal but less than substantial***."

9.1 Implementation Measures

The following are implementation measures to minimize impacts to natural resources during project construction:

1. BMPs will be incorporated during construction to minimize wetland impacts and provide sediment and erosion control.
2. BMPs will be incorporated during construction to minimize impacts to corals, wetlands, seagrass, and managed species and provide turbidity, sediment, and erosion control.

Table 9-3 Summary of Potential Permanent and Temporary Impacts to EFH and HAPC

Habitat[1]		Impact Type	Build Alternative 1 High-Level Fixed Bridge	Build Alternative 2 Mid-Level Movable Bridge
Estuarine Water Column EFH	Estuarine Water Column	Permanent – Bridge Piers	4,343 cubic feet	67,721 cubic feet[2]
		Temporary	--	--
Estuarine and Marine Submerged SAV EFH	Community 1 SAV (macroalgal beds)	Permanent - Bridge Piers, Shading	2.74 ac	3.03 ac
		Temporary – 25-foot Construction Buffer	1.00 ac	1.64 ac
	Community 2 SAV (seagrass)	Permanent – Bridge Piers, Shading	0.17 ac	0.33 ac
		Temporary – 25-foot Construction Buffer	0.11 ac	0.09 ac
Coral, Coral Reefs, and Live/hard Bottom Habitat EFH	Community 3 Live Bottom	Permanent – Bridge Piers, Shading	0.12 ac[3]	0.02 ac[3]
		Temporary – 25-foot Construction Buffer	0.04 ac	0.07 ac
	Community 4 Coral Habitat Adjacent to Seawalls	Permanent	--	--
		Temporary	--	--
	Community 5 Existing Seawalls and Bridge Piers	Permanent –Bridge Pier Demolition	Remove all 29 bridge piers	Remove all 29 bridge piers
		Temporary	--	--
Total Direct Impacts		**Permanent**	**4,343 cubic feet** (Estuarine Water Column) **3.03 ac** (Communities 1-3) **Remove all 29 bridge piers**	**67,721 cubic feet** (Estuarine Water Column) **3.38 ac** (Communities 1-3) **Remove all 29 bridge piers**
		Temporary	**1.15 ac** (Communities 1-3)	**1.80 ac (Communities 1-3)**

[1]Note that Unconsolidated Estuarine Bottom EFH was not delineated during the 2023 quantitative benthic survey because the extent of non-vegetated sediments within the project study area is minimal and these areas are scattered within the various habitats.
[2]Estuarine water column impacts for Build Alternative 2 is an underestimate of impacts, as they were calculated based on the volume of submerged bascule piers only (dimensions/locations of the mid-level bascule intermediate bridge piers are not available at this time).
[3]Shading impacts to Community 3 - Live Bottom for both Build Alternatives are an overestimate since the non-photosynthetic organisms in this sponges-dominated community would continue to inhabit the substrate underneath the new bridge.

3. A *Water Quality/Turbidity Monitoring Plan* will be developed and implemented during construction to ensure turbidity levels beyond containment measures are maintained at 0 NTUs above ambient (background) levels.
4. A *Conceptual Bridge Demolition/Debris Containment Plan*, which also includes a disposal plan for all the bridge materials, will be developed during the design/permitting phase. The plan will be provided to NMFS for their review and approval. A *Final Bridge Demolition/Debris Containment Plan* will be developed by the contractor prior to construction and will be provided to NMFS for their review and approval.

9.2 Commitments

Federally listed or protected species have the potential to occur within the project study area. In order to ensure that the proposed project will not adversely impact wetlands or protected species, the Town commits to the following:

1. If the listing status of the tricolored bat is elevated by USFWS to Threatened or Endangered and the Preferred Alternative is located within the consultation area during the design and permitting phase of the proposed project, the Town commits to reinitiating consultation with the USFWS to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the tricolored bat.
2. The USFWS and FWC *Standard Manatee Construction Conditions for In-Water Work* will be utilized during construction.
3. To reduce the risk of entrapment and drowning of manatees, manatee exclusion devices (such as grating) shall be installed and maintained over any existing or proposed pipes or culverts greater than eight inches that are submerged or partially submerged and reasonably accessible to manatees. If horizontal or vertical bars are used, no more than 8-inch gaps on center shall be allowed. Grates shall be in place at the accessible end(s) during all phases of the construction process and as a final design element to restrict manatee access.
4. If the listing status of the monarch butterfly is elevated by USFWS to Threatened or Endangered and if the project area is located within the consultation area, during the construction phase of the proposed project, the Town commits to reinitiating consultation with the USFWS to determine the appropriate survey methodology and to address USFWS regulations regarding the protection of the monarch butterfly.
5. The most recent version of the USFWS *Standard Protection Measures for the Eastern Indigo Snake* will be utilized during construction.
6. The NMFS *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office* will be utilized during construction.
7. The NMFS *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office* will be utilized during construction.
8. The Town will reinitiate consultation with NMFS during the design and permitting phase of the project, where final impacts to corals, octocorals and/or sponges will be determined and any required compensatory actions for unavoidable impacts will be defined. During final

design, a benthic survey will be conducted to identify listed coral species (boulder star coral, lobed star coral, and mountainous star coral) and to inventory corals and barrel sponges suitable for relocation prior to construction. The coral survey protocol will be coordinated with NMFS prior to completion. A *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* will be developed and coordinated with the NMFS, USACE, SFWMD, and DERM during the permitting process.

9. A seagrass survey will be conducted during the peak seagrass growing season (i.e., June 1-September 30) in the design phase. The seagrass survey protocol will be coordinated with NMFS prior to completion. If it is determined that there will be unavoidable impacts to seagrasses from the project, coordination with NMFS and USFWS will take place to determine appropriate avoidance and minimization measures to apply during construction.
10. The Town will provide mitigation for unavoidable impacts to seagrasses. A *Seagrass Mitigation Plan* will be developed to offset unavoidable impacts to seagrass from the proposed project. The *Seagrass Mitigation Plan* will be reviewed and approved by the NMFS, USFWS, USACE, SFWMD, and DERM during the permitting process.
11. A *Barge Accessibility Plan* depicting the locations of barge work channels and barge exclusion zones will be prepared during permitting and coordinated with the NMFS, USACE, SFWMD, and DERM.
12. To identify areas that should be avoided by barges and work boats for construction and staging, prior to construction commencement, the Town will delineate and mark with visible buoys seagrasses located adjacent to (outside of) the impact areas within the vicinity of the project corridor. The seagrass marking requirement will be coordinated with the NMFS and USFWS during the permitting process.
13. All in-water construction activities will be limited to daylight hours.
14. Measures to minimize potential underwater noise impacts from pile driving and in-water construction will be determined during design and implemented during construction. Noise abatement measures for the project will be coordinated with, and approved by, the NMFS and the USFWS during the design and permitting process.
15. A *Conceptual Blasting Plan* to provide general blasting information for the project, including proposed measures to minimize and mitigate potential effects on species, will be developed during the design process and reviewed/approved by the USFWS, NMFS, USCG, USACE, and FWC. Prior to construction, the Town and their contractor will submit a *Final Blasting Plan* containing details of the blasting means and methods, including the blasting design, an impact assessment, a mitigation plan, and an *Imperiled Species and Marine Mammal Watch Plan* which will be reviewed and approved by the USFWS, NMFS, USCG, USACE, and FWC. The blasting plan will be required to adhere to the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida*.
16. The Town commits to reinitiating consultation during design and permitting with NMFS and USFWS for boulder star coral and manatee CH and will provide the information necessary to

determine the type, degree, and extent of impacts to listed species [and/or CH] potentially adversely impacted by the proposed project. The Town will develop mitigation measures in consultation with the NMFS and USFWS to offset unavoidable impacts. Completion of consultation and documentation of the project's compliance with the avoidance, minimization and mitigation requirements for the impacted resources will be provided by the Town in a subsequent project reevaluation prior to advancing to construction.

17. The new seawall will be constructed landward of the existing seawall and the existing seawall will remain in place. All seawall construction activities will be conducted from land. A *Conceptual Seawall Debris Containment Plan* will be developed during the design/permitting phase and reviewed and approved by NMFS. The most likely means and methods for the seawall debris containment is the use of a temporary floating platform which will be repositioned regularly to minimize shading impacts to corals. A *Final Seawall Debris Containment Plan* will be developed by the contractor prior to construction and reviewed and approved by NMFS. If the contractor's seawall debris containment method differs from a temporary floating platform, the Town commits to reinitiating consultation with the NMFS for the boulder star coral.

9.3 Agency Coordination

The Town will initiate coordination with the USFWS and FWC in relation to the potential for listed species by submission of this NRE for review and concurrence. The Town will also initiate coordination with NMFS for impacts to listed species and EFH.

Coordination with NMFS and USFWS for listed species (i.e., boulder star coral and manatee CH) will be reinitiated during design and permitting.

Continued coordination with USACE, SFMWD, and DERM will occur during the permitting process for this project.

10.0 REFERENCES

Audubon Eagle Watch Public Nest Map, accessed October 7, 2023.

Cowardin, et. al. U.S. Department of Interior - Fish and Wildlife Service. Classification of Wetlands and Deepwater Habitats of the United States. USFWS/OBS-79/31, December 1979.

eBird Online Database and Species Maps, accessed October 7, 2023.

Florida Administrative Code, Chapter 62-330.051, Exempt Activities.

Florida Administrative Code, Chapter 62-340, Delineation of the Landward Extent of Wetlands and Surface Waters.

Florida Association of Environmental Soil Scientists, Hydric Soils of Florida Handbook, 4th edition, March 2007.

Florida Department of Agriculture and Consumer Services, Florida Forest Service, Florida's Federally Listed Plant Species website, accessed August 8, 2023.

Florida Department of Transportation, Efficient Transportation Decision Making Programming Screen Summary Report Number 14520, published September 28, 2023.

Florida Department of Transportation, Environmental Screening Tool, accessed March 17, 2023.

Florida Department of Transportation, 2018 Florida Greenbook, effective July 20, 2021.

Florida Department of Transportation, Florida Land Use, Cover and Forms Classification System Manual, 4th ed., January 1999.

Florida Department of Transportation, Natural Resources Evaluation Outline and Guidance, August 2022.

Florida Department of Transportation, Project Development and Environment Manual, Wetlands and Other Surface Waters Chapter.

Florida Department of Transportation, Project Development and Environment Manual, Water Resources Chapter.

Florida Department of Transportation, Project Development and Environment Manual, Protected Species and Habitat Chapter.

Florida Department of Transportation, Project Development and Environment Manual, Essential Fish Habitat Chapter.

Florida Fish and Wildlife Conservation Commission, Endangered and Threatened Species Management and Conservation Plan Progress Report Fiscal Year 2020-21, December 2021.

Florida Fish and Wildlife Conservation Commission, Florida's Imperiled Species Management Plan 2016-2026, November 2016, and Amended September 2022.

Florida Fish and Wildlife Conservation Commission, Manatee Datasets.

Florida Natural Areas Inventory and Florida Fish and Wildlife Conservation Commission, Strategic Habitat Conservation Areas GIS Dataset, accessed January 8, 2024

Signal4 Analytics, Florida Traffic Safety Dashboard, Crash Data, January 1, 2013 to September 30, 2023.

Miami-Dade County, Open Data Hub.

National Oceanographic and Atmospheric Administration, Fishery's Essential Fish Habitat - Data Inventory.

National Oceanographic and Atmospheric Administration, National Endangered Species Act Critical Habitat Mapper, accessed August 8, 2023.

National Oceanographic and Atmospheric Administration, Nassau Grouper Consultation Framework NOAA Fisheries Southeast Regional Office, August 2022.

South Florida Water Management District, Environmental Resource Permit Applicant's Handbook Volume I (General and Environmental), effective December 22, 2020.

South Florida Water Management District, Environmental Resource Permit Applicant's Handbook Volume II, effective May 22, 2016.

US Army Corps of Engineers and Florida Department of Environmental Protection, Effect Determination Key for the Manatee in Florida, April 2013.

US Army Corps of Engineers, Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plan Region (Version 2.0), ERDC/ED TR-10-20, November 2010.

US Army Corps of Engineers, Wetland Delineation Manual, Technical Report Y-87-1, January 1987.

US Department of Agriculture, Natural Resources Conservation Service, Soil Survey Geographic Database for Florida Data, 2021.

US Fish and Wildlife Service, Endangered and Threatened Wildlife and Plants, 50 CFR 17.11 and 17.12, June 2007.

US Fish and Wildlife Service, Information for Planning and Consultation, Resource List, accessed October 26, 2023.

US Fish and Wildlife Service, National Wetlands Inventory, Wetlands Online Mapper, reviewed May 2023.

US Fish and Wildlife Service, South Florida Ecological Services Office, Eastern Indigo Snake Programmatic Effect Determination Key, dated January 25, 2010 and revised July 2017.

US Fish and Wildlife Service, South Florida Ecological Services Office, Effect Determination Key for the Wood Stork in South Florida, May 2010.

US Fish and Wildlife Service, South Florida Ecological Services Office, Florida Bonneted Bat Consultation Guidelines, October 2019.

US Fish and Wildlife Service, Threatened and Endangered Species Active Critical Habitat Report.

US Fish and Wildlife Service, Wood Stork Florida Active Nesting Colonies and Core Foraging Areas 2010-2019 GIS Data.

11.0 APPENDICES

APPENDIX A – IPaC RESOURCE LIST AND FNAI BIODIVERSITY MATRIX QUERY RESULTS

APPENDIX B – AGENCY MEETING MINUTES

USFWS Meeting Minutes (1/12/2024)

NMFS Meeting Minutes (7/12/2023)

NMFS Meeting Minutes (12/21/2023)

NMFS Meeting Minutes (2/21/2024)

APPENDIX C – BLASTING INFORMATION

NMFS Blasting Information Email (2/27/2024)

SR 679 Pinellas Bayway Structure E Section 7 Consultation Letter (11/27/2018)

Veterans Memorial Bridge Section 7 Consultation Letter (11/01/2016)

SR 679 Pinellas Bayway Structure E Blasting Plan (12/10/2020)

SR 679 Pinellas Bayway Structure E Imperiled Species and Marine Mammal Watch Plan

SR 679 Pinellas Bayway Structure E Imperiled Species and Marine Mammal Watch Plan Report (5/18/2021)

APPENDIX D – OSW AND MANGROVE PHOTOGRAPHIC LOG

APPENDIX E – 2023 QUANTITATIVE BENTHIC SURVEY REPORT

APPENDIX F – OCTOBER 2023 FLORIDA BONNETED BAT SURVEY REPORT

APPENDIX G – SPECIES PROTECTION MEASURES

Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida

Standard Manatee Conditions for In-water Work

Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office

Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office

Standard Protection Measures for the Eastern Indigo Snake

APPENDIX H – SEAGRASS FUNCTIONAL ASSESESSMENT FORMS (UMAM)

APPENDIX I – SEAGRASS MITIGATION INQUIRY EMAIL

APPENDIX A

IPaC RESOURCE LIST AND FNAI BIODIVERSITY MATRIX QUERY RESULTS

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Miami-Dade County, Florida



Local office

Florida Ecological Services Field Office

(772) 562-3909
(772) 562-4288
fw4flesregs@fws.gov

1339 20th Street
Vero Beach, FL 32960-3559

https://www.fws.gov/office/florida-ecological-services

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not *guaranteed to be found on or near* the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

NOT FOR CONSULTATION

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Florida Bonneted Bat Eumops floridanus Wherever found There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8630	Endangered
Florida Panther Puma (=Felis) concolor coryi Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1763	Endangered
Puma (=mountain Lion) Puma (=Felis) concolor (all subsp. except coryi) No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6049	SAT
West Indian Manatee Trichechus manatus Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/4469	Threatened Marine mammal

Birds

NAME	STATUS

NAME	STATUS
Bachman's Warbler (=wood) Vermivora bachmanii Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3232	Endangered
Eastern Black Rail Laterallus jamaicensis ssp. jamaicensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10477	Threatened
Everglade Snail Kite Rostrhamus sociabilis plumbeus Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/7713	Endangered
Wood Stork Mycteria americana No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8477	Threatened

Reptiles

NAME	STATUS
American Alligator Alligator mississippiensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/776	SAT
American Crocodile Crocodylus acutus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6604	Threatened
Eastern Indigo Snake Drymarchon couperi Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/646	Threatened
Green Sea Turtle Chelonia mydas There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle Eretmochelys imbricata Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/3656	Endangered
Leatherback Sea Turtle Dermochelys coriacea Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle Caretta caretta There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1110	Threatened

Fishes

NAME	STATUS
Gulf Sturgeon Acipenser oxyrinchus (=oxyrhynchus) desotoi Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/651	Threatened

Insects

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NAME	STATUS
Bartram's Hairstreak Butterfly Strymon acis bartrami Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/4837	Endangered
Florida Leafwing Butterfly Anaea troglodyta floridalis Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6652	Endangered
Miami Blue Butterfly Cyclargus (=Hemiargus) thomasi bethunebakeri Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3797	Endangered
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

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Flowering Plants

NAME	STATUS
Beach Jacquemontia Jacquemontia reclinata No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1277	Endangered
Blodgett's Silverbush Argythamnia blodgettii There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/6823	Threatened
Cape Sable Thoroughwort Chromolaena frustrata There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/4733	Endangered
Carter's Mustard Warea carteri No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5583	Endangered
Carter's Small-flowered Flax Linum carteri carteri There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/7208	Endangered
Crenulate Lead-plant Amorpha crenulata No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6470	Endangered
Deltoid Spurge Chamaesyce deltoidea ssp. deltoidea No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/199	Endangered
Everglades Bully Sideroxylon reclinatum ssp. austrofloridense There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/4735	Threatened
Florida Brickell-bush Brickellia mosieri There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/956	Endangered
Florida Pineland Crabgrass Digitaria pauciflora There is **proposed** critical habitat for this species. https://ecos.fws.gov/ecp/species/3728	Threatened

Florida Prairie-clover Dalea carthagenensis floridana — Endangered
There is **proposed** critical habitat for this species.
https://ecos.fws.gov/ecp/species/2300

Florida Semaphore Cactus Consolea corallicola — Endangered
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/4356

Pineland Sandmat Chamaesyce deltoidea pinetorum — Threatened
There is **proposed** critical habitat for this species.
https://ecos.fws.gov/ecp/species/1914

Sand Flax Linum arenicola — Endangered
There is **proposed** critical habitat for this species.
https://ecos.fws.gov/ecp/species/4313

Small's Milkpea Galactia smallii — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/3360

Tiny Polygala Polygala smallii — Endangered
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/996

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
West Indian Manatee Trichechus manatus https://ecos.fws.gov/ecp/species/4469#crithab	Final

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

Additional information can be found using the following links:

- Eagle Managment https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act

requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats[3] should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/ documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

NOT FOR CONSULTATION

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Black Scoter *Melanitta nigra* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Brown Pelican *Pelecanus occidentalis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Jan 15 to Sep 30
Common Loon *gavia immer* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/4464	Breeds Apr 15 to Oct 31
Great Shearwater *Puffinus gravis* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds elsewhere
Manx Shearwater *Puffinus puffinus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 15 to Oct 31

Pomarine Jaeger Stercorarius pomarinus — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Red-breasted Merganser Mergus serrator — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Ring-billed Gull Larus delawarensis — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Royal Tern Thalasseus maximus — Breeds Apr 15 to Aug 31
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

Surf Scoter Melanitta perspicillata — Breeds elsewhere
This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

Breeding Season (■)
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

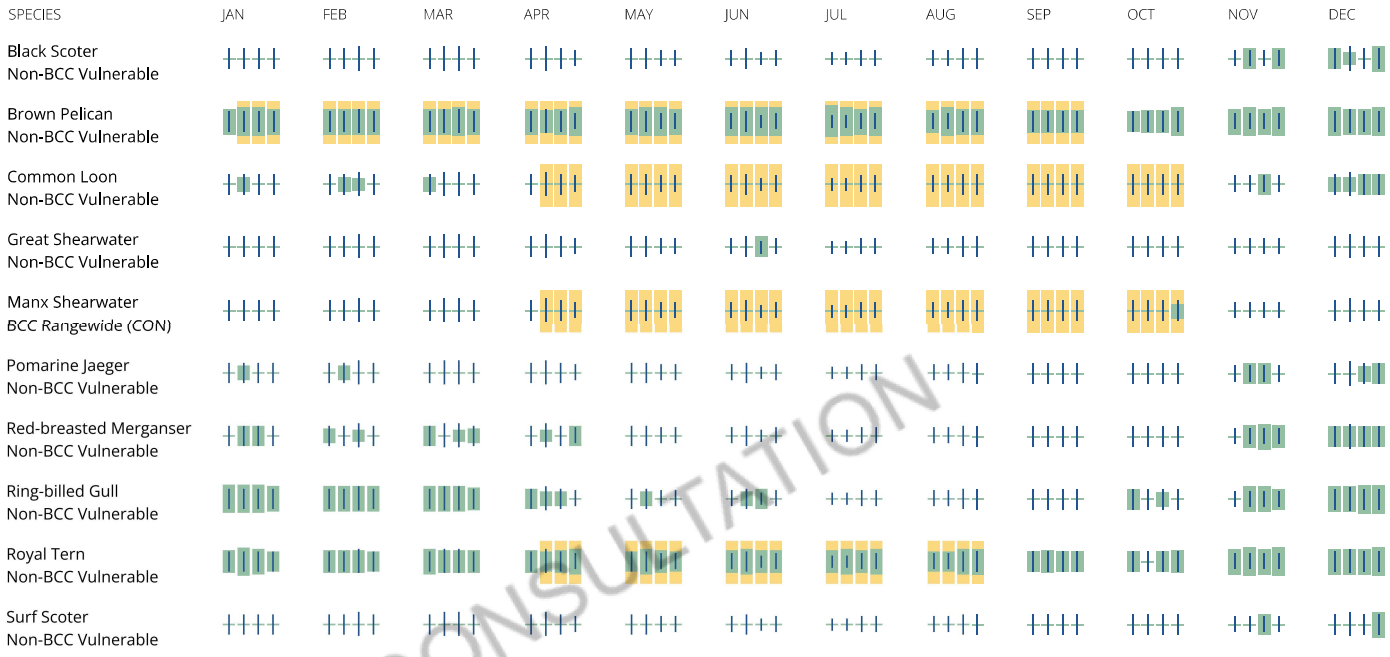
Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.

■ probability of presence ■ breeding season | survey effort – no data



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Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Marine mammals

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take (to harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill) of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The Endangered Species Act (ESA) of 1973.
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME

West Indian Manatee *Trichechus manatus*
https://ecos.fws.gov/ecp/species/4469

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

This location overlaps the following wetlands:

ESTUARINE AND MARINE DEEPWATER
E1UBL
E1AB/UBL
E1UB/ABL

A full description for each wetland code can be found at the National Wetlands Inventory website

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
850-681-9364 fax
www.fnai.org

Florida Natural Areas Inventory

Biodiversity Matrix Query Results

UNOFFICIAL REPORT

Created 10/7/2023

(Contact the FNAI Data Services Coordinator at 850.224.8207 or kbrinegar@fnai.fsu.edu for information on an official Standard Data Report)

NOTE: The Biodiversity Matrix includes only rare species and natural communities tracked by FNAI.

Report for 1 Matrix Unit: 68763



Descriptions

DOCUMENTED - There is a documented occurrence in the FNAI database of the species or community within this Matrix Unit.

DOCUMENTED-HISTORIC - There is a documented occurrence in the FNAI database of the species or community within this Matrix Unit; however the occurrence has not been observed/reported within the last twenty years.

LIKELY - The species or community is *known* to occur in this vicinity, and is considered likely within this Matrix Unit because:

1. documented occurrence overlaps this and adjacent Matrix Units, but the documentation isn't precise enough to indicate which of those Units the species or community is actually located in; *or*
2. there is a documented occurrence in the vicinity and there is suitable habitat for that species or community within this Matrix Unit.

POTENTIAL - This Matrix Unit lies within the known or predicted range of the species or community based on expert knowledge and environmental variables such as climate, soils, topography, and landcover.

Matrix Unit ID: 68763

0 **Documented** Elements Found

0 **Documented-Historic** Elements Found

3 **Likely** Elements Found

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
Eumops floridanus Florida bonneted bat	G1	S1	E	FE
Halophila johnsonii Johnson's seagrass	G2Q	S2	T	E
Scrub	G2	S2	N	N

Matrix Unit ID: 68763

19 **Potential** Elements for Matrix Unit 68763

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
Athene cunicularia floridana Florida Burrowing Owl	G4T3	S3	N	ST
Bolbocerosoma hamatum Bicolored Burrowing Scarab Beetle	G3G4	S3	N	N
Conradina grandiflora large-flowered rosemary	G3	S3	N	T
Crocodylus acutus American Crocodile	G2	S2	T	FT
Ctenogobius stigmaturus Spottail Goby	G2	S2	N	N
Dalea carthagenensis var. floridana Florida prairie clover	G5T1	S1	E	E
Elytraria caroliniensis var. angustifolia narrow-leaved Carolina scalystem	G4T2	S2	N	N
Eretmochelys imbricata Hawksbill Sea Turtle	G3	S1	E	FE
Gambusia rhizophorae Mangrove Gambusia	G3	S3	N	N
Glandularia maritima coastal vervain	G3	S3	N	E
Gopherus polyphemus Gopher Tortoise	G3	S3	C	ST
Rallus longirostris scottii Florida Clapper Rail	G5T3?	S3?	N	N
Rivulus marmoratus Mangrove Rivulus	G4G5	S3	SC	N
Roystonea regia Florida royal palm	G2G3	S2	N	E
Setophaga discolor paludicola Florida Prairie Warbler	G5T3	S3	N	N
Swietenia mahagoni West Indies mahogany	G3G4	S3	N	T
Trichechus manatus latirostris Florida Manatee	G2G3T2	S2S3	T	N
Trichomanes punctatum ssp. floridanum Florida filmy fern	G4G5T1	S1	E	E
Zephyranthes simpsonii redmargin zephyrlily	G2G3	S2S3	N	T

Disclaimer

The data maintained by the Florida Natural Areas Inventory represent the single most comprehensive source of information available on the locations of rare species and other significant ecological resources statewide. However, the data are not always based on comprehensive or site-specific field surveys. Therefore, this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. FNAI shall not be held liable for the accuracy and completeness of these data, or opinions or conclusions drawn from these data. FNAI is not inviting reliance on these data. Inventory data are designed for the purposes of conservation planning and scientific research and are not intended for use as the primary criteria for regulatory decisions.

Unofficial Report

These results are considered unofficial. FNAI offers a Standard Data Request option for those needing certifiable data.

APPENDIX B

AGENCY MEETING MINUTES

USFWS Meeting Minutes (1/12/2024)

NMFS Meeting Minutes (7/12/2023)

NMFS Meeting Minutes (12/21/2023)

NMFS Meeting Minutes (2/21/2024)

Minutes

Project:	Broad Causeway Bridge Replacement PD&E Study		
Subject:	U.S. Fish and Wildlife Service (USFWS) Technical Assistance Call		
Meeting place:	Teams Meeting		
Date and time:	January 12, 2024 | 9:00 a.m.		
Attendees:	John Wrublik Craig James Megan Moore Mauricio Gomez Kimberly Taveras Jim Mykytka Wendy Lasher Beth Zimmer	Representing:	USFWS FDOT FDOT FDOT FDOT RS&H AtkinsReális AtkinsReális

MINUTES:

1. Introductions: Attendees listed above.

2. Project Overview and Discussion
   - AtkinsRéalis (hereafter referred to as "Atkins") provided a project overview and summarized the Purpose and Need, the Proposed Alternatives, and the list of anticipated permits for the project.
   - The general project schedule was presented, including estimated dates for Location and Design Concept Acceptance (LDCA), submittal of the Natural Resources Evaluation (NRE) to USFWS, permitting timeframe, and construction.

3. Species Determinations of Effect
   - A table of listed species under USFWS jurisdiction and their associated anticipated effect determinations was presented.

   Manatee
   - The project area is located within designated critical habitat (CH) for the manatee. Atkins summarized the seagrass information documented during the 2023 benthic survey, including the location of the seagrass beds within the project study area.
   - Atkins presented the anticipated total impact to seagrasses, which is lower for the Preferred Alternative (Build Alternative 1 – High-level Fixed Bridge) (0.279 acres) than for Build Alterative 2 – Mid-level Moveable Bridge (0.417 acres).
   - Atkins summarized the proposed in-water construction activities for the project:
     - Installation of new bridge structures – the installation technique for the new bridge piers has not yet been determined.
     - Seawall replacement anticipated on east and west sides of the bridge.
     - Existing bridge demolition - the 27 bridge piers will be removed by cutting at the mudline. Blasting will be required to remove the two large bascule piers.

- The proposed project commitments and implementation measures related to the manatee were summarized by Atkins.
- Atkins demonstrated that based on the *Effect Determination Key for the Manatee in Florida*, the proposed project will result in a *may affect* determination for the manatee since blasting is required.
- Atkins inquired whether it is possible to arrive at a *may affect, not likely to adversely affect* determination if specific commitments or conservation measures are incorporated in the project.
- USFWS stated that because the proposed project will include and adhere to the *Standard Manatee Construction Conditions for In-Water Work*, the NFMS *Protected Species Construction Conditions* and *Vessel Strike Avoidance Measures*, and the USFWS *Guidelines for the Protection of Marine Animals During the Use of Explosives in the Waters of the State of Florida*, a *may affect, not likely to adversely affect* determination for the manatee is supported.
- Atkins presented the anticipated effect determination for manatee CH is "*the proposed project will not result in the destruction or adverse modification of manatee CH.*"
- The USFWS stated that they support the anticipated effect determination of "*the proposed project will not result in the destruction or adverse modification of manatee CH*" for manatee CH.

Florida bonneted bat (FBB)

- The eastern portion of the project area is located within the FBB Consultation Area – Urban Bat Area
- Atkins summarized the findings of the 2023 FBB Survey:
    - The FBB Acoustic Survey in March-April 2023 documented no FBB calls.
    - No signs of bat activity were found for the bridge structure.
    - A potential tree roost survey (August 2023) identified 18 royal palm trees that met the size criteria for the USFWS 2019 FBB Consultation Guidelines. The roost tree survey found that no crevices were identified and that no evidence of bat use was observed. Atkins presented photographs of the 18 royal palm trees.
- Based on the lack of FBB calls during the acoustic survey, the lack of potential roost trees and poor suitability of roosting habitat within the project study area, Atkins indicated that the anticipated determination of effect for the FBB is *no effect*.
- USFWS indicated that the *no effect* determination for the FBB is supported.

4. Seagrass Mitigation
    - FDOT inquired whether USFWS was aware of any potential seagrass mitigation opportunities. USFWS did not have any seagrass mitigation opportunities to suggest.
    - FDOT would like to be kept informed of any opportunities that may be identified by Atkins since there are a number of upcoming bridge/causeway projects.

Minutes were provided to all attendees for review. Please provide comments for revision ***no later than 1/22/24 at 5:00pm EST***, otherwise the minutes are assumed to be accepted and final.



Discussion Topics

Project Overview and Description

- Project location
- Project information

Determinations of Effect

- Manatee
- Florida bonneted bat



2

Project Location





Broad Causeway Bridge Replacement
From Causeway Island to East of West Broadview Drive
Miami-Dade County

3

Purpose And Need

BRIDGE CONSTRUCTED 1951 – 72 YEARS OLD

- Ongoing extensive and costly repair projects
- Increased cost to maintain



PROJECT PURPOSE

- Identify the best solution for replacement of the existing bridge

PROJECT NEED

- Address Bridge Deficiencies
  - 2023 FDOT Bridge Inspection
  - Graded "Functionally Obsolete" by National Bridge Index
  - Bridge does not meet current road design standards
  - Undersized power generator
- Improve Safety
- Improve Flow of Traffic
- Maintain Emergency Evacuation



4

Proposed Alternatives

PROPOSED ALTERNATIVES

- No Build Alternative
- Alternative 1: 65-foot High-Level Fixed Bridge
- Alternative 2: 40-foot Mid-Level Movable Bridge

ALTERNATIVES ANALYSIS

- Alignment
- Profile (height of the bridge)
- Typical Section (view of the driver)
- Pedestrian Accommodations
- Evaluation Matrix

QR Code to Video of Proposed Build Alternatives


No Build Alternative


Alternative 1


Alternative 2

5

Alternatives Analysis - Alignment

ALTERNATIVE 1: HIGH-LEVEL FIXED BRIDGE

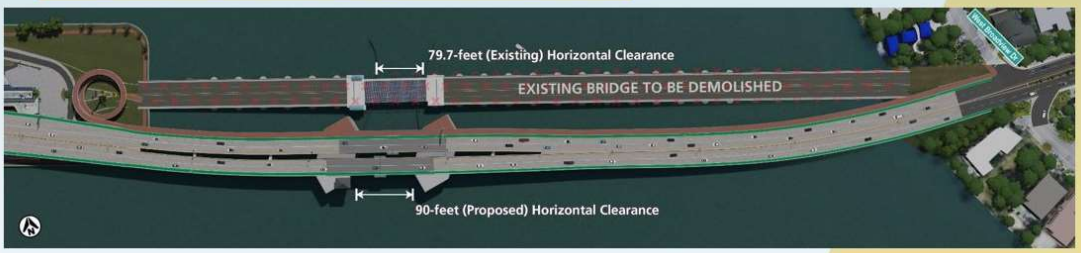



Alternative 1 – Final Condition

6

Alternatives Analysis - Alignment

ALTERNATIVE 2: MID-LEVEL MOVABLE BRIDGE



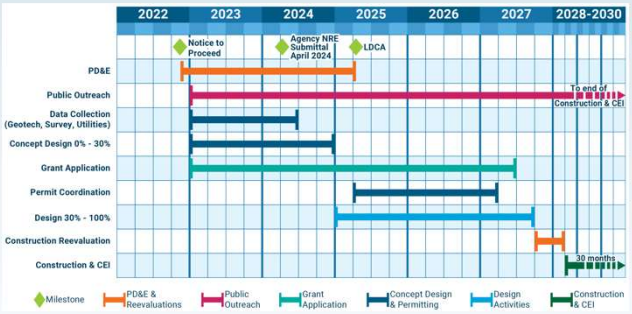


7

Anticipated Permits

- USCG Bridge Permit
- USACE Nationwide 15 Permit (including Section 408 review)
- FDEP NPDES Permit
- FDEP Contamination Stormwater Permit
- SFWMD Environmental Resource Permit
- Miami-Dade County Class I Coastal Construction Permit

Project Schedule



Natural Resources Evaluation (NRE) Report	**223 days**	**Mon 10/9/23**	**Wed 8/14/24**
Draft NRE Report	**50 days**	**Mon 10/9/23**	**Fri 12/15/23**
Prepare, QC, & Submit Draft NRE Report	33 days	Mon 10/9/23	Wed 11/22/23
Town/District Review Draft NRE Report	11 days	Fri 12/1/23	Fri 12/15/23
Revised Draft NRE Report	**78 days**	**Mon 12/18/23**	**Wed 4/3/24**
Revise, QC, & Submit Revised Draft NRE Report	28 days	Mon 12/18/23	Wed 1/24/24
Town/District Review & Submit Revised NRE Report	10 days	Thu 1/25/24	Wed 2/7/24
OEM Reviews Revised Draft NRE Report	20 days	Thu 2/8/24	Wed 3/6/24
Revise, QC, & Resubmit OEM Reviewed Draft NRE Repo	15 days	Thu 3/7/24	Wed 3/27/24
OEM Approves Revised Draft NRE Report for Agency Re	5 days	Thu 3/28/24	Wed 4/3/24
Agency Review of NRE Report	**35 days**	**Thu 4/4/24**	**Wed 5/22/24**
Agencies Review Revised NRE Report	20 days	Thu 4/4/24	Wed 5/1/24
Responses to RAIs	15 days	Thu 5/2/24	Wed 5/22/24
Final NRE Report	**63 days**	**Mon 5/20/24**	**Wed 8/14/24**
Prepare, QC, & Submit Final NRE Report	15 days	Mon 5/20/24	Fri 6/7/24
Town/District Review Final NRE Report	10 days	Mon 6/10/24	Fri 6/21/24
Revise, QC & Submit Revised Final NRE Report	10 days	Mon 6/24/24	Fri 7/5/24
Town/District Submit Final NRE Report to OEM	8 days	Mon 7/8/24	Wed 7/17/24
OEM Reviews Final NRE Report	20 days	Thu 7/18/24	Wed 8/14/24

Species Effect Determinations

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination[2]
MAMMALS				
Florida bonneted bat	*Eumops floridanus*	FE	Low[3]	*No effect*
Tricolored bat	*Perimyotis subflavus*	P(E)	Low[3]	*N/A*
West Indian manatee	*Trichechus manatus*	FT	High (CH)[4]	*May affect, not likely to adversely affect*
BIRDS				
Piping plover	*Charadrius melodus*	FT	Low	*No effect*
Wood stork	*Mycteria americana*	FT	Low	*May affect, not likely to adversely affect*
INSECTS				
Monarch butterfly	*Danaus plexippus*	C	Low	*N/A*
REPTILES				
American crocodile	*Crocodylus acutus*	FT	Low	*No effect*
Eastern indigo snake	*Drymarchon corais couperi*	FT	Low	*May affect, not likely to adversely affect*

MANATEE

Manatee

- Project area is within manatee CH
- Manatees are known to travel through the project area; however, no manatees observed within the study area during any of the field surveys
- 2023 Benthic Survey:
  - 18 seagrass beds/patches documented within the survey area (total seagrass area is 1.34 ac)







Build Alternative 1 High-Level Fixed Bridge				Build Alternative 2 Mid-Level Movable Bridge			
Direct Impact (ac)	Indirect Impact (ac)	Temporary Impact (ac)	**Total Impact (ac)**	Direct Impact (ac)	Indirect Impact (ac)	Temporary Impact (ac)	**Total Impact (ac)**
0.172	--	0.107	**0.279**	0.332	--	0.085	**0.417**

12

Anticipated Construction Activities

In-Water Work:

- Installation of the proposed bridge structures (new bridge piers and deck) – new bridge pier installation technique not yet determined (pile driving vs. drill shafts)
- Replacement of the existing seawalls
- Existing bridge demolition:
  - No blasting to be conducted for removal of the 27 bridge piers – cut at the mudline
  - Blasting will be required to remove the substructure of the two large bascule piers







Commitments & Implementation Measures

Proposed Commitments (Manatee):

- *Standard Manatee Construction Conditions for In-Water Work* will be utilized during construction.
- The NFMS *Protected Species Construction Conditions* and *Vessel Strike Avoidance Measures* will be utilized during construction.
- Manatee exclusion devices on all submerged pipes/culverts > 8 inches.
- The Town and their contractor will submit a *Blasting Plan* and acquire appropriate approvals from the USFWS, NMFS, and FWC to minimize potential effects on species prior to proceeding with construction activities. The blasting plan is expected to be consistent with the USFWS *Guidelines for the Protection of Marine Animals During the Use of Explosives in the Waters of the State of Florida*.
- Reinitiate consultation during design/permitting and development of mitigation measures to offset unavoidable impacts to manatee CH.

Proposed Implementation Measures:

- Additional seagrass survey during design phase
- Compensatory mitigation for unavoidable impacts to seagrasses. Currently developing a conceptual seagrass mitigation plan.
- A *Barge Accessibility Plan* will be developed and coordinated with agencies
- BMPs will be incorporated to minimize seagrass impacts, provide turbidity, sediment, and erosion control

14

Manatee Effect Determination

MANATEE KEY
Florida[1]
April 2013

The key is not designed to be used by the Corps' Regulatory Division for making their effect determinations for dredging projects greater than 50,000 cubic yards, the Corps' Planning Division in making their effect determinations for civil works projects or by the Corps' Regulatory Division for making their effect determinations for projects of the same relative scope as civil works projects. These types of activities must be evaluated by the Corps independently of the key.

A. Project is not located in waters accessible to manatees and does not directly or indirectly affect manatees (see Glossary).....*No effect*

Project is located in waters accessible to manatees **or** directly or indirectly affects manatees ..... B

B. Project consists of one or more of the following activities, all of which are *May affect*:

1. blasting or other detonation activity for channel deepening and/or widening, geotechnical surveys or exploration, bridge removal, movies, military shows, special events, etc.;

Since blasting is required, is it possible to arrive at a MANLAA if any specific conservation measures are incorporated?

Manatee CH – based on the proposed commitments/implementation measures:

- ***the proposed project will not result in the destruction or adverse modification of manatee CH.***

15

FLORIDA BONNETED BAT (FBB)

Florida bonneted bat (FBB)

- Eastern portion of the project area is within FBB Consultation Area – Urban Bat Area



2023 FBB Survey

- FBB Survey was conducted in 2023 - included an acoustic survey and a potential roost survey.

Acoustic survey (March - April 2023)

- 3 sites for 15 complete & 24 partial detector nights.
- Calls were analyzed by both automated analysis (Kpro) and visual call analysis by an acoustic analyst
- Results = No FBB calls were documented during the acoustic survey



18

FBB Survey

- Bridge – no signs of bat activity found.
- Potential Roost Tree Survey was conducted within the CA (August 2023)
  - 18 royal palm trees met the DBH and height criteria in the USFWS 2019 FBB Consultation Guidelines
  - Findings = no crevices identified, and no evidence of bat use was observed.

Tree #	Height (ft)	DBH (in)	Scientific Name	Common Name
1	43.5	15	*Roystonea regia*	royal palm
2	37	15.75	*Roystonea regia*	royal palm
3	38.5	13	*Roystonea regia*	royal palm
4	43.5	17	*Roystonea regia*	royal palm
5	53.5	19.25	*Roystonea regia*	royal palm
6	43.5	19	*Roystonea regia*	royal palm
7	51	18.75	*Roystonea regia*	royal palm
8	41	14	*Roystonea regia*	royal palm
9	49.5	13.75	*Roystonea regia*	royal palm
10	44.5	22.25	*Roystonea regia*	royal palm
11	48.5	21.25	*Roystonea regia*	royal palm
12	49	21.75	*Roystonea regia*	royal palm
13	45	17	*Roystonea regia*	royal palm
14	50	21	*Roystonea regia*	royal palm
15	38.5	14.75	*Roystonea regia*	royal palm
16	42	13	*Roystonea regia*	royal palm
17	41.5	16	*Roystonea regia*	royal palm
18	42	16.5	*Roystonea regia*	royal palm



FBB - Trees

Trees 1-4 on north side of Broad Causeway

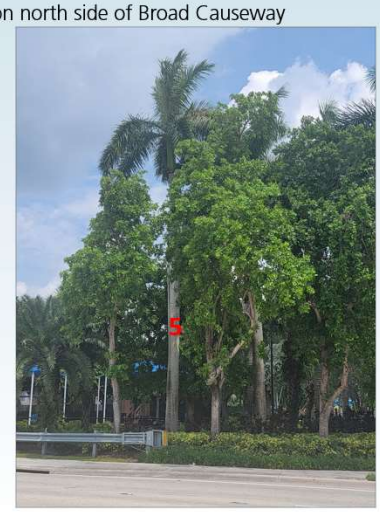






FBB - Trees

Trees 5-9 on north side of Broad Causeway





FBB - Trees

Trees 10-18 on south side of Broad Causeway





FBB

Determination of Effect

Based on lack of FBB calls, lack of potential roost trees, and poor suitability of roosting habitat within the project study area, a determination of ***no effect*** is anticipated.

23

Minutes

Project:	Broad Causeway Bridge Replacement PD&E Study		
Subject:	2023 Benthic Survey Methodology Coordination Meeting		
Meeting place:	Teams Meeting		
Date and time:	July 12, 2023 | 2:30 p.m.		
Attendees:	Kurtis Gregg Craig James Rob McMullen Wendy Lasher Beth Zimmer James Mykytka Kristi Savio	Representing:	NMFS FDOT FDOT Atkins Atkins RS&H RS&H

MINUTES:

1. Introductions: Attendees listed above.
    a. The PD&E study is being funded by the Town of Bay Harbor Islands (Town), but Federal funding will be sought for future phases. Therefore, based on Memorandum of Agreement between FHWA and FDOT, the FDOT Office of Environmental Management is approving the NEPA documents for the project. The FDOT Point of Contact is Rob McMullen.
    b. Wendy Lasher is the Consultant Assistant PM and NEPA Lead and Beth Zimmer is leading the benthic survey efforts. Atkins on behalf of the Town wanted to discuss the benthic survey methodology with the NMFS to get their input before the scheduled benthic survey on July 17 - 21, 2023.

2. Project Overview and Discussion:
    a. Atkins summarized the findings of last year's August 2022 preliminary benthic survey, presented the proposed 2023 Quantitative Benthic Survey Methodology, and showed maps of the proposed benthic survey area and transect swim locations.
    b. NMFS will complete the EFH application and is happy the Town is doing a full visual benthic survey. NMFS recommended collecting and recording visual percent cover (rather than quadrat cell counts) and they wanted to ensure the Town will have seagrass cover estimates that encompass seagrasses cover below 5%. Atkins responded that they will be recording percent cover values (rounded to the nearest 5%) for seagrass/SAV values $\geq$5% cover, and recording Braun-Blanquet density scores for seagrass/SAV percent cover <5% (which can be converted to percent cover, as needed).

c. There was a discussion concerning eco-friendly seawalls/nature-based solutions. Atkins noted that the Town is currently considering replacing the seawall. FDOT asked that the Town consider using a living seawall with natural or nature-based features. FDOT (Craig James) has some examples of environmentally friendly seawalls he can send Atkins. The Biscayne Bay SEIR is a study that gives information to manage water in the Biscayne Bay. NMFS mentioned the Miami Back Bay Feasibility Study as a good source and also referenced the Snook Island Natural Area project. FDOT stated that maybe a similar scenario could be used as a mitigation measure for seagrasses. Atkins questioned whether it would be preferable to the agencies to leave the seawall as-is, or to replace with an eco-friendly seawall. NMFS indicated that the preference would be to leave the seawall in place.
d. NMFS recommended adding an additional coral health note option for "no apparent visual coral stressors" to the coral evaluation methodology. NMFS asked what substrate are the corals on? Atkins replied that they are concentrated on the scour protection materials at the base of the seawalls and found with much lower frequency on the natural substrate. There are some attached to the seawall structure, but very few attached to the bridge structure. NMFS indicated that coral relocation is an impact minimization approach.
e. NMFS stated that sampling 1 – 5% of the documented benthic habitats containing coral (with belt transects) seems low for the coral survey. He would like to see maybe 25% of the coral habitat in the project area sampled. He referenced Long Key Bridge project which FDOT stated is much farther along in the Design/Permitting process. FDOT (Craig James) noted that a re-evaluation of this project will be required after the PD&E phase and that there will be a commitment in the PD&E to conduct additional assessments during the final Design phase. Atkins noted that a future benthic survey will be conducted in Permitting/Design phase that would be a 100% coral survey for the impact areas. Based on the discussion, NMFS indicated that for the 2023 benthic survey, a minimum sampling of 5% of the coral habitat will be sufficient, since a future 100% survey will happen in Design.
f. NMFS questioned whether there has been an analysis yet on the potential relocation areas for corals. Atkins indicated that they intend to begin this evaluation during the upcoming benthic survey.
g. NMFS noted that if Endangered Species Act (ESA) species are in the work area there will need to be a formal consultation. The August 2022 documented presence of *Orbicella franksi* within the survey area would suggest that formal consultation will be required.
h. Based on the meeting discussion, Atkins will update the 2023 Quantitative Benthic Survey Methodology and send out to NMFS and FDOT as soon as possible.

Minutes

Project:	Broad Causeway Bridge Replacement PD&E Study		
Subject:	National Marine Fisheries Service (NMFS) Technical Assistance Call - 2023 Benthic Survey Results, Determinations of Effect, and EFH Coordination		
Meeting place:	Teams Meeting		
Date and time:	December 21, 2023 | 3:00 p.m.		
Attendees:	Kurtis Gregg Craig James Megan Moore Liz Fulcher Madeline Martinez Wendy Lasher Beth Zimmer	Representing:	NMFS FDOT FDOT FDOT FDOT AtkinsReális AtkinsReális

MINUTES:

1. Introductions: Attendees listed above.

2. Project Overview and Discussion
   a. AtkinsRéalis (hereafter referred to as "Atkins") provided a project overview and summarized the findings of July-August 2023 Quantitative Benthic Survey and Natural Resource Evaluation (NRE) information concerning Determinations of Effect and Essential Fish Habitat (EFH).
   b. Benthic survey findings – seagrasses and corals were documented within the survey area. The threatened coral species *Orbicella franksi* (boulder star coral) was not observed during the 2023 benthic survey but was previously documented during the 2022 benthic survey and is potentially present within the project area in extremely low numbers.
   c. Atkins noted that they have not finalized the bridge and new seawall construction techniques yet.
   d. Existing bridge demolition - Atkins will remove the 27 bridge piers by cutting them at the mudline but will need to conduct blasting to remove the two large bascule piers.

   Species Determinations of Effect
   e. Atkins reviewed the proposed commitments and implementation measures related to protected species under NMFS jurisdiction.
   f. NMFS noted that they usually recommend that the Florida Fish and Wildlife Service (FWC) Coral and Octocoral Mitigation Relocation Recommendations be used as a guide for development of the *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges*.
   g. NMFS inquired about the proposed timeline for the project and the updated benthic survey. Atkins indicated that construction is estimated to begin in 2028. Because the scheduled start is so far out in the future, NMFS indicated that re-initiation of consultation with NMFS would be required during design/ permitting.

h. FDOT questioned whether the *Water Quality(WQ)/Turbidity Monitoring Plan* is a standard requirement and whether it should be a commitment rather than an implementation measure. NMFS stated that Chapter 18-18 FAC – Biscayne Bay Aquatic Preserve Code says WQ must be met.
   - **NOTE:** Subsequent to this meeting, Atkins reviewed this issue further. Based upon the South Florida Water Management District's *Procedure for Environmental Resource Permit Water Quality Evaluations for Applications Involving Discharges to Outstanding Florida Waters (OFW) and Water Bodies that Do Not Meet State Water Quality Standards* and the Florida Department of Environmental Protection's *Turbidity Monitoring Form* Instructions, it is Atkins' understanding that development of the *Water Quality(WQ)/Turbidity Monitoring Plan* is a standard requirement within an OFW and should thus be considered an Implementation Measure for this project.

i. NMFS indicated that they would like to review the seagrass UMAM worksheets. Atkins noted that they are provided in the NRE.
j. Atkins is currently in the process of preparing conceptual mitigation plans for corals and seagrasses.
k. Species Effect Determinations for motile species are based on whether project blasting will occur.
l. Atkins asked if it is possible to have a MANLAA if any specific conservation measures are incorporated?
   - NMFS noted that it should be investigated whether there is an environmental window where certain managed species would not be present in the project area. If species are not present during certain times of the year (migration, sea turtle nesting season, etc.) then we can likely arrive at a MANLAA if the construction schedule will blast during that period.
   - NMFS requested that additional research concerning this window be conducted.
   - Atkins indicated there is no suitable nesting habitat for sea turtles within the project area.
   - NMFS indicated that the Nassau grouper should be added to the managed species list because they can be affected by blasting (swim bladder rupture).
   - NMFS mentioned smalltooth sawfish are not affected by pile driving (as they lack a swim bladder) so we need to look into whether they are affected by blasting.
   - NMFS indicated that entanglement and vessel strikes are concerns for the smalltooth sawfish and giant manta ray. Impact can be minimized by having species observers during construction.
   - FDOT asked whether pile driving would result in an incidental take. NMFS indicated that pile driving doesn't automatically result in a formal consultation requirement and noise reduction measures can be implemented to reduce noise levels to below thresholds.
   - NMFS indicated they will need additional information on construction methods/details in order to complete noise impact calculations.
m. FDOT asked if Atkins included the removal of existing bridge in calculations for benefits? Atkins indicated that they did include the area of the existing bridge footprint in the NRE as an area of potential recruitment for seagrasses and/or corals.

Corals

n. Atkins questioned whether the commitment to relocate all listed corals colonies prior to construction would result in MANLAA for the *Orbicella* spp.? NMFS indicated that that approach holds merit, and the supervisors would make final decision.
o. NMFS recommended in the NRE to not make the effects determination for green sea turtle critical habitat.

EFH

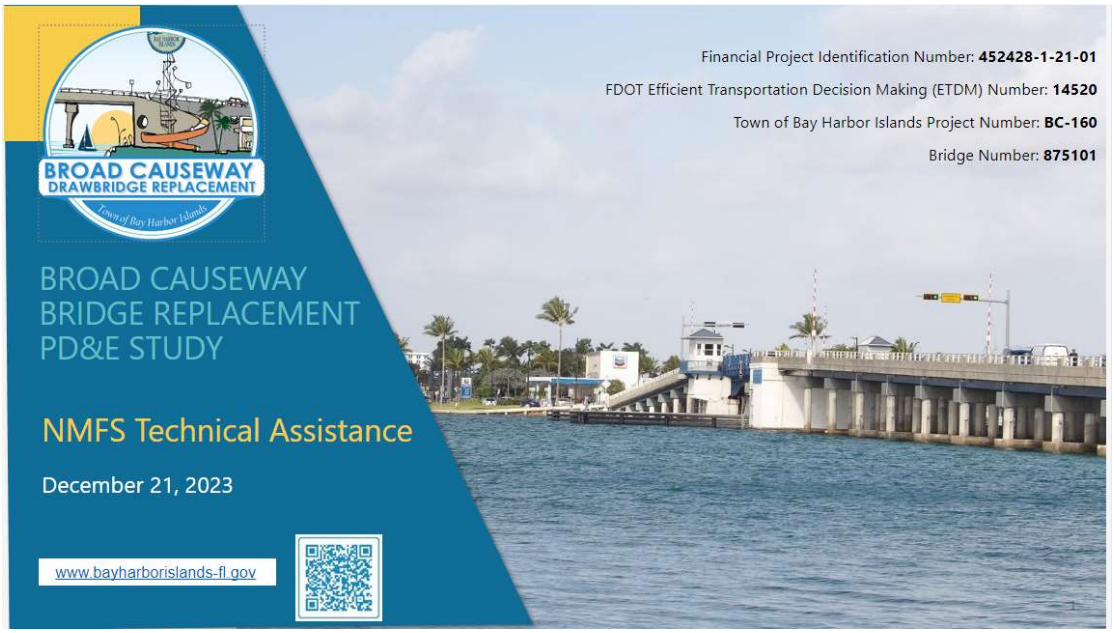
p. Atkins indicated that the occasional mangroves propagules and saplings within the riprap along the causeway island were not considered EFH since they do not provide any habitat for managed species.

q. NMFS stated that red drum is no longer Federally managed. References to the red drum Fishery Management Plan should be removed from the NRE and the red drum should not be included in the managed species list. NMFS acknowledges the importance of the red drum, but they do not consult on this species.
r. Community 3 Live Bottom is dominated by sponges, with 8 scleractinian coral species and 2 octocoral general. NMFS advised to address in the NRE that shading impacts on the Live Bottom community would be minimal since it is dominated by sponges which won't be affected by shading.
s. NMFS stated that if the Town would consider mangrove planters for the new seawall, NMFS would consider EFH restoration on-site and would not consider additional mangrove mitigation needed.

Action Items:

- Atkins and NMFS will conduct research on environmental windows for blasting. NMFS recommended reviewing the species framework documents on the Protected Resources Division website. NMFS will also discuss this with supervisors and see if blasting will elevate to a Formal Consultation.
- Have another meeting with NMFS after this information is obtained.

Minutes were provided to all attendees for review. Please provide comments for revision ***no later than 1/17/24 at 5:00pm EST***, otherwise the minutes are assumed to be accepted and final.



Discussion Topics

1. **Results of 2023 Quantitative Benthic Survey**
2. **Determinations of Effect**
   - **Sea turtles**
   - **Giant manta ray**
   - **Smalltooth sawfish**
   - ***Orbicella* spp. corals**
3. **Essential Fish Habitat**



2

Project Location





Broad Causeway Bridge Replacement
From Causeway Island to East of West Broadview Drive
Miami-Dade County

3

Purpose And Need

BRIDGE CONSTRUCTED 1951 – 72 YEARS OLD

- Ongoing extensive and costly repair projects
- Increased cost to maintain



PROJECT PURPOSE

- Identify the best solution for replacement of the existing bridge

PROJECT NEED

- Address Bridge Deficiencies
  - 2023 FDOT Bridge Inspection
  - Graded "Functionally Obsolete" by National Bridge Index
  - Bridge does not meet current road design standards
  - Undersized power generator
- Improve Safety
- Improve Flow of Traffic
- Maintain Emergency Evacuation



4

Proposed Alternatives

PROPOSED ALTERNATIVES

- No Build Alternative
- Alternative 1: 65-foot High-Level Fixed Bridge
- Alternative 2: 40-foot Mid-Level Movable Bridge

ALTERNATIVES ANALYSIS

- Alignment
- Profile (height of the bridge)
- Typical Section (view of the driver)
- Pedestrian Accommodations
- Evaluation Matrix

QR Code to Video of Proposed Build Alternatives



No Build Alternative



Alternative 1



Alternative 2

5

Alternatives Analysis - Alignment

ALTERNATIVE 1: HIGH-LEVEL FIXED BRIDGE

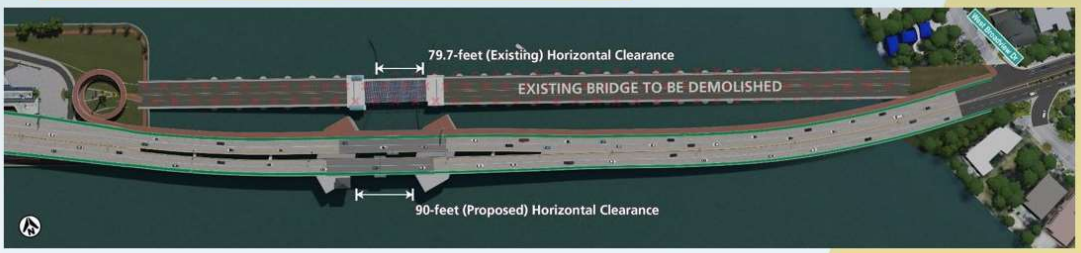




6

Alternatives Analysis - Alignment

ALTERNATIVE 2: MID-LEVEL MOVABLE BRIDGE





7

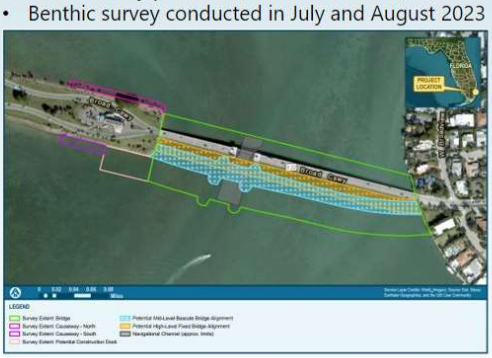
2023 QUANTITATIVE BENTHIC SURVEY

2023 Quantitative Benthic Survey - Methods

- Preliminary benthic survey conducted in Aug 2022
- NMFS survey protocol coordination on 7/12/2023
- Benthic survey conducted in July and August 2023

Qualitative data collection

- Transect swims – general habitat types and species observations





9

2023 Quantitative Benthic Survey - Methods

Quantitative seagrass data collection

- Seagrass edge-of-bed delineation
- *In-situ* SAV quadrats - 161 1-m^2 quadrats were conducted using a stratified random sampling design
- Sampled ~3% of the documented seagrass area



10

2023 Quantitative Benthic Survey - Methods

Quantitative coral data collection

- Coral data collection size criteria:
  - Scleractinian (stony) corals: ≥ 5 cm in diameter
  - Octocorals (soft corals): ≥ 10 cm in height
  - All colonies of listed coral species regardless of size
- Existing seawalls and bridge piers - 100% visual coral survey
- 19 haphazard coral belt transects (~280 m^2 or ~7.48% of the total benthic coral habitat area):
- Recorded:
  - Coral colony species and size (max diameter/height)
  - Colony health info (e.g., bleaching, paling, disease, predation, macroalgal or sponge overgrowth, or no apparent visual coral stressors, etc.)



11

2023 Quantitative Benthic Survey - Results

Benthic Community Types - 5 benthic community types were documented within the survey area





Seagrass – Quantitative Data Results

Seagrass (Community 2) - 18 seagrass beds/patches documented within the survey area (total seagrass area is 1.34 ac)

Mean total percent cover of seagrass across 161 quadrats

- *Halophila decipiens* (paddle grass): ~5.85%
- *Syringodium filiforme* (manatee grass): ~2.42%
- *Thalassia testudinum* (turtle grass) ~1.34%

The mean total percent cover of macroalgae within all 161 SAV quadrats was substantial (~64.88%).

Build Alternative 1 High-Level Fixed Bridge				Build Alternative 2 Mid-Level Movable Bridge			
Direct Impact (ac)	Indirect Impact (ac)	Temporary Impact (ac)	**Total Impact (ac)**	Direct Impact (ac)	Indirect Impact (ac)	Temporary Impact (ac)	**Total Impact (ac)**
0.172	--	0.107	**0.279**	0.332	--	0.085	**0.417**



Corals – Quantitative Data Results

Live Bottom (Community 3)

- 33 colonies documented within the 8 coral belt transects
  - 8 scleractinian coral species
  - 2 octocoral genera
- Mean coral density of 0.21 colonies/m^2
- ~69.70% of the 33 coral colonies showed visual signs of corals stress
- The most common visual coral stressor was colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted nearly half of the colonies (~48.48%)



Coral Type	Coral Species	Entire Community 3		
		Total No. Coral Colonies	Percentage	Mean Colony Maximum Diameter/Height (cm)
Scleractinian Corals	*Siderastrea radians*	8	24.24%	7.00
	Siderastrea siderea	2	6.06%	5.50
	Solenastrea bournoni	16	48.48%	12.06
	Solenastrea hyades	2	6.06%	17.50
	Oculina diffusa	1	3.03%	13.00
	Stephanocoenia intersepta	1	3.03%	7.00
	Porites astreoides	1	3.03%	17.00
	Pseudodiploria clivosa	1	3.03%	17.00
Octocorals	*Antillogorgia* sp.	1	3.03%	34.00
Total for Community 3		**33**	**100.00%**	**N/A**

*Excluding *Carijoa riisei*

Corals – Quantitative Data Results

Coral Habitat Adjacent to the Seawalls (Community 4)

- 564 colonies documented within the 11 coral belt transects
  - 3 scleractinian coral species
  - 2 octocoral genera
- Mean coral density of ~4.70 colonies/m^2
- ~70.57% of the 564 coral colonies showed visual signs of corals stress
- The most common visual coral stressor was macroalgal overgrowth which impacted the majority of colonies (~51.42%)



Coral Type	Coral Species	Entire Community 4		
		Total No. Coral Colonies	Percentage	Mean Colony Maximum Diameter/Height (cm)
Scleractinian Corals	*Siderastrea radians*	546	96.81%	8.22
	Siderastrea siderea	--	--	--
	Solenastrea bournoni	7	1.24%	20.00
	Solenastrea hyades	--	--	--
	Oculina diffusa	4	0.71%	7.25
	Stephanocoenia intersepta	--	--	--
	Porites astreoides	--	--	--
	Pseudodiploria clivosa	--	--	--
Octocorals	*Antillogorgia* sp.	6	1.06%	35.50
	Leptogorgia sp.	1	0.18%	33.00
	Carijoa riisei present (Y/N)	--	--	--
Total No. Colonies		**564**	**100.00%**	**--**

Corals – Quantitative Data Results

Existing Seawalls and Bridge Piers (Community 5)

Existing Seawalls

- 427 colonies documented on the seawalls
  - 2 scleractinian coral species (*S. radians, O. diffusa*)
  - 1 octocoral genera (*C. riisei*)
- Mean coral density of ~0.82 colonies per linear meter
- ~70.02% of the 427 coral colonies showed visual signs of corals stress
- The most common visual coral stressor was colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted nearly half of the recorded colonies (~47.08%)

Existing Bridge Piers

- 11 scleractinian coral colonies (4 *S. radians,* 4 *O. diffusa,* and 3 *S. bournoni*)
- 1 octocoral genera (*C. riisei*)
- ~81.82% of the 11 coral colonies showed visual signs of corals stress (partial/full bleaching)



Seawall Location	Total No. Coral Colonies	*Siderastrea radians*		*Oculina diffusa*		*Carijoa riisei* Present (Y/N)	Coral Species Richness	Mean No. Colonies Per Linear Meter of Seawall
		No. Colonies	Percentage of Colonies	No. Colonies	Percentage of Colonies			
All Seawalls	427	407	95.32%	20	4.68%	Yes	3	0.82

Listed Species

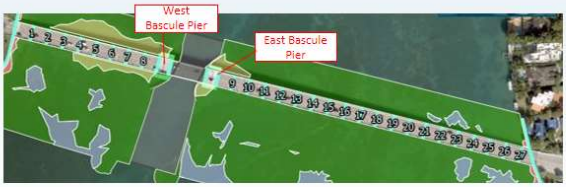
- No listed corals were observed within the survey area during the 2023 benthic survey.
- However, during the 2022 preliminary benthic survey area, two individual colonies of the federally threatened *Orbicella franksi* (boulder star coral) were previously observed on the benthic substrate. Thus, this species is potentially present within the project area in extremely low numbers.
- No other listed species were observed during any of the surveys.

SPECIES DETERMINATIONS OF EFFECT

Anticipated Construction Activities

In-Water Work:

- Installation of the proposed bridge structures (new bridge piers and deck) – new bridge pier installation technique not yet determined (pile driving vs. drill shafts)
- Replacement of the existing seawalls
- Existing bridge demolition:
  - No blasting to be conducted for removal of the 27 bridge piers – cut at the mudline
  - Blasting will be required to remove the substructure of the two large bascule piers





Commitments

Proposed Commitments:

- *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office*
- *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office*
- During final design, an updated benthic survey will be conducted to identify listed coral species and to inventory corals and barrel sponges suitable for relocation prior to construction. The coral survey protocol will be coordinated with NMFS. A *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* will be developed and coordinated with the NMFS during permitting.
- A *Blasting Plan* will be developed to minimize potential effects on species prior to proceeding with construction activities (to be consistent with the USFWS *Guidelines for the Protection of Marine Animals During the Use of Explosives in the Waters of the State of Florida*)
- Reinitiate consultation with NMFS during design/permitting for the boulder star coral and development of mitigation measures to offset unavoidable impacts to corals.

20

Implementation Measures

Proposed Implementation Measures:

- Additional seagrass survey during design phase (protocol coordinated with NMFS prior to completion)
- Compensatory mitigation will be provided for unavoidable impacts to seagrasses. A *Seagrass Mitigation Plan* will be developed and approved by NMFS and other agencies
- A *Barge Accessibility Plan* depicting the locations of barge work channels and barge exclusion zones will be prepared during permitting and coordinated with NMFS.
- BMPs will be incorporated to minimize impacts to corals, wetlands, seagrass, and managed species and provide turbidity, sediment, and erosion control.
- A *Water Quality/Turbidity Monitoring Plan* will be developed and implemented during construction to ensure turbidity levels beyond containment measures are maintained at 0 NTUs above ambient (background) levels.
- A *Bridge Demolition/Debris Containment Plan*, which also includes a disposal plan for all the bridge materials, will be developed during design and provided to NMFS for review and approval.

21

Species Effect Determinations

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination
		REPTILES		
Green sea turtle	*Chelonia mydas*	FT	Moderate (PCH)	*May affect, not likely to adversely affect*
Hawksbill sea turtle	*Eretmochelys imbricata*	FE	Moderate	*May affect, not likely to adversely affect*
Leatherback sea turtle	*Dermochelys coriacea*	FE	Low	*No effect*
Loggerhead sea turtle	*Caretta caretta*	FT	Low	*May affect, not likely to adversely affect*
		FISH		
Giant manta ray	*Manta birostris*	FT	Low	*May affect, not likely to adversely affect*
Smalltooth sawfish	*Pristis pectinata*	FE	Low	*May affect, not likely to adversely affect*
		CORALS		
Boulder star coral	*Orbicella franksi*	FT	High	*May affect, not likely to adversely affect*
Elkhorn coral	*Acropora palmata*	FT	Low	*No effect*
Lobed star coral	*Orbicella annularis*	FT	Moderate	*May affect, not likely to adversely affect*
Mountainous star coral	*Orbicella faveolata*	FT	Moderate	*May affect, not likely to adversely affect*
Pillar coral	*Dendrogyra cylindrus*	FT	Low	*No effect*
Rough cactus coral	*Mycetophyllia ferox*	FT	Low	*No effect*
Staghorn coral	*Acropora cervicornis*	FT	Low	*No effect*

As blasting is required, is it possible to arrive at a MANLAA if any specific conservation measures are incorporated?

Does commitment to relocate all listed coral colonies prior to construction result in a MANLAA?

Critical Habitat - project area is located within the proposed CH for the green sea turtle. No suitable nesting habitat, *Seagrass Mitigation Plan, Protected Species Construction Conditions, Vessel Strike Avoidance Measures, Blasting Plan*

22

Essential Fish Habitat (EFH)

Mangroves

- Occasional mangrove propagules and saplings (no mature trees) noted within the riprap along the causeway island.
- These mangroves are not considered EFH - very small and do not provide canopy or any substantial root structure that would provide any significant habitat for managed species.
- Impacts to the riprap shoreline will be revaluated during permitting and any impacts to mangroves will be addressed.





EFH and HAPC

- Project area overlaps designated EFH and HAPC for six Fishery Management Plans: Penaeid Shrimp; Snapper-Grouper Complex; Spiny Lobster; Red Drum, Coastal Migratory Pelagics; and Coral, Coral Reefs and Live/Hard Bottom Habitat.

EFH Type	FMP	Community Types Present
Estuarine Water Column	Coastal Migratory Pelagics, Highly Migratory Species	1,2,3,4,5
Estuarine and Marine Submerged SAV (Seagrass and Macroalgae)	Shrimp, Snapper-Grouper, Spiny Lobster, Red Drum, Coastal Migratory Pelagics, Highly Migratory Species	1,2,3,4
Algal Communities (*Laurencia*)	Spiny Lobster	1,2
Live Bottom	Snapper-Grouper, Spiny Lobster, Highly Migratory Species, Coral and Coral Reefs	3,4
Rough, Hard, Exposed, Stable Substrate	Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region	3,4
Sponges	Spiny Lobster	1,2,3,4,5
Unconsolidated Estuarine Bottom	Shrimp, Snapper-Grouper, Red Drum	1, 2,3,4

HAPC	Managed Species/Group
Biscayne Bay	Spiny Lobster Coral, Coral Reefs and Live/hard Bottom Habitat
SAV / Seagrass	Penaeid Shrimp Snapper-Grouper Complex Spiny Lobster Red Drum Coastal Migratory Pelagics
Coral, Coral Reefs and Live/Hard Bottom Habitat	Corals Spiny Lobster

Summary of Impacts to EFH

Habitat[1]		Impact Type	Build Alternative 1 High-Level Fixed Bridge	Build Alternative 2 Mid-Level Movable Bridge[2]
Estuarine Water Column EFH	Estuarine Water Column	Permanent – Bridge Piers	4,343 cubic feet	67,721 cubic feet
		Temporary	--	--
Estuarine and Marine Submerged SAV EFH	Community 1 SAV (macroalgal beds)	Permanent - Bridge Piers, Shading	2.74 ac	3.03 ac
		Temporary – 25-foot Construction Buffer	1.00 ac	1.64 ac
	Community 2 SAV (seagrass)	Permanent – Bridge Piers, Shading	0.17 ac	0.33 ac
		Temporary – 25-foot Construction Buffer	0.11 ac	0.09 ac
Coral, Coral Reefs, and Live/hard Bottom Habitat EFH	Community 3 Live Bottom	Permanent – Bridge Piers, Shading	0.12 ac	0.02 ac
		Temporary – 25-foot Construction Buffer	0.04 ac	0.07 ac
	Community 4 Coral Habitat Adjacent to Seawalls	Permanent – Seawall Replacement	0.44 ac	0.44 ac
		Temporary	--	--
	Community 5 Existing Seawalls and Bridge Piers	Permanent – Seawall Replacement and Bridge Pier Demolition	1,703 linear feet of seawall Remove all 29 bridge piers	1,703 linear feet of seawall Remove all 29 bridge piers
		Temporary	--	--
Total Direct Impacts		**Permanent**	**4,343 cubic feet** (Estuarine Water Column) **3.47 ac** (Communities 1-4) **1,703 linear feet** (seawall) **Remove all 29 bridge piers**	**67,721 cubic feet** (Estuarine Water Column) **3.82 ac** (Communities 1-4) **1,703 linear feet** (seawall) **Remove all 29 bridge piers**
		Temporary	**1.15 ac** (Communities 1-3)	**1.80 ac (Communities 1-3)**

[1]Note that Unconsolidated Estuarine Bottom EFH was not delineated during the 2023 quantitative benthic survey because the extent of non-vegetated sediments within the project study area is minimal and these areas are scattered within the various habitats.
[2]Estuarine water column impacts for Build Alternative 2 is an underestimate of impacts, as they were calculated based on the volume of submerged bascule piers only (dimensions/locations of the mid-level bascule intermediate bridge piers are not available at this time).

Avoidance and Minimization

- Selection of the High-level Fixed Bridge as the Preferred Alternative minimizes impacts to estuarine water column EFH, macroalgal beds (SAV) EFH, and seagrass (SAV) EFH
- Existing bridge piers will be cut at the mudline to avoid the need for dredging/filling
- Currently, there is no treatment of stormwater runoff. Proposed stormwater improvements will enhance WQ by providing stormwater treatment.
- Town is considering incorporation of nature-based solutions associated with the seawall replacement
- Barge spudding/staging locations will be carefully selected to minimize seagrass/coral impacts. A *Barge Accessibility Plan* will be developed and approved by NMFS.
- During design, potential minimization for underwater noise impacts will be examined (e.g., high density cushion blocks, bubble curtains, and utilization of the ramp up or vibratory installation methodology for pile driving)
- Prior to construction start, seagrasses in the vicinity of the project footprint will be delineated and marked with visible buoys.
- A *Bridge Demolition/Debris Containment Plan* will be developed during design for NMFS review and approval.
- A *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* will be developed and coordinated with the NMFS during permitting.

EFH Determination of Effect

- On the basis of the avoidance and minimization measures to be implemented for this project, along with the compensatory mitigation to be conducted for impacts to seagrass and corals, the project's impact on EFH is anticipated to be "**more than minimal but less than substantial**."

Minutes

Project:	Broad Causeway Bridge Replacement PD&E Study		
Subject:	National Marine Fisheries Service (NMFS) Technical Assistance Call - 2023 Benthic Survey Results, Determinations of Effect, and EFH Coordination		
Meeting place:	Teams Meeting		
Date and time:	December 21, 2023 | 3:00 p.m.		
Attendees:	Kurtis Gregg Craig James Megan Moore Liz Fulcher Madeline Martinez Wendy Lasher Beth Zimmer	Representing:	NMFS FDOT FDOT FDOT FDOT AtkinsReális AtkinsReális

MINUTES:

1. Introductions: Attendees listed above.

2. Project Overview and Discussion
   a. AtkinsRéalis (hereafter referred to as "Atkins") provided a project overview and summarized the findings of July-August 2023 Quantitative Benthic Survey and Natural Resource Evaluation (NRE) information concerning Determinations of Effect and Essential Fish Habitat (EFH).
   b. Benthic survey findings – seagrasses and corals were documented within the survey area. The threatened coral species *Orbicella franksi* (boulder star coral) was not observed during the 2023 benthic survey but was previously documented during the 2022 benthic survey and is potentially present within the project area in extremely low numbers.
   c. Atkins noted that they have not finalized the bridge and new seawall construction techniques yet.
   d. Existing bridge demolition - Atkins will remove the 27 bridge piers by cutting them at the mudline but will need to conduct blasting to remove the two large bascule piers.

   Species Determinations of Effect
   e. Atkins reviewed the proposed commitments and implementation measures related to protected species under NMFS jurisdiction.
   f. NMFS noted that they usually recommend that the Florida Fish and Wildlife Service (FWC) Coral and Octocoral Mitigation Relocation Recommendations be used as a guide for development of the *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges*.
   g. NMFS inquired about the proposed timeline for the project and the updated benthic survey. Atkins indicated that construction is estimated to begin in 2028. Because the scheduled start is so far out in the future, NMFS indicated that re-initiation of consultation with NMFS would be required during design/ permitting.

h. FDOT questioned whether the *Water Quality(WQ)/Turbidity Monitoring Plan* is a standard requirement and whether it should be a commitment rather than an implementation measure. NMFS stated that Chapter 18-18 FAC – Biscayne Bay Aquatic Preserve Code says WQ must be met.
   - **NOTE:** Subsequent to this meeting, Atkins reviewed this issue further. Based upon the South Florida Water Management District's *Procedure for Environmental Resource Permit Water Quality Evaluations for Applications Involving Discharges to Outstanding Florida Waters (OFW) and Water Bodies that Do Not Meet State Water Quality Standards* and the Florida Department of Environmental Protection's *Turbidity Monitoring Form* Instructions, it is Atkins' understanding that development of the *Water Quality(WQ)/Turbidity Monitoring Plan* is a standard requirement within an OFW and should thus be considered an Implementation Measure for this project.

i. NMFS indicated that they would like to review the seagrass UMAM worksheets. Atkins noted that they are provided in the NRE.
j. Atkins is currently in the process of preparing conceptual mitigation plans for corals and seagrasses.
k. Species Effect Determinations for motile species are based on whether project blasting will occur.
l. Atkins asked if it is possible to have a MANLAA if any specific conservation measures are incorporated?
   - NMFS noted that it should be investigated whether there is an environmental window where certain managed species would not be present in the project area. If species are not present during certain times of the year (migration, sea turtle nesting season, etc.) then we can likely arrive at a MANLAA if the construction schedule will blast during that period.
   - NMFS requested that additional research concerning this window be conducted.
   - Atkins indicated there is no suitable nesting habitat for sea turtles within the project area.
   - NMFS indicated that the Nassau grouper should be added to the managed species list because they can be affected by blasting (swim bladder rupture).
   - NMFS mentioned smalltooth sawfish are not affected by pile driving (as they lack a swim bladder) so we need to look into whether they are affected by blasting.
   - NMFS indicated that entanglement and vessel strikes are concerns for the smalltooth sawfish and giant manta ray. Impact can be minimized by having species observers during construction.
   - FDOT asked whether pile driving would result in an incidental take. NMFS indicated that pile driving doesn't automatically result in a formal consultation requirement and noise reduction measures can be implemented to reduce noise levels to below thresholds.
   - NMFS indicated they will need additional information on construction methods/details in order to complete noise impact calculations.
m. FDOT asked if Atkins included the removal of existing bridge in calculations for benefits? Atkins indicated that they did include the area of the existing bridge footprint in the NRE as an area of potential recruitment for seagrasses and/or corals.

Corals

n. Atkins questioned whether the commitment to relocate all listed corals colonies prior to construction would result in MANLAA for the *Orbicella* spp.? NMFS indicated that that approach holds merit, and the supervisors would make final decision.
o. NMFS recommended in the NRE to not make the effects determination for green sea turtle critical habitat.

EFH

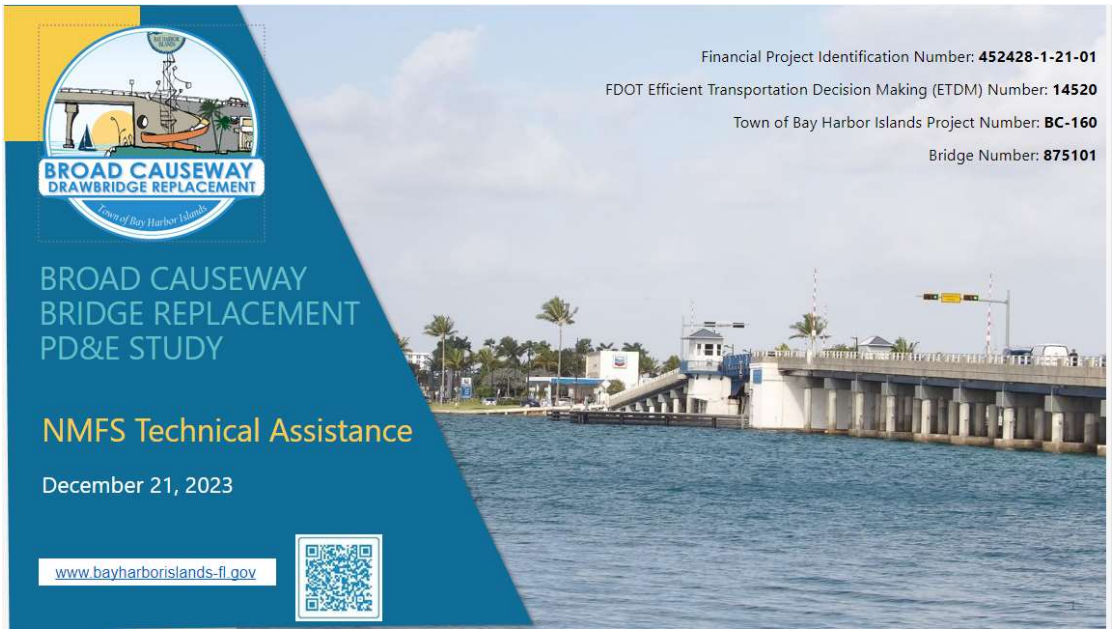
p. Atkins indicated that the occasional mangroves propagules and saplings within the riprap along the causeway island were not considered EFH since they do not provide any habitat for managed species.

q. NMFS stated that red drum is no longer Federally managed. References to the red drum Fishery Management Plan should be removed from the NRE and the red drum should not be included in the managed species list. NMFS acknowledges the importance of the red drum, but they do not consult on this species.
r. Community 3 Live Bottom is dominated by sponges, with 8 scleractinian coral species and 2 octocoral general. NMFS advised to address in the NRE that shading impacts on the Live Bottom community would be minimal since it is dominated by sponges which won't be affected by shading.
s. NMFS stated that if the Town would consider mangrove planters for the new seawall, NMFS would consider EFH restoration on-site and would not consider additional mangrove mitigation needed.

Action Items:

- Atkins and NMFS will conduct research on environmental windows for blasting. NMFS recommended reviewing the species framework documents on the Protected Resources Division website. NMFS will also discuss this with supervisors and see if blasting will elevate to a Formal Consultation.
- Have another meeting with NMFS after this information is obtained.

Minutes were provided to all attendees for review. Please provide comments for revision ***no later than 1/17/24 at 5:00pm EST***, otherwise the minutes are assumed to be accepted and final.



Discussion Topics

1. **Results of 2023 Quantitative Benthic Survey**
2. **Determinations of Effect**
   - **Sea turtles**
   - **Giant manta ray**
   - **Smalltooth sawfish**
   - ***Orbicella* spp. corals**
3. **Essential Fish Habitat**



2

Project Location





Broad Causeway Bridge Replacement
From Causeway Island to East of West Broadview Drive
Miami-Dade County

3

Purpose And Need

BRIDGE CONSTRUCTED 1951 – 72 YEARS OLD

- Ongoing extensive and costly repair projects
- Increased cost to maintain



PROJECT PURPOSE

- Identify the best solution for replacement of the existing bridge

PROJECT NEED

- Address Bridge Deficiencies
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Alternative 1



Alternative 2

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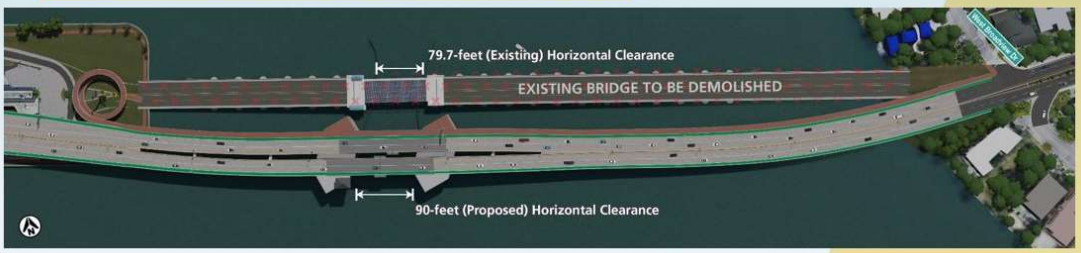




6

Alternatives Analysis - Alignment

ALTERNATIVE 2: MID-LEVEL MOVABLE BRIDGE





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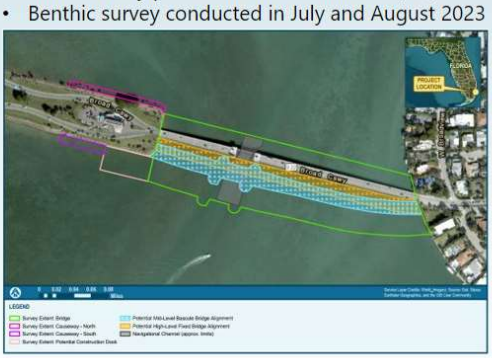
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- Recorded:
  - Coral colony species and size (max diameter/height)
  - Colony health info (e.g., bleaching, paling, disease, predation, macroalgal or sponge overgrowth, or no apparent visual coral stressors, etc.)



11

2023 Quantitative Benthic Survey - Results

Benthic Community Types - 5 benthic community types were documented within the survey area





Seagrass – Quantitative Data Results

Seagrass (Community 2) - 18 seagrass beds/patches documented within the survey area (total seagrass area is 1.34 ac)

Mean total percent cover of seagrass across 161 quadrats

- *Halophila decipiens* (paddle grass): ~5.85%
- *Syringodium filiforme* (manatee grass): ~2.42%
- *Thalassia testudinum* (turtle grass) ~1.34%

The mean total percent cover of macroalgae within all 161 SAV quadrats was substantial (~64.88%).

Build Alternative 1 High-Level Fixed Bridge				Build Alternative 2 Mid-Level Movable Bridge			
Direct Impact (ac)	Indirect Impact (ac)	Temporary Impact (ac)	**Total Impact (ac)**	Direct Impact (ac)	Indirect Impact (ac)	Temporary Impact (ac)	**Total Impact (ac)**
0.172	--	0.107	**0.279**	0.332	--	0.085	**0.417**



Corals – Quantitative Data Results

Live Bottom (Community 3)

- 33 colonies documented within the 8 coral belt transects
  - 8 scleractinian coral species
  - 2 octocoral genera
- Mean coral density of 0.21 colonies/m^2
- ~69.70% of the 33 coral colonies showed visual signs of corals stress
- The most common visual coral stressor was colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted nearly half of the colonies (~48.48%)



Coral Type	Coral Species	Entire Community 3		
		Total No. Coral Colonies	Percentage	Mean Colony Maximum Diameter/Height (cm)
Scleractinian Corals	*Siderastrea radians*	8	24.24%	7.00
	Siderastrea siderea	2	6.06%	5.50
	Solenastrea bournoni	16	48.48%	12.06
	Solenastrea hyades	2	6.06%	17.50
	Oculina diffusa	1	3.03%	13.00
	Stephanocoenia intersepta	1	3.03%	7.00
	Porites astreoides	1	3.03%	17.00
	Pseudodiploria clivosa	1	3.03%	17.00
Octocorals	*Antillogorgia* sp.	1	3.03%	34.00
Total for Community 3		**33**	**100.00%**	**N/A**

*Excluding *Carijoa riisei*

Corals – Quantitative Data Results

Coral Habitat Adjacent to the Seawalls (Community 4)

- 564 colonies documented within the 11 coral belt transects
  - 3 scleractinian coral species
  - 2 octocoral genera
- Mean coral density of ~4.70 colonies/m^2
- ~70.57% of the 564 coral colonies showed visual signs of corals stress
- The most common visual coral stressor was macroalgal overgrowth which impacted the majority of colonies (~51.42%)



Coral Type	Coral Species	Entire Community 4		
		Total No. Coral Colonies	Percentage	Mean Colony Maximum Diameter/Height (cm)
Scleractinian Corals	*Siderastrea radians*	546	96.81%	8.22
	Siderastrea siderea	--	--	--
	Solenastrea bournoni	7	1.24%	20.00
	Solenastrea hyades	--	--	--
	Oculina diffusa	4	0.71%	7.25
	Stephanocoenia intersepta	--	--	--
	Porites astreoides	--	--	--
	Pseudodiploria clivosa	--	--	--
Octocorals	*Antillogorgia* sp.	6	1.06%	35.50
	Leptogorgia sp.	1	0.18%	33.00
	Carijoa riisei present (Y/N)	--	--	--
Total No. Colonies		**564**	**100.00%**	**--**

Corals – Quantitative Data Results

Existing Seawalls and Bridge Piers (Community 5)

Existing Seawalls

- 427 colonies documented on the seawalls
  - 2 scleractinian coral species (*S. radians, O. diffusa*)
  - 1 octocoral genera (*C. riisei*)
- Mean coral density of ~0.82 colonies per linear meter
- ~70.02% of the 427 coral colonies showed visual signs of corals stress
- The most common visual coral stressor was colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted nearly half of the recorded colonies (~47.08%)

Existing Bridge Piers

- 11 scleractinian coral colonies (4 *S. radians,* 4 *O. diffusa,* and 3 *S. bournoni*)
- 1 octocoral genera (*C. riisei*)
- ~81.82% of the 11 coral colonies showed visual signs of corals stress (partial/full bleaching)



Seawall Location	Total No. Coral Colonies	*Siderastrea radians*		*Oculina diffusa*		*Carijoa riisei* Present (Y/N)	Coral Species Richness	Mean No. Colonies Per Linear Meter of Seawall
		No. Colonies	Percentage of Colonies	No. Colonies	Percentage of Colonies			
All Seawalls	427	407	95.32%	20	4.68%	Yes	3	0.82

Listed Species

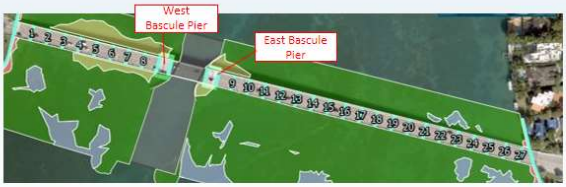
- No listed corals were observed within the survey area during the 2023 benthic survey.
- However, during the 2022 preliminary benthic survey area, two individual colonies of the federally threatened *Orbicella franksi* (boulder star coral) were previously observed on the benthic substrate. Thus, this species is potentially present within the project area in extremely low numbers.
- No other listed species were observed during any of the surveys.

SPECIES DETERMINATIONS OF EFFECT

Anticipated Construction Activities

In-Water Work:

- Installation of the proposed bridge structures (new bridge piers and deck) – new bridge pier installation technique not yet determined (pile driving vs. drill shafts)
- Replacement of the existing seawalls
- Existing bridge demolition:
  - No blasting to be conducted for removal of the 27 bridge piers – cut at the mudline
  - Blasting will be required to remove the substructure of the two large bascule piers





Commitments

Proposed Commitments:

- *Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office*
- *Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office*
- During final design, an updated benthic survey will be conducted to identify listed coral species and to inventory corals and barrel sponges suitable for relocation prior to construction. The coral survey protocol will be coordinated with NMFS. A *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* will be developed and coordinated with the NMFS during permitting.
- A *Blasting Plan* will be developed to minimize potential effects on species prior to proceeding with construction activities (to be consistent with the USFWS *Guidelines for the Protection of Marine Animals During the Use of Explosives in the Waters of the State of Florida*)
- Reinitiate consultation with NMFS during design/permitting for the boulder star coral and development of mitigation measures to offset unavoidable impacts to corals.

20

Implementation Measures

Proposed Implementation Measures:

- Additional seagrass survey during design phase (protocol coordinated with NMFS prior to completion)
- Compensatory mitigation will be provided for unavoidable impacts to seagrasses. A *Seagrass Mitigation Plan* will be developed and approved by NMFS and other agencies
- A *Barge Accessibility Plan* depicting the locations of barge work channels and barge exclusion zones will be prepared during permitting and coordinated with NMFS.
- BMPs will be incorporated to minimize impacts to corals, wetlands, seagrass, and managed species and provide turbidity, sediment, and erosion control.
- A *Water Quality/Turbidity Monitoring Plan* will be developed and implemented during construction to ensure turbidity levels beyond containment measures are maintained at 0 NTUs above ambient (background) levels.
- A *Bridge Demolition/Debris Containment Plan*, which also includes a disposal plan for all the bridge materials, will be developed during design and provided to NMFS for review and approval.

21

Species Effect Determinations

Common Name	Scientific Name	Listing Status[1]	Occurrence Potential	Effect Determination
		REPTILES		
Green sea turtle	*Chelonia mydas*	FT	Moderate (PCH)	*May affect, not likely to adversely affect*
Hawksbill sea turtle	*Eretmochelys imbricata*	FE	Moderate	*May affect, not likely to adversely affect*
Leatherback sea turtle	*Dermochelys coriacea*	FE	Low	*No effect*
Loggerhead sea turtle	*Caretta caretta*	FT	Low	*May affect, not likely to adversely affect*
		FISH		
Giant manta ray	*Manta birostris*	FT	Low	*May affect, not likely to adversely affect*
Smalltooth sawfish	*Pristis pectinata*	FE	Low	*May affect, not likely to adversely affect*
		CORALS		
Boulder star coral	*Orbicella franksi*	FT	High	*May affect, not likely to adversely affect*
Elkhorn coral	*Acropora palmata*	FT	Low	*No effect*
Lobed star coral	*Orbicella annularis*	FT	Moderate	*May affect, not likely to adversely affect*
Mountainous star coral	*Orbicella faveolata*	FT	Moderate	*May affect, not likely to adversely affect*
Pillar coral	*Dendrogyra cylindrus*	FT	Low	*No effect*
Rough cactus coral	*Mycetophyllia ferox*	FT	Low	*No effect*
Staghorn coral	*Acropora cervicornis*	FT	Low	*No effect*

As blasting is required, is it possible to arrive at a MANLAA if any specific conservation measures are incorporated?

Does commitment to relocate all listed coral colonies prior to construction result in a MANLAA?

Critical Habitat - project area is located within the proposed CH for the green sea turtle. No suitable nesting habitat, *Seagrass Mitigation Plan, Protected Species Construction Conditions, Vessel Strike Avoidance Measures, Blasting Plan*

22

Essential Fish Habitat (EFH)

Mangroves

- Occasional mangrove propagules and saplings (no mature trees) noted within the riprap along the causeway island.
- These mangroves are not considered EFH - very small and do not provide canopy or any substantial root structure that would provide any significant habitat for managed species.
- Impacts to the riprap shoreline will be revaluated during permitting and any impacts to mangroves will be addressed.





EFH and HAPC

- Project area overlaps designated EFH and HAPC for six Fishery Management Plans: Penaeid Shrimp; Snapper-Grouper Complex; Spiny Lobster; Red Drum, Coastal Migratory Pelagics; and Coral, Coral Reefs and Live/Hard Bottom Habitat.

EFH Type	FMP	Community Types Present
Estuarine Water Column	Coastal Migratory Pelagics, Highly Migratory Species	1,2,3,4,5
Estuarine and Marine Submerged SAV (Seagrass and Macroalgae)	Shrimp, Snapper-Grouper, Spiny Lobster, Red Drum, Coastal Migratory Pelagics, Highly Migratory Species	1,2,3,4
Algal Communities (*Laurencia*)	Spiny Lobster	1,2
Live Bottom	Snapper-Grouper, Spiny Lobster, Highly Migratory Species, Coral and Coral Reefs	3,4
Rough, Hard, Exposed, Stable Substrate	Coral, Coral Reefs, and Live/Hard Bottom Habitats of the South Atlantic Region	3,4
Sponges	Spiny Lobster	1,2,3,4,5
Unconsolidated Estuarine Bottom	Shrimp, Snapper-Grouper, Red Drum	1, 2,3,4

HAPC	Managed Species/Group
Biscayne Bay	Spiny Lobster Coral, Coral Reefs and Live/hard Bottom Habitat
SAV / Seagrass	Penaeid Shrimp Snapper-Grouper Complex Spiny Lobster Red Drum Coastal Migratory Pelagics
Coral, Coral Reefs and Live/Hard Bottom Habitat	Corals Spiny Lobster

Summary of Impacts to EFH

Habitat[1]		Impact Type	Build Alternative 1 High-Level Fixed Bridge	Build Alternative 2 Mid-Level Movable Bridge[2]
Estuarine Water Column EFH	Estuarine Water Column	Permanent – Bridge Piers	4,343 cubic feet	67,721 cubic feet
		Temporary	--	--
Estuarine and Marine Submerged SAV EFH	Community 1 SAV (macroalgal beds)	Permanent - Bridge Piers, Shading	2.74 ac	3.03 ac
		Temporary – 25-foot Construction Buffer	1.00 ac	1.64 ac
	Community 2 SAV (seagrass)	Permanent – Bridge Piers, Shading	0.17 ac	0.33 ac
		Temporary – 25-foot Construction Buffer	0.11 ac	0.09 ac
Coral, Coral Reefs, and Live/hard Bottom Habitat EFH	Community 3 Live Bottom	Permanent – Bridge Piers, Shading	0.12 ac	0.02 ac
		Temporary – 25-foot Construction Buffer	0.04 ac	0.07 ac
	Community 4 Coral Habitat Adjacent to Seawalls	Permanent – Seawall Replacement	0.44 ac	0.44 ac
		Temporary	--	--
	Community 5 Existing Seawalls and Bridge Piers	Permanent – Seawall Replacement and Bridge Pier Demolition	1,703 linear feet of seawall Remove all 29 bridge piers	1,703 linear feet of seawall Remove all 29 bridge piers
		Temporary	--	--
Total Direct Impacts		**Permanent**	**4,343 cubic feet** (Estuarine Water Column) **3.47 ac** (Communities 1-4) **1,703 linear feet** (seawall) **Remove all 29 bridge piers**	**67,721 cubic feet** (Estuarine Water Column) **3.82 ac** (Communities 1-4) **1,703 linear feet** (seawall) **Remove all 29 bridge piers**
		Temporary	**1.15 ac** (Communities 1-3)	**1.80 ac (Communities 1-3)**

[1]Note that Unconsolidated Estuarine Bottom EFH was not delineated during the 2023 quantitative benthic survey because the extent of non-vegetated sediments within the project study area is minimal and these areas are scattered within the various habitats.
[2]Estuarine water column impacts for Build Alternative 2 is an underestimate of impacts, as they were calculated based on the volume of submerged bascule piers only (dimensions/locations of the mid-level bascule intermediate bridge piers are not available at this time).

Avoidance and Minimization

- Selection of the High-level Fixed Bridge as the Preferred Alternative minimizes impacts to estuarine water column EFH, macroalgal beds (SAV) EFH, and seagrass (SAV) EFH
- Existing bridge piers will be cut at the mudline to avoid the need for dredging/filling
- Currently, there is no treatment of stormwater runoff. Proposed stormwater improvements will enhance WQ by providing stormwater treatment.
- Town is considering incorporation of nature-based solutions associated with the seawall replacement
- Barge spudding/staging locations will be carefully selected to minimize seagrass/coral impacts. A *Barge Accessibility Plan* will be developed and approved by NMFS.
- During design, potential minimization for underwater noise impacts will be examined (e.g., high density cushion blocks, bubble curtains, and utilization of the ramp up or vibratory installation methodology for pile driving)
- Prior to construction start, seagrasses in the vicinity of the project footprint will be delineated and marked with visible buoys.
- A *Bridge Demolition/Debris Containment Plan* will be developed during design for NMFS review and approval.
- A *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* will be developed and coordinated with the NMFS during permitting.

EFH Determination of Effect

- On the basis of the avoidance and minimization measures to be implemented for this project, along with the compensatory mitigation to be conducted for impacts to seagrass and corals, the project's impact on EFH is anticipated to be "**more than minimal but less than substantial**."

Minutes

Project:	Broad Causeway Bridge Replacement PD&E Study		
Subject:	National Marine Fisheries Service (NMFS) Technical Assistance Call - Seagrass Mitigation Option, Seawall Replacement, and Blasting Information		
Meeting place:	Teams Meeting		
Date and time:	February 21, 2024 | 10:00 a.m.		
Attendees:	Kurtis Gregg Craig James Megan Moore Jimmy Mykytka Wendy Lasher Beth Zimmer David Konz Steve Tissier	Representing:	NMFS FDOT FDOT RS&H AtkinsRéalis AtkinsRéalis AtkinsRéalis AtkinsRéalis

MINUTES:

1. Introductions: Attendees listed above.

2. Project Overview and Discussion
   a. AtkinsRéalis (hereafter referred to as "Atkins"), on behalf of the Town of Bay Harbor Islands (hereafter referred to as "Town"), provided a project overview and summarized findings for a potential seagrasses mitigation option, seawall replacement design option, and bridge demolition blasting information.

   Nassau Grouper
   b. Atkins provided information that the *Nassau Grouper Consultation Framework* indicates the absence of this species in nearshore locations north of Government Cut. Based on this information, should we remove the Nassau grouper from the managed species list in the NRE? NMFS suggested that the current guidance be used to show it was evaluated and make a "*no effect*" determination. NMFS noted that the previous suggestion to include the Nassau grouper made during the technical assistance call on December 21, 2023, was based on documentation of this species on a nearshore reef in Boynton Beach and other locations in South Florida which was gathered subsequent to publication of the Framework. Atkins confirmed that the Nassau grouper should be included in the NRE and include a discussion of the reasoning for the "*no effect"* determination.

   Seagrass Mitigation Option
   c. Atkins noted total anticipated seagrass impact of 0.279 ac for the Preferred Alternative (High-Level Fixed Bridge). NMFS suggested describing the seagrass impacts in the Natural Resource Evaluation (NRE) as "unavoidable seagrasses impacts".
   d. The Town is investigating an opportunity to partner with Biscayne National Park (BNP) for the Broad Causeway Bridge project seagrass mitigation. NMFS asked what types of seagrass projects is the Town investigating? Atkins stated that we have not coordinated with the NPS yet for this project but have coordinated with them on other projects and know they have a variety of potential seagrass restoration projects in the

works. NMFS agreed with the higher potential for seagrass mitigation success in southern Biscayne Bay as compared to northern Biscayne Bay near the Broad Causeway project area. NMFS suggested using the term "seagrass mitigation" vs. "seagrass restoration" as NMFS makes a distinction in these terms.

Seawall Replacement

e. The Town is currently investigating a new design option for the seawall which would 1) construct the new seawall behind the existing seawall, 2) leave existing seawall in place, and 3) include seawall construction activities to be conducted from land. This design is expected to significantly minimize impacts to corals on the seawall, as well as on the coral habitat and scour protection materials immediately adjacent to the seawall.
f. NMFS asked about construction methodology and if the new sheet pile would be driven. Atkins stated that all work would be conducted in the dry and the sheet pile would either be driven or vibrated. NMFS indicated that if all work will be conducted in the dry, the species review process would be easier, and NMFS would not need to complete noise impact calculations. This would make the project easier to move through the Endangered Species Act (ESA) consultation process. NMFS was happy to see the minimization of impacts to corals with this seawall design option.
g. Atkins confirmed that during the 2023 benthic survey, there were no listed corals documented on the seawall which was 100% surveyed, and that there were no listed corals documented within the transects in the coral habitat adjacent to the seawall. However, there is a potential that listed corals (*Orbicella* sp.) may be located within the coral habitat adjacent to the seawall, since they were observed within the project area during the 2022 benthic survey.
h. Does NMFS have any concerns regarding this proposed seawall design option or anticipate any impact to the proposed MANLAA effect determination for *Orbicella* spp.? NMFS stated to that they need to consider the "routes to effect" for listed *Orbicella* spp. and the effect determination will be dependent upon the debris containment method utilized. Debris netting would have a different route to effect than a floating platform. The Town will have to evaluate the routes to effect. Atkins noted that these debris containment measures are "means and methods" to be decided by the contractor. NMFS suggesting documenting the likely approach the contractor will use with a commitment that if a different approach is used, the Town will have to reinitiate consultation. FDOT noted that the contractor means and methods would first need to be reviewed and approved by FDOT before further coordination with NMFS.
i. There was a discussion concerning noise impacts and noise monitoring associated with the installation of sheet pile. FDOT suggested that noise monitoring by the contractor be considered for sheet pile installation. Atkins stated that there would be sheet pile driven in the water around the bascule piers to mitigate impacts from blasting. NMFS said there would be noise monitoring for these sheet piles and ESA Section 7 coordination on these sheet piles; however, NMFS would support these since it is aiding in protection of species. NMFS reiterated that they would not require noise monitoring or mitigation for the sheet pile being driven from the land for the seawall installation since the work will be in the dry.

Blasting Information

j. Atkins stated that a review of the NMFS Southeast Region Species Consultation Frameworks for sea turtles, giant manta ray, smalltooth sawfish, Nassau grouper, and corals resulted in the following:
    - No "environmental windows" were identified for any of these species where they would be absent from the project area
    - No direct reference to blasting for pier/bridge removal, but there is a "blasting impacts" mentioned in association with "Artificial Reef"
    - The Potential Threats tables in multiple Consultation Frameworks indicate that blasting is typically considered *"likely to adversely affect"* (LAA)
k. Information on the Pinellas Bayway Structure E blasting plan was provided that showed informal consultation with NMFS (SERO-2021-00360). Blasting Plan information was graciously provided by David Rydene at NMFS in St. Petersburg.

l. Atkins covered the highlights from the Pinellas Bayway Blasting Plan and Imperiled Species and Marine Mammal Watch Plan, as detailed in the slides below. NMFS indicated that this is an excellent example to follow for the Broad Causeway Bridge project.
m. Atkins mentioned that the Veterans Memorial Bridge project in Daytona, Florida also had blasting and informal consultation with NMFS.
n. Atkins asked if based on this blasting information, whether it is possible to arrive at MANLAA effect determination for sea turtles, giant manta ray, and smalltooth sawfish for the Broad Causeway Bridge project?
o. NMFS stated that based on these examples, it appears that the project may arrive at a MANLAA determination for these species and suggested that the Conceptual Blasting Plan should include the higher level (higher end) of the blasting impact spectrum for NMFS approval. That way if blasting activity is reduced moving forward, NMFS would not need to reinitiate consultation for evaluation from expanded blasting effects. This same approach should also be applied for noise impacts associated with pile driving (present to the higher end of the impact spectrum) during this initial consultation.
p. There was a discussion as to whether or not it is appropriate to reference these other example blasting projects in the NRE. FDOT suggested not referencing them, but emulating what was done within the blasting plan and species watch plan. NMFS differed in their opinion and thought for this topic it would be helpful in their review of the NRE to have the successful example projects noted in the document. FDOT suggested that the Town coordinate with the contractor or agency that built the Pinellas Bayway Bridge and see if there are any recommendations on what could have been improved based on the results of the blasting. Also, the final signed NMFS Section 7 consultation letter needs to be obtained and a review of the Post-Event Blast Reports would be helpful. NMFS supported these suggestions. FDOT requested to be notified of what the Town finds concerning this coordination and NMFS requested the same.
    - **NOTE:** Subsequent to this meeting, Atkins was able to locate the final, signed version of the NMFS Section 7 consultation letters for both the Pinellas Bayway Structure E project and the Veterans Memorial Bridge project. These Section 7 letters are attached to these meeting minutes.
q. There was a discussion on species observations conducted prior to blasting and water clarity. FDOT asked if there is a specification for water clarity in the Imperiled Species and Marine Mammal Watch Plan. Atkins indicated they would check on this. FDOT recommended adding the water clarity criterion as a requirement in the Blasting Plan/Imperiled Species and Marine Mammal Watch Plan.
r. There was a discussion concerning the project Class of Action and whether there are "significant" impacts to threatened and endangered species and habitat. NMFS indicated that the example blasting projects are suggesting MANLAA determinations and thus a Type 2 Categorical Exclusion. He applauds the modified seawall design concept.
s. The NRE is currently in OEM review. It is anticipated that the NRE will be sent to NMFS for review at the beginning of April. The NRE will be updated with this coordination and information resulting from it when the Town incorporates the comments from OEM. FDOT will contact OEM to notify them that the Town and FDOT has had additional coordination with NMFS since this is an ongoing process and the NRE is a living document.

Action Items:

- The Town will present the seawall debris containment options in the NRE and state the likely approach the contractor will use. The Town will add a commitment that if a different approach is used by the contractor, the Town will have to reinitiate consultation with NMFS.
- Town will coordinate with the contractor or agency that built the Pinellas Bayway Bridge to obtain the Post-Event Blast Report and see if there are any recommendations on what could have been improved. The Town will also try to locate a copy of the final signed NMFS Section 7 Consultation letter.
    - **NOTE:** Subsequent to this meeting, Atkins was able to locate the final, signed version of the NMFS Section 7 consultation letters for both the Pinellas Bayway

Structure E project and the Veterans Memorial Bridge project. These Section 7 letters are attached to these meeting minutes.

- The Town will review the Blasting Plan/Imperiled Species and Marine Mammal Watch Plan for the Pinellas Bayway project to determine whether a specification concerning water clarity is included. A water clarity criterion should be added to the Blasting Plan/Imperiled Species and Marine Mammal Watch Plan for the Broad Causeway Bridge project.
- FDOT will contact OEM to notify them that the Town and FDOT have had had additional coordination with NMFS, since this is an ongoing process and the NRE is a living document. The NRE will be updated with this coordination and information resulting from it when the Town incorporates the comments from OEM.

Minutes were provided to all attendees for review. Please provide comments for revision ***no later than 3/1/24 at 5:00pm EST***, otherwise the minutes are assumed to be accepted and final.



Discussion Topics

Updates:

1. **Nassau Grouper**
2. **Seagrass Mitigation Option**
3. **Seawall Replacement**
4. **Blasting Information**



2

Project Location

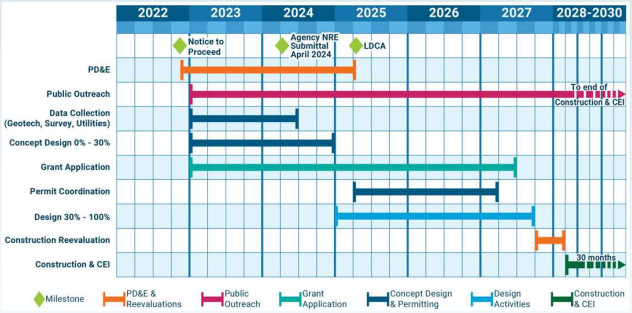




Broad Causeway Bridge Replacement
From Causeway Island to East of West Broadview Drive
Miami-Dade County

3

Project Schedule



Natural Resources Evaluation (NRE) Report	223 days	Mon 10/9/23	Wed 8/14/24
Draft NRE Report	50 days	Mon 10/9/23	Fri 12/15/23
Prepare, QC, & Submit Draft NRE Report	33 days	Mon 10/9/23	Wed 11/22/23
Town/District Review Draft NRE Report	11 days	Fri 12/1/23	Fri 12/15/23
Revised Draft NRE Report	78 days	Mon 12/18/23	Wed 4/3/24
Revise, QC, & Submit Revised Draft NRE Report	28 days	Mon 12/18/23	Wed 1/24/24
Town/District Review & Submit Revised NRE Report	10 days	Thu 1/25/24	Wed 2/7/24
OEM Reviews Revised Draft NRE Report	20 days	Thu 2/8/24	Wed 3/6/24
Revise, QC, & Resubmit OEM Reviewed Draft NRE Repo	15 days	Thu 3/7/24	Wed 3/27/24
OEM Approves Revised Draft NRE Report for Agency Re	5 days	Thu 3/28/24	Wed 4/3/24
Agency Review of NRE Report	35 days	Thu 4/4/24	Wed 5/22/24
Agencies Review Revised NRE Report	20 days	Thu 4/4/24	Wed 5/1/24
Responses to RAIs	15 days	Thu 5/2/24	Wed 5/22/24
Final NRE Report	63 days	Mon 5/20/24	Wed 8/14/24
Prepare, QC, & Submit Final NRE Report	15 days	Mon 5/20/24	Fri 6/7/24
Town/District Review Final NRE Report	10 days	Mon 6/10/24	Fri 6/21/24
Revise, QC & Submit Revised Final NRE Report	10 days	Mon 6/24/24	Fri 7/5/24
Town/District Submit Final NRE Report to OEM	8 days	Mon 7/8/24	Wed 7/17/24
OEM Reviews Final NRE Report	20 days	Thu 7/18/24	Wed 8/14/24

NASSAU GROUPER

Nassau grouper - Note

- During the NMFS Technical Assistance call on 12/21/23, NFMS requested that the Nassau grouper be included in the NRE list of managed species.
- The *Nassau Grouper Consultation Framework* indicates the absence of this species in nearshore locations north of Government Cut.

Based on this information, should we remove the Nassau grouper from the managed species list in the NRE?

Southeast Florida, North of Government Cut

- General coastal construction projects occurring in the southeastern United States, with the exception of those in the Florida Keys (including the Dry Tortugas and Biscayne Bay to Government Cut), will have no effect on the species due to the absence of Nassau grouper in these nearshore locations. The general absence of Nassau grouper outside of the Florida Keys is well documented by the lack of records in Florida Fish and Wildlife Conservation Commission's, Fisheries Independent Monitoring data as well as various surveys conducted by the National Marine Fisheries Service's SEFSC. Specifically, we do not believe Nassau grouper will be present in waters on the north side of the Florida Keys (north of Hwy 1), the Gulf of Mexico, and coastal locations along the Atlantic coast north of Government Cut.
- Adults and large juvenile Nassau grouper may be present at offshore (> 3miles) reef outcroppings north of Government Cut to Cape Canaveral, FL. Nassau grouper are captured incidentally in the snapper-grouper fishery by both commercial and recreational fishers using handlines (NMFS 2016).
- The general absence of Nassau grouper in nearshore areas outside of the Florida Keys is well documented by the lack of records in Florida Fish and Wildlife Conservation Commission's, Fisheries Independent Monitoring data as well as various surveys conducted by the National Marine Fisheries Service's SEFSC.

SEAGRASS MITIGATION OPTION

Seagrass Impacts

- Total anticipated seagrass impact of 0.279 ac for the Preferred Alternative (High-Level Fixed Bridge)



Build Alternative 1 High-Level Fixed Bridge			
Direct Impact (ac)	Indirect Impact (ac)	Temporary Impact (ac)	**Total Impact (ac)**
0.172	--	0.107	**0.279**

7

Seagrass Mitigation Option

- Investigating an opportunity to partner with Biscayne National Park (BNP) for the Broad Causeway Bridge project seagrass mitigation.
- BNP has previously identified various seagrass restoration projects within the BNP boundaries.
- Higher potential for seagrass restoration success in southern Biscayne Bay.



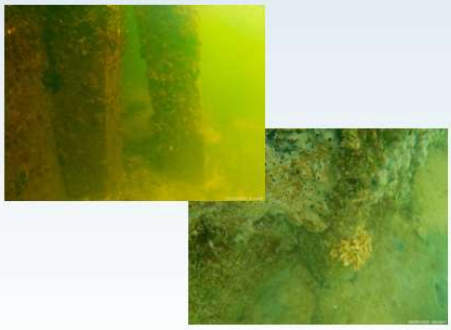
8

SEAWALL REPLACEMENT

Seawall – Coral Impacts

Existing Seawalls

- Mean coral density of ~0.82 colonies per linear meter
  - 2 scleractinian coral species (*S. radians, O. diffusa*)
  - 1 octocoral genera (*C. riisei*)



Coral Habitat Adjacent to Seawalls

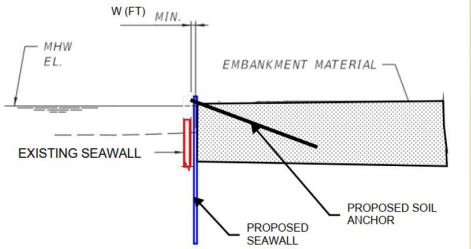
- Mean coral density of ~4.70 colonies/m^2
  - 3 scleractinian coral species (*S. radians, S. bournoni, O. diffusa*)
  - 2 octocoral genera *(Antillogorgia* sp., *Leptogorgia* sp.*)*



Seawall Replacement Update

Minimize impacts to corals from the proposed seawall replacement:

- Previously, the existing seawall was proposed to be removed and replaced
- Currently investigating a new design option:
  - Construct the new seawall behind the existing seawall
  - Leave existing seawall in place
  - Seawall work to be conducted from land
- Expected to significantly minimize impacts to corals on the seawall, as well as on the scour protection materials immediately adjacent to the seawall



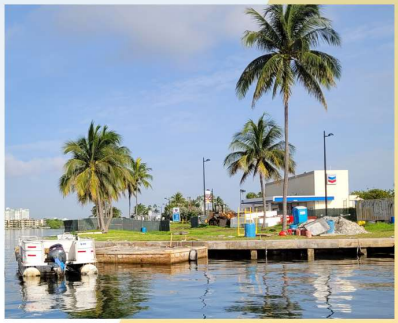
12

Seawall Replacement Update

No changes in previous proposals to minimize impacts to corals:

- *Conceptual Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* is currently being developed and will be coordinated with NMFS
- **Commitment** - The *Plan for Relocation and Monitoring of Corals, Octocorals, and Sponges* will be developed and coordinated with the NMFS during the design/permitting process
- **Debris Containment Plan** – will be developed by the contractor to prevent construction debris from entering water (e.g., debris netting, floating silt mats, temporary floating platform, etc.)

Does NMFS have any concerns regarding this proposed seawall design option or anticipate any impact to the proposed MANLAA effect determination for Orbicella* spp.*?



13

BLASTING INFORMATION UPDATE

Blasting - Species Consultation Frameworks

Review of the NMFS Southeast Region Species Consultation Frameworks:

- Sea turtles, giant manta ray, smalltooth sawfish, Nassau grouper, corals
- No "environmental windows" identified for any of these species where they would be absent from the project area
- No direct reference to blasting for pier/bridge removal, but there is a "blasting impacts" mentioned in association with "Artificial Reef"
- The Potential Threats tables show that blasting is typically considered LAA

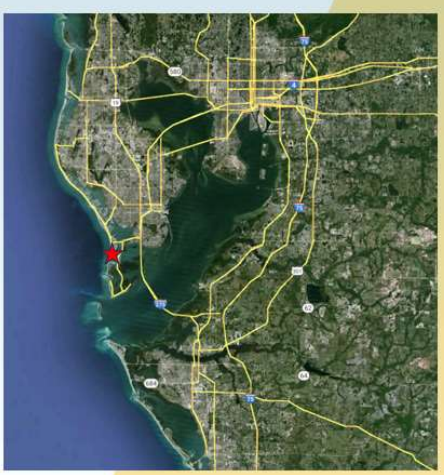
Example - Potential Threats Table from Smalltooth Sawfish Consultation Framework

Activity	Route of Effects	Potential Impact to Species	Considerations
Outfalls, water releases, and effluent discharge	• Long term habitat alteration • Foraging energetics	• Inability to use habitat or reduction in prey because water quality parameters are not suitable • Habitat degradation and avoidance or displacement from the action area	• Project location and habitat type • Project duration (temporary or long-term) • Reduction in habitat and prey availability
Artificial Reef	• Potential for entanglement in fishing line that gets wrapped around the structure • Blasting impacts, if explosives are used to sink vessels • Physical injury from placed material.	• These projects are typically NLAA, but need to consider potential for entanglement • Use of explosives typically LAA • Noise associated with construction activities is typically NLAA if it is below the injury threshold level of > 2 g fish. • Interaction with construction equipment and placement of material – unlikely due to species' mobility	• Project location and habitat type • Noise abatement measures • Type of equipment to be used and duration of in-water construction • Duration of the permit (consider how often USACE may request reauthorization since most artificial reef permits are ongoing leading to an increase in structures placed in the marine environment over time)

14

SR679 Pinellas Bayway Structure E Bridge Project

- FDOT D7
- FM# 410755-2-52-01
- Design-Build
  - FDOT PD&E Study – permitting occurred during PD&E
  - Project was with FDOT until 2016
  - USCG then became action agency
- Section 7 Informal Consultations with NMFS:
  - FDOT - 2016 original consultation: SER-2014-15940 (signed by NMFS on 4/1/2016)
  - USCG - 2018 Re-initiation (pile size change, temporary work trestles & cofferdams): SER-2018-19642 (signed by NMFS on 11/27/2018)
  - USCG - 2021 Re-initiation (blasting/explosives): **SERO-2021-00360**
- MS Word version of the Section 7 Letter (SERO-2021-00360 - unsigned/undated)
  - Included approval of Blasting Plan and Imperiled Species and Marine Mammal Watch Plan



SR679 Pinellas Bayway Structure E Bridge Project

Blasting Plan – highlights:

- NMFS reviewed/approved:
  - Explosive material (minimum amount to accomplish the demo)
  - Stemming material length to help contain blast energy
  - The weight of explosives detonating at a given time (pounds of explosives per delay)
- Explosives confined in the concrete of the structures
- Tops of the piers covered with wire rope blast mats to contain blast debris
- Installed cofferdams around piers to be blasted
- Both bascule piers demolished in single blast event during day at slack tide
- **Fish Scare** - series of non-electric blasting caps suspended in the water column surrounding the structure. These are detonated 15-30 seconds prior to the main blast.

SR679 Pinellas Bayway Structure E Bridge Project

Imperiled Species and Marine Mammal Watch Plan – highlights:

- **Danger Zone** – to prevent protected species from being injured or killed by the blast event
  - Zone to be visually monitored for sea turtles, smalltooth sawfish, giant manta rays, and other protected species
  - Radius calculated based on explosive charge weight
- **Buffer Zone** – additional species observation zone extending 300 additional feet
- **Observation crew** – at least 6 experienced observers, including 1 aerial observer and 2 boat observers
- No blasting to occur until all "observed animals" are clear of the protection zones for 30 minutes
- Scan for dead/injured protected species for 30-minute period following the blast
- Blasting observation report submitted to agencies

SR679 Pinellas Bayway Structure E Bridge Project

Species effect determinations from the NMFS Section 7 Consultation Letter:

Effects Determination(s) for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status[1]	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North Atlantic [NA] distinct population segment [DPS])	T	NLAA	NLAA
Green (South Atlantic [SA] DPS)	T	NLAA	NLAA
Kemp's ridley	E	NLAA	NLAA
Leatherback	E	NLAA	NE
Loggerhead (Northwest Atlantic [NWA] DPS)	T	NLAA	NLAA
Hawksbill	E	NLAA	NE
Fish			
Smalltooth sawfish (U.S. DPS)	E	NLAA	NLAA
Giant Manta Ray	T	NLAA	NLAA

E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect; NE = no effect

Conclusion

Because all potential project effects to listed species were found to be extremely unlikely to occur, insignificant, or beneficial, we conclude that the proposed action is not likely to adversely affect listed species under NMFS's purview. This concludes your consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or if the identified action is subsequently modified in a manner that causes an effect to the listed species in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. NMFS's findings on the project's potential effects are based on the project description in this response. Any changes to the proposed action may negate the findings of this consultation and may require reinitiation of consultation with NMFS.

SR679 Pinellas Bayway Structure E Bridge Project







Blasting occurred in May 2021
Photos from *American Bridge*

Blasting - Species Effect Determinations

- FDOT OEM is requesting confidence in our Class of Action (EA or Type 2 Categorical Exclusion) before they will review our Environmental Assessment document.
- The Broad Causeway Bridge project includes a commitment to develop:
  - *Conceptual Blasting Plan* – to be provided to NMFS for review/approval during design/permitting phase
  - *Final Blasting Plan* - to be developed by the contractor prior to construction and reviewed/approved by NMFS
  - The blasting plan is expected to be consistent with the USFWS's May 2005 *Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida*

Based on this information, is it possible to arrive at MANLAA effect determination for sea turtles, giant manta ray, and smalltooth sawfish for the Broad Causeway Bridge project?

APPENDIX C

BLASTING INFORMATION

NMFS Blasting Information Email (2/27/2024)

SR 679 Pinellas Bayway Structure E Section 7 Consultation Letter (11/27/2018)

Veterans Memorial Bridge Section 7 Consultation Letter (11/01/2016)

SR 679 Pinellas Bayway Structure E Blasting Plan (12/10/2020)

SR 679 Pinellas Bayway Structure E Imperiled Species and Marine Mammal Watch Plan

SR 679 Pinellas Bayway Structure E Imperiled Species and Marine Mammal Watch Plan Report (5/18/2021)

From: David Rydene - NOAA Federal <david.rydene@noaa.gov>
Sent: Tuesday, February 27, 2024 12:31 PM
To: Lasher, Wendy G <Wendy.Lasher@atkinsrealis.com>
Cc: Zimmer, Beth <Beth.Zimmer@atkinsrealis.com>
Subject: Re: Pinellas Bayway Blasting Information

If I recall our conversation last month correctly, you indicated that the Pinellas Bayway blasting was a successful because it resulted in no threatened and endangered species being killed. Is that correct? YES, THAT IS CORRECT. UP TO THIS POINT WE HAVE NOT OBSERVED ANY ANY INJURED OR KILLED ESA-LISTED SPECIES AT ANY OF THE BLASTS I HAVE BEEN INVOLVED WITH. HOWEVER, IT IS ENTIRELY POSSIBLE THAT YOU MAY KILL A NUMBER OF NON-LISTED FISH SPECIES (AND LOCAL FISHERS MAY BE VERY UNHAPPY).

1. Are there any lessons learned or suggestions for recommendations/improvements that we should consider incorporating into a blasting plan and/or species watch plan for our upcoming project? NO SUGGESTIONS.....EXCEPT THAT USING HELICOPTERS FOR AERIAL OBSERVATIONS GENERALLY WORKS BETTER THAN FIXED WING PLANES.
2. We haven't been able to locate a copy of the Post-Event Blasting Report that was submitted to the agencies for the Pinellas Bayway Structure E project (a requirement in the *Imperiled Species and Marine Mammal Watch Plan*). Is there any chance that you have a copy in your files? SEE THE ATTACHED WATCH PLAN REPORT

On Tue, Feb 27, 2024 at 1:17 PM Lasher, Wendy G <Wendy.Lasher@atkinsrealis.com> wrote:

> Hi David,
>
> Thank you again for all of the information you have provided for blasting. We were able to locate the final, signed version of the NMFS Section 7 consultation letters for both the Pinellas Bayway Structure E (SERO-2021-00360) project and the Veterans Memorial Bridge (SERO-2016-18141) project.
>
> If I recall our conversation last month correctly, you indicated that the Pinellas Bayway blasting was a successful because it resulted in no threatened and endangered species being killed. Is that correct?

We've been coordinating with Kurtis Gregg and FDOT District 6 and they have requested that we reach out with the following questions with regard to the *Blasting Plan* and the *Imperiled Species and Marine Mammal Watch Plan* for the Pinellas Bayway Structure E project. We have contacted the contractor and the monitoring consultant and have not heard back. We are preparing to provide an update to FDOT OEM tomorrow and are hoping you may have this information:

1. Are there any lessons learned or suggestions for recommendations/improvements that we should consider incorporating into a blasting plan and/or species watch plan for our upcoming project?
2. We haven't been able to locate a copy of the Post-Event Blasting Report that was submitted to the agencies for the Pinellas Bayway Structure E project (a requirement in the *Imperiled Species and Marine Mammal Watch Plan*). Is there any chance that you have a copy in your files?

Thank you,

Wendy Lasher AICP

Senior Transportation Planner IV

AtkinsRéalis

T: 813-281-8309 **M:** 813-404-4979

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

11/27/2018

F/SER46:DR
SER-2018-19642

Commander, Seventh Coast Guard District
Bridge Administration Branch
Attn: Randall Overton, Chief, Permits Division
United States Coast Guard
909 Southeast 1st Avenue, Suite 432
Miami, Florida 33131-3050

Dear Sir or Madam:

This letter responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act (ESA) for the following action.

Permit Number	Applicant	SER Number	Project Type
USCG Case File Number 3870	Florida Department of Transportation District 7 (FDOT)	SER-2018-19642	Bridge construction and demolition

Consultation History
This is a reinitiation of a previously completed 2016 ESA Section 7 consultation (SER-2014-15940). This consultation is being reinitiated due to changes in the size of the new bridge's concrete piles and the newly proposed installation and use of temporary work trestles and temporary cofferdams.

For the original consultation, we received a Biological Assessment from the applicant on July 29, 2015. We requested additional information from the applicant on July 31, 2015. We received your letter requesting consultation on August 10, 2015. We received the requested additional information from the applicant on September 22, 2015, and initiated consultation that day. The original Section 7 consultation was completed and signed by NMFS on April 1, 2016.

A meeting was held with United States Coast Guard (USCG) and FDOT staff and FDOT's contractors on September 4, 2018, to discuss the proposed changes to the project and determine if reinitiation of the consultation was necessary. The USCG concluded that reinitiation of the consultation was advisable. We received the USCG's reinitiation request and associated bridge construction information on October 11, 2018. We requested clarifications and additional information from October 16-19, 2018. We received the requested additional information from the applicant on October 22, 2018, and initiated consultation that day. All project descriptions and effects analyses below are based on the bridge replacement project as currently proposed.

Project Location

Address	Latitude/Longitude	Water body
SR 679 Pinellas Bayway Structure E Bridge	27.693625ºN, 82.717931ºW (North American Datum 1983)	Boca Ciega Bay

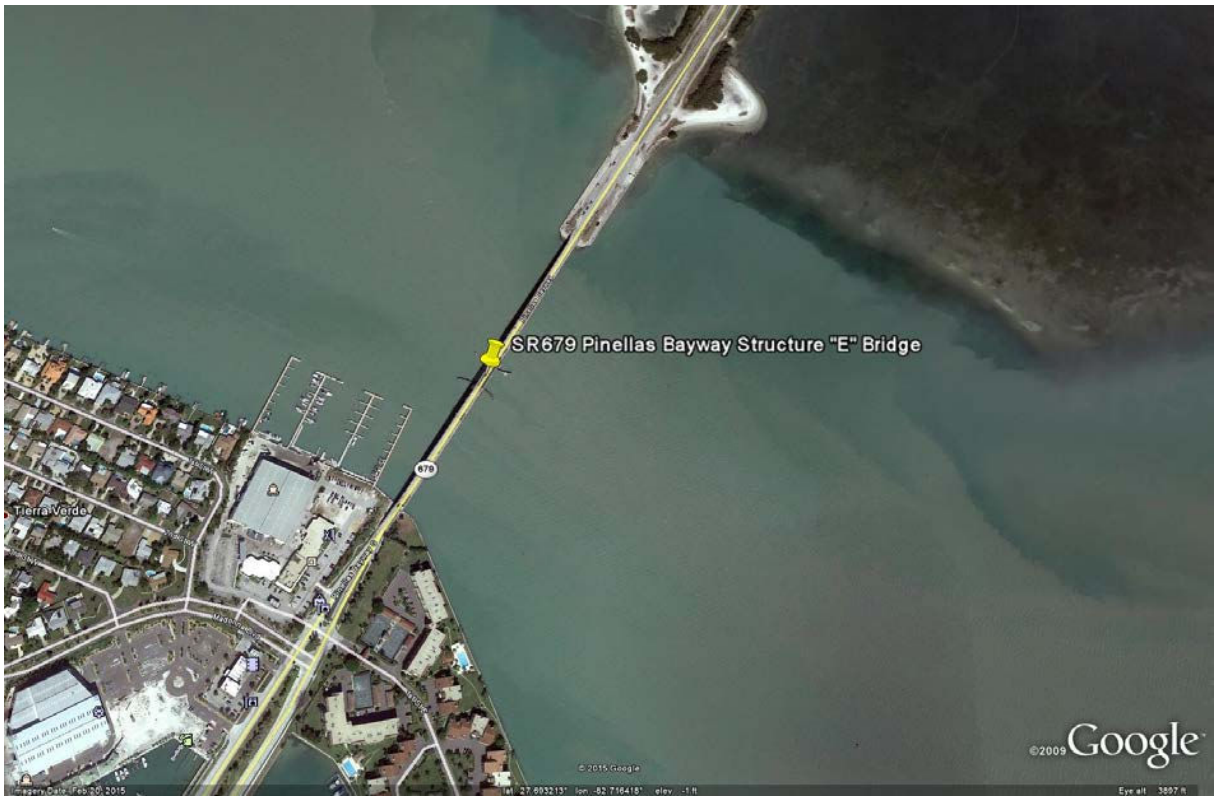


Image of the project location and surrounding area (©2015 Google)

Existing Site Conditions

SR 679 is a north-south urban minor arterial roadway in Pinellas County, Florida, that provides the only vehicular access to the islands of Tierra Verde and Mullet Key, where Fort De Soto Park is located. The existing 2-lane Structure E Bridge (over Boca Ciega Bay and the Gulf Intracoastal Waterway navigation channel) is a low-level, double-leaf bascule (i.e., drawbridge) bridge.

Boca Ciega Bay is an estuarine/marine waterbody located at the mouth of Tampa Bay. A review of Google Earth indicates that the width of the waterbody at the project location is approximately 1,250 feet (ft). The majority of bay bottom under the bridge is unvegetated sand with the exception of seagrass beds in shallow areas adjacent to the northern bridge approach. The shorelines at the northern approach support mangrove and salt marsh. Geotechnical investigations conducted at this site show that subsurface soils generally consist of fine to slightly silty fine sand, with some layers of shell fragments and clay lenses. Water depths in the project area range from -0 to -35 ft North American Vertical Datum (NAVD), and the navigation channel depth exceeds -9 ft (NAVD).

Project Description
The applicant proposes the replacement of the existing SR 679 2-lane, low-level Structure E (bascule) bridge with a 2-lane, high-level, fixed-span bridge. The vertical clearance in the navigation channel will be 65 ft and the horizontal clearance will be 100 ft. Bridge construction will require the installation of concrete piles for the bridge substructure, polymeric piles (composed of a mixture of plastic and fiberglass) for the navigation channel fender system, steel pipe piles for temporary work trestles and steel sheet piles for temporary cofferdams. Most in-water pile driving will be accomplished from shallow-draft barges, but pile driving to install Pier 11 may be done from a work trestle. Small work boats will also be used during bridge construction. Heavy equipment such as cranes, dump trucks, backhoes, and graders will be used for land-based activities.

Pile Installation

Expected Pile types	Expected Number of Piles	Installation Method	Confined Space or Open Water
30-inch (in) by 30-in square pre-stressed concrete piles	133	Impact driving	Open Water
12-in diameter round polymeric piles	70	Impact driving	Open Water
36-in diameter round steel pipe piles	60	Vibratory and Impact driving	Open Water
18-in-wide steel sheet piles	Several hundred	Vibratory driving	Open Water

A total of 133 square concrete bridge piles (30-in by 30-in) will be impact driven using a hydraulic pile-driving hammer. The use of pre-formed pile holes or jetting may also be required prior to impact driving in order to achieve the minimum pile-tip elevations. Impact pile driving of concrete piles may occur at 2 locations at the same time. Up to 5 piles may be driven at each location each day (a grand total of 10 piles per day) requiring between 1,400 and 3,600 strikes per pile. This means that up to 36,000 strikes may occur in a day. The 70 round polymeric fender system piles (12-in diameter) may be installed using either an impact hammer or a vibratory hammer.

To support bridge construction and demolition activities 2 temporary work trestles will be built (one on the north side of Boca Ciega Bay and another on the south side) requiring the temporary installation of 60 steel pipe piles (36-in diameter). The steel pipe piles for the temporary work trestles will be installed with a vibratory hammer until the final 15-20 ft of driving, when an impact hammer will be used to complete the installation and verify the load capacity of the work trestle piles for safety reasons (i.e., “proofing” the piles). Up to 8 pipe piles may be driven each day requiring a total of 3 hours of vibratory hammer use per day. Each pipe pile installation will also require up to 250 impact hammer strikes to complete the installation. The impact component of installation will take about 15-20 minutes per pile. It is estimated that all pipe piles installations will be completed in 10-12 days. The pipe piles will also be removed using a vibratory hammer once the temporary work trestles are no longer needed.

The project may require the installation of several temporary steel sheet pile cofferdams as part of bridge pier construction activities along the causeway on the north side of Boca Ciega Bay. Another pair of temporary cofferdams may be installed to surround the old bridge's bascule piers and contain demolition debris during the old bridge's demolition phase. All cofferdams would be constructed from 18-in-wide steel sheet piles that would be installed by vibratory hammer. Vibratory sheet pile installations may occur for up to 12 hours per day. The steel sheet piles will also be removed using a vibratory hammer once the temporary cofferdams are no longer needed.

In-water pile-driving activities are expected to take about 8 months to complete. Construction of the new bridge is estimated to take about 22 months to complete. Permanent impacts to seagrasses due to the project are anticipated to be 0.07 acre (ac). The existing (i.e., "old") bridge will be demolished once the new bridge is operational. The old bridge will be dismantled by mechanical means (i.e., using heavy equipment) and also possibly by using explosives (to demolish the old bridge's bascule piers). If the contractor determines that explosive demolition is necessary to demolish the old bridge, the United States Coast Guard will have to reinitiate consultation and submit a detailed blast plan and marine wildlife watch plan for NMFS to review and approve before any blasting is done.

Construction Conditions

The applicant has agreed to adhere to NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*.[1] The applicant will also comply with *Construction Special Provisions Gulf Sturgeon Protection Guidelines*, dated September 2012. Sediment and turbidity control measures will be implemented during the construction and demolition phases. The contractor will use a "ramp up" technique when impact pile driving, using low force blows initially and gradually increasing to full force hammer blows. In-water pile driving will only be done during civil twilight hours from Monday through Saturday. Civil twilight begins in the morning and ends in the evening, and is the limit at which twilight illumination is sufficient, under good weather conditions, for terrestrial objects to be clearly distinguished.

Effects Determinations for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North Atlantic [NA] distinct population segment [DPS])	T	NLAA	NLAA
Green (South Atlantic [SA] DPS)	T	NLAA	NLAA
Kemp's ridley	E	NLAA	NLAA
Leatherback	E	NLAA	NE

[1] NMFS. 2006. Sea Turtle and Smalltooth Sawfish Construction Conditions revised March 23, 2006. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, Saint Petersburg, Florida. http://sero.nmfs.noaa.gov/protected_resources/section_7/guidance_docs/documents/sea_turtle_and_smalltooth_sawfish_construction_conditions_3-23-06.pdf, accessed June 2, 2017.

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Loggerhead (NA DPS)	T	NLAA	NLAA
Hawksbill	E	NLAA	NE
Fish			
Smalltooth sawfish (U.S. DPS)	E	NLAA	NLAA
Gulf sturgeon	T	NLAA	NLAA
E=endangered; T=threatened; NLAA=may affect, not likely to adversely affect; NE=no effect			

Critical Habitat
The project is not located in designated critical habitat, and there are no potential routes of effect to any designated critical habitat.

Analysis of Potential Routes of Effects to Species
We believe that only smalltooth sawfish, Gulf sturgeon, loggerhead sea turtles, green sea turtles, and Kemp's ridley sea turtles can be found in or near the action area and may be affected by the project. We believe the project will have no effect on hawksbill and leatherback sea turtles, due to the species' very specific life history strategies, which are not supported at the project site. Leatherback sea turtles have a pelagic, deepwater life history, where they forage primarily on jellyfish. Hawksbill sea turtles typically inhabit inshore reef and hard bottom areas where they forage primarily on encrusting sponges.

Effects to sea turtles (loggerhead sea turtles, green sea turtles, and Kemp's ridley sea turtles), smalltooth sawfish, and Gulf sturgeon include the risk of injury from land-based and in-water construction machinery (e.g., barge movement, anchoring, construction equipment operation). The effects of such activities will be discountable due to the species' ability to move away from the project site if disturbed, and the measures in place to protect the species. There are numerous suitable alternative sites in the area that sea turtles and fish could use for foraging or refuge. An animal's movement away from construction activities is a behavioral response, with the same effects discussed below. The applicant's compliance with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 2006, and *Gulf Sturgeon Protection Guidelines*, dated September 2012, will provide additional protection by requiring all construction workers to watch for listed species. Operation of any mechanical construction equipment will cease immediately if a protected species is seen within a 50-ft radius of the equipment. Activities will not resume until a protected species has departed the project area of its own volition. In-water work will only be conducted during civil twilight hours to facilitate the detection of animals. The likelihood of injury to smalltooth sawfish and Gulf sturgeon is further reduced because these species are relatively rare in the Tampa Bay system. The highest densities of smalltooth sawfish in the Gulf of Mexico occur from Charlotte Harbor and southward. Charlotte Harbor is 60 miles south of Tampa Bay. The highest densities of Gulf sturgeon occur from the Suwannee River and northward. The Suwannee River is 112 miles north of Tampa Bay.

As referenced above, sea turtles, Gulf sturgeon, and sawfish may avoid the project area due to construction activities, and will also be physically excluded from active work areas by turbidity

curtains. Any impacts to these species from physical exclusion or avoidance of the project area due to project activities will be insignificant as there are numerous suitable alternative sites in the area that sea turtles, Gulf sturgeon, and sawfish could use for foraging or refuge, and any exclusion impacts will be temporary at any one location.

In-water construction activities may result in temporary increases in turbidity that could affect water quality, but these effects will be insignificant. These highly turbid areas will be contained within turbidity curtains and these curtains will not be removed until after turbidity levels have returned to background conditions.

The project will result in the loss of 0.07 ac of seagrasses that could be used as foraging habitat by adult green sea turtles. However, we believe any effects will be insignificant. An examination of seagrass maps for Tampa Bay show that an abundance of seagrass beds exist in the areas surrounding the proposed project. Therefore, the loss of 0.07 ac of seagrasses will not appreciably affect the ability of adult green sea turtles to forage.

The permanent in-water installation of 133 concrete piles (30-in by 30-in) and 70 polymeric piles (12-in diameter) will result in the permanent loss of 0.02 ac of unvegetated estuary bottom (e.g., sand/silt) where sawfish, Gulf sturgeon, and sea turtles might forage for prey. In addition 0.01 ac of unvegetated estuarine bottom will be temporarily displaced by the 60 steel pipe piles (36-in diameter) installed for the temporary work trestles. Because this type of substrate is highly abundant in Boca Ciega Bay, we believe the effects on fish and sea turtles caused by this loss of estuarine bottom habitat due to this project will be insignificant. Also, the temporary work trestle pipe piles will be removed once the new bridge is built and the old (existing) bridge is demolished, and the removal of the old bridge's concrete piles will open up additional areas of submerged bottom. Invertebrate prey items will likely recolonize this estuarine bottom upon removal of these piles.

Noise created by pile-driving activities can physically injure animals in the affected areas or change animal behavior in the affected areas. Physical injurious effects can occur in 2 ways. First, effects can result from a single noise event's exceeding the threshold for direct physical injury to animals, and these constitute an immediate adverse effect on these animals. Second, effects can result from prolonged exposure to noise levels that exceed the daily cumulative exposure threshold for the animals, and these can constitute adverse effects, if animals are exposed to the noise levels for sufficient periods. Behavioral effects can be adverse if such effects prevent animals from migrating, feeding, resting, or reproducing, for example. All in-water noise sound pressure levels discussed below, including peak pressure and root mean square (RMS) sound pressure, are referenced to decibels (dB) 1 micropascal, and sound exposure levels (SEL) are referenced to dB 1 micropascal^2-second. The NMFS-accepted noise thresholds for impact pile driving are 206 dB for peak-pressure injury, 187 dB for cumulative sound exposure level (cSEL) injury, 150 dB RMS for behavioral disturbance of fishes, and 160 dB RMS for behavioral disturbance of sea turtles[2].

Because the impact hammer installation of 30-in by 30-in square concrete piles creates considerably more in-water noise than the installation of 12-in diameter polymeric piles, only the

[2] NMFS 2014. Regional General Permit SAJ-82 (SAJ-2007-1590), Florida Keys, Monroe County, Florida.

impact hammer installation of concrete piles will be analyzed here, as a worst-case effects scenario. Based on our noise calculations, the installation of 30-in by 30-in square solid concrete piles by impact hammer could cause peak-pressure injury to smalltooth sawfish, Gulf sturgeon, and sea turtles. We believe that the potential for peak-pressure injury effects is extremely unlikely and is discountable. Peak-pressure sound levels at the source (i.e., the pile-driving operation) would be 220 dB, while the NMFS-accepted peak-pressure noise injury threshold is 206 dB for fish and sea turtles. Peak-pressure injury could occur if a sawfish, sturgeon, or sea turtle was within 16 ft of a pile driving operation. The use of the "ramp-up" technique prior to full-force impact pile driving will provide fish and sea turtles ample opportunity to leave the project area as noise levels increase and before the peak-pressure injury threshold is reached. Because we anticipate that fish and sea turtles will move away from the project area during the "ramp-up" period, we believe that an animal's suffering physical injury from peak-pressure noise exposure is extremely unlikely to occur. The applicant's compliance with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006, and *Construction Special Provisions Gulf Sturgeon Protection Guidelines*, dated September 2012, will provide an additional measure of protection by causing the installation activities to stop if sea turtles, sawfish, or sturgeon are spotted within 50 ft of operations. There are adequate avenues for a fish or sea turtle to leave or avoid the project area during pile-driving activities, and there is similar habitat nearby. An animal's movement away from the injurious impact zone is a behavioral response, with the same effects discussed below.

Based on our noise calculations, the installation of concrete piles by impact hammer could cause cSEL injury to smalltooth sawfish, Gulf sturgeon, and sea turtles. However, we believe the risk of cSEL injury is extremely unlikely and is discountable. The maximum cSEL at the source will be approximately 236 dB, while the NMFS-accepted cSEL injury threshold is 187 dB. The cSEL of multiple pile strikes to 30-in by 30-in square concrete piles (possibly reaching 36,000 strikes per day) over the course of a day may cause injury to fish and sea turtles at a radius of up to 328 ft from a pile-driving operation, if a fish or sea turtle remained within this zone for a full day's pile driving. Due to the mobility of sawfish, sturgeon, and sea turtles, we expect them to move away from noise disturbances. Because we anticipate that fish and sea turtles will move away from the project area during the "ramp-up" period, we believe that an animal's suffering physical injury from cSEL noise exposure is extremely unlikely to occur. The project has adequate avenues for a fish or sea turtle to leave or avoid the project area during pile-driving activities, and there is similar habitat outside of the cSEL injury zone. An animal's movement away from the injurious impact zone is a behavioral response, with the same effects discussed below.

The impact hammer installation of 30-in by 30-in square concrete piles could cause behavioral disturbance effects to smalltooth sawfish, Gulf sturgeon, and sea turtles. However, we anticipate any behavioral effects will be insignificant. Behaviorally disturbing noise levels extend 328 ft from the source for sea turtles and 1,037 ft from the source for smalltooth sawfish and Gulf sturgeon. The 328-ft radius marks the point at which the RMS noise level drops below the NMFS-accepted RMS behavioral disturbance threshold of 160 dB for sea turtles, and the 1,037-ft radius marks the point at which the RMS noise level drops below the NMFS-accepted RMS behavioral disturbance threshold of 150 dB for fish. If an individual chooses to remain within the behavioral disturbance zone, it could be exposed to behavioral noise effects during pile

installations and alter its behavioral pattern. Due to the mobility of sea turtles, sturgeon, and sawfish, we expect them to move away from noise disturbances to similar habitat outside of the behavioral disturbance zones and resume normal behaviors. In addition, fish and sea turtles will be able to resume normal activities during quiet periods between pile installations, during nighttime hours, and all day Sunday.

Of the 3 pile types to be installed by vibratory hammer (i.e., 18-in-wide steel sheet piles, 36-in diameter steel pipe piles, and potentially 12-in diameter polymeric piles), the vibratory installation of 36-in diameter steel pipe piles will produce the most in-water noise. Therefore, only the noise produced by the vibratory hammer installation of pipe piles will be analyzed here, to represent the worst-case effects scenario for that type of installation method. Smalltooth sawfish, Gulf sturgeon, and sea turtles may be affected by noise associated with the vibratory hammer installation of steel pipe piles (36-in diameter) into the estuary's bottom for the construction of temporary work trestles (as well as their later removal by vibratory hammer).

Based on our noise analysis, we believe the risk of any peak-pressure or cSEL injury from the vibratory hammer installation of 36-in diameter steel pipe piles is discountable. The vibratory installation or removal of pipe piles will not cause peak-pressure or cSEL injury to sea turtles, Gulf sturgeon, or sawfish. The peak-pressure noise level at the source will be approximately 195 dB, while the NMFS-accepted peak-pressure injury threshold is 206 dB. The maximum cSEL at the source will be approximately 225 dB, while the NMFS-accepted cSEL injury threshold is 234 dB for vibratory installations.

The vibratory hammer installation of steel pipe piles could cause behavioral disturbance effects to smalltooth sawfish, Gulf sturgeon, and sea turtles. However, we anticipate any behavioral effects will be insignificant. Based on our noise calculations, the vibratory hammer installation or removal of 36-in diameter steel pipe piles could cause behavioral disturbance effects at radii of 152 ft from the source for sea turtles and 707 ft from the source for fish. The 152-ft radius marks the point at which the RMS noise level drops below the NMFS-accepted RMS behavioral disturbance threshold of 160 dB for sea turtles, and the 707-ft radius marks the point at which the RMS noise level drops below the NMFS-accepted RMS behavioral disturbance threshold of 150 dB for fish. If an individual chooses to remain within the behavioral disturbance zone, it could be exposed to behavioral noise effects during pile installations and alter its behavioral pattern. Due to the mobility of sea turtles and fish, we expect them to move away from noise disturbances to similar habitat outside of the behavioral disturbance zones and resume normal behaviors. In addition, fish and sea turtles will be able to resume normal activities during quiet periods between pile installations, during nighttime hours, and all day Sunday.

An impact hammer will be used to complete the installation and verify the load capacity of the 36-in diameter steel pipe piles (temporary work trestle piles) during the final 15-20 ft of driving (i.e., "proofing" the piles). Based on our noise calculations, the "proofing" of 8 steel pipe piles (36-in diameter) per day by impact hammer could cause peak-pressure injury to smalltooth sawfish, Gulf sturgeon, and sea turtles. However, we believe that the potential for peak-pressure injury effects is extremely unlikely and is discountable. Peak-pressure sound levels at the source would be 223 dB, while the NMFS-accepted peak-pressure injury threshold is 206 dB for fish and sea turtles. Peak-pressure injury could occur if a fish or sea turtle was within 45 ft of a pile-

driving operation. The use of the "ramp-up" technique prior to full-force impact pile driving will provide fish and sea turtles ample opportunity to leave the project area as noise levels increase and before the peak-pressure injury threshold is reached. Because we anticipate that fish and sea turtles will move away from the project area during the "ramp-up" period, we believe that an animal's suffering physical injury from peak-pressure noise exposure is extremely unlikely to occur. The applicant's compliance with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006, and *Construction Special Provisions Gulf Sturgeon Protection Guidelines*, dated September 2012, will provide an additional measure of protection by causing the installation activities to stop if sea turtles, sawfish, or sturgeon are spotted within 50 ft of operations. There are adequate avenues for a sawfish or sea turtle to leave or avoid the project area during pile-driving "proofing" activities, and there is similar habitat nearby. An animal's movement away from the injurious impact zone is a behavioral response, with the same effects discussed below.

Based on our noise calculations, the "proofing" of 8 steel pipe piles (36-in diameter) per day by impact hammer could cause cSEL injury to smalltooth sawfish, Gulf sturgeon, and sea turtles. However, we believe that the potential for cSEL injury effects is extremely unlikely and is discountable. The maximum cSEL at the source will be approximately 228 dB, while the NMFS-accepted cSEL injury threshold is 187 dB. The cSEL of multiple pile strikes to 36-in diameter pipe piles (a maximum of 2,000 total strikes per day) over the course of a day may cause cSEL injury to fish and sea turtles at a radius of up to 1,778 ft from a pile-driving operation, if a fish or sea turtle remained within this zone for a full day's pile driving. Due to the mobility of fish and sea turtles, we expect them to move away from noise disturbances. Because we anticipate that fish and sea turtles will move away from the project area during the "ramp-up" period, we believe that an animal's suffering physical injury from cSEL noise exposure is extremely unlikely to occur. The project has adequate avenues for a fish or sea turtle to leave or avoid the project area during pile-driving activities, and there is similar habitat outside of the cSEL injury zone. An animal's movement away from the injurious impact zone is a behavioral response, with the same effects discussed below. In addition, the impact-based "proofing" of the pipe piles will only occur intermittently for 20-minute periods as each pile reaches the final 15-20 ft of driving. The likelihood of injury to smalltooth sawfish and Gulf Sturgeon is further reduced because these species are relatively rare in the Tampa Bay system. The highest densities of smalltooth sawfish in the Gulf of Mexico occur from Charlotte Harbor and southward. Charlotte Harbor is 60 miles south of Tampa Bay. The highest densities of Gulf sturgeon occur from the Suwannee River and northward. The Suwannee River is 112 miles north of Tampa Bay.

Based on our noise calculations, the "proofing" of 8 steel pipe piles (36-in diameter) per day by impact hammer could cause behavioral disturbance effects to smalltooth sawfish, Gulf sturgeon, and sea turtles. However, we anticipate any behavioral effects will be insignificant. The impact hammer "proofing" of steel pipe piles (36-in diameter) by impact hammer could cause behavioral disturbance effects at radii of 3,281 ft from the source for sea turtles and 15,228 ft from the source for fish. The 3,281-ft radius marks the point at which the RMS noise level drops below the NMFS-accepted RMS behavioral disturbance threshold of 160 dB for sea turtles, and the 15,228-ft radius marks the point at which the RMS noise level drops below the NMFS-accepted RMS behavioral disturbance threshold of 150 dB for sawfish. If an individual chooses

to remain within the behavioral disturbance zone, it could be exposed to behavioral noise effects during pile installations and alter its behavioral pattern. Although these behavioral disturbance zones are quite large, the duration of the intermittent individual "proofing" events is relatively short (250 strikes per pile taking less than 20 minutes). An animal may have its behavior temporarily disrupted during the each brief "proofing" event, but it should return to normal behaviors following the cessation of the event. In addition, fish and sea turtles will be able to resume normal activities during quiet periods between pile installations, during nighttime hours, and all day Sunday. Also, the installation of the pipe piles should only take 2 weeks to complete.

Conclusion

Because all potential project effects to listed species were found to be discountable, insignificant, or beneficial, we conclude that the proposed action is not likely to adversely affect listed species under NMFS's purview. This concludes your consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or if the identified action is subsequently modified in a manner that causes an effect to the listed species in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. NMFS's findings on the project's potential effects are based on the project description in this response. Any changes to the proposed action may negate the findings of this consultation and may require reinitiation of consultation with NMFS.

We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions on this consultation, please contact Dr. Dave Rydene, Consultation Biologist, at (727) 824-5379, or by email at David.Rydene@noaa.gov.

Sincerely,

WUNDERLICH.MARY.JANE.1400345488

Digitally signed by WUNDERLICH.MARY.JANE.1400345488
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=OTHER, cn=WUNDERLICH.MARY.JANE.1400345488
Date: 2018.11.27 14:15:44 -05'00'

for David Bernhart
Assistant Regional Administrator
for Protected Resources

File: 1514-22.H

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

F/SER46:DR

Commander, Seventh Coast Guard District
Bridge Administration Branch
Attn: Rodney Elkins
United States Coast Guard
909 Southeast 1st Avenue, Suite 432
Miami, Florida 33131-3028

NOV 01 2016

Chief, Cocoa Permits Section
Jacksonville District Corps of Engineers
Department of the Army
400 High Point Drive, Suite 600
Cocoa, Florida 32926

Dear Sir or Madam:

This letter responds to your request for consultation with us, the National Marine Fisheries Service (NMFS), pursuant to Section 7 of the Endangered Species Act (ESA) for the following action.

SER Number	Project Type
SER-2016-18141	Veterans Memorial River Bridge bascule piers explosive demolition

Consultation History
A previous consultation (NMFS tracking number SER-2014-15063) for the demolition and reconstruction of this bridge was concluded with the United States Army Corps of Engineers (SAJ-2009-01682). That consultation did not include explosive demolition. We received your email requesting consultation and the attached blast plan and wildlife watch plan on August 10, 2016. We requested additional information regarding the ESA-listed species you wished to include in the consultation on October 26, 2016. We received a final response on October 26, 2016, and we initiated consultation that day.

Project Location

Address	Latitude/Longitude	Water body
Veterans Memorial Bridge, Daytona Beach, Volusia County, Florida	29.211184°N, 81.011096°W (North American Datum 1983)	Halifax River



Image of the project location and surrounding area (©2016 Google)

Existing Site Conditions
The bascule bridge piers from the old Veterans Memorial Bridge lie within the Halifax River in Volusia County, Florida. The Halifax River is an estuarine waterway that connects to the Atlantic Ocean north and south of the project, but that is separated from the Atlantic Ocean by the barrier island that comprises Daytona Beach and Ormond Beach.

No mangroves, corals, or seagrasses are in the project footprint. The average water depth in the vicinity of the project area is approximately 3 feet (ft) deep, but is deeper in the maintained navigation channel between the old bridge's bascule piers (8-12 ft deep). Sediment in the vicinity of the piers consists of sand and shell hash.

Project Description
Volusia County proposes using explosives to demolish the 2 bascule bridge piers from the old Veterans Memorial Bridge. Each bascule bridge pier is approximately 40 ft by 24 ft (in cross section) and is made of reinforced concrete. Two blasts in succession will be required to complete the explosive demolition of both piers. After the first blast has occurred and been determined to have been successful, the second blast will occur several minutes later.

Initially, each pier will be demolished mechanically (with heavy equipment) down to an elevation of about +2 ft above the waterline. Next, 30 evenly-spaced vertical holes (each 3.5 inches in diameter) will be drilled in each pier (from a temporary work platform) down to a

maximum depth of -18 ft (to the bottom of each pier's seal concrete). Each hole will be loaded with explosives and then filled with at least 3 vertical ft of 3/8-inch-diameter angular crushed stone as a stemming material. The use of stemming material helps to contain the force of the blast within the structure for more effective demolition requiring the smallest amount of explosives. The maximum pounds of explosives in a hole will be 32.5 pounds (lbs) with 25 millisecond (ms) delays. The delays are used to make each pier blast a series of 30 sequential explosions each separated by 25 ms. In blasting contractor terminology this could also be referred to as a maximum 32.5 lbs per delay. Steel drapes will be placed over the exposed portion of the piers as blast mats to contain potential flying concrete debris.

Following the blast, the resulting concrete rubble will be removed with heavy equipment (clamshell and excavator bucket). The material will be placed into containers on barges and sent to a process yard by barge or truck to be recycled. The rubble material will not be placed in the Halifax River or sent to an artificial reef site. Scare shots (0.003 lb explosives) will be used immediately before a blast to temporarily move wildlife away from the near-field blast area.

Construction Conditions

A Marine Species Watch Program Plan has been developed and will be implemented to prevent protected species from being injured by the explosive demolitions. A zone (hereafter referred to as the "Safety Zone") will be monitored for the presence of sea turtles, smalltooth sawfish, and other protected species before and after the blasting events, and blasting will not proceed if protected species are believed to be within the Safety Zone. The radius of the Safety Zone is based on a formula used in previous explosive demolition projects that NMFS has conducted Section7 consultations on, and is considered conservative for preventing injury to protected species. This formula is $R = [520 (W)^{1/3}] + 500$, where R = the Safety Zone radius in ft and W = equals the maximum lbs of explosive per delay. The maximum lbs of explosive per delay for this project of 32.5 lbs yields a Safety Zone radius of 2,160 ft. The perimeter of the Safety Zone will be marked by brightly-colored buoys.

The Safety Zone observation crew will consist of 5 observers with experience spotting sea turtles and marine mammals in situations similar to this project, including 1 Chief Observer and 4 Primary Observers. The Chief Observer will continuously monitor the Safety Zone from a fixed-wing aircraft, while the primary Observers will scan the Safety Zone from land and/or boats. The observers will begin scanning the Safety Zone for protected species 1 hour before blasting is scheduled to occur and the Chief Observer must give an "all clear" signal to the blasting contractor before a blast can occur. Observers will scan for any dead or injured protected species for a 30 minute period following the blast.

Communication among observers and with the blasting contractor will be accomplished using 2-way radios and cellular phones. Observers will use polarized sunglasses and binoculars to aid in spotting protected species within the Safety Zone. Any protected species observed within the Safety Zone must leave the zone of their own volition before blasting can occur. If an animal is spotted within the zone, but not seen again for a 30-minute period, it will be assumed that the animal has left the zone and the observation clock may resume. A blast coordination meeting will be held at least 1 week before the scheduled blast to ensure that all observers and the

blasting contractor know the correct protocols to follow, and another meeting will be held the morning of the blast.

All blasting will be done during daylight hours and only when the Chief Observer has determined that weather and sea state conditions are suitable for effective Safety Zone monitoring by observers. The contractor will also comply with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions*, dated March 23, 2006. The Chief Observer will submit a report detailing the pre- and post-blast observation results to the relevant natural resource and permitting agencies within 30 days after the blast.

Effects Determination(s) for Species the Action Agency or NMFS Believes May Be Affected by the Proposed Action

Species	ESA Listing Status	Action Agency Effect Determination	NMFS Effect Determination
Sea Turtles			
Green (North and South Atlantic distinct population segment [DPS])	T	NLAA	NLAA
Loggerhead (Northwest Atlantic Ocean DPSs)	T	NLAA	NLAA
Fish			
Smalltooth sawfish (U.S. DPS)	E	NLAA	NLAA
E = endangered; T = threatened; NLAA = may affect, not likely to adversely affect			

The consultation (NMFS tracking number SER-2014-15063) for the demolition and reconstruction of this bridge that was previously concluded with the United States Army Corps of Engineers (SAJ-2009-01682) concluded that the presence of leatherback, hawksbill, and Kemp's ridley sea turtles at the project site was extremely unlikely and therefore any effects to these species were considered discountable. Thus, these species will not be discussed here.

Critical Habitat

The project is not located in designated critical habitat, and there are no potential routes of effect to any designated critical habitat.

Analysis of Potential Routes of Effects to Species

Effects to sea turtles and smalltooth sawfish include the risk of injury from direct impact by construction machinery and associated activities (e.g., work boat movement, pre-blast mechanical demolition operations and drilling activities), which will be discountable due to the species' ability to move away from the project site if disturbed. The applicant's compliance with NMFS's *Sea Turtle and Smalltooth Sawfish Construction Conditions* will provide an additional measure of protection by requiring in-water construction activities to stop if sea turtles or sawfish are spotted within 50 ft of operations.

The probability of a smalltooth sawfish occurring in the project area during demolition activities is very low. Juvenile smalltooth sawfish tend to stay near shorelines, especially shorelines with

mangroves, in waters less than 1 m deep.[1] This is believed to be a predation avoidance strategy against large sharks, such as bull and lemon sharks. Therefore, juvenile sawfish would not usually be found in the deeper channel waters near the bridge's bascule piers where demolition activities will occur. There are no records of smalltooth sawfish (adults or juveniles) in the immediate vicinity of the Veterans Memorial Bridge or in the Halifax River in the National Sawfish Encounter Database (1999 to 2014). The closest reports of sawfish encounters in the area all occurred on the ocean side of Daytona Beach in the Atlantic Ocean (two adults caught with rod and reel at Sun Glow Fishing Pier on Daytona Beach in 2003 and an adult caught with rod and reel 2.13 miles offshore of Daytona Beach in 2007). Most sawfish encounters on the Atlantic side of Florida occur south of Cape Canaveral. Cape Canaveral lies about 60 miles south of the project area. This indicates that the probability of a sawfish, even an adult, occurring near the main bridge piers during the instant of a blast will be very low.

Based on the information discussed above regarding the geographic distribution of smalltooth sawfish and their life history strategies, it is highly unlikely that any sawfish will be found in the project's blast zone at the instant of detonation. Also, because sawfish are benthic-oriented fishes without swim bladders, they are less prone to mortality or injury from underwater blasting compared to fish species with swim bladders. In addition, as stated in the Marine Species Watch Program Plan, blasting of the bridge piers will only move forward if weather and water conditions provide suitable visibility to allow detection of protected marine organisms within the Safety Zone. This will increase the chances of the aerial observer spotting a large sawfish, if one should occur within the Safety Zone. Based on the proposed harm avoidance measures in the Marine Species Watch Program Plan, available local distribution data, and the species' life history characteristics, NMFS has determined that risk of harm to smalltooth sawfish from explosive demolition activities will be discountable.

Sea turtles may occur in the Halifax River and could be injured by pressure wave impacts from the detonation events during the demolition of the piers. Studies have shown that underwater explosions can injure or kill sea turtles. The risk of injury to sea turtles can be reduced by blasting only when observations indicate that there are no sea turtles within the Safety Zone. The equation being used to calculate the size of the Safety Zone is believed to be conservative in estimating zones of influence for protected species based on studies to date,[2,3] and mitigation based on this model has been tested in the field.[4] Aerial and platform-based surveys are typically used to monitor for sea turtle presence prior to the use of explosives, and to determine that all

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[1] Simpfendorfer, C.A. 2006. Movement and habitat use of smalltooth sawfish. Mote Marine Laboratory Technical Report 1070. Final Report to NOAA Fisheries under Purchase Order Number WC133F-04-SE-1543. 26 pp.

[2] Hempen, G.L., T.M. Keevin, and H.J. Ruben. 2005. Underwater blast pressures from confined rock removal shots: The Kill van Kull Deepening Project. Pp. 91-100. In: Proceedings of the Thirty-first Annual Conference on Explosives and Blasting Technique, Volume 1, Orlando, Florida. International Society of Explosive Engineers, Cleveland, OH.

[3] Hempen, G.L., T.M. Keevin, and T.L. Jordan. 2007. Underwater Blast Pressures from a Confined Rock Removal During the Miami Harbor Deepening Project. International Society of Explosives Engineers, 2007G Volume 1, 12 pp.

[4] Jordan, T.L., K.R. Hollingshead and M.J. Barkaszi. 2007. Port of Miami Project - Protecting Marine Species During Underwater Blasting. International Society of Explosives Engineers 2007G, Volume 1, 10 pp.

animals have left the Safety Zone. Animals will not be harassed into leaving the Safety Zone (e.g., chasing animals or enticing bow riding), and will be allowed to leave the zone under their own volition.

The use of observers to monitor sea turtle presence/absence within a defined area (i.e. the Safety Zone) will minimize the potential for harm from underwater explosions. Based on the proposed harm avoidance measures in the Marine Species Watch Program Plan, NMFS has determined that risk of harm to sea turtles from demolition activities will be reduced to discountable levels.

Conclusion

Because all potential project effects to listed species were found to be discountable, insignificant, or beneficial, we conclude that the proposed action is not likely to adversely affect listed species under NMFS's purview. This concludes your consultation responsibilities under the ESA for species under NMFS's purview. Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action. NMFS's findings on the project's potential effects are based on the project description in this response. Any changes to the proposed action may negate the findings of this consultation and may require reinitiation of consultation with NMFS.

We have enclosed additional relevant information for your review. We look forward to further cooperation with you on other projects to ensure the conservation of our threatened and endangered marine species and designated critical habitat. If you have any questions regarding this consultation, please contact Dr. Dave Rydene, Consultation Biologist, at (727) 824-5379, or by email at David.Rydene@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

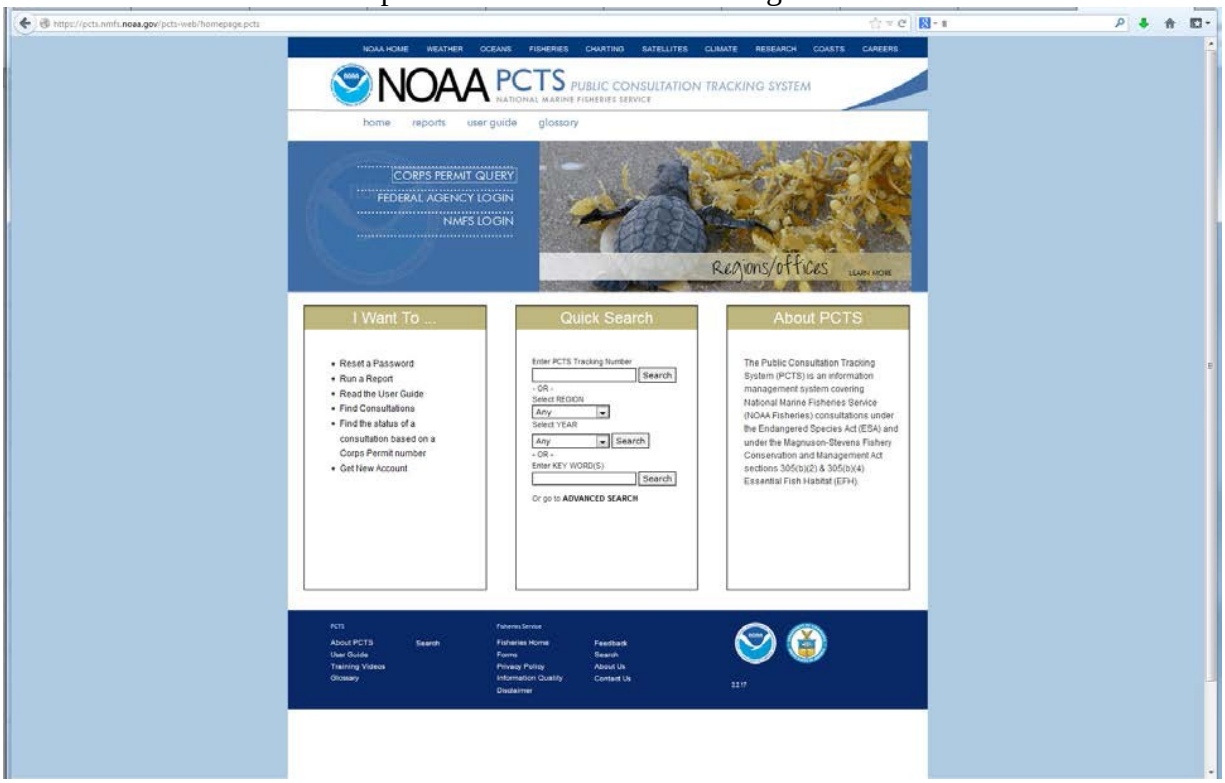
Enc.: 1. *PCTS Access and Additional Considerations for ESA Section 7 Consultations* (Revised March 10, 2015)
2. Sea Turtle and Smalltooth Sawfish Construction Conditions (Revised March 23, 2006)

File: 1514-22.H

PCTS Access and Additional Considerations for ESA Section 7 Consultations
(Revised 03-10-2015)

Public Consultation Tracking System (PCTS) Guidance: PCTS is a Web-based query system at **https://pcts.nmfs.noaa.gov/** that allows all federal agencies (e.g., U.S. Army Corps of Engineers - USACE), project managers, permit applicants, consultants, and the general public to find the current status of NMFS's Endangered Species Act (ESA) and Essential Fish Habitat (EFH) consultations which are being conducted (or have been completed) pursuant to ESA Section 7 and the Magnuson-Stevens Fishery Conservation and Management Act's (MSA) Sections 305(b)2 and 305(b)(4). Basic information including access to documents is available to all.

The PCTS Home Page is shown below. For USACE-permitted projects, the easiest and quickest way to look up a project's status, or review completed ESA/EFH consultations, is to click on either the "Corps Permit Query" link (top left); or, below it, click the "Find the status of a consultation based on the Corps Permit number" link in the golden "I Want To…" window.



Then, from the "Corps District Office" list pick the appropriate USACE district. In the "Corps Permit #" box, type in the 9-digit USACE permit number identifier, with no hyphens or letters. Simply enter the year and the permit number, joined together, using preceding zeros if necessary after the year to obtain the necessary 9-digit (no more, no less) number. For example, the USACE Jacksonville District's issued permit number SAJ-2013-0235 (LP-CMW) must be typed in as 201300235 for PCTS to run a proper search and provide complete and accurate results. For querying permit applications submitted for ESA/EFH consultation by other USACE districts, the procedure is the same. For example, an inquiry on Mobile District's permit MVN201301412 is entered as 201301412 after selecting the Mobile District from the "Corps District Office" list. PCTS questions should be directed to Kelly Shotts at Kelly.Shotts@noaa.gov or (727) 551-5603.

EFH Recommendations: In addition to its protected species/critical habitat consultation requirements with NMFS' Protected Resources Division pursuant to Section 7 of the ESA, prior to proceeding with the proposed action the action agency must also consult with NMFS' Habitat Conservation Division (HCD) pursuant to the MSA requirements for EFH consultation (16 U.S.C. 1855 (b)(2) and 50 CFR 600.905-.930, subpart K). The action agency should also ensure that the applicant understands the ESA and EFH processes; that ESA and EFH consultations are separate, distinct, and guided by different statutes, goals, and time lines for responding to the action agency; and that the action agency will (and the applicant may) receive separate consultation correspondence on NMFS letterhead from HCD regarding their concerns and/or finalizing EFH consultation.

Marine Mammal Protection Act (MMPA) Recommendations: The ESA Section 7 process does not authorize incidental takes of listed or non-listed marine mammals. If such takes may occur an incidental take authorization under MMPA Section 101 (a)(5) is necessary. Please contact NMFS' Permits, Conservation, and Education Division at (301) 713-2322 for more information regarding MMPA permitting procedures.

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006

10 December 2020

Reference: **Pinellas Bayway Bridge / Replacement of Bridge Structure E**
Financial Project ID: 410755-2-52-01, 432587-1-52-01 &427143-2-52-01
Contract No: E7R20
County Road No: Pinellas, SR 679

Subject: **Blasting Plan Submittal for Pinellas Bayway Bridge Bascule across Gulf Intracoastal Waterway**

Please find for approval the following blasting plan for the demolition of the main piers of the Pinellas Bayway Bridge, Structure "E" in St. Petersburg, Florida. Blasting activities are planned for March/April 2021.

A. GENERAL:

1. The purpose of this blast plan is to provide information on the procedures that will be used to explosively demolish the concrete bascule piers of the old Pinellas Bayway Bridge, Structure "E".

2. In preparing this plan, the applicable sections of the following Standards and References were used (where standards between agencies differ, the more restrictive standard will be adhered to):

   a. Florida Department of Transportation Standard Specification for Road and Bridge construction in conjunction with the Special Provisions, Supplemental Specifications and Technical Special Provisions pertaining to this project.

   b. The SWFWMD permit issued for construction of State Road 679 (Pinellas Bayway Structure E) (Permit # 43023803.003). (Attachment C)

   c. The USCG Bridge Permit #10-16-7 dated December 12, 2016 issued for construction of the Pinellas Bayway "E" across the Gulf Intracoastal Waterway (Boca Ciega Bay).

   d. Department of The Army Permit #SAJ-2002-04286-NW dated March 3, 2017.

   e. The plan will be submitted to the National Marine Fisheries Service, Florida Fish & Wildlife Conservation Commission an US Fish & Wildlife Service at least 60 days prior to proposed blasting date for approval.

   f. No blasting will commence until all environmental agencies above approve the blasting proposal.

   g. U.S. Army Corps of Engineers Manual (EM) 1385-1-1 Sec 29.

   h. National Fire Protection Association Code (NPFA)

i. OSHA requirements as applicable.

j. USC Chapter 40 (Explosives and Specification).

k. Codes and Statues: State of Florida, Pinellas County and City of St. Petersburg and St. Petersburg Beach.

l. Imperiled Species and Marine Mammal Watch Plan by Land and Sea Group, Inc (Attachment F)

B. SUBMITTALS:

The following information is being submitted for review, approval, and filing with project records.

a. The resume of Ken Tully of Contract Drilling and Blasting (CDB) who will be the on site supervisor for all explosive operations. Attached in the Blasting Plan his resume will demonstrate his work in controlled explosive demolition.

b. State and federal explosives Licenses held by Ken Tully and his company CBD.

c. Daily Blasting Logs are part of the Blast Plan Attached. (To be filled out after each blast).

d. Drilling and Loading working drawings for all Piers are included for the bascule piers in the Blast Plan.

C. ASSIGNMENTS OF PRIORITIES:

The prioritization and scheduling of the blasting operations will be coordinated with all involved parties as called for by the Engineer responsible for the project, The Florida Department of Transportation (FDOT), Pinellas County, United States Coast Guard, and local law enforcement agencies. Controlling factors in the daily operations, in the order of precedence, are as follows:

a. Safety of on-site personnel associated with or visiting this project, the general public crossing the new bridge, and all commercial mariners or recreational boaters transiting or planning to transit the safety zone. American Bridge Project Engineer will notify the appropriate agencies when blasting operations are to take place and coordinate these operations with the on site marine watch observers.

b. Protection of existing structures, utilities and other improvements within the area of bridge demolition.

c. Protection of Endangered Species including manatees, sea turtles, marine mammals and other marine wildlife.

d. Proper and adequate demolition of substructure members. Balance the need to minimize energy generated from explosive work with need to adequately rubblize concrete. Efficient and rapid removal of post-blast debris from waterway will be given priority. Care will also be taken to avoid the need to re-drill and re-blast irretrievable underwater portions of structure too large to remove with normal excavation equipment.

e. Scheduling of blast activities to minimize impact on parties listed in item a. above. Consideration will be given to the tidal schedule and if possible all shots will be scheduled on the high tide.

D. SAFETY IMPLEMENTATION:

To provide assured safety, the following safety measures, unique to this project, will be implemented.

a. Pre-blast inspections will be conducted prior to any blasting activities. Blast monitoring will be conducted during blast activities. Notifications of blasting activities will be issued as required by the Engineer. A record of all seismic and over pressure (sound) will be maintained at American Bridge office for the Engineer's review.

b. There is a reasonable probability that sea turtles, manatees, and dolphins will be located in the blast area during the blast event. A Safety Zone around the blasting operations will be maintained at a sufficient distance to preclude any possible injury due to "fly rock". The "Danger Zone" is based on the actual explosives loaded in each shot. The calculated exclusion zone is based on the charge weight in TNT equivalency and shall be categorized as an open-water blast.

   An observation buffer zone of 300 additional feet shall be added. An aerial map is included as part of the Blast Plan and Watch Plan to depict the zones.
   No additional listed species' habitat or feeding areas are anticipated to be destroyed by this blasting project.

c. All unauthorized travel into or near the blasting Safety Zone via vehicle, watercraft or any other means will be prevented by signs, roped-off areas, guards, patrol boats or other means necessary to control unauthorized ingress. Prior to detonation of any explosive, the Safety Zone will be secured and cleared. American Bridge with the assistance of local law enforcement where needed, will clear the Safety Zone of all unauthorized spectators. Assistance is anticipated from the Coast Guard Marine Safety Office for waterborne activity controls, and from the local sheriff's office for restricting vehicular traffic near the blasting area. Generally, it will take 5 to 10 minutes to set up traffic stops in the blast area and then another 5 minutes to complete the explosive shot. Immediately after the shot is completed, a post shot inspection will be made by the blaster and if conditions are determined safe, the all clear signal will be sounded and all traffic will be allowed to proceed.

d. Prior to detonation of an underwater blast, a "Fish Scare" charge will be detonated prior to the shot. A nonel detonator suspended in the water column beside the pier will be detonated as described in the Blasting Plan (Attachment A).

e. An audible warning horn will be sounded as follows: Five minutes prior to the blast 3 short air horn blasts, 1 minute prior to the blast 2 short air horn blasts and after the blast an all clear 1 long air horn blast.

Note: The blaster will be in direct radio communications with the Project Engineer and Chief Endangered Species Observer who must give their approval before the shot is fired. The details of these communications procedures will be discussed prior to the shot, and will include communications requirements from each entry control point, both on land and in the waterway.

E. BLASTING PLANS/DAILY BLASTING LOGS (Blast Plan):

Adjustments may have to be made if unexpected conditions are encountered while drilling the Piers. Any changes needed as a result of unknown conditions will be discussed with the Engineer. Any changes will be such that it will not effect the seismic or air blast limits for safe blasting in built up areas.

The Blast Plan contains sketches of the details for drilling and blasting and shows various elevations of piers, location of blast holes, diameters, depth of blast holes and spacing of holes.

F. MITIGATION

To the extent practicable the blasting shall be conducted during slack tide conditions.

The volume and length of all blasting agents, detonation cord, and explosives will be limited to the minimum necessary to conduct the work in a manner that is efficient, safe for workers, and protective of aquatic and marine organisms. Initiation of explosive charges will be conducted with the minimum length of detonation cord possible.

All shock tubes and detonation cord or electric wires will be recovered and removed after each blast.

For any information pertaining to this plan contact Oscar Camacho, Project Engineer, at (412) 760-70-78. Should you require any additional information please advise.

Sincerely,

American Bridge Company.
Oscar Camacho
Project Engineer
Pinellas Bayway Structure “E” Bridge

Attachments: (A) Blasting Plan
(B) Watch Program by Land and Sea Group, Inc.
(C) Southwest Florida Water Management District Permit

Cc: FFWCC
NMFS Southeast Regional Office
U.S. FWS
USCG
Job File

SR 679
Bayway Structure E
Bascule Piers Demolition



Blast Plan

December, 2020

SCOPE OF WORK

Contract Drilling & Blasting LLC (CDB) has been contracted by American Bridge Company to conduct drilling and blasting for the removal of the existing bascule piers of the SR679 Pinellas Bayway Bridge. American Bridge Company will mechanically remove the piers to elevation +5. CDB will then utilize a drill rig placed on a work platform on top of each bascule to drill the bore holes at the designed locations in the piers. Drill templates and casing pipes will be used where required for the drilling of holes in the foundations.The piers will then be loaded with explosives, covered with blast mats and blasted as per scheduled loading days and shot day. The loading will be broken into two consecutive days. The piers will be blasted simutaneuosly in one event. Explosives will be delivered on each blast day, no onsite storage will be required. Once the piers have been blasted American Bridge Company will complete the removal of the debris from the river with their equipment.

Project Key Personnel

Ken Tully.....Blaster-in-Charge

Albert VanNiekerk.....Alternate Blaster-in-Charge

Edward Harvey.....Drilling Superintendant

KENNETH L. TULLY

Geologist / Blasting Specialist / **Drilling Consultant**

ACADEMIC QUALIFICATIONS
Saint Mary's University, Halifax, NS
Bachelor of Science Degree, Major in Geology

CERTIFICATIONS
Federal Explosives License, issued by the ATF
Explosives User's License, State of Florida
Licensed Blaster in the states of AL, AR, FL, SC, VA, NJ, PA, MO, NC, NYC, MD, GA, CA, NH, ME, CT
Licensed Blaster in the province of BC.(Licenses Previously Held in NS, WV,TN)

PROFESSIONAL AFFILIATIONS
International Society of Explosives Engineers, ISEE
National Demolition Association
Founder and 1st President of the first Canadian Chapter of the ISEE

PRESENTATIONS & PUBLICATIONS
Featured in a documentary by the Discovery Channel & in The Journal of Explosives Engineers
Seminar presentations on blasting vibrations and air concussion for Technical University of Nova Scotia
Consulted on the drafting of the current South Carolina blasters exams
Consulted on the drafting of municipal blasting by-laws in Nova Scotia
Drafted TMG Rock Contractors safety policy and manual for Drilling and Blasting Operations
Presentation on the Advantages of Explosives, presented to the Civil Engineers Society of Charleston, SC.
Speaker/presenter at the Georgia Blasters Training Seminar
Presenter at the ISEE 2020 annual conference.

PROFESSIONAL EXPERIENCE

KT Blasting Specialists LLC (Mt. Pleasant, SC, USA) Owner	2014 – Present
Contract Drilling & Blasting LLC (Jacksonville, FL, USA) Geologist / Blasting Specialist / Vibration Specialist Drilling Specialist	Nov. 2008 - Present
Advanced Blasting Services (Mt. Pleasant, SC, USA) Geologist / Blasting Specialist / Drilling Consultant	Aug. 2005 – Nov. 2008
Independent Blasting Consultant (Parrsboro, NS)	Oct.1998 – July 2005
Advanced Blasting Technologies (Princeton, WV) Superintendent	June 1997 - Sept. 1998
TMG Rock Contractors Ltd. (Kingston, ON) Atlantic Region Manager	Nov. 1995 – June 1997
Rockwork Construction (Dartmouth, NS) Blaster in Charge	April 1995 – Sept. 1995

TMG Rock Contractors Ltd. (Nova Scotia Division) April 1994 – Feb.1995
Blaster in Charge

Risktech Consulting Services (NS) Sept.1989 – Jan.1992
VP, Manager of Seismic Operations

Seistech Blasting Consultants (Windsor, NS) Sept.1987 – Sept.1989
Owner / President

Atlantic Explosives Ltd. (Waverly, NS) Aug. 1984 –Sept.1987
Seismic Technician

Awards

San Francisco Oakland Bay East Span Foudation Removal Project 2013 - 2018
Controlled Blasting Speciailist/Blaster in Charge, CDB - Kiewit/Manson JV CMGC team.
- Associated General Contractors (AGC), 2017 & 2019 Marvin M. Black Partnering Excellence Merit Award
- AGC California, The Construction Awards, 2018 Partnering Excellence Award
- California Transportation Foundation, Transportation Awards Finalist, 2017 Unique Project
- Federal Highways Administration 2017 Environmental Excellence Award
- AGC California, The Construction Awards Finalist, 2016 Meeting the Challenge of a Difficult Job - Heavy Equip.
- World DemolitionAwards, 2016 Collaboration Award
- Caltrans, 2015 Partnering Success in Motion Award

EXAMPLES OF PROJECTS

Demolition / Underwater Projects

Cooper River Bridges & Piers Demolition, Charleston, SC – Testa Corp.
Fuller Warren Bridge Pier Demolition – Jacksonville, FL. – Cashman, Inc.
Combahee River Bridge Pier Demolition – United Constructors
Sanibel River Bridge Piers Demolition – Sanibel, FL. – Testa Corp.
Broad River Bridge & Piers Demolition – Gaffney, NC. – Rae Constructors
Genesee River Bridge Piers Demolition – Rochester, NY – Edward Kramer & Sons
Saskonnet River Train Bridge Piers – Tiverton, RI – Testa Corp
Titan America Smoke Stacks Demolition (250 ft) – Miami, FL. – Testa Corp.
Chickahominy Bridge – Charles City & James City, VA - Advanced Blasting Services LLC
Giant Cement Plant, Smoke Stack (225 ft) and Piers Demolition – Harleyville, SC – ISP Inc.
Mosaic Phosphates Sulphuric Cake Tanks Demolition – Green Bay, FL – DH Griffin
Route 36 Bridge Demolition - Highlands, NJ - JH Reid
Route 25/70 Bridge Demolition – Newport, TN – DH Griffin
Holtwood Power Plant Skimmer Wall Demolition – Holtwood, PA – PPL
Imperial Sugar Furnace Building & Pan House Demolition – Sugar Land, TX – DH Griffin
Carondelet Coke Plant Stack Demolition (165ft)– St. Louis, MO – Environmental Operations Inc.
Max Brewer Bridge Demolition – Titusville, FL – Seaward Marine
Court Street Bridge Piers Demolition – Hackensack, NJ – Creamer/Sanzari
Willis Ave. Bridge Piers Demolition – New York, NY – Kiewit/Weeks JV

KAUT TV Tower Demolition (1400 ft)– Oklahoma City, OK – Midwest Wrecking Co.
Harley Davidson Plant, Smokestack Demolition (135ft) – York, PA - MECO Demoilition
Gorgas Power Plant Boiler Bldg. Demolition – Parish, AL – DH Griffin Wrecking Co.
FMC Corp. Stack Demolition (160 ft)– Baltimore, MD – DH Griffin Wrecking Co.
Exelon Plant Boiler Bldg. Demolition – Fort Worth, TX – DH Griffin of Texas
University of Alabama,Rose Towers Dormitory Implosion(13 story bldg..)–Tuscaloosa, AL–DHG
Jordan Bridge, Gantry Truss Emergency Removal – Chesapeake, VA – Seaward Marine
Holtwood Power Plant, New Pier Removals – Holtwood, PA – Walsh Construction
Cooke's Children's Hospital Demolition (8 story bldg.)– Fortworth, TX – Midwest Wrecking
Six Flags over Texas, Parachute Ride Demolition – Arlington, TX – Dallas Demolition II
Thomas Building Demolition (9 story)- Dallas TX – Dallas Demolition II
NASA Test Stand 4696 – Huntsville AL – Britt Demolition
Rt.3 Bridge Pier Demolition – Clifton, NJ – Creamer / Sanzari JV
Holtwood Power Plant, Closure Wall Demolition - Holtwood, PA – Walsh Construction
AMP Ohio Stack Demolition (360 ft)– Marietta OH - Brandenburg Industrial Service Company
Bayway Pinellas Bridge Pier Demolition – Pinellas FL – Orion Marine Group
FPL Power Plant Boilers & Stacks Demolition (365 ft)– Port Everglades FL – DHG Wrecking Co.
FPL Stack Bases Demolition – Port Everglades FL – DH Griffin Wrecking Co.
Alabama Newsprint Silos Demolition – Monroeville AL- DH Griffin Wrecking Co
Holtwood Power Plant, Bridge B Piles removal – Holtwood PA – Walsh Construction.
SC 5 Catawba Bridge piers demolition – Lancaster Co. SC – United Contractors
DuPont Stack Demolition (235 ft) - Kinston NC – DH Griffin Wrecking Co.
Genesee Towers Demolition (19 story bldg.) – Flint MI – Burnash Wrecking
SC 601 Congaree River Bridge piers demolition- Calhoun Co.SC- United Contractors
Skidaway Narrows Bridge piers demolition - Chatham Co. GA – United Contractors
Scot Towers demolition (15 story bldg.) – Greenville SC – Keys Construction
Port Mann Bridge piers demolition – Coquitlam BC Canada – Kiewit/Flatiron JV
Winkler Hall demolition (11 story dorm) – Appalachian State University, Boone NC – DH Griffin Wrecking
Houston Club Demolition (18 story office building) – Houston, TX – DH Griffin of Texas
Horsehead Stack Demolition (400 ft) – Monaca PA – Brandenburg Industrial Services
499 Sheridan Demolition (two 12 story buildings) – Oklahoma City – Midwest Wrecking
Cliffside Power Plant (boiler demolition) – Duke Energy,Cleveland Co, NC – DH Griffin Wrecking
SFOBB Pier E3 Demolition (submerged bridge pier) – Oakland Bay, CA – Kiewit/Manson JV
McCullom Hall Demolition (10 story dormitory) – University of Kansas, Lawrence,KS – Midland Wrecking
PPL Stack Demolition (350 ft) – Billings MT – Brandenburg Industrial Services
American Airlines Headquarters Demolition – Fort Worth TX – Meco Demolition
BB Comer Bridge Demolition, superstructure & piers – Scottsboro AL – United Demolition
SFOBB Piers E4&5 Demolition (bridge piers) – Oakland Bay, CA – Kiewit/Manson JV
Rt. 9 Great Egg Harbor Bay Bridge pier removal – Egg Harbor, NJ – Rt 52 Constructors
Sarah Mildred Long Bridge pier removals - Portsmouth NH/ Kittery ME - ACD
Gerritsen Inlet Bridge pier removals - Brooklyn NY - China Construction
SC 41 Bridge over the Wando Pier Demolition - Mt. Pleasant SC - Freeland Construction
SFOBB Piers 6 through 22 Demolition (bridge piers) - Oakland Bay - Kiewit/Manson JV
Goethals Bridge Pier C Demolition - New York - R.E. Pierson
US70 E Bridge Piers Demolition - Beaufort, NC - United Demolition/UIG
Cyclopean Wall Demolition-Pier F Port of Long Beach, Long Beach CA - Manson Construction

Underwater Rock Projects

Scott Paper Dock Expansion Project – Liverpool, NS, Canada – Scott Paper Ind. Halifax
Container Pier Expansion – Halifax, NS, Canada – City of Halifax
S-NB-2 Newark Bay – Newark, NJ – Northeast Dredging
South Yard Assembly Plant - Thames River, CT- Electric Boat Company/ General Dynamics

Tunnel & Underground Projects

National Docks Bergen Tunnel Clearance - Jersey City, NJ - RJ Corman Railroad Group
Steubenville Deep Sewer Development – Steubenville, OH – Mid-West Mole Construction.
Bolt Mtn. Coal Mine Face-up – V & G Construction, Beckley, WV

Highway Projects

Wendell Interchange, Wendell, NC – Barnhill Construction
Highway 64 Development – Franklin, TN – TDOT
Staunton Bypass – Staunton, VA – Branch Highways
Highway 102 Widening – Mt. Uniacke, NS, Canada – Municipal Contractors
Superior Construction Co., Inc., Drilling Pier Caps & Installing Dowels, SR9A & SR202 JTB Interchange, Duval County, FL

Site Development Projects

Controlled Blasting Specialist - Port of Long Beach, CA - Manson Construction
Controlled Blasting Specialist – San Francisco/Oakland Bay Bridge – Kiewit/Manson JV
Blasting Consultant - World Trade Center, NY – Tutor / Perini
Roanoke Sewer Treatment Plant Upgrade – City Of Roanoke, VA
LaVergne Industrial Park – Tennessee Excavators – LaVergne, TN
Bayers Lake Industrial Park – Halifax, NS, Canada – Municipal Contractors
Middle Tyger River Sewer Project – Lyman, SC. – Reynolds Construction
Fairview Sewer Upgrade Project – Fairview, NS, Canada, - Dexter Construction
Naval Base Sewer Upgrade & Expansion- CFB Halifax, NS, Canada – Municipal Contracting Clayton Park Residential Housing – Halifax, NS, Canada – Shaw Group

Construction Vibration Monitoring Projects

UNC Harleson Hall Demolition – Raleigh NC – UNC Construction services
Tobacco Bay Reverse Osmosis Plant – Bermuda – Bermuda Ministry of Health
Isle of Palms Marina Bulkhead Replacement – Isle of Palms, SC – Meisner Marine
Strathmere / Sea Isle Beach Re-nourishment – Strathmere, NJ – GGLD
Municipal Contracting Quarry Operations – Halifax, NS
Bayer's Lake Industrial Park – Halifax, NS
Barrington Passage Temporary Quarry – Barrington, NS

Provided blast consulting, blast design for vibration control and vibration monitoring / analysis for numerous projects in Maritime Canada.

ALBERT P VANNIEKERK PhD PE

Blasting Specialist & Blast Monitoring Specialist

ACADEMIC QUALIFICATIONS

Doctor of Philosophy (Explosives Chemistry) 1993
New Mexico Institute of Mining and Technology, USA

Master's Degree (Chemical Engineering) 1991
University of Pretoria, South Africa

Bachelor's Degree (Chemical Engineering) 1988
University of Pretoria, South Africa

CONTINUING EDUCATION

Program in Financial Management and Investments 1998
University of South Africa, South Africa

International High-Tech Seminar on Blasting Technology 1995 / 1997
Blasting Analysis International, USA

Certificate in Industrial Marketing 1995
Rand Afrikaans University, South Africa

Short Course in Technological Innovation, University of South Africa 1994

Various Management Training Courses 1988 - 1999
Sasol Limited, South Africa

International Society of Explosives Engineers 1990 - 2019
Annual Conference & Technical Seminar, Blaster's Training Seminar

PROFESSIONAL QUALIFICATIONS

Professional Engineer (Registration # 20060162) 1991
Engineering Council of South Africa

CERTIFICATIONS

California – Certificate of Eligibility
California Contractor State License Board – General Engineering License
MSHA Surface Mining Safety Training
New Jersey – Public Works Contractor
New York City – Small Business Services Approval
OSHA 10 Safety Training
Port of Long Beach, CA – Small Business Enterprise
US Small Business Administration – Small Business

EXPLOSIVES & BLASTING LICENSES

BATF – Federal Explosives User Permit & Manufacturing License
California – Blaster's License (General Above Ground: Mining & Construction)
Connecticut – Certificate of Blasting Competency
Florida - User License and Blasters Permit
New York City Fire Department (FDNY) – Unrestricted / All Purpose blasting license E10
Massachusetts – Blasting Certificate of Competency
Puerto Rico – License to manufacture and use explosives

AWARDS

San Francisco Oakland Bay Bridge East Span Marine Foundation Removal 2013 – 2018
Drilling, Blasting & Blast Monitoring Subcontractor to Kiewit-Manson JV CMGC team
- Associated General Contractors (AGC), 2017 & 2019 Marvin M. Black Partnering Excellence Merit Award
- AGC California, The Construction Awards, 2018 Partnering Excellence Award
- California Transportation Foundation, Transportation Awards, 2017 Unique Project
- Federal Highway Administration 2017 Environmental Excellence Award
- AGC California, The Construction Awards Finalist, 2016 Meeting the Challenge of a Difficult Job – Heavy Equipment
- World Demolition Awards, 2016 Collaboration Award
- Caltrans, 2015 Partnering Success in Motion Award

Columbia River Channel Improvements Rock Removal (W9127N09C0026) 2009/10
Drilling & Blasting Subcontractor to J.E. McAmis, Inc.
- USACE Certificate of Appreciation
- USACE Construction Performance Evaluation (Outstanding):
- Western Dredging Association 2011 Navigation Dredging Environmental Excellence
- Western Dredging Association 2011 Annual Safety Award

Outstanding Performance - Certificate in Industrial Marketing, Rand Afrikaans University 1995

PROFESSIONAL MEMBERSHIPS

American Institute of Chemical Engineers (AIChE) – Member	2012
Society of American Military Engineers (SAME) – Member	2012
American Chemical Society (ACS) – Member	2011
Society for Mining, Metallurgy & Exploration (SME) - Member	2000
South African Institute of Chemical Engineers (SAIChE) - Member	1987

PROFESSIONAL AFFILIATIONS

Western Dredging Association (WEDA)	2010
National Demolition Association (NDA)	2008
Florida Shore & Beach Preservation Association (FSBPA)	2007
American Shore & Beach Preservation Association (ASBPA)	2007
International Society of Explosives Engineers (ISEE)	1990

PRESENTATIONS & PUBLICATIONS

Speaker – Blowing Things Up in the Bay: Near-field Hydroacoustic Monitoring. 51st Annual Cal-Neva American Fisheries Society Meeting, Eureka, CA 2017
Instructor – WV Blaster Refresher Training 2013
Panelist – ISEE Panel Discussion on Electronic Detonators 2004
Instructor – MSHA Training Seminar, Beckley, WV 2003 / 2004
Speaker – 'Best in the West' ISEE Chapter Meeting 2003 / 2004
Speaker – Great Lakes ISEE Chapter Meeting 1999 / 2003
Instructor – BAI High-Tech Explosives Seminar 1995 / 1997
Speaker – Canadian Mining Conference 1997
Speaker – South African Institute of Mining Engineers Annual Conference 1996
Speaker – South African Institute of Chemical Engineers Annual Conference 1994

Develop "Train-the-Trainer" program for UNI Tronic™ Electronic Blasting System
Master Trainer – UNI Tronic™ Electronic Blasting System

vanNiekerk, A.P & Brower, K.R., "Decomposition of Composite Explosives Containing Ammonium Nitrate by transient adiabatic gas compression", Propellants, Explosives, Pyrotechnics, Volume 20 Issue 5, Pages 273 – 278 (2004)
Development of Graduate Degree level course content: "Explosives Physics & Chemistry"
M.Eng. Thesis: "Optimization of Emulsion Formation in CR-Mixer"
PhD Thesis: "A Study of the Reaction Products from Detonation and Rapid Thermolysis of Emulsion Explosives"
Poster Session presented at ISEE Conference 2004
Paper presented at ISEE Conference 1997
Paper presented at Canadian Mining Conference 1997
Paper presented at South African Institute of Mining Engineers Annual Conference 1996
Paper presented at South African Institute of Chemical Engineers Annual Conference 1994

PROFESSIONAL EXPERIENCE

Contract Drilling & Blasting LLC (Florida, USA) 2007 to Present
President

Sasol North America Inc. (Minnesota, USA) 1999 – 2004
General Manager Operations
Sasol Mining Initiators (Pty) Ltd *2002 – 2004*
Sasol DHB Holdings Inc. (Viking Explosives & Supply, Inc.) *1999 – 2002*
Sasol DHB Holdings Inc. (Continental Nitrogen & Resources Corporation) *1999 – 2001*

Sasol Mining Explosives (Randburg, South Africa) 1998 – 1999
Manager, Bulk & Nitrates Business

Sasol Mining Explosives (Secunda and Witbank, South Africa) 1992 – 1998
Manager, Bulk Business / Manager, Bulk Operations

Center for Explosives Technology Research (CETR) (Socorro, New Mexico) 1990 – 1992
Research Center for Energetic Materials (RCEM) (Socorro, New Mexico)
PhD Researcher

Sasol Mining Explosives (Secunda, South Africa) 1988 – 1990
Process Engineer

EDWARD HARVEY, JR.

Drilling / Blasting Superintendent

ACADEMIC QUALIFICATIONS

Bernardsville High School, Bernardsville, NJ

CERTIFICATIONS

Currently hold or have held explosives licenses in the states of: Indiana, Iowa, Minnesota, New Jersey, Tennessee, Texas, Utah, and Virginia.

PROFESSIONAL AFFILIATIONS

Association of Demolition Contractors
International Society of Explosive Engineers

PROFESSIONAL EXPERIENCE

Contract Drilling & Blasting LLC (Florida, USA) 2007 - Present
General Superintendent - Drilling, Blasting and Rock Stabilization

Contract Drilling & Blasting, Inc. (Florida, USA) 1990 - 2007
General Superintendent - Drilling, Blasting and Rock Stabilization

General Superintendent for drilling, blasting, rock stabilization both on land and in a marine environment.

Affiliation with CDB, Inc. has encompassed both the practical application as well as supervision of many union affiliated general contractors.

Marvic Incorporated 1989 - 1990
Project Superintendent

Specialty Demolition Contractor

Tantra Incorporated 1980 - 1988
Project Superintendent

Specialty Demolition Contractor

PRESENT & PAST PROJECTS

- BBL of Albany, NY,Truss Bridge Removal, Poland, NY
- Traylor Brothers, Bridge Pier, Vilano Beach, St. Augustine, FL
- U.S. 40 Bascule Bridge Removal, Ormond Beach, FL
- R.R. Bridge Removal, Steel and Granite Block Piers, Sioux City, IA
- 32 R.R. Bridges, Milwaukee R.R., Marshaltown, IA
- Highway Bridge Removal, over Snake River, Swan Valley, ID
- Bridge Pier and Ice Break Cell Removal, Illinois River, IL
- Tantra, Inc., R.R. Bridge Removal, Jackson, MN
- Johnson Brothers Construction, Highway Bridge Removal, over Mississippi River, MN
- Great Lakes Dredge & Dock Co. & Don Jon Marine, Bridge Pier Removal, C&O Railroad, Port Newark, NJ
- McKinnen Bridge Company, Highway Bridge Removal, Concrete Piers & Steel, New Johnsonville, TN
- Brown & Root, Bascule Bridge Removal, Steel & Concrete Piers, Clearcreek, TX
- Brown & Root, Bridge Pier Removal, Brasso, TX
- Brown & Root, Bridge Pier Removal, Fort Worth, TX
- Railroad Bridge Removal, Steel and Concrete Piers, Salt Lake, UT
- Anderson Excavating, U.S. 1 Highway Bridge, Woodbridge, VA
- Bean Stuyvesant, SKVK2, Newark Bay Channel, Navigational Improvement 50ft Project, NJ and New York, NY
- American Bridge, Port Manatee, FL & Tampa, FL
- American Bridge, Truman Annex Pier, Key West, FL
- American Bridge, Port of Tampa – Berth 223, Tampa, FL
- Atlantic Dry Dock, Rock Removal for Navy Dry Dock, Jacksonville, FL
- Balfour Beatty Constructors, Bridge Pier Demolition, Cape May, NJ
- Citgo Petroleum, Concrete Removal, Lake Charles, LA
- Crowder Construction, Lake Gaston Water Intake, Lake Gaston, VA
- Durocher Dredge & Dock, Outfall Pipeline, Dominican Republic
- EBY Construction Co., Palm Valley Bridge Removal, Jacksonville, FL
- English Construction Co., CSO-1, City of Richmond, VA
- G.L. Howard Co., CSO-2, City of Richmond, VA
- GLF Construction Corp, Bascule Bridge Pier Removal, Seabreeze Bridge, Daytona, FL
- Great Lakes Dredge & Dock Co., Inner Harbor Spit Removal, Grand Bahamas
- Great Lakes Dredge & Dock Co., Boston Hubline Pipeline, Boston, MA
- Kiewit Constructors Inc., CSO-3, City of Richmond, VA
- Kiewit Constructors Inc., Shell-At-Grade, New Rochelle, NY
- Kiewit/Tidewater, JV, Long Port Bridge, Ocean City, NJ
- Kiewit Constructors Inc., MTA – Queens, Long Island City, NY
- Misener Marine, Port Manatee Navigation Improvement, Port Manatee, FL
- Misener Marine, Freeport Container Port, Freeport, Grand Bahamas
- Northeast Construction Co., East & West Shaft, Bronx, NY
- Recchi-GLF, JV, Sidney Lanier Bridge, Brunswick, GA
- R.W. Harris, Utility Tower, Loganville, GA
- Spinello Companies, Ashburton Plant Bypass, Baltimore, MD
- Tidewater Construction Corp, Bent Removals, I95/St. Mary's Bridge, St. Mary's, GA
- Traylor Brother, Bridge Pier Demolition, Vilano, FL

- USACOE, Wilmington Test Blast Mitigation, Wilmington, NC
- Weeks Marine, Channel Improvements KVK4B, Bayonne, NJ
- Western Summit, Atlanta, GA
- W.L. Hailey, Huguenot Water Main, Richmond, VA
- Carl Tomas Construction, Drilling, Groton, CT
- George Harms Construction Company, Victory Bridge, Bridge / Pier Demolition, Perth Amboy, NJ
- JR Cruz Corporation, Kerrigan Avenue Sewer Replacement, Union City, NJ
- Granite Construction Co., Drilling and Expansion Grout, Jewfish Creek, Key Largo, FL
- Kiewit Constructors, Inc., Castle Village Retaining Wall, New York, NY
- DonJon Marine, Howland Hook Linedrilling, Staten Island, NY
- Marianna Limestone, LLC, Quarry Drilling, Marianna, FL
- Kiewit Constructors, Inc., Verrazano Bridge, Drilling Project, Staten Island, NY
- Parsons Brinkerhoff Construction Services, Fuller Warren Bridge Replacement Project, Jacksonville, FL – Vibration Monitoring
- Kiewit Constructors, Inc., Modifications to Hellgate Line Catenary & Related Facilities, New Rochelle, CT
- George Harms Construction Co., Inc., Route 70 Bridge Removal, Brick, NJ
- Soupcon, Inc., Drilling, Satelite Beach, FL
- Barnhill Construction, Wendell Falls Interchange, Raleigh, NC
- Great Lakes Dredge & Dock Company, New York and New Jersey Harbor Channel Navigation Improvement 50 FT Project, Newark Bay Channels, Contract 4, S-NB-1, NJ
- Southwind Construction, Maintenance Dredging (IWW), Volusia County, FL
- Weeks Marine, Inc., Shore Protection Project, Fernandina Beach Nourishment, Nassau County, FL
- Hayward Construction Group, Walls Duplex Pile Driving, Fernandina Beach, FL
- Superior Construction Co., Inc., Drilling Pier Caps & Installing Dowels, SR9A & SR202 JTB Interchange, Duval County, FL
- Norfolk Dredging Company, Beach Placement, Rockaway Beach, Queens County, New York City, NY
- RW Harris, Inc., Jim Moore Road – Sharon Church 230KV Transmission Line, Auburn, GA
- Advanced Blasting Services LLC, Route 5 Bridge over the Chickahominy River, Charles City & James City, VA
- Great Lakes Dredge & Dock Company, LLC, New York and New Jersey Harbor Channel Improvement 50 FT Project, Kill van Kull Channels, Contract 5, S-KVK-1, NY & NJ
- Weeks Marine, Inc., Shore Protection Project, Ft. Pierce Beach Renourishment 2009, St. Lucie County, FL
- Leware Construction Co., Vibration Monitoring, SR21 Over Black Creek, Middleburg, FL
- Great Lakes Dredge & Dock Company, LLC, 2009 Strathmere, Sea Isle City, Stone Harbor and North Wildwood Beachfill, Cape May County, NJ
- J.E. McAmis, Inc., Columbia River Channel Improvement Project, St Helens, OR
- J.H. Reid General Contractors, Route 36 Bridge At the Shrewsbury River, Monmouth County, NJ
- Southwind Construction, Beach Erosion Control Project, Pinellas County, FL

Insurance, Federal License & Permit

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 7/1/2020

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Texas AGA, a division of Marsh USA, Inc.
1717 Main Street, Suite 4400
Dallas, TX 75201

www.aga-us.com

CONTACT NAME: (AGA DAL) Melinda Trevino
PHONE (A/C, No, Ext): 469-759-1759 **FAX (A/C, No):** 469-709-1303
E-MAIL ADDRESS: mtrevino@aga-us.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : United States Fire Insurance Company	21113
INSURER B : Charter Oak Fire Insurance Company	25615
INSURER C : StarNet Insurance Company	40045
INSURER D :	
INSURER E :	
INSURER F :	

INSURED
Contract Drilling & Blasting LLC
P O Box 51468
Jacksonville FL 32240

COVERAGES **CERTIFICATE NUMBER:** 56352313 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	✓ **COMMERCIAL GENERAL LIABILITY** ☐ CLAIMS-MADE ✓ OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: ☐ POLICY ✓ PRO-JECT ☐ LOC ☐ OTHER:			543-225818-7	7/1/2020	7/1/2021	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG	$ 1,000,000 $ 100,000 $ 5,000 $ 1,000,000 $ 2,000,000 $ 2,000,000
B	**AUTOMOBILE LIABILITY** ☐ ANY AUTO ☐ OWNED AUTOS ONLY ✓ SCHEDULED AUTOS ✓ HIRED AUTOS ONLY ✓ NON-OWNED AUTOS ONLY			BA2G03703119SEL	9/30/2019	9/30/2020	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident)	$ 1,000,000 $ $ $
A	✓ **UMBRELLA LIAB** ✓ OCCUR **EXCESS LIAB** ☐ CLAIMS-MADE ☐ DED ☐ RETENTION $ 0			523-811358-9	7/19/2020	7/19/2021	EACH OCCURRENCE AGGREGATE	$ 5,000,000 $ 5,000,000
C	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y / N ANYPROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? ☐ **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		SNWC272403	12/31/2019	12/31/2020	✓ PER STATUTE ☐ OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

SAMPLE

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Texas AGA, a division of Marsh USA, Inc.

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U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

Federal Explosives License/Permit
(18 U.S.C. Chapter 40)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555), you may engage in the activity specified in this license or permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. **THIS LICENSE IS NOT TRANSFERABLE UNDER 27 CFR 555.53.** See "WARNINGS" and "NOTICES" on reverse.

Direct ATF Correspondence To	ATF - Chief, FELC 244 Needy Road Martinsburg, WV 25405-9431	License/Permit Number	**1-FL-031-33-2H-00754**
Chief, Federal Explosives Licensing Center (FELC)	Christopher R. Reeves	Expiration Date	**August 1, 2022**

Name
CONTRACT DRILLING & BLASTING LLC

Premises Address (Changes? Notify the FELC at least 10 days before the move.)
1550 ROBERTS DR
JACKSONVILLE, FL 32250-3222

Type of License or Permit
33-USER OF EXPLOSIVES

Purchasing Certification Statement

The licensee or permittee named above shall use a copy of this license or permit to assist a transferor of explosives to verify the identity and the licensed status of the licensee or permittee as provided by 27 CFR Part 555. The signature on each copy must be an original signature. A faxed, scanned or e-mailed copy of the license or permit with a signature intended to be an original signature is acceptable. The signature must be that of the Federal Explosives Licensee (FEL) or a responsible person of the FEL. I certify that this is a true copy of a license or permit issued to the licensee or permittee named above to engage in the business or operations specified above under "Type of License or Permit."

Mailing Address (Changes? Notify the FELC of any changes.)

CONTRACT DRILLING & BLASTING LLC
P.O. BOX 51468
JACKSONVILLE, FL 32240-1468

Licensee/Permittee Responsible Person Signature	President Position/Title	I certify that this is a true copy of a User Permit issued to me to engage in the specified business or operations.
ALBERT VANNIEKERK Printed Name	08/19/2019 Date	

Previous Edition is Obsolete

CONTRACT DRILLING & BLASTING LLC:1550 ROBERTS DR:32250:1-FL-031-33-2H-00754:August 1, 2022:33-USER OF EXPLOSIVES

ATF Form 5400.14/5400.15 Part I
Revised October 2011

Federal Explosives License (FEL) Customer Service Information

Federal Explosives Licensing Center (FELC)
244 Needy Road
Martinsburg, WV 25405-9431

Toll-free Telephone Number: (877) 283-3352
Fax Number: (304) 616-4401
E-mail: FELC@atf.gov

ATF Homepage: www.atf.gov

Change of Address *(27 CFR 555.54(a)(1))*. Licensees or permittees may during the term of their current license or permit remove their business or operations to a new location at which they intend regularly to carry on such business or operations. The licensee or permittee is required to give notification of the new location of the business or operations not less than 10 days prior to such removal with the Chief, Federal Explosives Licensing Center. The license or permit will be valid for the remainder of the term of the original license or permit. **(The Chief, FELC, shall, if the licensee or permittee is not qualified, refer the request for amended license or permit to the Director of Industry Operations for denial in accordance with § 555.54.)**

Right of Succession *(27 CFR 555.59)*. (a) Certain persons other than the licensee or permittee may secure the right to carry on the same explosive materials business or operations at the same address shown on, and for the remainder of the term of, a current license or permit. Such persons are: (1) The surviving spouse or child, or executor, administrator, or other legal representative of a deceased licensee or permittee; and (2) A receiver or trustee in bankruptcy, or an assignee for benefit of creditors. (b) In order to secure the right provided by this section, the person or persons continuing the business or operations shall furnish the license or permit for for that business or operations for endorsement of such succession to the Chief, FELC, within 30 days from the date on which the successor begins to carry on the business or operations.

(Continued on reverse side)

Cut Here ✂

Federal Explosives License/Permit (FEL) Information Card

License/Permit Name: **CONTRACT DRILLING & BLASTING LLC**

Business Name:

License/Permit Number: **1-FL-031-33-2H-00754**

License/Permit Type: **33-USER OF EXPLOSIVES**

Expiration: **August 1, 2022**

Please Note: Not Valid for the Sale or Other Disposition of Explosives.

Jimmy Patronis
CHIEF FINANCIAL OFFICER

Julius Halas
DIVISION DIRECTOR

Casia Sinco
BUREAU CHIEF

Keith McCarthy
SAFETY PROGRAM MANAGER

FLORIDA DEPARTMENT OF FINANCIAL SERVICES
DIVISION OF STATE FIRE MARSHAL
200 East Gaines Street - Tallahassee, Florida 32399-0342
Tel. 850-413-3644 Fax. 850-410-2467

STATE EXPLOSIVE BLASTERS PERMIT
OFFICIAL COPY

ISSUED TO:	Albert P. VanNiekerk
IDENTIFICATION:	DOB: 01/18/1965 Height: 5"11' Weight: 180 Hair: Gray Eyes: Blue Sex: Male Race: White VALID ONLY WHILE EMPLOYED BY AND FOR PURPOSE AS DESCRIBED ON EMPLOYERS LICENSE
EMPLOYER:	Contract Drilling & Blasting 1550 Roberts Ave JACKSONVILLE BEACH FL 32250
LICENSE #:	EL19-000033

Issue Date:	10/09/2020
Type:	09
Class:	06
County:	Duval
License/Permit #:	EP19-000019
Expiration Date:	09/30/2021
Taxes & Fees	50.00

Chief Financial Officer

RECEIVED

SEP 09 2020

Jimmy Patronis
CHIEF FINANCIAL OFFICER

Julius Halas
DIVISION DIRECTOR

Casia Sinco
BUREAU CHIEF

Keith McCarthy
SAFETY PROGRAM MANAGER

FLORIDA DEPARTMENT OF FINANCIAL SERVICES
DIVISION OF STATE FIRE MARSHAL
200 East Gaines Street - Tallahassee, Florida 32399-0342
Tel. 850-413-3644 Fax. 850-410-2467

STATE EXPLOSIVE LICENSE
USER OF EXPLOSIVES
OFFICIAL COPY

ISSUED TO:	Albert P. VanNiekerk
EMPLOYER:	Contract Drilling & Blasting P.O. Box 51468 Jacksonville FL 32240-1468
PURPOSE:	Construction blasting and quarry blasting
TYPES OF EXPLOSIVES:	Straight Dynamites, Seismograph Explosives, Special Dynamites, Gelatin Dynamites, Prima Cord, Blasting Caps, Two Component, Emulsions, water gels, cast boosters, and deflagrating products
IDENTIFICATION:	DOB: 01/18/1965 Height: 5"11' Weight: 180 Hair: Gray Eyes: Blue Sex: Male Race: White

Issue Date:	10/09/2020
Type:	07
Class:	06
County:	Duval
License/Permit #:	EL19-000033
Expiration Date:	09/30/2021
Taxes & Fees	125.00

Jimmy Patronis

Chief Financial Officer

U.S. Department of Justice
Bureau of Alcohol, Tobacco, Firearms and Explosives

Federal Explosives License/Permit
(18 U.S.C. Chapter 40)

In accordance with the provisions of Title XI, Organized Crime Control Act of 1970, and the regulations issued thereunder (27 CFR Part 555), you may engage in the activity specified in this license or permit within the limitations of Chapter 40, Title 18, United States Code and the regulations issued thereunder, until the expiration date shown. **THIS LICENSE IS NOT TRANSFERABLE UNDER 27 CFR 555.53.** See "WARNINGS" and "NOTICES" on reverse.

Direct ATF Correspondence To: ATF - Chief, FELC 244 Needy Road Martinsburg, WV 25405-9431	License/Permit Number: **1-SC-003-33-3H-00234**
Chief, Federal Explosives Licensing Center (FELC) Shawn Stevens	Expiration Date: **August 1, 2023**

Name
KT BLASTING SPECIALISTS LLC

Premises Address (Changes? Notify the FELC at least 10 days before the move.)
431 BEAVER DAM RD
AIKEN, SC 29805-

Type of License or Permit
33-USER OF EXPLOSIVES

Purchasing Certification Statement

The licensee or permittee named above shall use a copy of this license or permit to assist a transferor of explosives to verify the identity and the licensed status of the licensee or permittee as provided by 27 CFR Part 555. The signature on each copy must be an original signature. A faxed, scanned or e-mailed copy of the license or permit with a signature intended to be an original signature is acceptable. The signature must be that of the Federal Explosives Licensee (FEL) or a responsible person of the FEL. I certify that this is a true copy of a license or permit issued to the licensee or permittee named above to engage in the business or operations specified above under "Type of License or Permit."

Mailing Address (Changes? Notify the FELC of any changes.)

KT BLASTING SPECIALISTS LLC
431 BEAVER DAM RD
AIKEN, SC 29805-

Licensee/Permittee Responsible Person Signature	Position/Title: Owner
Printed Name: Kenneth Tully	Date: 12/08/20

This is a true copy of the issued Permit.

Previous Edition is Obsolete KT BLASTING SPECIALISTS LLC:431 BEAVER DAM RD:29805:1-SC-003-33-3H-00234:August 1, 2023:33-USER OF EXPLOSIVES

ATF Form 5400.14/5400.15 Part I
Revised October 2011

Federal Explosives License (FEL) Customer Service Information

Federal Explosives Licensing Center (FELC)
244 Needy Road
Martinsburg, WV 25405-9431

Toll-free Telephone Number: (877) 283-3352
Fax Number: (304) 616-4401
E-mail: FELC@atf.gov

ATF Homepage: www.atf.gov

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(Continued on reverse side)

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Federal Explosives License/Permit (FEL) Information Card

License/Permit Name: **KT BLASTING SPECIALISTS LLC**

Business Name:

License/Permit Number: **1-SC-003-33-3H-00234**

License/Permit Type: **33-USER OF EXPLOSIVES**

Expiration: **August 1, 2023**

Please Note: Not Valid for the Sale or Other Disposition of Explosives.

Ken Tully’s renewed Florida State Explosive Blasters Permit will be submitted when received, prior to project start-up.

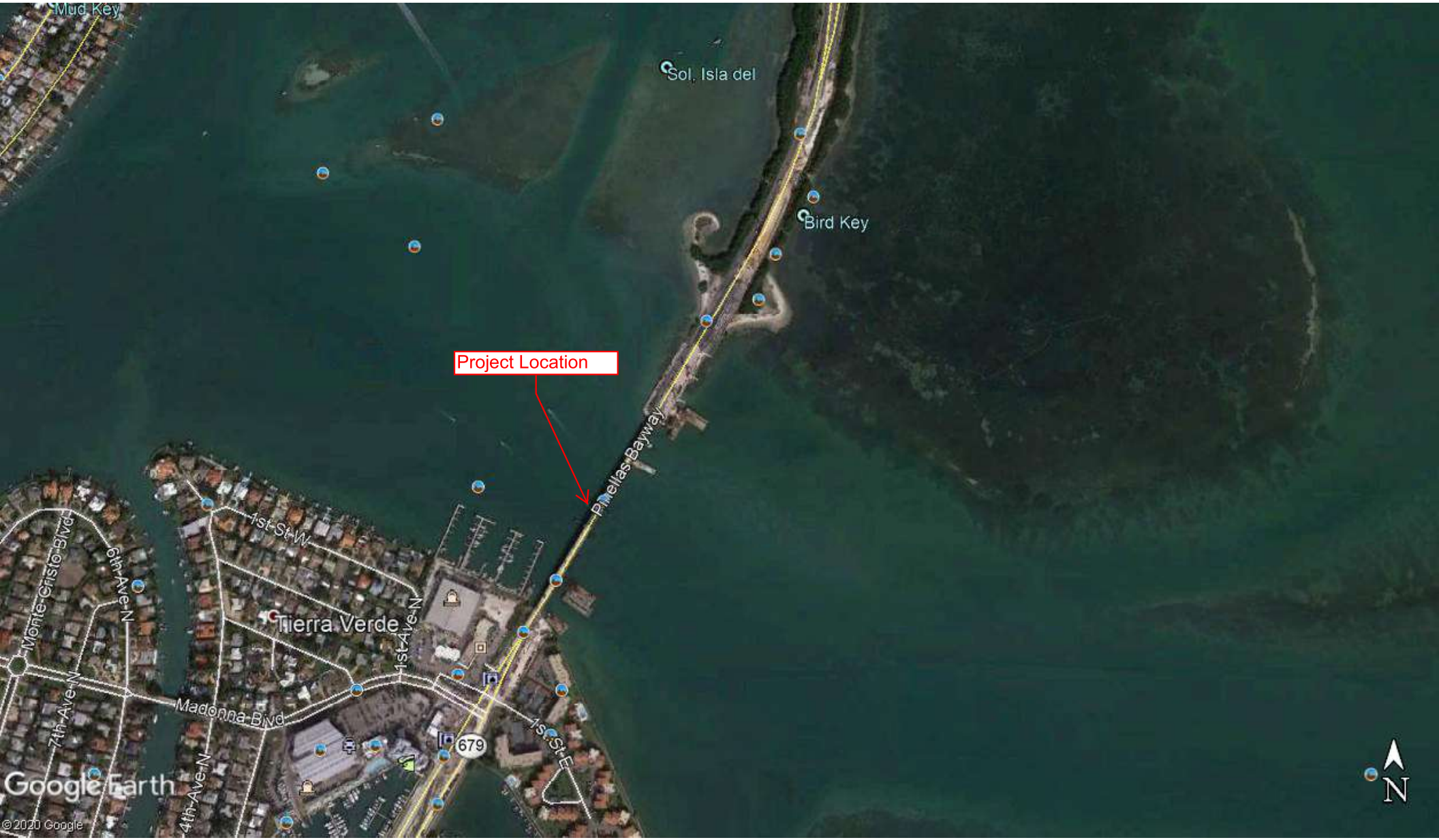
Blast Design

Design Considerations

The following site conditions have been taken into consideration while developing the blast designs;

1) The condition of the existing piers.
2) The proximity of any utilities.
3) The proximity of the new bridge.
4) Water depths.
5) The river bottom elevations and limits of removal.
6) The proximity of other structures in the area.
7) Marine life in the immediate area.
8) Environmental concerns.

The blast designs have addressed these factors and blast hole patterns and weight of explosives detonated per delay have been designed to minimize any detrimental impact and while providing sufficient fragmenting of the concrete for removal.


Mud Key
Sol, Isla del
Bird Key
Project Location
Pinellas Bayway
1st St W
6th Ave N
Monte Cristo Blvd
Tierra Verde
1st Ave N
7th Ave N
Madonna Blvd
679
1st St E
4th Ave N
Google Earth
© 2020 Google
N

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR
3	FLA.	1520-175	

INDEX OF SHEETS

SHEET NO. 1	KEY SHEET
2	HYDRAULIC EMBANKMENT — SUMMARY OF QUANTITIES
3	GUARD RAIL FOR BRIDGES
	STRUCTURE "E" — MAIN CHANNEL INTRACOASTAL WATERWAY
E-1	GENERAL PLAN & ELEVATION — BORING LOGS ✓
E-2	GENERAL NOTES, ESTIMATED BRIDGE QUANTITIES, AND SLOPE PROTECTION DETAILS ✓
E-3 & 3A	BULKHEADS ✓
E-4	PRECAST CONCRETE SHEET PILES (7" x 30") ✓
E-5	FENDER DETAILS
E-6	20" x 20" PRECAST CONCRETE PILES ✓
E-7	END BENTS Nos. 1 & 2
E-8	BENTS 1, 2, 6, 7, 9, 10, 11, 12 & 13
E-9	BENTS Nos. 3, 4 & 5
E-10	BENT No. 8
E-11	PIERS Nos. 1, 2, 3 & 6
E-12	PIERS Nos. 4 & 5
E-13	PIER No. 7
E-14	TRUNNION PIERS — GENERAL LAYOUT
E-15	TRUNNION PIERS — GENERAL LAYOUT
E-16	TRUNNION PIERS — REINFORCING DETAILS
E-17	TRUNNION PIERS — REINFORCING DETAILS
E-18	TRUNNION PIERS — BILL OF REINFORCING STEEL
E-19	CONCRETE CONTROL HOUSE
E-20	BASCULE SPAN — FRAMING PLAN, GIRDER GEOMETRY AND STRESS SHEET
E-21	BASCULE SPAN — SECTIONS AND BRACING
E-22	BASCULE SPAN — MAIN GIRDER
E-23	BASCULE SPAN — TRUNNION AND RELATED DETAILS
E-24	COUNTERWEIGHT — GENERAL DETAILS
E-25	CENTER LOCK ASSEMBLY AND LIVE LOAD SHOES
E-26	BUFFER DETAILS
E-27	BASCULE SPAN — MACHINERY LAYOUT
E-28	BASCULE SPAN — MACHINERY SUPPORTS
E-29	BASCULE SPAN — WIRING DIAGRAM
E-30	BRACKET DETAILS FOR SAFETY GATES AND TRAFFIC LIGHTS
E-31	STEEL FLANKING SPAN
E-32	48 FOOT PRESTRESSED SPAN — DECK REINFORCING
E-33	48 FOOT PRESTRESSED SPAN — GIRDER DETAILS
E-34	48 FOOT PRESTRESSED SPAN - TYPE "C" ALTERNATE
E-35	72 FOOT PRESTRESSED SPAN - DECK REINFORCING
E-36	72 FOOT PRESTRESSED SPAN — GIRDER DETAILS
E-37	HANDRAIL DETAILS

STRUCTURE "F" — BUNCES PASS CROSSING

F-1	GENERAL PLAN AND ELEVATION — BORING LOGS ✓
F-2	GENERAL NOTES, ESTIMATED BRIDGE QUANTITIES, AND SLOPE PROTECTION DETAILS ✓
F-3	BULKHEAD — GENERAL LAYOUT ✓
F-4	PRECAST CONCRETE SHEET PILES (7" x 30") ✓
F-5	NAVIGATION LIGHTS AND FENDER DETAILS ✓
F-6	20" x 20" PRECAST CONCRETE PILES ✓
F-7	END BENTS Nos. 1 & 2 ✓
F-8	INTERMEDIATE BENTS ✓
F-9	TOWER BENTS ✓
F-10	PIERS ✓
F-11	48 FOOT PRESTRESSED SPAN — DECK REINFORCING
F-12	48 FOOT PRESTRESSED SPAN — GIRDER DETAILS
F-13	48 FOOT PRESTRESSED SPAN — TYPE "C" ALTERNATE
F-14	72 FOOT PRESTRESSED SPAN — DECK REINFORCING
F-15	72 FOOT PRESTRESSED SPAN — GIRDER DETAILS
F-16	HANDRAIL DETAILS

CONVENTIONAL SIGNS

COUNTY LINE		TRAVELED WAY	
TOWNSHIP LINE		CULVERTS	
SECTION LINE		BRIDGES OVER 20 FT. SPAN	
UNFENCED PROPERTY		POWER POLE	
CITY LINE		TELEPHONE POLE	
FENCE LINE		MARSH	
RIGHT OF WAY LINE		GROUND ELEV.	
BASE OR SURVEY LINE		GRADE ELEV.	
RAILROADS		R. R. MILE POST	

GOVERNING SPECIFICATIONS: STATE OF FLORIDA, STATE ROAD DEPARTMENT, STANDARD SPECIFICATIONS, DATED JULY 1970, DATED FEB 1, 1971 SUPPLEMENT NO.

APPROVED BY BUREAU OF PUBLIC ROADS - DATE

STATE OF FLORIDA
STATE ROAD DEPARTMENT

PLANS OF PROPOSED

STATE HIGHWAY

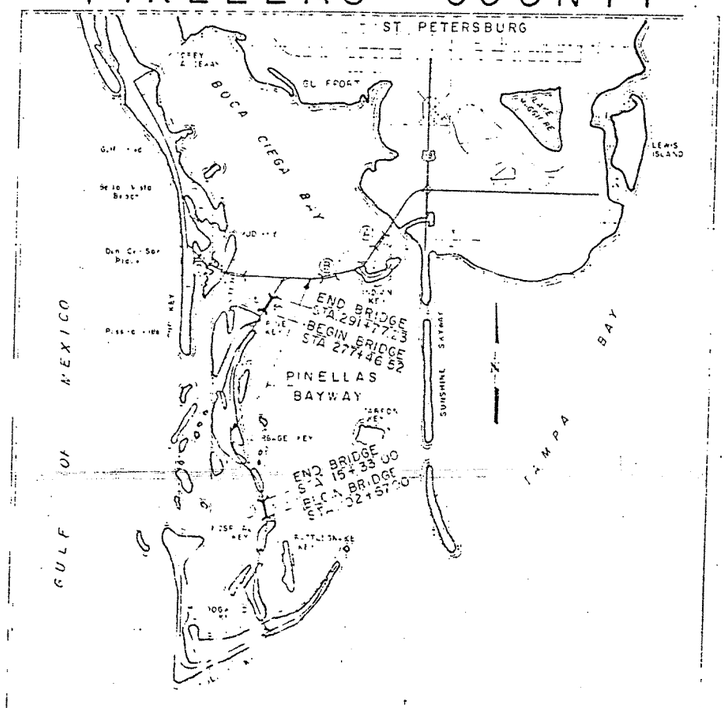
STATE PROJECT NO. 1520 - 175

PINELLAS BAYWAY

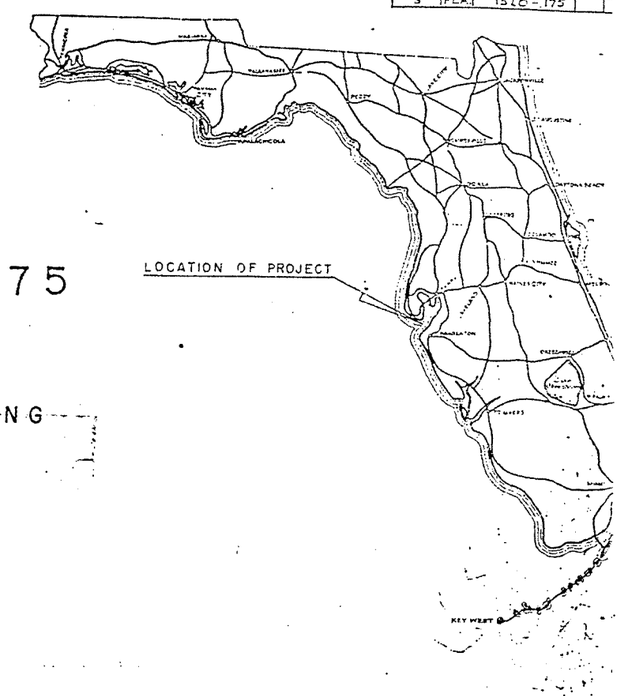
150049 STRUCTURE "E" — MAIN CHANNEL INTRACOASTAL WATERWAY

150048 STRUCTURE "F" — BUNCES PASS CROSSING

PINELLAS COUNTY



NET LENGTH OF PROJECT = 2,690.46'



PLANS PREPARED BY

J. E. GREINER COMPANY, INC.
ENGINEERS - ARCHITECTS
TAMPA, FLORIDA

150049

SUBMITTED BY

STATE HIGHWAY ENGINEER

DISTRICT ENGINEER
BUREAU OF PUBLIC ROADS

STATE PROJECT NO.	SHT. NO.	FED. ROAD DIV. NO.	STATE	PROJECT NO.
15200-3536	R-2	3	FLA.	1520-175

SHEET NO. F-8

Sta. 277+77.27 Back
Sta. 277+83.52 Ahead

Florida Power Submarine Cables

S.R.A. SR 60 BRIDGE

50'

90' Min. Horz. Clearance

R.N.L.

Sta. 277+22.19 Working Line End Bent No.1

Bent No.1 Sta. 277+77.77

Bent No.2 Sta. 278+39.77

Bent No.3 Sta. 279+17.77

Bent No.4 Sta. 279+89.77

Bent No.5 Sta. 280+61.77

Pier No.1 Sta. 281+33.77

Pier No.2 Sta. 282+05.77

Pier No.3 Sta. 282+77.77

Pier No.4 Sta. 283+49.77

Pier No.5 Sta. 285+80.13

Pier No.6 Sta. 286+52.13

Pier No.7 Sta. 287+24.13

Bent No.6 Sta. 287+72.13

Bent No.7 Sta. 288+20.13

Bent No.8 Sta. 288+68.13

Bent No.9 Sta. 289+16.13

Bent No.10 Sta. 289+64.13

Bent No.11 Sta. 290+11.13

Bent No.12 Sta. 290+60.13

Bent No.13 Sta. 291+08.13

Working Line End Bent No.2 Sta. 291+35.56

68'-0" R/W Line

Edge of Shoulder

Edge of Pavement (N.I.C.)

280

285

290

Hole No.1

Hole No.2

Hole No.3

Hole No.4

Hole No.5

℄ Roadway

Steel Guard Rail (N.I.C.)

Concrete Sheet Pile Bulkhead

Sand Cement Riprap

Note: For Section A-A, see Sheet E-3.

Traffic Light & Signal Bell

2-Single arm Safety Gates

Remove Roadway Crown within these limits

℄ Floor Break Sta. 285+96.48

℄ Channel Sta. 284+45.00

℄ Floor Break Sta. 285+31.52

Remove Roadway Crown within these limits

2-Single Arm Safety Gates

Traffic Light & Signal Bell

Concrete Sheet Pile Bulkhead

Sand Cement Riprap

Steel Guard Rail (N.I.C.)

Edge of Pavement

Edge of Shoulder

102'-0"

R/W Line

Beam Bridge Sta. 277+46.52

(LOCATION OF PEDESTAL)

PLAN

(LOCATION OF PEDESTAL)

ORIGINAL PLANS FOR INFORMATION ONLY

1424-5½" Overall Length of Bridge

Approach Slab 21'-0" 3-45' Prestressed Spans = 144' 6-72' Prestressed Spans = 432' 48'-8½" Steel Flanking Span 133'-0½" Bascule Span 48'-8½" Steel Flanking Span 2-72' Prestressed Spans = 144' 9-45' Prestressed Spans = 432' 21'-0" Approach Slab

End Bent No.1 ℄ of Jt.

Elev. 15.863 Sta. 277+67.52

Elev. 17.303

Elev. 18.743

Elev. 20.183

Elev. 21.343

Elev. 24.430

Elev. 26.193

Elev. 27.610

Elev. 28.682

Elev. 29.407

℄ Span Sta. 284+65.00 Elev. 29.850

R.E.G.N.L.

Elev. 29.407

Elev. 28.682

Elev. 27.610

Elev. 26.704

Elev. 25.644

Elev. 24.430

Elev. 23.063

Elev. 21.613

Elev. 20.183

Elev. 18.743

Elev. 17.303

Sta. 291+56.23 Elev. 15.863

End Bent No.2 ℄ of Jt.

M.S.L. 0.0

N.W.L.W. EL. -0.85

21.5' Min.

26.5' Min.

0

-10

-20

-30

Drive one Unloaded Test Pile 65' Long in the location shown

Drive one Unloaded Test Pile 65' Long in the location shown

Trunnion Pier No.1

Trunnion Pier No.2

Proposed Submarine Cable to be laid at Elev. - 21.0

Drive one Unloaded Test Pile 55' Long in the location shown.

R.N.L. denotes Red Navigation Lights - 180° Red
R.&G.N.L. denote Red & Green Navigation Lights
Span fully Open - 180° Green. All other positions of Span - 180° Red.

ELEVATION

LEGEND

STRATA	DESCRIPTION
S1	Light fine sand, some shell.
S2	Sandy shell.
S3	Dark fine marly sand, some shell.
S4	Dark fine sand, some marl and organic silt.

Hole No.1 Water
Hole No.2 Water
Hole No.3 Water
Hole No.4 Water
Hole No.5 Water

M.S.L. 0.0
-20
-40
-60
-80
-100
-120

BORING LOGS

Note: A copy of the detailed Log of Borings is available for the inspection of the Contractor at the State Road Department in Tallahassee.

¼" Iron Pipe (in Water)

4"x4" Conc. Marker

N 30°-52'-55"E

EQUALITY: P.O.T. Sta. 277+77.27 Bk. = Sta. 277+83.52 Ahd.

P.O.T. Sta. 291+46.23

4"x4" Conc. Marker

4" Iron Pipe (in Water)

Begin Bridge Sta. 277+46.52

End Bridge Sta. 291+17.23

4"x4" Conc. Marker

N 30°-52'-55"W

P.C. Sta. 277+35.15

P.I. Sta. 283+71.56
Δ = 31°-52'-46"
D = 1°-00'-00"
T = 1436.41
L = 3187.94
R = 5729.58

P.T. Sta. 249+23.09

HORIZONTAL ALIGNMENT

P.T. Sta. 249+23.09

4"x4" Conc. Marker

168.10

143°-02'-00"

53.35

30.00

Iron Pipe

Iron Pipe

REFERENCE POINTS

2.5" Butwood

Iron Pipe

85.14

24.13

40.32

78°-08'-00"

4"x4" Conc. Mark.

P.O.T. Sta. 277+77.27 Bk. = Sta. 277+83.52 Ahd.

102°-04'-00"

140.30

24.15

Iron Pipe

2.6" Butwood

Sta. 277+77.27 Back
Sta. 277+83.52 Ahead

P.V.C. Sta. 272+83.75

P.V.I. Sta. 274+53.75 Elev. +6.45 V.C. 400'

P.V.T. Sta. 276+53.75

P.V.C. Sta. 280+15.00

P.V.I. Sta. 284+65.00 Elev. +36.60 V.C. 900'

P.V.T. Sta. 289+15.00

P.V.C. Sta. 292+10.00

P.V.I. Sta. 294+70.00 Elev. +6.45 V.C. 1400'

P.V.T. Sta. 296+70.00

0.0%

-3.0%

+3.0%

0.0%

Begin Bridge Sta. 277+46.52

End Bridge Sta. 291+17.23

VERTICAL ALIGNMENT

EXISTING STRUCTURE

GENERAL PLAN & ELEVATION

BORING LOGS

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

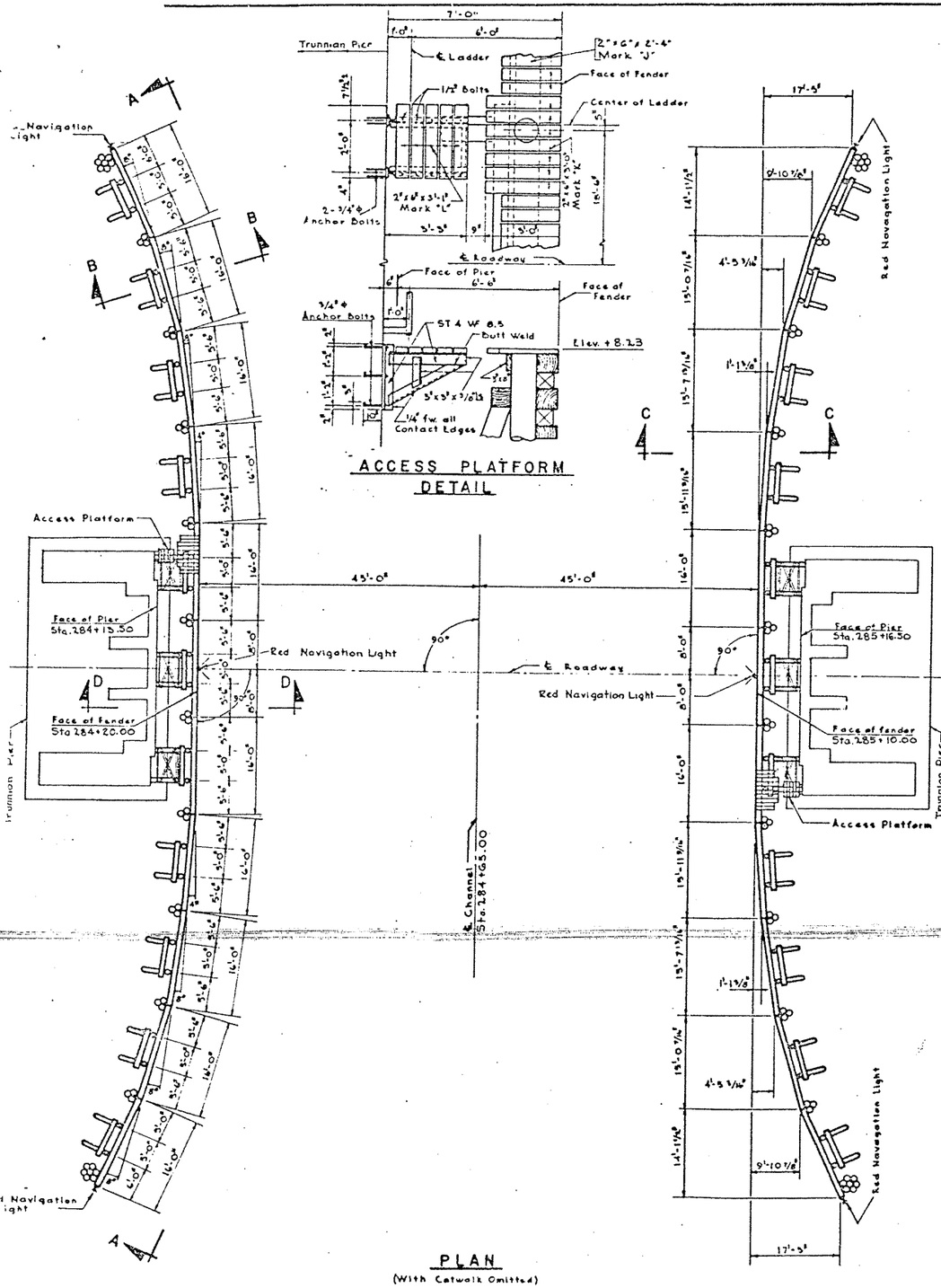
STRUCTURE "E"
MAIN CHANNEL INTRACOASTAL WATER

REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Dates	Descriptions		PINELLAS	1520-175
8-60	Fixed and Exp. Ends of Spans.		Names	Dates
12-60	Riprap & Bulkhead South End of Bridge.	Detailed by	W.B.	10-57
		Checked by	L.H.S.	10-57
		Quantities by		
		Checked by		
		Traced by	W.B.	10-57

APPROVED BY: T. W. Simpson, Engineer of Bridges; K. Wood, State Road Engineer

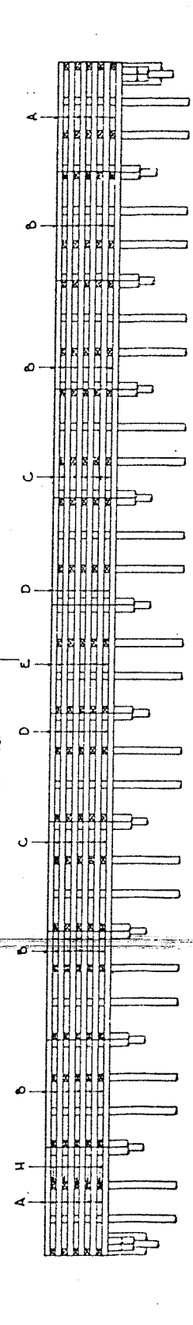
Drawing No. 1 of ST.-2 | Index No. 415

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	1520-175		E-5

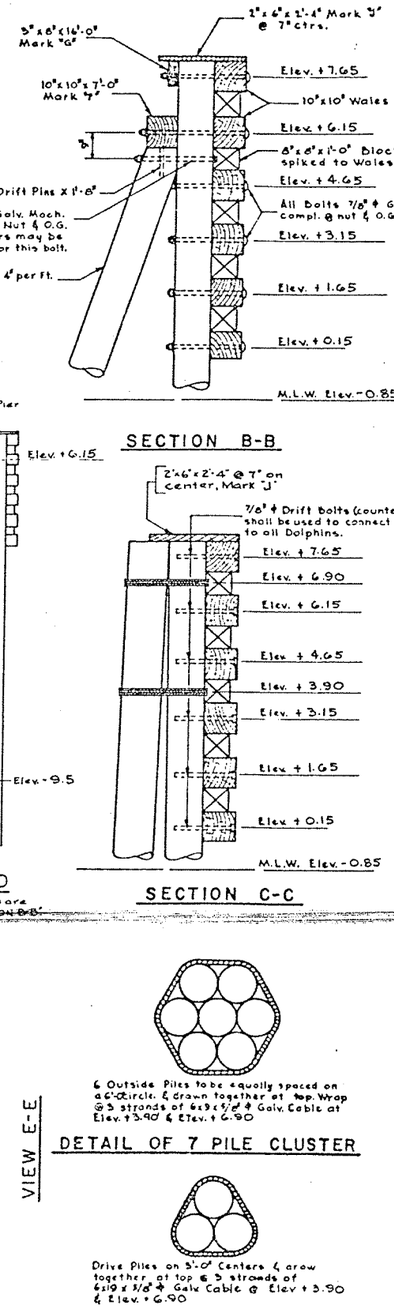


PLAN
(With Catwalk Omitted)

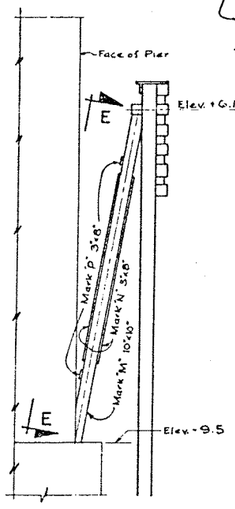
ACCESS PLATFORM DETAIL



ELEVATION A-A



SECTION B-B



SECTION D-D

All details not shown are the same as in SECTION B-B

SECTION C-C

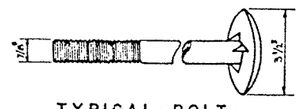
BILL OF TREATED STRUCTURAL TIMBER FOR TWO FENDERS

MARK	SIZE	LENGTH	NO. REQ.	F.B.M.	CUTTING DIAGRAM
A	10" x 10"	16'-0"	24	3200	16' — 4'-0"
B	10" x 10"	16'-0"	48	6400	4'-0" — 12' — 4'-0"
C	10" x 10"	16'-0"	24	3200	4'-0" — 16' — 2'-0"
D	10" x 10"	16'-0"	24	3200	2'-0" — 16'
E	10" x 10"	16'-0"	12	1600	16'
F	10" x 10"	7'-0"	22	1283	7'
G	3" x 8"	16'-0"	22	704	16'
H	8" x 8"	1'-0"	220	1173	1'-0"
J	2" x 6"	2'-4"	590	1377	2'-4"
K	2" x 6"	3'-0"	14	42	3'-0"
L	2" x 8"	3'-1"	10	31	3'-1"
M	10" x 10"	16'-6"	12	1650	16'-6" Cut ends in field to fit
N	5" x 8"	11'-0"	12	264	11'-0"
P	5" x 8"	6'-0"	12	144	6'-0"

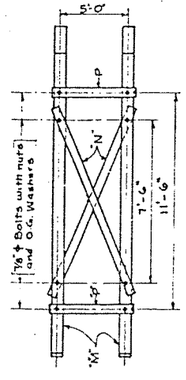
ESTIMATED QUANTITIES FOR TWO FENDERS

ITEM	UNIT	QUANTITY
Treated Structural Timber (12# Treatment)	M.F.B.M.	24.268
Treated Timber Piling †	Lin. Ft.	1,380
Structural Steel (Steel Flanking Spans)	Lb.	420

† 164 Piles 45' Long



TYPICAL BOLT



VIEW E-E

6 Outside Piles to be equally spaced on a 6'-0" circle & drawn together at top. Wrap @ 3 strands of 6x9 x 5/16" ϕ Galv. Cable at Elev. + 3.90 & Elev. + 6.90

DETAIL OF 7 PILE CLUSTER

Drive Piles on 5'-0" Centers & draw together at top @ 3 strands of 6x19 x 5/8" ϕ Galv. Cable @ Elev + 3.90 & Elev. + 6.90

DETAIL OF 3 PILE CLUSTER

NOTES

1. Bolts: All bolts shall be Lewis Scaltite Guardrail (Dome Head) Bolts (or equal) 7/8" ϕ @ one O.G. Washer Galv. (as mfg. by Lewis Bolt & Nut Co., Minneapolis, Minn.) except as noted. Special forged nut equal to diameter of O.G. Washer may be used in lieu of O.G. Washer.
2. Access Platforms: Anchor Bolts & 1" ϕ Bolts (Round Head) shall be Galv. & shall be paid for as Structural Steel (Steel Flanking Spans).
3. Treatment: All Timber shall be given 12# Treatment.
4. Pile Head Coverings: See Specifications.
5. Timber: All Timber shall be Rough.
6. Hardware, Cables, etc. shall be included in the Contract Unit Price for Treated Structural Timber (12# Treatment).
7. For General Notes see Sheet E-2

FENDER DETAILS

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

STRUCTURE "E"
MAIN CHANNEL INTRACOASTAL WATERWAY

REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Date	Description		PINELLAS	1520-175

	Names	Date
Detailed by	S.F.J.	9-57
Checked by	J.E.S.	9-57
Quantities by	L.M.S.	10-57
Checked by	J.E.S.	10-57
Traced by	S.F.J.	9-57

APPROVED BY

Engineer of Bridges

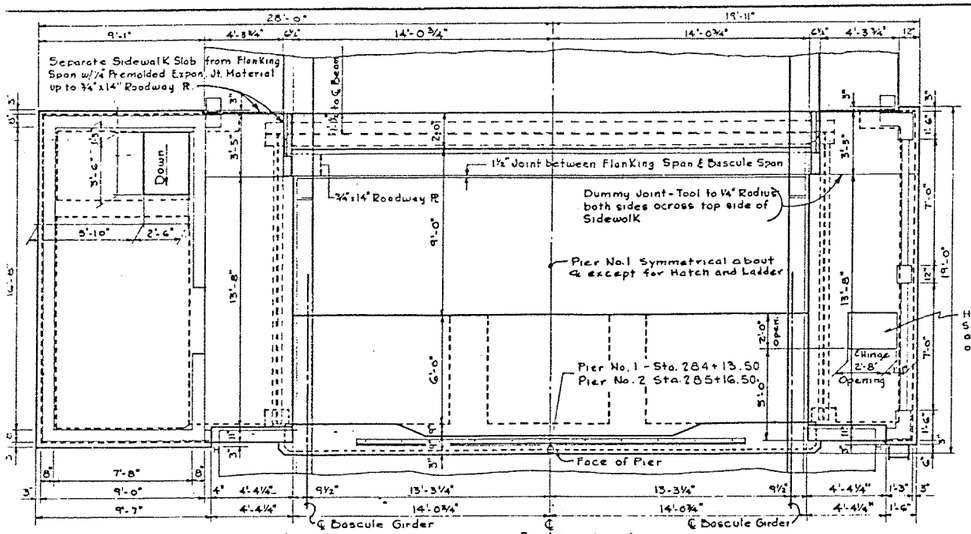
Assistant State Highway Engineer

Drawing No. 5 of 37

Index No. 4153

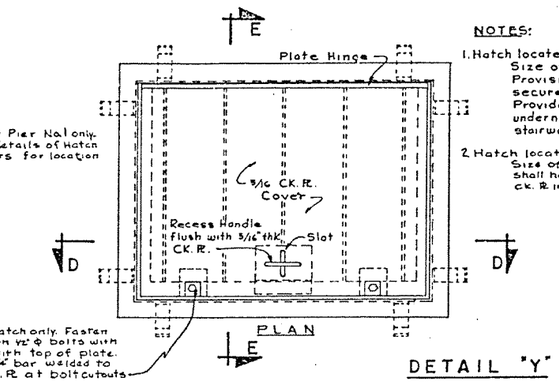
E-14 thru E-28 ✓

FED. ROAD DIV. No.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	1520-175		E-14



HALF PLAN OF PIER NO 1

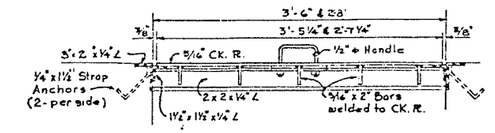
PLAN OF PIER NO 2



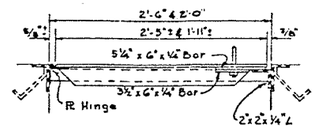
NOTES:

1. Hatch located in Control House. Size of Slab opening 3'-6" x 2'-6". Provision shall be made to hold cover securely while in open position. Provide 1½" ϕ Std. pipe and weld to underneath side and align with stairway rail below.
2. Hatch located in Sidewalk of Pier No. 1. Size of Slab opening 2'-8"x2'-0" and shall have 4 - 5½"x2" bars welded to CK. R. instead of 5 as shown.

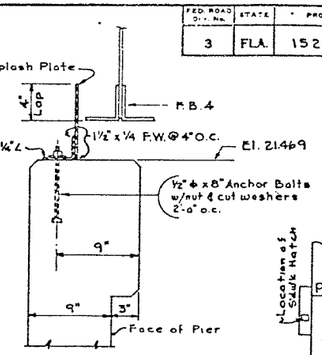
DETAIL "Y"



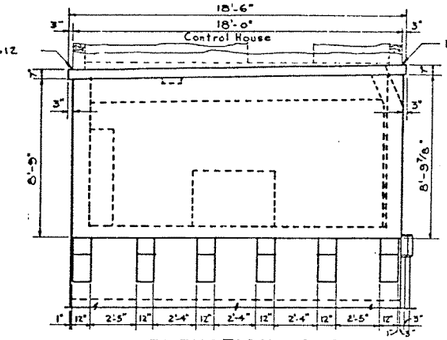
SECTION D-D



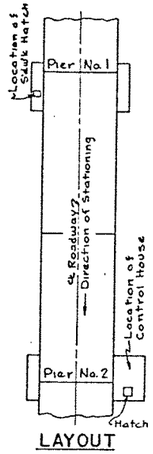
SECTION E-E



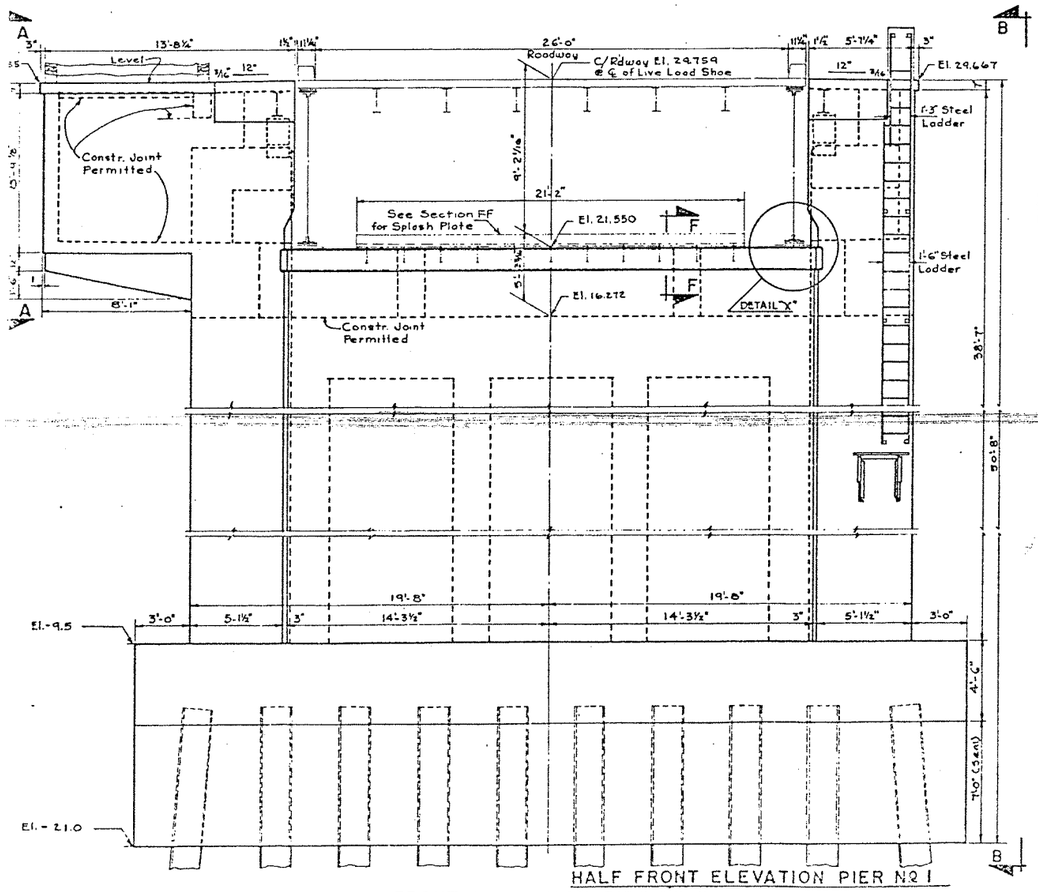
SECTION F-F



ELEVATION A-A

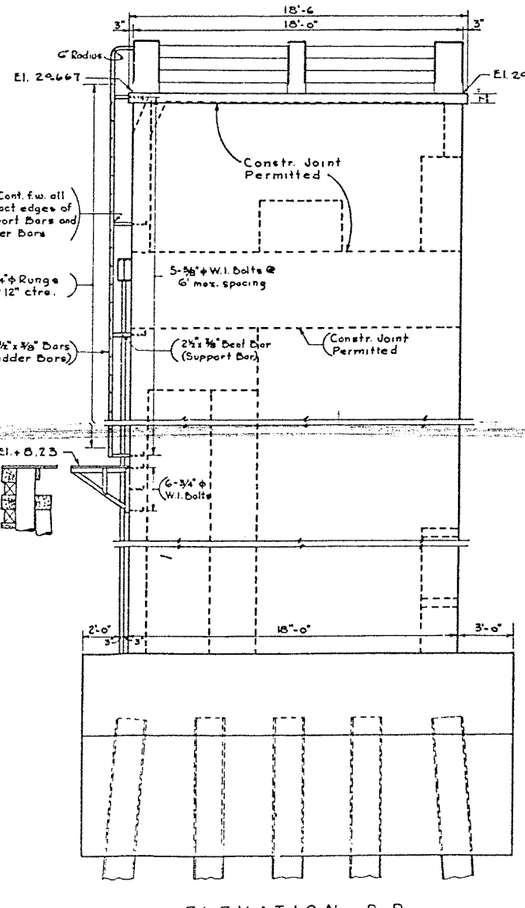


LAYOUT OF PIERS

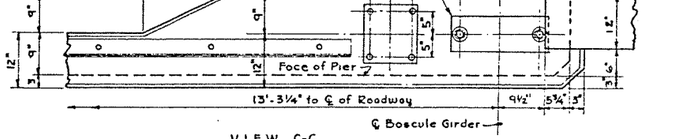


HALF FRONT ELEVATION PIER NO 1

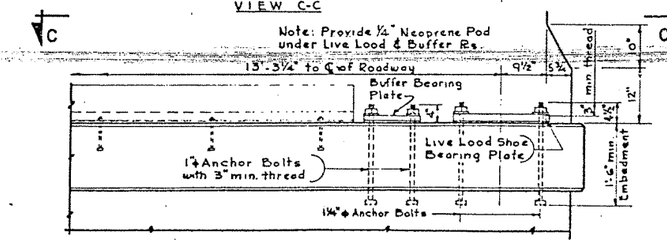
FRONT ELEVATION PIER NO 2



ELEVATION B-B



VIEW C-C



DETAIL "X"

TRUNNION PIERS - GENERAL LAYOUT

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

STRUCTURE "E"
MAIN CHANNEL INTRACOASTAL WATERWAY

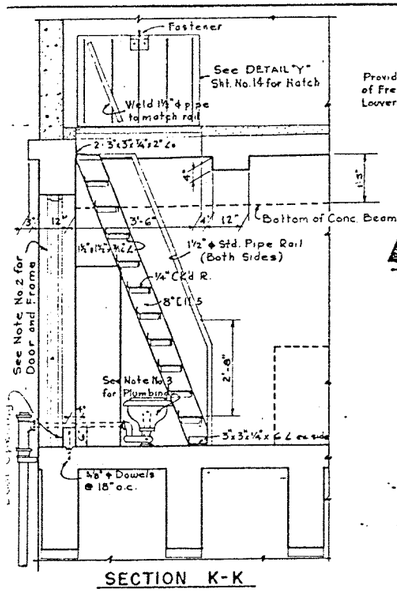
REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Dates	Descriptions		PINELLAS	1520-175

	Names	Dates	APPROVED BY
Detailed by	S.F.J.	6-57	
Checked by	L.H.S.	6-57	
Quantities by	L.H.S.	10-57	
Checked by	N.B.	10-57	
Traced by	S.F.J.	6-57	

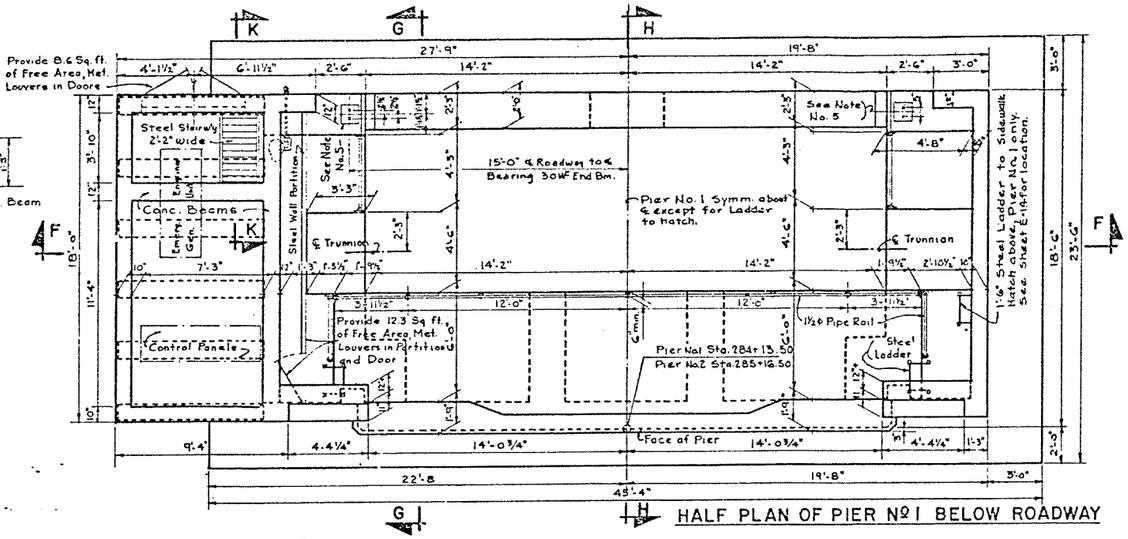
Engineer Bridge Division

Drawing No. 14 of 37 | Index No. 4153

FED. ROAD DIV. No.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	1520-175		E-15

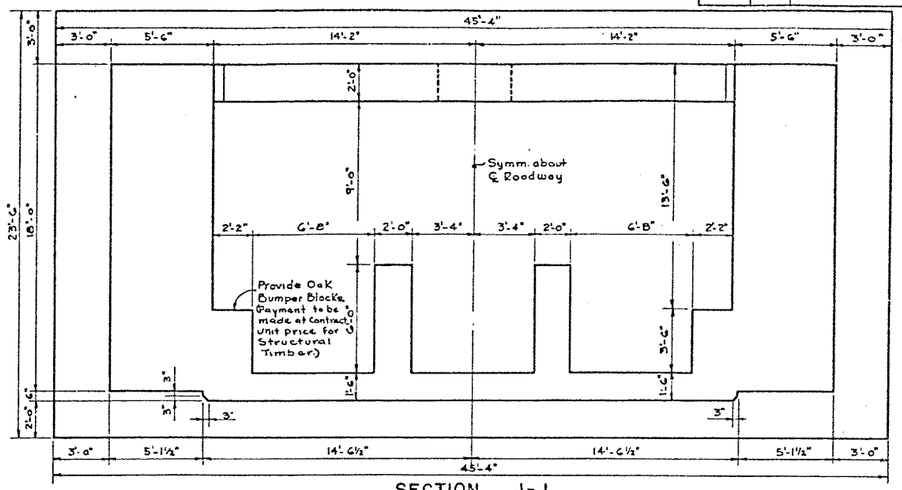


SECTION K-K

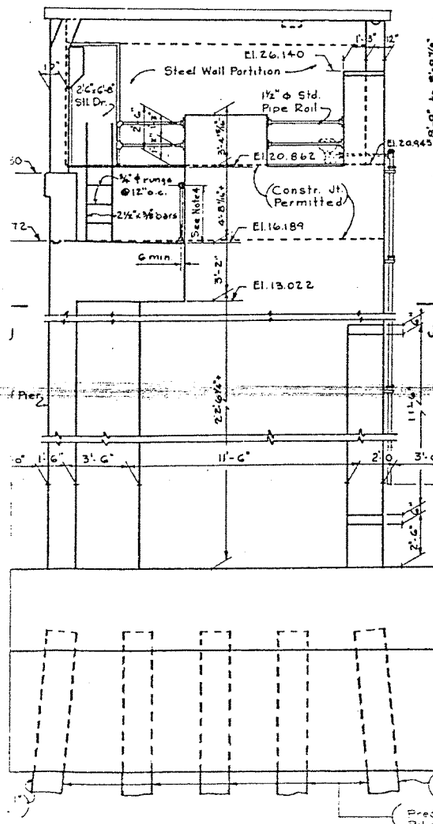


HALF PLAN OF PIER Nº 1 BELOW ROADWAY

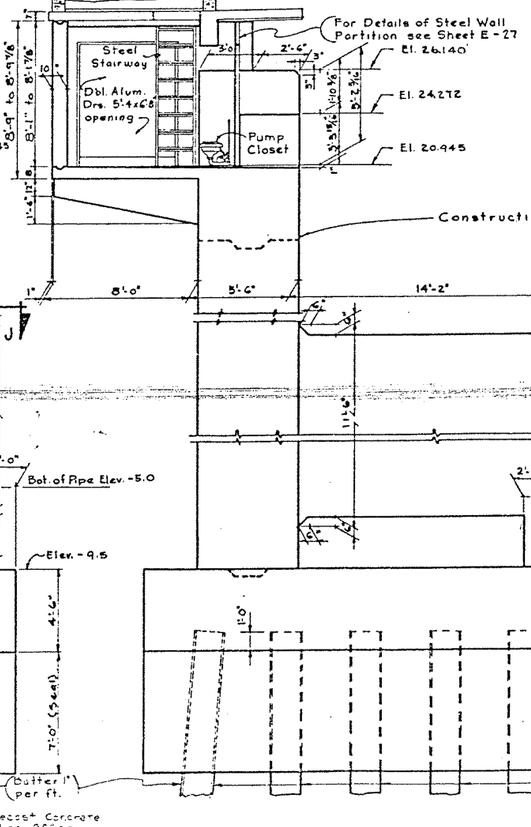
PLAN OF PIER Nº 2 BELOW ROADWAY



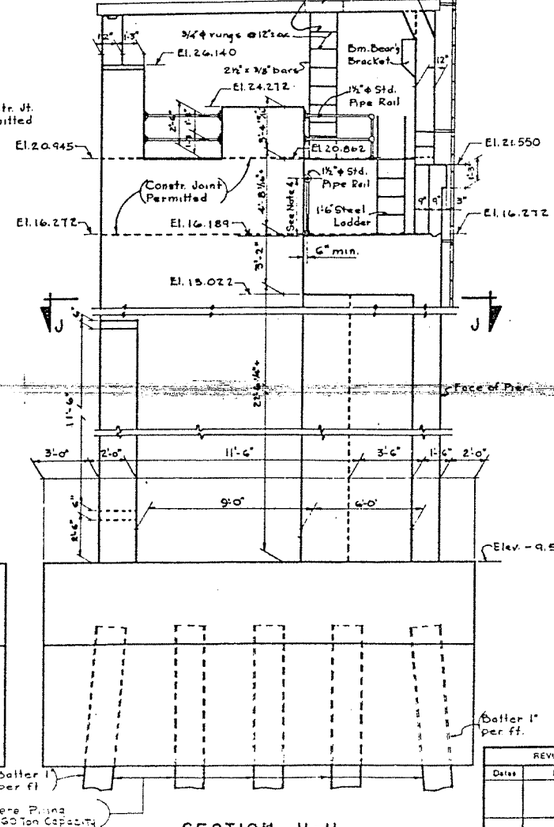
SECTION J-J
(REVOLVED 90°)



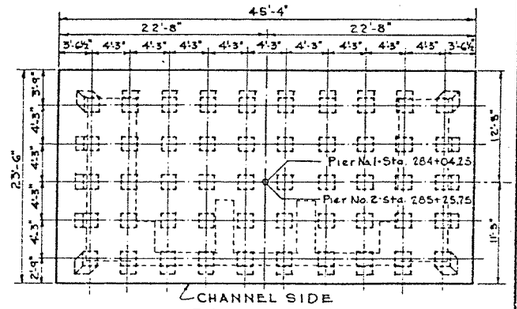
SECTION G-G



SECTION F-F



SECTION H-H



PILE PLAN

1. For General Notes see Sheet E-2.
2. Double Aluminum Door, 5'-4"x6'-8" (Ludman Corporation of Miami or equal) equipped with inside lock and safety chain. Provide metal louvers as called for on PLAN. Door and Frame shall be of 63-ST5 Aluminum alloy, and hardware shall be according to Manufacturers specifications for use over salt water. Doors shall be hinged to swing out. Provide door with interlocking metal weatherstrip. Cost of Door, safety chain, weatherstrip and metal louvers shall be included in the Contract Lump Sum Price for Control House.
3. Install Water Closet: Cost of installation shall be included in the Contract Lump Sum Price for Control House. The Water Closet shall be a Crane Co., 3M-484 Navigator, salt water fitted, or equal.
4. Center 24'-0" of pipe rail on Machinery Platform to be 3'-0" high, remaining 3'-11½" on each side to be 2'-0" high to clear Rock.
5. 30 WF 210 End Girder Bearing Plates to be provided with 2-1"ϕ Anchor Bolts with 3" min. Thread, 1'-6" min. embedment and with 9" min. Extension above top of concrete.
6. The Elevations shown on Pier Drawings for Machinery Supports and Trunnion Bearing may be changed after Machinery and Main Girder are detailed.

TRUNNION PIERS-GENERAL LAYOUT

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

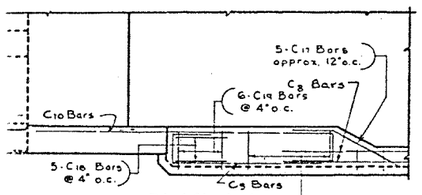
STRUCTURE "E"
MAIN CHANNEL INTRACOASTAL WATERWAY

REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Dates	Descriptions		PINELLAS	1520-175

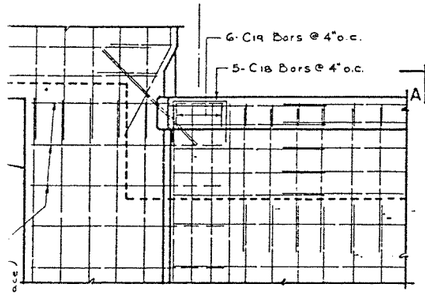
	Name	Date	APPROVED BY
Detailed by	S.F.J.	6-57	
Checked by	L.H.S.	6-57	
Quantities by	L.H.S.	6-57	
Checked by	N.R.	10-57	
Traced by	S.F.J.	6-57	

Drawing No. 15 20 37 | Sheet No. 4 of 53

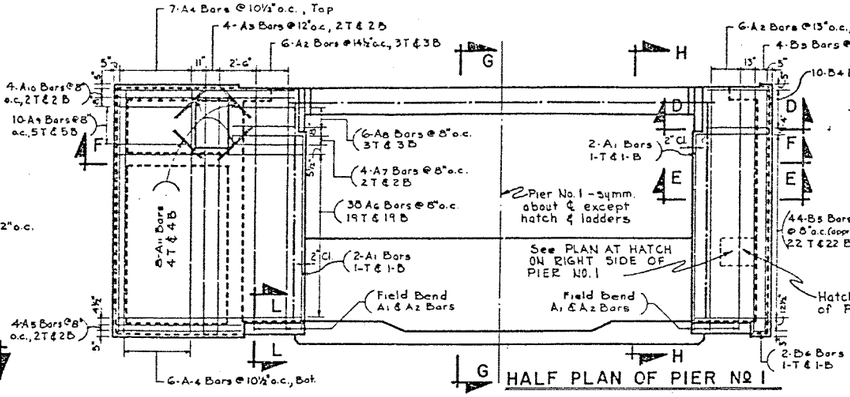
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3	FLA.	1520-175		E-16



PLAN A-A



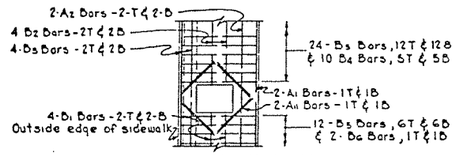
ELEVATION AT LIVE LOAD SHOE



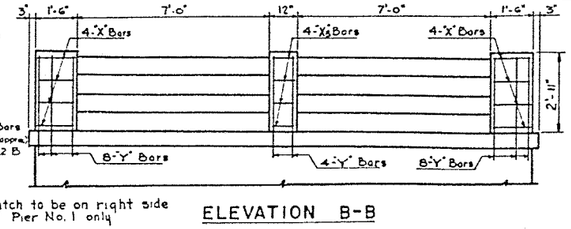
PLAN OF PIER NO 2 SHOWING TOP SLABS

NOTE: For SECTIONS F-F, G-G, H-H & L-L; See Sht No. E-17

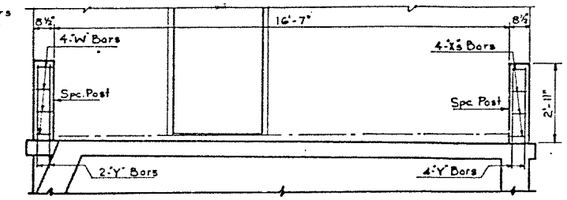
HALF PLAN OF PIER NO 1



PLAN AT HATCH ON RIGHT SIDE OF PIER NO 1



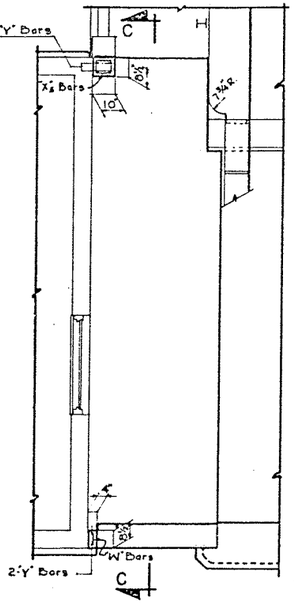
ELEVATION B-B



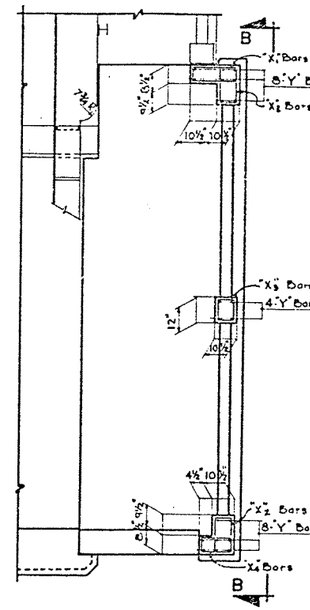
ELEVATION C-C

Handrail Notes:

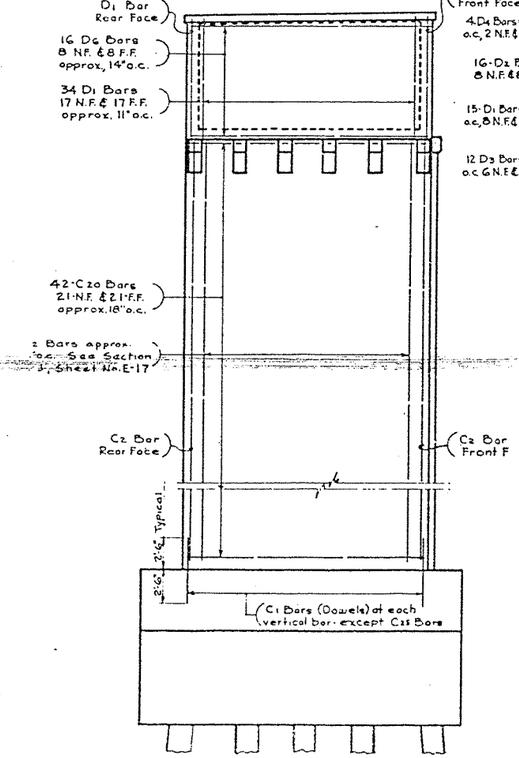
1. All handrail and handrail posts on Trunnion Pier, including special posts of Control House, will be included in contract unit for Concrete Handrail, Bid Item No. 74.
2. For details of handrail not shown, see Sheet E-37



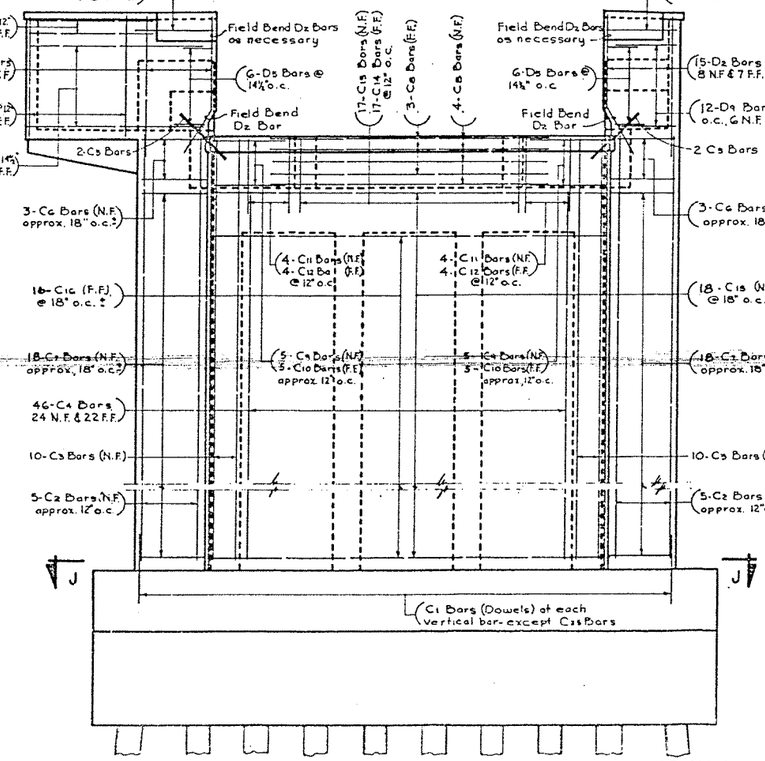
PLAN SPECIAL POSTS



PLAN HANDRAIL POST



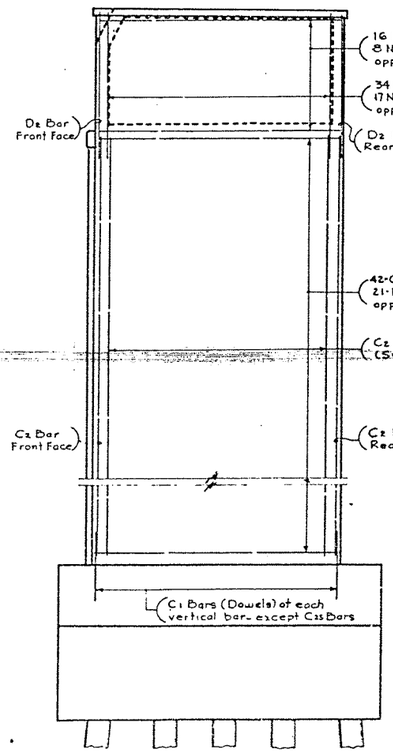
LEFT SIDE ELEVATION



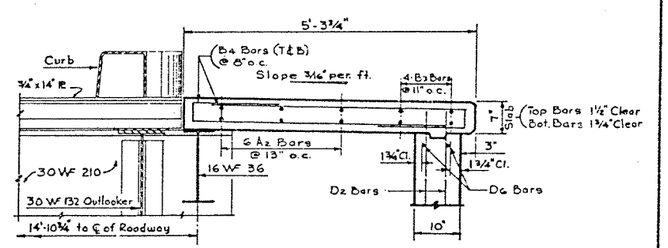
HALF FRONT ELEV. PIER NO 1

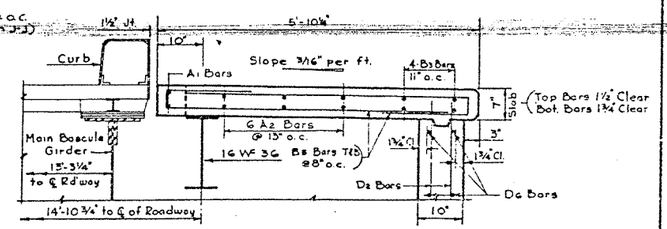
FRONT ELEVATION PIER NO 2

NOTE: For SECTION J-J, see Sht No. 17



RIGHT SIDE ELEVATION





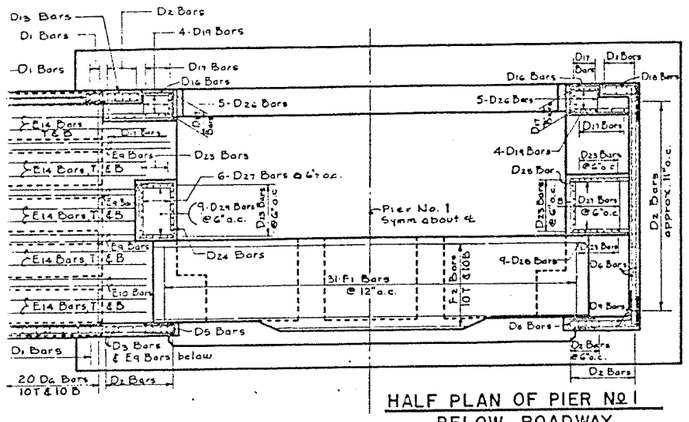
TRUNNION PIERS - REINFORCING DETAILS

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

STRUCTURE "E"
MAIN CHANNEL INTRACOASTAL WATERWAY

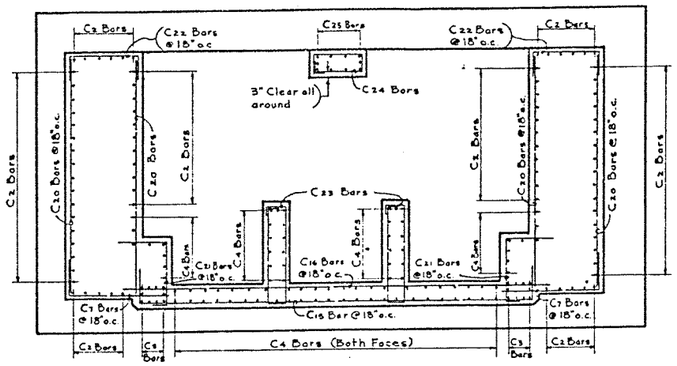
REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Dates	Descriptions		PINELLAS	1520-175

	Names	Dates	APPROVED BY
Detailed by	S.F.J.	6-57	
Checked by	L.H.S.	6-57	
Quantities by	L.H.S.	10-57	
Approved by	N.B.	10-57	
Traced by	S.F.J.	6-57	Drawing No. 10 of 37 — Index No. 4755



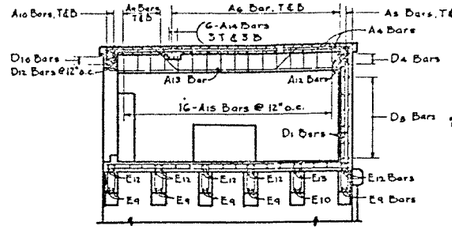
HALF PLAN OF PIER Nº 1 BELOW ROADWAY

PLAN OF PIER Nº 2 BELOW ROADWAY

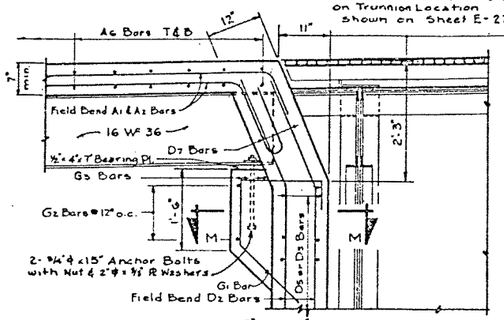


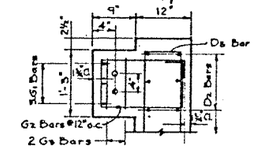
SECTION J-J

NOTE: For location of SECTION J-J, see Sht. No. E-16



SECTION K-K





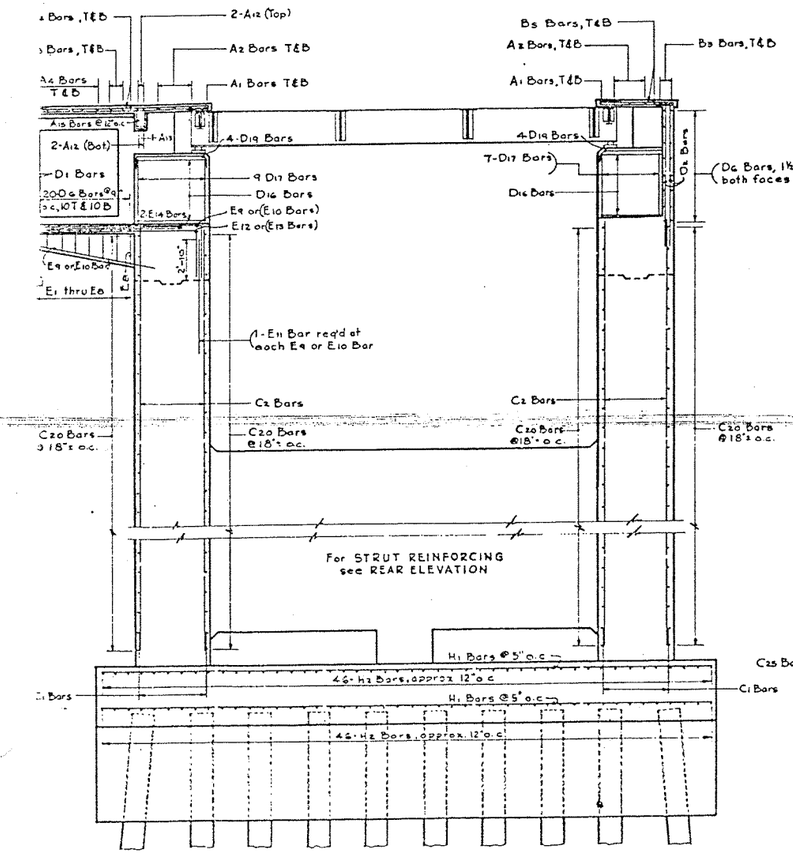
SECTION M-M

SECTION L-L

NOTE: For location of SECTION L-L, see Sht No. E-16

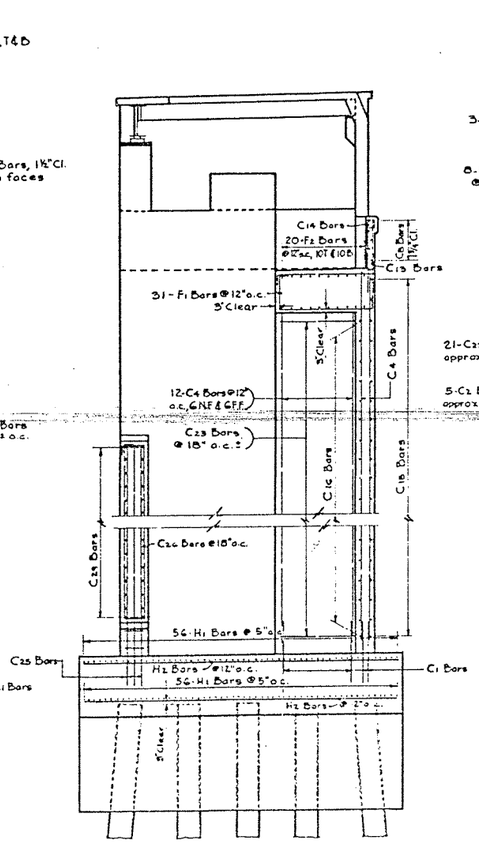
FED. ROAD DIV. No.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	1520-175		E-17

These dimensions are based on Trunnion Location shown on Sheet E-22



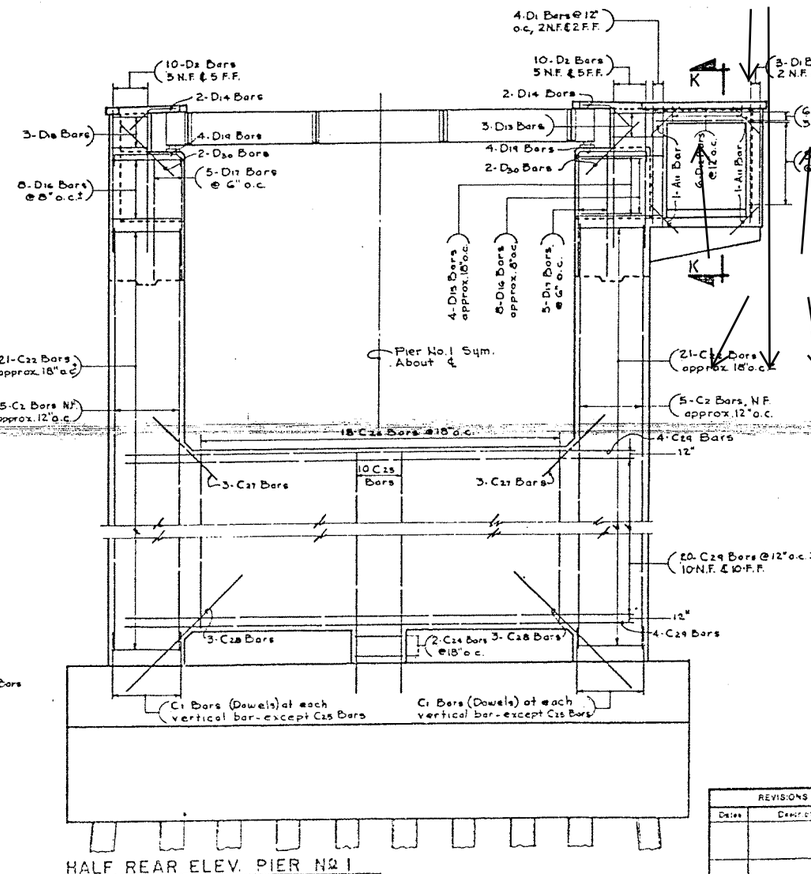
SECTION F-F

NOTE: For location of SECTION F-F, see Sht No. E-16



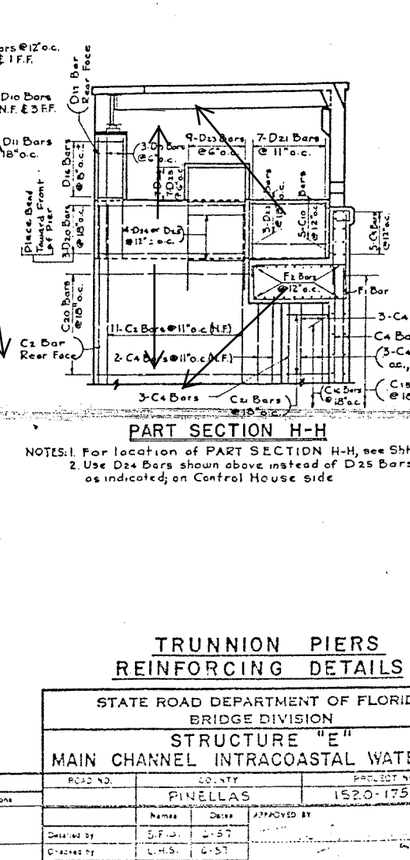
SECTION G-G

NOTE: For location of SECTION G-G, see Sht No. E-16



HALF REAR ELEV. PIER Nº 1

REAR ELEVATION PIER Nº 2



PART SECTION H-H

NOTES: 1. For location of PART SECTION H-H, see Sht. No E-16
2. Use D24 Bars shown above instead of D25 Bars, as indicated on Control House side

TRUNNION PIERS REINFORCING DETAILS

STATE ROAD DEPARTMENT OF FLORIDA
BRIDGE DIVISION

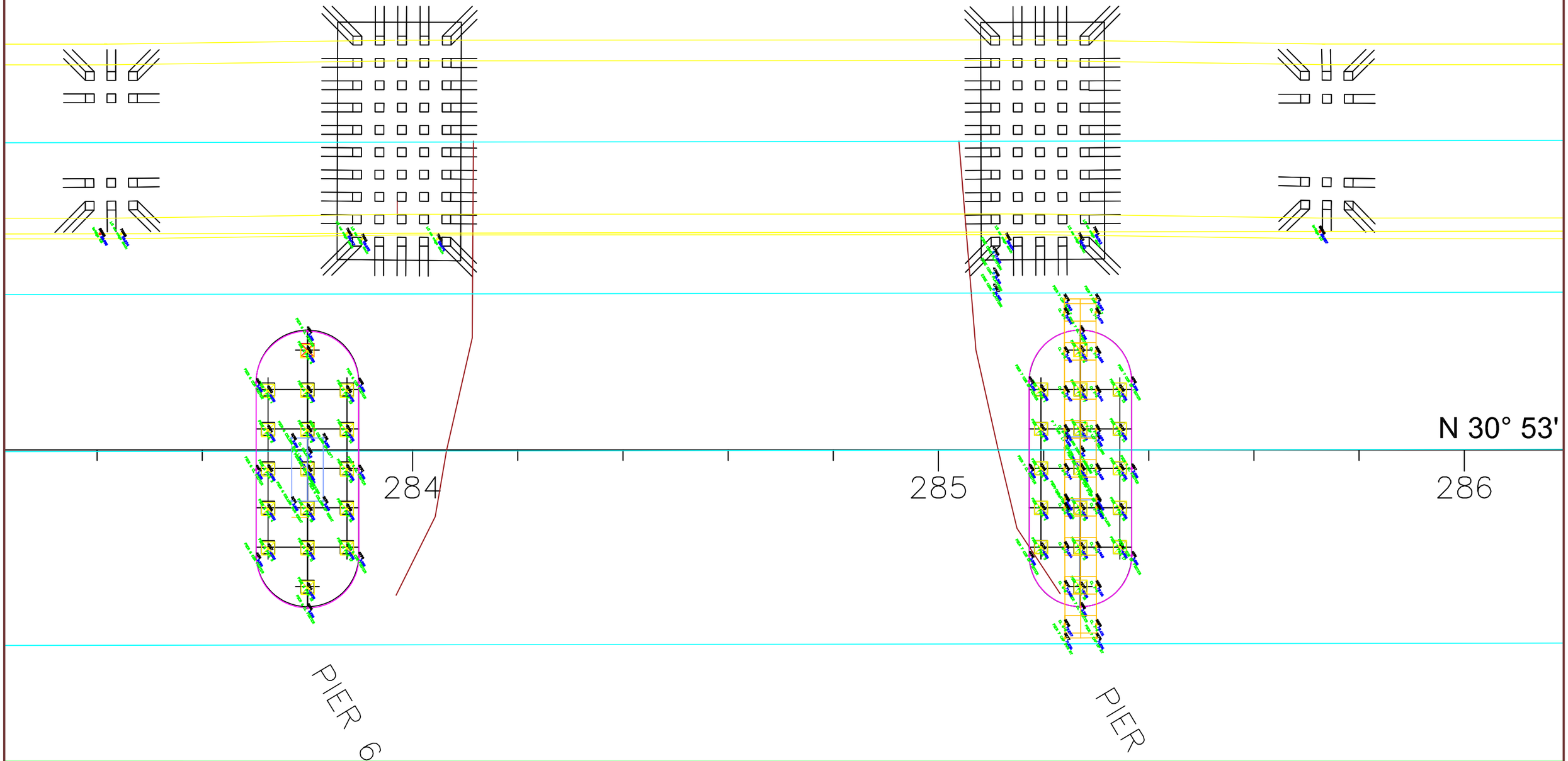
STRUCTURE "E"
MAIN CHANNEL INTRACOASTAL WATERWAY

REVISIONS		ROAD NO.	COUNTY	FED. PROJECT NO.
Dates	Descriptions		PINELLAS	152.0-175

	Names	Dates	APPROVED BY
Detailed by	S.F.D.	6-57	
Checked by	L.H.S.	6-57	
Quantities by	L.H.S.	6-57	
Checked by	N.S.	10-57	
Traced by	S.F.D.	6-57	

DATE OF APPROVAL: 17 Dec 57

SHEET NO. E-17



STATE OF FLORIDA D.O.T.
FINANCIAL PROJECT ID 410755-2-52-01
PINELLAS COUNTY (15200)
STATE ROAD NO. 679 (PINELLAS BAYWAY)
STRUCTURE E INTERCOASTAL WATERWAY

STATE	COUNTY
FL	PINELLAS

		Drawn	Date	Check	Date	Description
6						
5						
4						
3						
2						
1						

Revisions

Office: PITTSBURGH
Design By: OC
Drawn: OC
Checked:
Date: 12/2/2020
Date: XX/XX/XX

Pier 6 and 7 Layout
DETAIL DRAWING

In Charge Of: JON YATES

American Bridge

Region: SOUTHEAST

AB Job Number: 482710
Rev: 0
Sheet Number: WP00X

PIER REMOVAL

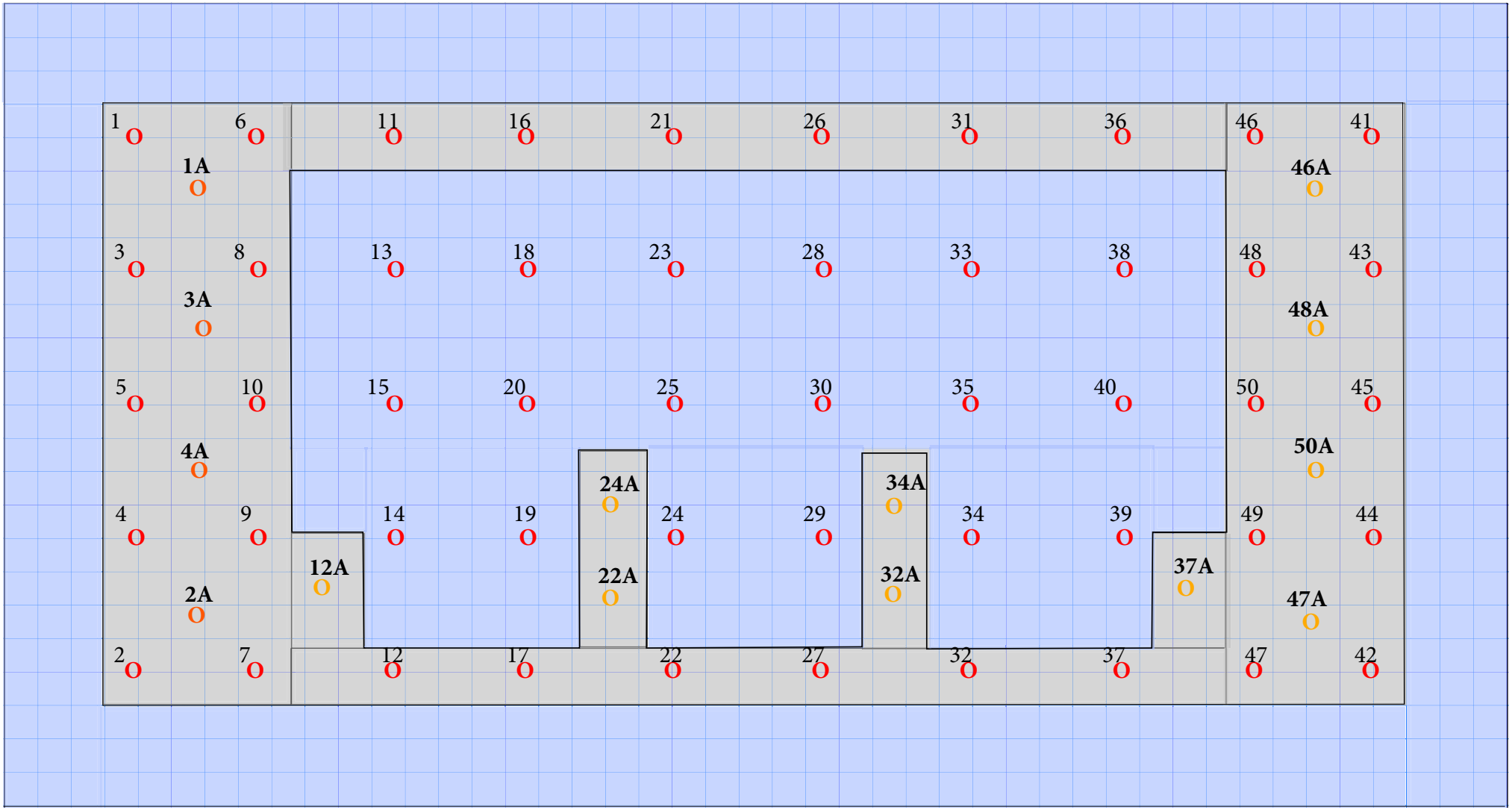
The existing trunnion piers will be drilled vertically with a rock drill rig placed work platforms on the structures to drill vertical holes where required. Holes will be drilled on the designed pattern and will be 2.75 to 3.5 inches in diameter. The drilling of the foundation will require the use of casing pipes and a template to ensure the location of the hole is correct and to ensure no debris falls in the hole after it is drilled. Once drilled the holes will have hole plugs inserted in the top of each to prevent foreign material from going down the hole.

Once the drilling of both piers is complete a blast date and time will be scheduled. Explosives will be brought to the site by our explosives distributor at an adequate time ahead of the scheduled blast time to allow for the loading of explosives in the piers. All holes to be loaded will be checked for depth and obstructions the day prior to the explosives delivery. Transfer/transport of the explosives to the piers will be coordinated with the Fire Dept., Police Dept, and USCG and conducted in accordance with regulations. Loading of the piers will be conducted by Florida licensed blasters and once completed all unused explosives will be returned to the distributors truck and taken back to their magazine site. There will be no onsite storage of explosives. Once loading is complete the hole to hole connections will be made in the proper sequence as per the approved plan. The pier will then be covered with wire rope blast mats. On the scheduled blast day the the connection from pier to pier will be made in preparation for detonation of the blast.

The blast will be detonated at slack high tide under the direction of the Blaster and once all safety measures have been adhered, the blast zone is cleared of people and vehicles and is secure, the marine safety zone is clear of marine traffic and the marine Mammal watch zone has been deemed clear by the Observers. A post detonation inspection will be conducted by the Blaster and the All Clear will be issued at his direction.

To minimize impacts to the new bridge, surrounding structures on the water/shorelines and the marine environment the blasts have been designed with low pounds of explosive per delay but maintaining sufficient powder factors to adequately fragment the piers while confining the debris to a small footprint. The explosive to be used will be 60% NG product, such as Unimax 60%. This product has proven to be very effective at fragmenting concrete at low powder factors and separating the concrete from reinforcing steel and has very good water resistance. Each column of explosives will be primed with two non-electric detonators for redundancy. Proper stemming material, 3/8 inch angular crushed clear stone, will be used for all decking and stemming of the collar of each loaded hole to ensure the explosives energy is contained in the structure to achieve maximum work of the energy in breaking the concrete. Proper collar stemming lengths will be used to prevent blow outs at the top of hole and reduce air overpressure levels.

Hole layout and firing sequence



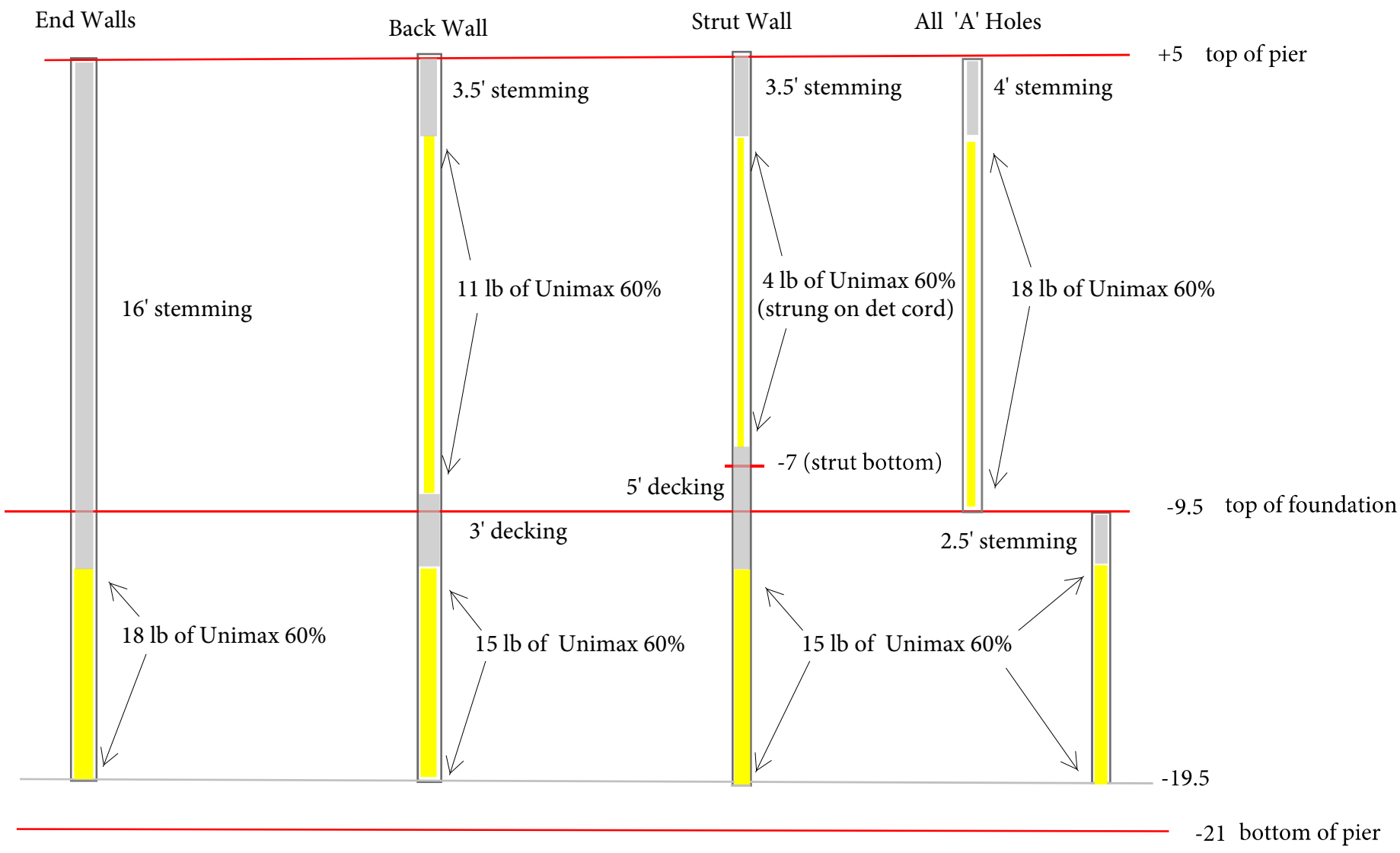
foundation below water

walls extending from foundation to above water

Hole diameter = 2.75" - 3.5"
Hole depths = 10' - 26'
Spacing = 3.5' and 4'
Burden = 3.5' and 4'
Number of holes = 64
Delays = 9ms minimum
Maximum lb/delay = 18

new bridge

Explosive Column Loads



Each deck of explosive will be double primed with nonel detonators with 9ms minimum delay between each detonation.

Bayway structure E timing

Hole #	ms	Hole #	ms	Hole #	ms	Hole #	ms	Hole #	ms	Hole #	ms	Hole #	ms	Hole #	ms	Hole #	ms	Hole #	ms
1	0	6	81	10	126	16	180	21	234	26	288	31	342	36	405	46	513	41	468
1A	45															46A	558		
3	18	8	99	13	153	18	207	23	252	28	306	33	369	38	423	48	531	43	486
3A	63															48A	576		
5	36	10	117	15	171	20	225	25	279	30	333	35	396	40	441	50	549	45	504
4	27	9	108	14	162	19	216	24	261	29	315	34	378	39	432	49	540	44	495
4A	72							24A	270			34A	387			49A	585		
2	9	7	90	12	135	17	189	22	234	27	297	32	351	37	414	47	522	42	477
2A	54			12A	144			22A	243			32A	360	37A		47A	567		

*There will be a 250ms delay between the two piers, i.e. the second pier will initiate at 835ms.

Safety & Transportation of Explosives

PROTECTION OF THE PUBLIC

General

The blast designs have taken into consideration the proximity of buildings in the area, the new bridge, waterways, and adjacent work areas. All explosives will be handled, transported, used and stored in accordance with all State and Federal Regulations. All on site workers will be notified of the activities and instructed to stay clear of the blast area. Signs will be posted to indentify the blast area to other workers on the site. Only those authorized by the Blaster will be permitted in this area. All unused product will be returned to the Explosives Distributor's delivery truck prior to detonating the blast. The structures will be covered with blasting mats to reduce air blast and prevent any flying debris. Prior to detonation the Blaster will ensure that a 250' minimum radius Blast Zone is clear of all people and vehicles and secured by guards, and the Marine Safety Zone of 1500' has been secured as well. This will be accomplished by designated persons stationed at designated locations on the site and safety boats at designated locations on the adjacent waterway. The waterway way will be secured 10 minutes prior to the scheduled shot time and will remain secured until the blaster gives the "All Clear". All persons involved with securing the blast zone will be equipped with radios. When it is confirmed the zone is clear and the Blaster is comfortable with the conditions he will sound the 5 minute warning, check with stationed personnel to ensure the area is still clear, fire the shot, check the post shot conditions and give the All Clear signal.

State Police, Local Police, Local Fire Departments and the Coast Guard will be made aware of the blasting schedules and any changes in the schedule in advance. Should a circumstance arise that prevents the firing of any loaded explosives at the scheduled time a security person will "guard" the shot until the blast is fired at a new shot time. No structures loaded with explosives will be left unattended. Local Police, Fire Departments and Coast Guard will be notified of the situation.

Warnings and Signals

The Blaster will warn all employees on the job site of an impending blast through communication with the General Contractor's Superintendent and the use of warning signals. The warning signals will be posted and all employees onsite will be advised of the schedule of warning signals. The warning signals to be used are as follows:

5 minute warning – three 3 second blasts of the air horn.
1 minute warning – two 3 second blasts of the air horn.
All Clear – one 10 second blast of the air horn.

After the blast is over, there will be an All Clear signal sounded so all in the area understand that all blasting operations are finished. The signal is a prolonged horn or siren following the inspection of the blast area to indicate that all blasting has ceased.

Pre-Blast Notifications

All required agencies will be notified 48 hours before any blast to coordinate with the Blaster in Charge to determine the proper time for the blasting. A two hour notification will be given to the General Contractor's Superintendant. A blast will not be fired until communication with the Guards at the perimeter of the secured Danger Area and visual inspection of the Danger area confirm it is clear and the observers confirm the Exclusion zone is clear.

Guarding Before a Blast

The Blaster in Charge will identify the perimeter of the Danger Area prior to commencing loading any explosives in the planned blast. The contractor will place guards around the Blast Area, when instructed to do so by the Blaster in Charge, to ensure no unauthorized people enter while a blast is being detonated. Sufficient guards must be in place to see all approaches to the area. The guards must be in radio communication with the blaster and able to stop the blast if necessary.

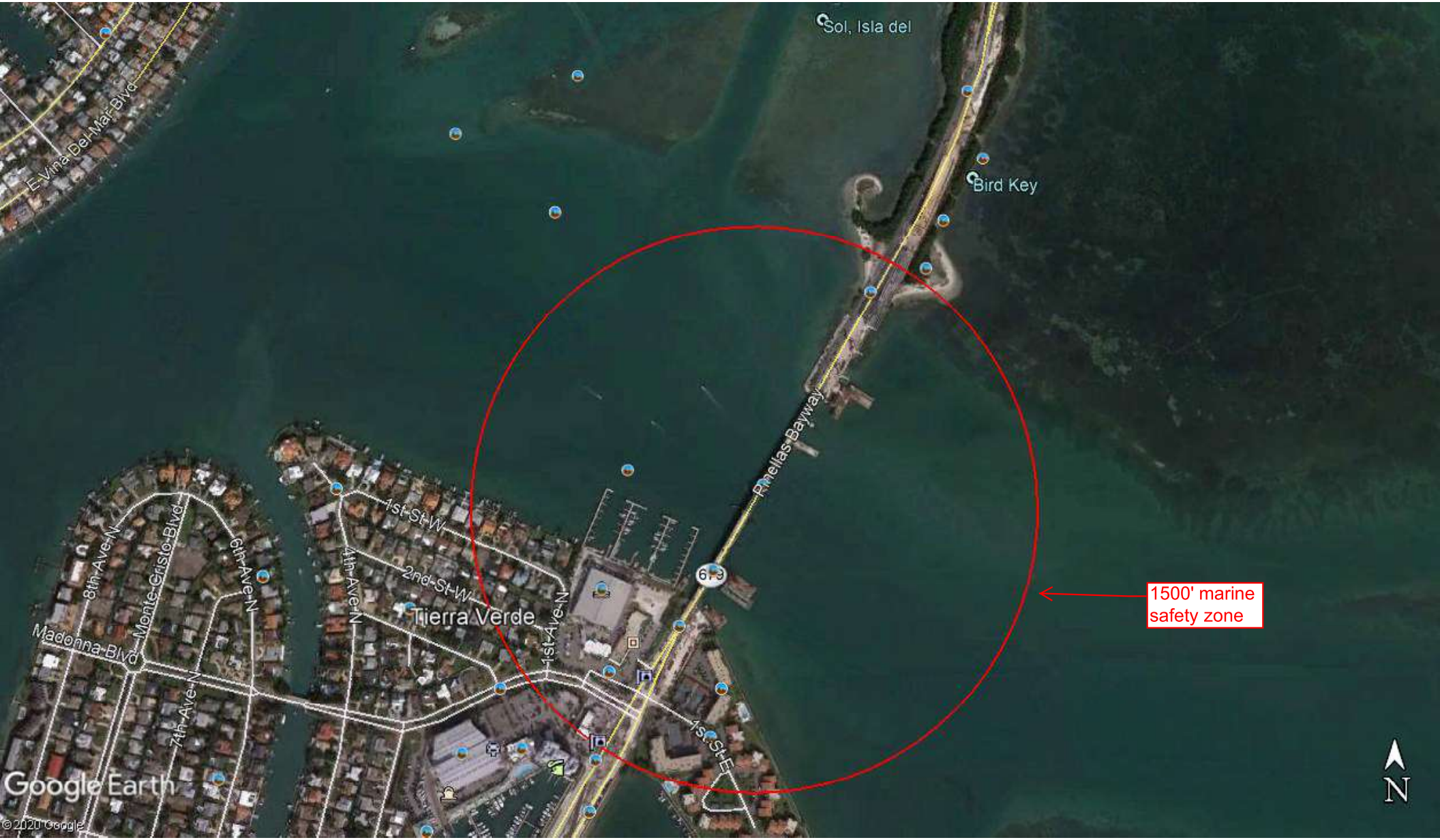
Control of Blast Debris

The structure to be blasted will be covered with approved blasting mats or other acceptable cover material. When deemed neccesasry by the Blaster in Charge the adjacent new bridge piers will be covered as well.

Blast Zone


Pinellas Bayway
679
Pinellas Bayway S
1st St W
2nd St W
250' blast zone
Google Earth
© 2020 Google
N

Marine Safety Zone



PROTECTION OF EXISTING STRUCTURES

General

The blast designs have taken into consideration the proximity of the new bridge piers, commercial/residential structures and utilities. Pounds of explosives per delay have been designed to produce minimal negative impacts on these structures.

Each blast will be covered with wire-rope blast mats prior to detonation to prevent any flying debris. Sand bags will be placed on top of the structure to be matted to protect the shock tubes of the detonators from damage by the mats.

Seismographs will be setup at the closest structures to record the resulting ground vibrations and air overpressures. Each blast event will be monitored and recorded.

Pre-Condition Surveys

When required the Contractor shall arrange for a pre-blast survey of any nearby buildings, structures, or utilities which may potentially be at risk from blasting damage. The pre-blast surveys must contain drawings of each wall of the structure and photographs of existing damage. The survey method used shall be acceptable to the Contractor's insurance company. The pre-blast survey records shall be made available to the Engineer for review. Occupants of local buildings shall be notified prior to the commencement of blasting.

Vibration Control and Monitoring

When blasting near buildings, structures, or utilities which may be subject to damage from blast induced ground vibrations, the ground vibrations shall be controlled by the use of properly designed delay sequences and allowable charge weights per delay. Allowable charge weights per delay shall be based on vibration levels which will not cause damage. The allowable charge weights per delay shall be established through industry standard prediction equations and constantly checked through seismograph monitoring of the blast generated ground vibration levels for each blast.

Every blast will be monitored using approved seismographs located, as approved, between the blast and the closest structure subject to blast damage. The seismographs will be capable of recording particle velocity for three mutually perpendicular components of vibration in the range generally found with controlled blasting.

Data recorded for each shot shall be furnished to the Blaster in Charge and the Engineer prior to the next blast and shall include the following:

1. Identification of instrument used.
2. Name of equipment operator.
3. Distance and direction of recording station from blast area.

4. Type of ground at recording station and material on which the instrument is sitting.
5. Maximum particle velocity in each component.
6. Peak particle velocity.
7. Frequency, in hertz, of the maximum particle velocity in each component.
8. A dated and signed copy of records of seismograph readings.

The accepted conservative safe limits for blast vibration are given in Table 1 below.

TABLE 1

Safe Vibration Levels

Structure Type	Maximum PPV (inches per second)
Standard Construction (Timber, Frame, Brick, and Concrete Buildings)	**2.0 (frequency >40)**
Reinforced Concrete Structures	**4.0**
Steel Structures	**4.0**
Buried Utilities	**4.0**
New Bridge	**20.0**

Vibration Level for New Bridge

The majority of new bridges are designed to withstand an earthquake impact in the range of 7.3 on the Richter scale. This is approximately equivalent to a peak particle velocity of 28 inches per second at a one hertz earthquake frequency or 56 inches per second for a 0.5 hertz earthquake frequency.

The allowable ground vibration level of 20 ips for blast design purposes is considered conservative. An earthquake would impact the entire bridge for seconds at these Richter levels where a blast is a localized, transient, high frequency event lasting only milliseconds.

The predicted ppv at the closest new bridge pier for a maximum weight of explosives per delay of 18 pounds is well below this conservative threshold value.

Lewis L. Oriard has shown through his extensive research that the following levels are required to cause damage to massive concrete;

Damage	Strain (μin/in)	PPV (ips)
Static	140	20
grout spall	700	100
Skin spall	1300	200
Cracking	2400	375

(Lewis L. Oriard, "Construction Vibrations and Geotechnology", Explosives Engineering Chapter 11, pages 415-416, 420-422, 474-454.)
(David E Siskind, "Vibrations from Blasting", International Society of Explosives Engineers, Cleveland OH (2000) pages 63-64.)

Predicted ground vibrations generated by pier blasts

Strucutre	Distance	lb/delay	PPV (in/sec)
new piers	18'	18	2.39
marina	662'	18	0.007

Air Blast and Noise Control

Appropriate blast hole patterns, detonation systems, stemming material and blast mats will be used to prevent venting of blasts and to minimize airblast and noise levels produced by the blasting operations. The peak overpressure recorded for each blast will be included on the Blast Report.

PROTECTION OF MARINE LIFE

In-water blasts have been designed to minimize the impact on marine life in the area through confinement of explosives in the concrete of the structures, using adequate stemming lengths, controlling the weight of explosives detonating at a given time (pounds of explosives per delay), and utilizing a fish scare charge.

Different marine species react differently to the same fish scare technique. Some species may be deterred from the area by one type of scare while others may be attracted by it. Scare charges are a widely used technique, cost effective and easily deployed prior to a blast. The weight of explosives is minimal and produces low level, non-lethal impact upon detonation.

Prior to initiating a in-water blast fish scare charges will be detonated. These fish scares will consist of a series of non-electric blasting caps, each containing 0.75 grains (0.01 pounds) of explosives, suspended in the water column surrounding the structure to be blasted. The scare charges will be detonated 15 to 30 seconds prior to the main blast.

The location of the scare charges is based on past experience and the intent to drive fish away from the structure being blasted. Placing the charges at further distances, even if delayed, may potentially drive fish back towards the structure.

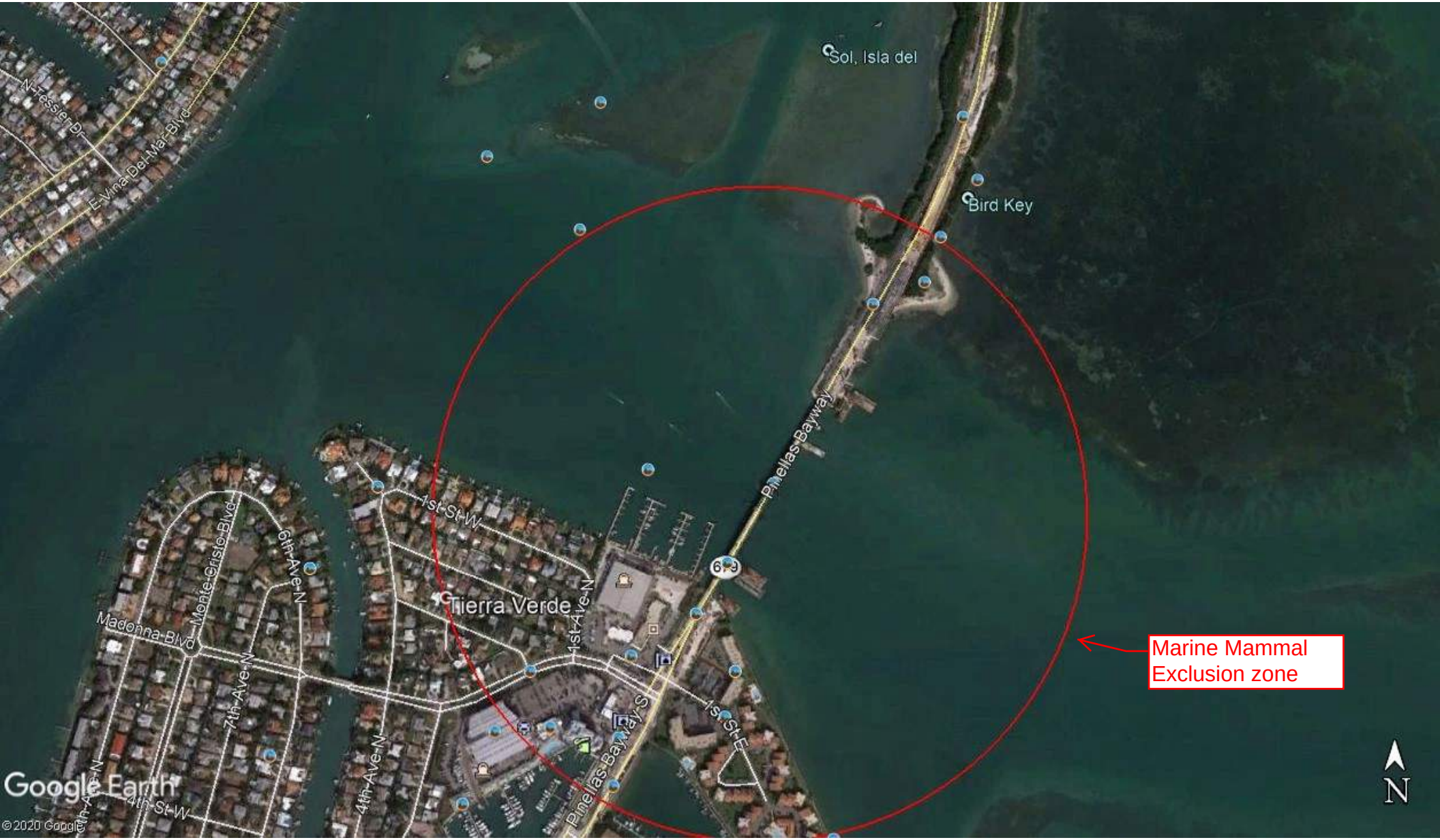
In addition to the use of scare charges a Marine Mammal Watch Program will be conducted to ensure the required Exclusion Zone is clear of mammals immediately prior to the detonation of the blast. The Exclusion Zone radiuis has been determined using the equation cited in the FWS " Guidelines for the Protection of Marine Animals During the Use of Explosives In the Waters of the State of Florida, May 2006 Draft;

$$EZow\ (feet) = (520\ w1/3) + 500\ feet$$

For a maximum pounds per delay of 18 we get;

$$EZow(feet) = (520 \times 18^{1/3}) + 500$$
$$= (520 \times 2.6) + 500$$
$$= 1863\ feet$$

Details of the Mammal Watch Program will be submitted under a seperate cover.


Sol, Isla del
Bird Key
N Tessier Dr
E Vina Del Mar Blvd
Pinellas Bayway
1st St W
Tierra Verde
1st Ave N
6th Ave N
Monte Cristo Blvd
Madonna Blvd
7th Ave N
4th Ave N
4th St W
1st St E
Pinellas Bayway S
Marine Mammal Exclusion zone
Google Earth
© 2020 Google
N

Transportation and Storage of Explosives

The explosives will be delivered to the site by the explosives distributor by an approved truck licensed for the transportation of explosives. It will be brought to a location pre-approved by the USCG as for explosives off-load in BATF licensed magazines. The magazines will then be transferred to a barge, also pre-approved by the USCG for the transport of explosives over water, and under a USCG 4260 permit will be taken to pier to be loaded. Explosives will be taken out of the magazines on an as needed basis and will be attended all times. Once loading is complete all unused explosives will be returned to the delivery truck for transport back to the distributor's magazine site.

There will be no unattended on-site storage of explosives.

DEPARTMENT OF HOMELAND SECURITY

U.S. Coast Guard

APPLICATION AND PERMIT TO HANDLE HAZARDOUS MATERIALS

(See instructions on Page 2)

Form Approved
OMB No. 1625-0005

1. TO: CAPTAIN OF THE PORT U.S. COAST GUARD _____	2. FROM: *(Name, Business address and postal code)*

3. CARGO BY UN NUMBER, PROPER SHIPPING NAME AND EX NUMBER *(if included)*	4. HAZARD CLASS, DIVISION AND COMPATIBILITY GROUP	5. STOWAGE LOCATION *(Vessel Only)*	6. WEIGHT *(Net Pounds)*

7. ☒ ONLOAD ☐ OFFLOAD	8. TOTAL FOR NET EXPLOSIVE WEIGHT:

	VESSEL OR BARGE	WATERFRONT FACILITY
9. NAME, VESSEL IMO OR ID#, LOCATION, POINT OF CONTACT *(name and phone #)*		
10. NAME, ADDRESS, AND POSTAL CODE OF OWNER		
11. NAME, ADDRESS, AND POSTAL CODE OF LESSOR OR CHARTERER		
12. DATE(S) AND TIME(S) OF OPERATION		

I UNDERSTAND and will comply with current safety laws, rules and regulations of the United States, the State, County, City and Port Authority while handling hazardous materials. *(See Page 2.)*

13. DATE	14. TITLE	15. APPLICANT'S SIGNATURE

PERMIT *(COAST GUARD USE ONLY)*

The above request is: ☐ Approved ☐ Approved with the following conditions ☐ Disapproved

EXCEPTIONS/CONDITIONS

DATE	SIGNATURE: *(Captain of the Port, U.S. Coast Guard)*

VESSEL/FACILITY REPRESENTATIVE ACKNOWLEDGMENT

I have read and understand the conditions of this permit.

DATE	VESSEL RESPONSIBLE PERSON SIGNATURE:	
DATE	FACILITY REPRESENTATIVE POSITION:	SIGNATURE:

TRANSPORTATION OVER WATER INSPECTION CHECKLIST

SUBAQUEOUS BLASTING ACTIVITY

Contractor: _____ Date of Inspection: _____

Project: _____ Activity Inspected: _____

Location: _____ Approved By: _____

Phase/Area: _____ Inspected By: _____

Contract No: _____

DATE	TOPIC	Y	N	N/A
	33 CFR 6.12 SUPERVISION AND CONTROL OF EXPLOSIVES OR OTHER DANGEROUS CARGOES.			
	6.12-1 GENERAL SUPERVISION & CONTROL			
	The Captain of the Port may supervise and control the transportation, handling, loading, discharging, stowage, or storage of hazmat on board vessels as covered by the regulations in 49 CFR Parts 170-189, 46 CFR 150-156, 46 CFR parts 170-189, 46 CFR 150-156, 46 CFR Parts 146-148 and the regulations governing tank vessels (46 CFR Parts 30-39)			
	33 CFR 126.16 CONDITIONS FOR DESIGNATING A "FACILITY OF PARTICULAR HAZARD"			
	(a) BASIC REQUIREMENTS. The facility shall comply with all the conditions in 33 CFR 126.15 except where specifically waived by 33 CFR 126.11.			
	(b) WARNING ALARMS. Warning alarms shall be installed at the waterside facility to warn approaching or transiting water traffic of immediate danger in the event of fire or cargo release. Warning alarms shall be of the siren type, or the emergency rotating flashing light type, and be sufficient intensity to be heard, or seen, a distance of 1 mile during normal facility working conditions. The alarm signal shall not conflict with local municipal prescription.			
	46 CFR 25.30 FIRE EXTINGUSHING EQUIPMENT			
	(a) The provisions of this subpart with the exception of 25.30-90, shall apply to all vessels contracted for on or after November 19,1952. Vessels contracted for or prior to that date shall meet the requirements of 25.30-90.			
	25.30-10			
	(b) All required portable and hand held extinguishers shall be of the BRAVO type; i.e. suitable foe fighting fires involving flammable liquids.			
	25.30-15			
	(a) When a fixed fire extinguishing system is installed, it shall be of an approved carbon dioxide type.			
	25.30-20			
	(b) MOTOR VESSELS. All motor vessels shall carry at least the minimum number of hand held portable extinguishers as set forth in Table 25.30-20 (b) (1) of 46 CFR 25.30			
	33 CFR 175.201 VENTILATION			
	No person shall operate a boat built after July 31,1980, that has a gasoline engine for electrical generation, mechanical power, or propulsion unless it is equipped with an operable ventilation system.			

	49 CFR 176.60 "NO SMOKING" SIGNS			
	When smoking is prohibited during the loading, stowing, storing, transportation, or unloading of hazmat by this part, the carrier and the master of the vessel are jointly responsible for posting "NO SMOKING" signs in conspicuous locations.			
	SUBPART G- DETAILED REQUIREMENTS FOR EXPLOSIVES			
	49 CFR 176.100 PERMIT FOR CLASS "A"			
	Before a shipment of class A explosive may be discharged from, loaded, handled, or restored on board a vessel at any place in the U.S.A., it's territories, or it's possessions (except for the Panama Canal Zone). The carrier must obtain a permit from the Captain of the Port or his authority's representative.			
	49 CFR 176.105 LOADING AND UNLOADING OF EXPLOSIVES			
	(a) In any particular port, Class A or Class B explosives (except special fireworks), may not be loaded on a vessel until all other cargo has been loaded on board a vessel. No explosives may be loaded or unloaded at the same time that other cargo is being handled.			
	(b) All explosives must be handled carefully. Packages of explosives may not be thrown, dropped, rolled, dragged, or slid over each other or over the deck.			
	(c) Packaged Class A explosives must be loaded and discharged from a vessel by using a chute as provided for in 49CFR 176.163 or by a mechanical pallet, skipboard, tray or pie pallet, fitted with a cargo net or sideboards. A stuffed mattress at least 4 feet wide by 6 feet long and at least 4 inches thick, or a heavy hemp or jute mat of these dimensions, must be used for depositing explosives lifted by mechanical means or slide down a chute. The maximum load handled in a pallet, skipboard, tray, or pie plate may not exceed 2,640 pounds. A rope net sling with a pallet, skipboard, pie plate or similar base must be loaded so that a minimum displacement of items occurs when it is lifted; the cargo net must completely encompass the cotton and sides of the load. Not more than one third dimension of any package may extend above the sideboard of a tray. (A landing mattress and cargo net are not needed for palletized Class A explosives)			
	(d) Detonators, detonating primers, detonating fuses, fulmate or mercury, and other initiating or priming explosives defined in this subchapter constitute distinct types of explosives. They must be handled with extreme care. A chute and mattress may not be used when loading or discharging this type of explosive.			
	(e) A "can" hook may not be used for raising or lowering a barrel, drum, or other container of explosives.			
	(f) A fire hose of sufficient length to cover the area of the loading operation and connected with adequate water supply must be laid out and read for use.			
	49 CFR 176.110 CONDITION OF PACKAGE			
	A package of explosive which is damp, moldy, stained, or in any condition that indicates leakage may not be transported by vessel. The shipper must substantiate any claim that a stain is due to accidental contact with grease, oil, or similar substance. In case of doubt, the package may not be transported.			
	49 CFR 176.115 ON DECK STORAGE OF EXPLOSIVES			
	(a) The following requirements apply to the stowage of explosives on deck:			
	(1) An explosive may not be stowed on or under a bridge deck.			

	49 CFR 176.115 ON DECK STORAGE OF EXPLOSIVES Continued			
	(2) An explosive may not be stowed nearer than 25 feet in a horizontal plane to the crews quarters.			
	(b) Explosives being transported on deck on a vessel between receiving points within the same harbor, bay, sound, lake, or river including explosive anchorages must be covered with a fire resistant or flame-proof tarpaulin securely lashed in place.			
	49 CFR 176.120 PREPERATION OF DECKS, GANGWAYS, HATCHES, AND CARGO PORTS			
	(a) All decks, gangways, and hatches over or through which explosives must be freed of all loose material and must be swept broom clean before loading and unloading.			
	(b) All hatches and cargo ports opening into a compartment which any explosive are stowed must be kept closed, except during loading or unloading of the compartment. After loading, hatches must be securely closed against weather. If tarpaulins are used, They must be securely battened.			
	49 CFR 176.130 SECURING AND DUNNAGING OF PACKAGEING OF EXPLOSIVES			
	(a) Each package of explosives must be secured and dunnaged to prevent movement in any direction. Vertical restraints are not required if the shape of the package and the stuffing pattern precludes shifting of the load.			
	(b) Each keg of black powder must be stowed in an upright position with the bungs up and each tier must be completely dunnaged.			
	(c) Each package of explosives must be braced and dunnaged so that it is not likely to be pierced by the dunnaging or crushed by any superimposed weight.			
	33 CFR 126.19 ISSUANCE OF PERMITS FOR HANDLING DESIGNATED DANGEROUS CARGO			
	(a) Upon the application of the owners or operators of a designated waterfront facility or of their authorized representatives, the Captain of the Port is authorized to issue a permit for each transaction of handling, loading, discharging, or transporting designated dangerous cargo at such waterfront facility provided the following requirements are met:			
	(1) The facility shall comply in all respect with the regulations in this subchapter.			
	(2) The quantity of designated dangerous cargo, except military explosives shipped by or for the Armed Forces of the United States, on the waterfront facility and vessels moored thereto shall not exceed the limits as to maximum quantity, isolation and			
	46 CFR 67.45 FAILURE TO HAVE CERTIFICATE ONBOARD			
	(a) The person in command of a documented vessel must have on board that vessel the Certificate of Documentation.			
	46 CFR 25.25 PERSONAL FLOTATION DEVICES			
	(a) No person may operate a vessel to which this subpart applies unless it meets the requirements of this subpart.			
	(b) Each vessel not carrying passengers for hire, less than 40 feet in length must have at least one life preserver (Type I PFD), buoyant vest (Type II), or marine buoyant intended to be worn (Type III PFD) for each person on board.			

	(c) Each vessel carrying passengers for hire and each vessel 40 feet in length or longer not carrying passengers for hire must have at least one life preserver for each person aboard.			
	46 CFR 25.35-1 BACKFIRE FLAME CONTROL			
	(a) Every gasoline engine installed in a motorboat and motor vessel after April 25, 1940 shall be equipped with an acceptable means of backfire control.			
	(b) Installations made before November 19, 1952 need not meet the requirements of this subpart.			
	(e) The following are acceptable means of backfire flame control:			
	(1) An arrester built in accordance with Subpart 162.041 of Subchapter Q.			
	(2) An engine air and fuel induction system which provides adequate protection from propagation of backfire equal to an approved flame control.			
	(3) Any attachment to the carburetor or location of the engine air induction that disperses flames in such a manner as not to endanger the vessel.			
	(4) Vessels having an integrated engine-vessel design shall be tested and labeled in accordance with the specifications contained in Subpart 162.043 of Subchapter Q and shall be specifically approved by Commandant.			
	33 CFR 155.450 PLACARD			
	(a) A ship, except a ship of less than 26 feet in length must have a placard of at least 5 by 8 inches made of a durable material, fixed in a conspicuous place in each machinery space or at the bilge and ballast pump control station.			
	33 CFR 151.59 PLACARDS			
	(b) The master of each ship shall ensure that one or more placards meeting the requirements of this section are displayed in prominent locations.			

SAFETY AND ACTIVITY HAZARD ANALYSIS

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
TRANSPORTATION OF EXPLOSIVE MATERIALS	Fire	Vehicles transporting explosive materials shall be equipped with one or more fire extinguishers of a type listed by a nationally recognized test laboratory.
	Fire	Persons engaged in the transportation, handling, or other use of explosive materials shall not smoke, carry matches, firearms, ammunitions, or flame producing devices.
	Poor Visibility	Display all placards, lettering, or numbering required.
	Premature Detonation	Explosives shall not be transported with any other materials, cargoes, or crew members.
	Premature Detonation	Blasting caps shall not be transported in the vehicle with other explosives.
	Premature Detonation	No other items shall be carried in the bed or body of any vehicle transporting explosive materials.
	Premature Detonation	Transportation of explosives from land to a watercraft shall be done in certified and approved magazines and shall be supervised by the licensed blaster.
	Theft of Product	Vehicles transporting explosive materials shall not be left unattended. All magazines are to be kept locked except during the transfer. In the event of loss or theft of product Contractor shall report all incidents with details to the BATF and police.
	Vehicle Accident	In case of an accident, Notification Instructions and Procedures on Securing an Accident Scene will be kept in the vehicle at all times**.**
	Vehicle Failure	Vehicle shall not be loaded beyond rated capacity and the products shall be secured to prevent shifting. Vehicles will be inspected and found satisfactory for transportation of explosive materials.
	Vehicle Failure	Operators of the vehicles shall be physically fit, careful, reliable, and able to read, write, and understand instructions in the English language.
	Vehicle Failure	Vehicles transporting explosive materials shall be in good repair.
	Vehicle Failure	Only the authorized driver and his/her helper shall be permitted to ride on any truck carrying explosive materials.
HANDLING OF EXPLOSIVE MATERIALS	Fire	Magazines used for the storage of detonators shall be separated from magazines storing other explosive materials by the appropriate distance or approved barrier.
	Fire	Smoking matches, firearms, open flames, or any flame producing device shall not be permitted within 50 feet of any magazine.
	Fire	Smoking will be allowed only in a designated smoking area.
	Premature Detonation	Only authorized and qualified persons shall be allowed to handle and use explosives.
	Premature Detonation	Containers shall be opened only with non-sparkling tools or instruments.
	Premature Detonation	Explosive materials shall be removed from containers only as they are needed for use.
	Premature Detonation	Explosive materials and/or primers shall be separated and taken to the blasting area in their original containers.

SAFETY AND ACTIVITY HAZARD ANALYSIS

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
	Premature Detonation	Primers shall not be made up in excess of immediate need for holes to be loaded.
	Premature Detonation	Primers should be made up at the "site specific" Pier Location.
	Premature Detonation	Detonators, primers, or other initiators shall not be stored in the same magazine with explosives, or blasting agents.
	Premature Detonation	Magazines in which explosive materials are stored shall not be used for any other purposes.
	Theft of Materials	After loading a blast, all excess explosive materials and detonators shall be returned to the magazine day storage box. Inventory records shall be updated at the close of business each day.
DAILY INVENTORY JUSTIFICATION	Theft of Materials	Explosive materials and related materials shall be stored in approved containers.
	Theft of Materials	Magazines are to be kept locked at all times and the keys in the possession of the Licensed blaster or the explosives delivery truck driver.
DRILLING AND BLASTING	Drilling into Loaded Holes	Drilling and loading of holes shall not be carried on in the same immediate areas.
	Personal Injury	Personnel unnecessary for the operation are not allowed in the Blast Area.
	Personal Injury	Trained individuals under the "direct" supervision of a qualified person shall perform drilling and loading.
	Personal Injury	Safety glasses and hearing protection shall be worn while in a drilling environment.
	Personal Injury	The walking surface from the magazines to the Blast Area shall be free of trip hazards and obstructions.
	Personal Injury	Standard audible signals shall be used to warn of a blasting operation (see Warning Signs).
	Personal Injury	Explosive materials shall not be transported during crew changes.
	Personal Injury	In the event of a thunderstorm, loading of charges shall cease. Continuous monitoring for potential/actual thunderstorms shall be ongoing.
	Premature Detonation	Explosive materials shall only be removed from their containers for immediate intended use.
	Premature Detonation	Primers shall not be made up in or near magazines and shall be made up on an “as needed basis.”
	Product Failure	All drill holes shall be of a greater diameter than the cartridges.
	Product Failure	Magazines shall be kept clean and dry at all times.
	Product Failure	Explosive materials shall be arranged so the oldest stock will be used first.

SAFETY AND ACTIVITY HAZARD ANALYSIS

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
LOADING FOR BLASTING	Product Failure	Explosive materials shall be stored in their original containers lying flat.
	Personal Injury	Explosives will be delivered directly to the site by explosives distributor..
	Personal Injury	The Blast Area shall be kept free of any equipment, operations, or persons not essential to the loading process.
	Personal Injury	Tamping shall be done with an approved non-sparking loading pole.
	Personal Injury	Primers shall not be tamped.
	Personal Injury	Cartridges or boosters shall be primed only in the number required for a single round.
	Personal Injury	No detonator shall be inserted in explosive materials without a cap well or without first making a hole in the cartridge with a non-sparking tool of proper size.
	Personal Injury	No explosive material or loaded hole shall be left unattended.
	Personal Injury	No holes shall be loaded except those to be fired in the designated blast. The blast shall not be detonated until all personnel are accounted for.
	Premature Detonation	Holes will not be loaded in the prospect of thunderstorms indicated by the National Weather Service, Coast Guard, or static electricity detected by the lightning detector.
	Vibration Control	Loaded holes or charges shall be verified and documented on the Drill Log and Blast Report before firing.
	Vibration Control	Loaded holes shall be stemmed to the collar with non-combustible materials as designed.
FIRING		
	Misfire	The person attaching the lead-in connections shall fire the shot.
	Personal Injury	Prior to the firing of the shot, all persons in the Blast Area shall be warned of the blast.
	Personal Injury	The blast shall not be fired until it is certain that everyone has retreated to a safe position and are accounted for.
	Personal Injury	All blasting operations shall use signals as stated in the blast plan.
	Personal Injury	Prior to each shot, security shall be posted at designated locations.
INSPECTION	Premature Detonation	Accidental detonation is avoided by strict adherence to safe blast procedures.
	Personal Injury	Immediately after the blast has been fired, the lead-in shall be disconnected from the blast machine.
	Personal Injury	An inspection of the tattletale shall be made by the blaster to determine that all charges have been detonated.
MISFIRE	Personal Injury	Other persons shall not be allowed to return to the Blast Area until an All Clear is given.

SAFETY AND ACTIVITY HAZARD ANALYSIS

PRINCIPAL STEP	POTENTIAL HAZARD	RECOMMENDED CONTROLS
	Detonation Failure	Misfires shall be handled under the direction of the Licensed blaster.
	Detonation Failure	No other work is to be done except that which is necessary to correct the hazard of the misfire.
SPECIFIC HAZARDS		
	Loss/Injury to Eyesight	Eye protection is available for grinding, brazing, welding and drilling operations.
	Loss/Injury to Hearing	Hearing protection shall be worn in identified noise hazard areas.
	Personal Injury	Eyewash stations and proper protective gear will be available at all times.
	Personal Injury	Employees are required to wear hard hats, safety glasses, safety boots at all times. PFD's will be worn when within 6 feet of open water.
	Respiratory Failure	Respiratory protection is issued for specific hazards.

CONCLUSION:
Hazards and preventative measures are not limited to this plan. Continuous efforts will be made to observe for hidden hazards and correct them with immediate and proper action.

CONTINGENCY PLAN

The blast designs, explosive product selection and the choice of using nonelectric detonators all lend to the blasting of the piers being successful. Weather can not be controlled. Lightning detection equipment will be used during the entire time that explosives are on site at Piers. When an electrical storm is detected and presents a hazard to the safety of personnel the following procedure shall be followed;

1) Notify the Project manager of the potential hazard.
2) Terminate all loading of explosives into boreholes and return explosive to the magazines.
3) Clear the 250' blast zone of all vessels and personnel.
4) The lightning detection equipment shall be taken with the personnel to continuosly monitor the conditions.
5) The blast zone shall be vissually monitored to ensure no vessels or personnel have re-entered the danger zone while the hazard still exists.
6) Resume operations only after all potentail hazard has passed. All other applicable safety requirements shall be implemented in addition to those required above.

A misfire is highly unlikely with the type of detonators being used for the blasting of Piers due to the ability of the blaster to identify "bad" connectons prior to the blast and correct the problem before firing the shot. The redundant use of detonators (two per deck/hole) also ensures the detonation of explosives will occur. In the event of a misfire, the blaster in charge will notify the Project manager and take the following actions.

1) The blaster will maintain the secure 250' blast zone while he conducts an inspection to determine conditions and cause.
2) If the inspection indicates only that the lead line has malfunctioned, a new lead line will be installed and the shot re-fired.
3) If the inspection indicatesthat a portion of the shot missed fired, hence a cut-off has occurred, the following procedure shal be implemented;
   a) The blaster will maintain the blast zone and restrict enry for ½ hour.
   b) The blaster and only personnel authorized by him will re-enter the blast area to rectify the problem.
   c) If all downlines are intact where a surface connection failed, a new connection will be made, all zones re-secured and the shot re-fired.
   d) If the misfire cannot be safely re-energized and re-fired the blaster will maintain security of the 250' blast zone and contact the technical representative of the explosives manufacturing company to consult on how to best handle the situation. Once the contingency plan has been confirmed the blaster will advise the Project manager of the procedure.
4) When the misfire has been corrected, the blaster will notify the Project manager of an "all clear".

Explosive Products

Data Sheets

&

MSDS

UNIMAX®

Technical Information

Extra Gelatin Nitroglycerin Dynamite



Product Description

UNIMAX is an extra gelatin dynamite formulated to consistently deliver high detonation velocity and excellent water resistance. UNIMAX is designed to satisfy the vast majority of explosive applications in hard rock and may be used as the main explosive charge where high density and energy is required or as a primer for ANFO.

Application Recommendations

- UNIMAX is an excellent primer for Dynomix (ANFO), Dynomix-WR (WR ANFO) or other detonator sensitive packaged product and can be used as a secondary primer in hard seams or at the top of the explosive column.
- Minimum diameter is 25 mm (1 in).
- Minimum detonator is No. 8 strength.
- Storage at elevated temperatures and/or high humidity for 1 to 6 months can reduce the performance of Unimax depending on the diameter. Consult your Dyno Nobel representative for specific recommendations.
- Dynamites are susceptible to sympathetic detonation when applied in very wet conditions where boreholes are closely spaced and/or where geological conditions promote this effect. Consult your Dyno Nobel representative for recommendations where these conditions exist.

Properties

MSDS #1019

Density	(g/cc) Avg	1.51
Energy[a]	(cal/g)	1,055
	(cal/cc)	1,510
Relative Weight Strength[a]		1.20
Relative Bulk Strength[a,b]		2.10
Velocity[c]	(m/s)	5,300
	(ft/s)	17,400
Detonation Pressure[c]	(Kbars)	106
Gas Volume[a]	(moles/kg)	32
Water Resistance		Excellent
Fume Class		IME1 & NRCan1[d]

[a] All Dyno Nobel Inc. energy and gas volume values are calculated using PRODET™ the computer code developed by Dyno Nobel Inc. for its exclusive use. Other computer codes may give different values.
[b] ANFO = 1.00 @ 0.82 g/cc
[c] Unconfined @ 50 mm (2 in) diameter.
[d] Approved by Natural Resources Canada as Fume Class 1.



Hazardous Shipping Description
Explosive, Blasting, Type A, 1.1D, UN 0081 II

See Product Disclaimer on page 2

DYNO Dyno Nobel
Groundbreaking Performance™

UNIMAX®

Technical Information

Transportation, Storage and Handling

- UNIMAX must be transported, stored, handled and used in conformity with all applicable federal, state, provincial and local laws and regulations.
- For maximum shelf-life, dynamite must be stored in cool, dry and well-ventilated magazines. Dynamite inventory should always be rotated by using the oldest materials first. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Diameter x Length		Qty / Case	Case Type	Nominal Case Weight	
mm	in			kg	lbs
25 x 200	1 x 8	140	DA	21	47
29 x 200	1 1/8 x 8	100	DA	20	45
32 x 200	1 1/4 x 8	88	DA	21	47
32 x 400	1 1/4 x 16	44	DA	21	47
40 x 200	1 1/2 x 8	60	DA	20	45
40 x 300	1 1/2 x 12	40	DA	21	47
45 x 200	1 3/4 x 8	40	DB	18	40
50 x 200	2 x 8	34	DB	20	45
50 x 400[a]	2 x 16[a]	17	DB	20	45
60 x 400[a]	2 1/4 x 16[a]	14	DB	19	42
65 x 400[a]	2 1/2 x 16[a]	10	DB	20	44
70 x 400[a]	2 3/4 x 16[a]	9	**	**	**
75 x 200	3 x 8	16	DE	21	47
75 x 400[a]	3 x 16[a]	8	DE	21	47

[a] Avaliable in spiral tube shell with tapered end. • Note: all weights are approximate.

**Available upon request. Check with your Dyno Nobel representative should you have any questions.

- Product density is 1.50 g/cc for package diameters less than 50mm (2 in). Use cartridge count to determine actual explosive charge weight.
- UNIMAX is available in a wide variety of sizes. Custom sizes are subject to surcharge and may require longer than usual lead times.

Case Dimensions

DA	45 x 34 x 17 cm	17¾ x 13⅜ x 6⅜ in
DB	45 x 34 x 15 cm	17⅞ x 13⅜ x 5⅞ in
DE	45 X 34 X 17 cm	17⅝ x 13 5/16 x 6¾ in

Product Disclaimer Dyno Nobel Inc. and its subsidiaries disclaim any warranties with respect to this product, the safety or suitability thereof, or the results to be obtained, whether express or implied, INCLUDING WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND/OR OTHER WARRANTY. Buyers and users assume all risk, responsibility and liability whatsoever from any and all injuries (including death), losses, or damages to persons or property arising from the use of this product. Under no circumstances shall Dyno Nobel Inc. or any of its subsidiaries be liable for special, consequential or incidental damages or for anticipated loss of profits.

Dyno Nobel Inc.
2650 Decker Lake Boulevard, Suite 300, Salt Lake City, Utah 84119 USA
Phone 800-732-7534 Fax 801-328-6452 Web www.dynonobel.com

Material Safety Data Sheet

Dyno Nobel Inc.
2795 East Cottonwood Parkway, Suite 500
Salt Lake City, Utah 84121
Phone: 801-364-4800 Fax: 801-321-6703
E-Mail: dnna.hse@am.dynonobel.com
FOR 24 HOUR EMERGENCY, CALL **CHEMTREC (USA) 800-424-9300**
CANUTEC (CANADA) 613-996-6666

MSDS # 1019
Date 09/16/10

Supercedes
MSDS # 1019 08/25/10

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):

D-GEL™ 1000
DYNOSPLIT® D
DYNOSPLIT®: D-1
DYNOMAX PRO™
EXTRA GELATIN: 40%, 75%
GELAPRIME® F
IP: 724, 738
Oil Well Explosive 80%
RED H®A
RED H®B
STONECUTTER™
UNIGEL®
UNIMAX®
VIBROGEL®: 1, 3
Z POWDER™
60% Hi-Pressure Gelatin

Product Class: Dynamites and Blasting Gelatins
Product Appearance & Odor: Powdery to gelatinous solid, light tan to dark brown color. Faint, waxy odor.
DOT Hazard Shipping Description: Explosive, blasting, type A 1.1D UN0081 II
NFPA Hazard Classification: Not Available (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**ACGIH TLV-TWA**	**OSHA PEL-TWA**
Nitroglycerin (NG)	55-63-0	3-30	0.05 ppm	0.05 ppm
Ethylene Glycol Dinitrate (EGDN)	628-96-6	5-50	0.05 ppm	0.05 ppm
Nitrocellulose	9004-70-0	0-6	None	None
Ammonium Nitrate	6484-52-2	0-75	None	None
Sodium Nitrate	7631-99-4	0-50	None	None
Sulfur[1]	7704-34-9	0-4	None	None

[1] This ingredient is not found in most of the products listed above.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable

Evaporation Rate (Butyl Acetate = 1): Not Applicable

Vapor Pressure: Not Applicable
Density: 0.8-1.48 g/cc
Solubility in Water: Ammonium and sodium nitrates are completely soluble. NG and EGDN are very slightly soluble.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable **Flammable Limits:** Not Applicable
Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe location, no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Eyes: May cause irritation, redness and tearing.
Skin: Contact may result in headache, nausea and blood vessel dilation.
Ingestion: May result in headache, nausea, intestinal upset and blood vessel dilation.
Inhalation: May result in headache, nausea and blood vessel dilation.
Systemic or Other Effects: None known.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Remove contaminated clothing. Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Remove to fresh air. If irritation persists, seek medical attention.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions. May explode when subjected to fire, supersonic shock, or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources and strong shock.
Materials to Avoid (Incompatibility): Corrosives (mineral acids, bases, strong acids).
Hazardous Decomposition Products: Carbon Monoxide (CO), Hydrogen Sulfide (H_2S), Nitrous Oxides (NO_X), and Sulfur Oxides (SO_X).
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 2,500 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements. Contact of this product with water may result in a reportable release.

Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Forced ventilation may be necessary where natural ventilation is limited. Magazines containing NG and/or EGDN based explosives must be ventilated before entry.
Respiratory Protection: None normally required.
Protective Clothing: Chemical resistant (nitrile) gloves are suggested.
Eye Protection: Safety glasses are recommended.
Other Precautions Required: Inhalation and skin contact should be minimized to avoid headaches, nausea, and blood vessel dilation. Protective clothing should be changed daily, more often if contaminated.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources, and strong shock.
Precautions to be taken during use: Avoid breathing the fumes or gases from detonation of explosives. Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

Chemical Name	CAS Number	% By Weight
Nitroglycerin	55-63-0	3-40

The reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372 may become applicable if the physical state of this product is changed to an aqueous solution. If an aqueous solution of this product is manufactured, processed, or otherwise used, the nitrate compounds category and ammonia listing of the previously referenced regulation should be reviewed.

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PRIMACORD®

Technical Information

BOOSTERS • CORDS

Detonating Cord



Properties

MSDS #1126

See Page 2 for PRIMACORD Detonating Cord properties

Product Description

PRIMACORD detonating cords are flexible linear explosives with a core of PETN explosive encased in a textile outer jacket. PRIMACORD detonating cord detonates along its entire length at a velocity of approximately 7,000 m/s (23,000 ft/s). PRIMACORD detonating cords are designed for use as trunklines and/or downlines in various mining, quarrying and construction applications.

Application Recommendations

- **ALWAYS** cut detonating cord with a sharp, non-sparking knife.
- **NEVER** attempt to cut detonating cords by abrasion or with a blow from a sharp or blunt object.
- **ALWAYS** use square knots to extend/join detonating cords that will propagate self-to-self. When connecting downlines to trunklines, always use a clove hitch knot and keep incoming and outgoing cords at right angles to avoid possibility of cut-offs.
- **NEVER** join PRIMACORD 1, 2 and 3 together with knots because it will not propagate self-to-self.
- **ALWAYS** use a detonating cord product, such as PRIMACORD 4Y or 4R or detonating cord with a greater explosive coreload as a trunkline to initiate PRIMACORD 1, 2 or 3.
- **ALWAYS** use a double wrap clove hitch knot to connect PRIMACORD 1, 2 and 3 detonating cord to the trunkline cord.
- **NEVER** allow trunklines and/or downlines to cross.
- Minimum recommended initiating detonator is a No. 8 strength.
- Minimum recommended cord initiator is a 3.6 g/m (18 gr/ft) detonating cord, such as PRIMACORD 4Y or 4R, or another detonating cord with an equal or greater explosive coreload.

Transportation, Storage and Handling

- PRIMACORD must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (5 years), PRIMACORD must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library publications of the Institute of Makers of Explosives.

Hazardous Shipping Description

Cord, Detonating, 1.1D, UN 0065, II EX 1992020035



PRIMACORD®

Technical Information

BOOSTERS • CORDS

Packaging

Product	PETN Coreload		Outside Diameter		Tensile Strength		Color / Counter	Weight / Case		Spools / case	Length / Spool		Net Explosives Content (NEC) / 1000 ft	
	g/m	gr/ft	mm	in	kg	lbs		kg	lbs		m	ft	kg	lbs
PRIMACORD 1	1.5	7.5	3.18	0.125	68	150	Yellow / 5 Black	9	20	2	610	2000	0.5100	1.0720
PRIMACORD 2.5	2.4	12.5	2.8	0.110	27	60	Orange / 4 Black	12	25	2	610	2000	0.8117	1.7857
PRIMACORD 3	3.2	15	3.66	0.144	113	250	Red / 1 Black & 1 White	13	29	2	610	2000	1.0200	2.1440
PRIMACORD 4Y	3.6	18	3.61	0.142	68	150	Yellow / 1 Black	6	14	2	305	1000	1.2200	2.5720
PRIMACORD 4R*	3.6	18	3.61	0.142	68	150	Red	4	8	2	610	2000	1.2200	2.5720
PRIMACORD 5	5.3	25	3.99	0.157	68	150	Red / 1 Black	11	25	2	458	1500	1.7000	3.5730
PRIMACORD 8	8.5	40	4.47	0.176	90	200	Red / 2 Black	11	24	2	305	1000	2.7200	5.7160
PRIMACORD 10	10.8	50	4.70	0.185	90	200	Yellow / 2 Black	12	27	2	305	1000	3.4000	7.1450

* Pull-out Box

NOTE: Higher coreload detonating cords are available. Please contact your Dyno Nobel representative for details.

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Material Safety Data Sheet

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FOR 24 HOUR EMERGENCY, CALL **CHEMTREC (USA) 800-424-9300**
CANUTEC (CANADA) 613-996-6666

MSDS # 1126
Date 09/16/10

Supercedes
MSDS # 1126 08/13/08

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): PRIMALINE®
PRIMACORD®
PRIMASHEAR™
OPTICORD®
GEOSEIS®
LOW FLEX™
FIRELINE CORD

Product Class: Detonating Cord

Product Appearance & Odor: Flexible cord of woven textile with a protected explosive core of PETN (white crystalline powder) and covered by a white or colored plastic or textile jacket. May have a waxed finish. No odor.

DOT Hazard Shipping Description: UN0065 Cord, Detonating 1.1D II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients	**CAS#**	**%**	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Pentaerythritol tetranitrate (PETN)	78-11-5	-----*	None[1]	None[2]

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3.
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3.
Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).
* Core powder is 100% PETN. The approximate amount of PETN in a given grade of cord is expressed as that number of grams of PETN per linear meter of cord. Range is from 1 to 280 gram/meter. Example: PRIMALINE® 5 contains approximately 5 grams PETN per meter of cord. (1 gram/meter = 4.7 grains/foot)

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable (PETN decomposes at melting point, about 141°C)
Vapor Pressure: Not Applicable
Vapor Density: (Air = 1) Not Applicable
Percent Volatile by Volume: Not Applicable
Solubility in Water: Insoluble.

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SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe, distant location. Allow fire to burn unless it can be fought remotely or with fixed extinguishing systems (sprinklers). For transportation fires involving large quantities of detonating cord, such as a trailer load, evacuate no less than 2,500 feet in all directions.
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning or detonating material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive core material under normal conditions of use.

Eyes: May cause irritation, redness and tearing.
Skin: PETN is not known as a skin irritant or sensitizer.
Ingestion: PETN is moderately toxic if ingested. See systemic effects below.
Inhalation: See systemic effects below.
Systemic or Other Effects: PETN is a known coronary vasodilator, and ingestion or inhalation may result in a lowering of blood pressure, headache or faintness, and a decreased tolerance for grain alcohol. Repeated over-exposure may result in chest pains in the absence of exposure. Systemic effects by ingestion include dermatitis.
Carcinogenicity: No constituents are listed by NTP, IARC or OSHA.

Emergency and First Aid Procedures

Eye: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Remove to fresh air. If symptoms persist, seek medical attention.
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact, especially when confined or in large quantities.
Conditions to Avoid: Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.
Materials to Avoid (Incompatibility): Corrosives (strong acids and strong bases or alkalis).
Hazardous Decomposition Products: Nitrogen Oxides (NO_X), Carbon Monoxide (CO)
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate all personnel to a safe distant area and allow to burn or fight fire remotely. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If explosive powder is spilled from damaged detonating cord, remove all other explosives from the spill area. Wet down and clean spilled powder using a damp sponge or rag, avoid applying friction or pressure to the explosive, and place in a (Velostat) electrically conductive bag. Contamination of this material with sand, grit or dirt will render the material more sensitive to detonation. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other

clean DOT approved container. Ensure that a complete account of product has been made and is verified. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: Not required for normal handling.
Respiratory Protection: None normally required.
Protective Clothing: Work gloves and work clothing that reduce the possibility of skin abrasion and that would prevent contact with spilled explosive powder is suggested.
Eye Protection: Safety glasses or goggles are recommended.
Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State and local regulations. Only properly qualified and authorized personnel should handle and use explosives. Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.
Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None		

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NONEL® EZ DET® 1.1B

Technical Information

Nonelectric Blast Initiation System



Properties

MSDS #1122

Net Explosive Content per 100 units 0.1125 kg
0.1782 lbs

Nominal Time (msec)	Nominal Time (msec)	Nominal Time (msec)	Connector Block Color
17 / 350	17 / 500	17 / 700	Yellow
25 / 350	25 / 500	25 / 700	Red
42 / 350	42 / 500	42 / 700	White
25 / 375			Red

Product Description
NONEL® nonelectric delay detonator EZ DET® units consist of a length of orange shock tube with a surface detonator attached to one end and an in-hole, High Strength, detonator on the other. The surface detonator is inside a color-coded plastic EZ™ Connector block to facilitate easy connections to up to 6 shock tube leads. Easy-to-read, color-coded delay tags display the delay number and nominal firing time prominently.

NONEL EZ DET units can be easily connected to one another to satisfy basic blast design requirements in construction, mining, and quarry operations. They can also be used in combination with NONEL MS, NONEL EZTL™ and/or NONEL TD detonators to satisfy complex blast design requirements and minimize inventory of initiation system components.

Application Recommendations
For detailed application recommendations, **ALWAYS** request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.
- **ALWAYS** select a NONEL EZ DET unit having more than enough tubing length to extend from the planned primer location in the borehole to the collar of the next hole.

Hazardous Shipping Description
Detonator assemblies nonelectric,
1.1B, UN 0360 PG II



See Product Disclaimer on page 2.

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NONEL® EZ DET® 1.1B

Technical Information

Application Recommendations (continued)

- **ALWAYS** protect the plastic EZ Connector block and all shock tube leads from impact or damage during the loading and stemming operations. Use care when placing blasting mats and cover material on top of the blasting circuit. The EZ Connector block contains a detonator and is subject to detonation caused by abuse such as impact. Shock tube which has been cut, ruptured or damaged may cause misfires.
- **ALWAYS** be sure that the shock tube(s) are securely inserted, one at a time, into the EZ Connector block. The head of the EZ Connector block should rise to accept the shock tube and return to a closed position with an audible click.
- **ALWAYS** ensure that individual shock tubes remain aligned side by side in the connector channel and do not cross one over the another on insertion.
- **NEVER** use NONEL EZ DET units with detonating cord. The low strength surface detonator will not initiate detonating cord and may cause misfires.
- **NEVER** attempt to disassemble the delay detonator from the plastic EZ Connector block or use the detonator without the connector.
- **NEVER** place more than 6 shock tube leads into the plastic EZ Connector block. Misfires may result.
- **NEVER** pull, stretch, kink or put tension on shock tube such that the tube could break.
- **NEVER** splice NONEL EZ DET shock tube together to extend between holes.
- **NEVER** connect NONEL EZ DET units together until all holes have been primed, loaded and stemmed and the blast site has been cleared.

Transportation, Storage and Handling

- NONEL EZ Det must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL EZ Det must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Quantity/ Case	
m	ft		case	subpack
3.5	12	D	200	100
4.5	16	D	180	90
7	24	D	140	70
9	30	DC	120	--
12	40	DC	120	--
15	50	DC	90	--
18	60	DC	90	--
24	80	DC	50	--
30	100	DC	40	--
37	120	DC	30	--

- Length rounded to nearest one-half meter.
- Case weight varies by length & delay; see case label for exact weight.

Case Dimensions

Detpak Case (DC)	48 x 45 x 26 cm	18 ¾ x 17 ¾ x 10 ¾ in
Detpak (D)		
subpack	44 x 22 x 25 cm	17 ½ x 8 ¾ x 10 in
strapped case	44 x 45 x 25 cm	17 ½ x 17 ⅝ x 10 in

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NONEL® MS 1.1B

Technical Information

Nonelectric Millisecond Delay Detonator



Product Description

NONEL® nonelectric delay detonator MS 1.1B units consist of a length of orange shock tube with a High Strength detonator attached to one end and the other end sealed. A white J-hook is affixed near the sealed end, providing easy means of connection to detonating cord. Easy-to-read, color-coded delay tags display the delay number and nominal firing time prominently.

NONEL MS is designed to provide in-hole time for underground (non-coal) and surface blast applications in the mining, quarry and construction industries and can be used in combination with a detonating cord trunkline, NONEL EZTL™, NONEL EZ DET® and/or NONEL TD detonators for maximum timing flexibility.

Application Recommendations

For detailed application recommendations, **ALWAYS** request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.

- **ALWAYS** use the plastic J-hook when using a detonating cord trunkline to initiate a NONEL MS unit. A minimum 3 g/m (15 gr/ft) detonating cord qualified for surface use is required for use with the J-hook.
- **ALWAYS** make sure the shock tube is connected to the J-hook and leads back to the hole collar at right angles to the detonating cord trunkline.

Properties

MSDS #1122

Net Explosive Content per 100 units 0.0885 kg / 0.1947 lbs

Delay Time (msec)	Delay Tag Color	Delay Time (msec)	Delay Tag Color	Delay Time (msec)	Delay Tag Color
0	Orange	225	White	450	Orange
25	Red	250	Red	475	White
50	Tan	275	White	500	Purple
75	Green	300	Tan	525	White
100	Blue	325	White	600	Gray
125	Orange	350	Green	700	Lt Blue
150	Purple	375	White	800	Red
175	Gray	400	Blue	900	Tan
200	Lt Blue	425	White	1000	Green

Hazardous Shipping Description

Detonator assemblies, nonelectric, 1.1B, UN 0360 PG II



See Product Disclaimer on page 2.

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NONEL® MS 1.1B

Technical Information

Transportation, Storage and Handling

- NONEL MS must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL MS must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Coil Type	Quantity / Case
m	ft			
3.5	12	DC	Detpak	300
4.5	16	DC	Detpak	240
6	20	DC	Detpak	180
9†	30	DC	Detpak	150
12†	40	DC	Detpak	120
15†	50	DC	Detpak	90
18†	60	DC	Detpak	90
24†	80	DC	Detpak	50
30†	100	DC	Detpak	40
37†	120	DC	Detpak	30
40††	130	L	Spool	30
46††	150	L	Spool	30
55††	180	L	Spool	30
61††	200	L	Spool	30

- Length rounded to nearest one-half meter.
- Case weight varies by length & delay; see case label for exact weight.
- 2.5 to 24 meter product, in 500 & 1000 ms delays, is also available with HD tube.

† Available in Super Tube. †† Super Tube only.

Case Dimensions

L	56 x 27 x 32 cm	22 x 10 ½ x 12 ½ in
Detpak Case (DC)	48 x 45 x 26 cm	18 ¾ x 17 ¾ x 10 ¼ in

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NONEL® EZTL™

Technical Information

Nonelectric Trunkline Delay Detonators



Product Description

NONEL® nonelectric delay detonator EZTL™ units consist of a length of yellow shock tube, with a surface detonator attached to one end and the other end sealed. The detonator is housed in a plastic EZ Connector block which facilitates easy connection to shock tube. A white J-hook is affixed near the sealed end. Easy-to-read, color-coded delay tags display the delay number and nominal firing time prominently.

EZTL detonators are designed for use with NONEL MS and EZ DET® units to provide effective and accurate surface timing between blastholes and/or rows of blastholes in surface and underground blasting designs.

Application Recommendations

For detailed application recommendations, **ALWAYS** request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.

- **ALWAYS** be sure that the shock tube(s) are securely inserted, one at a time, into the plastic EZ connector. The head of the connector block should rise to accept the tube, and return to a closed position with an audible click.
- **ALWAYS** ensure that the individual shock tubes remain aligned side by side in the EZ connector channel and do not cross over one another during insertion.
- **ALWAYS** protect the plastic EZ connector and all shock tube leads from impact or

Properties

MSDS #1122

Net Explosive Content per 100 units 0.0240 kg / 0.0529 lbs

Delay Time (msec)	Connector Block Color
9	Green
17	Yellow
25	Red
33	Green
42	White
67	Blue
100	Black
109	Black

Hazardous Shipping Description

Detonator assemblies nonelectric, 1.4B, UN 0361 PG II



See Product Disclaimer on page 2.

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NONEL® EZTL™

Technical Information

Application Recommendations (continued)

damage. Use care when placing blasting mats and cover material on top of the blasting circuit. The EZ connector contains a detonator and is subject to detonation caused by abuse such as impact. Shock tube which has been cut, ruptured or damaged may cause misfires.

- **NEVER** use NONEL EZTL detonators with detonating cord. The low strength surface detonator will not initiate detonating cord.
- **NEVER** attempt to disassemble the delay detonator from the EZ connector block or use the detonator without the connector.
- **NEVER** place more than 6 shock tube leads into an EZ connector block. Misfires may result.
- **NEVER** tie-in NONEL EZTL units until all holes have been primed, loaded, stemmed and the blast site has been cleared.

Transportation, Storage and Handling

- NONEL EZTL must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL EZTL must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Quantity / Case	
m	ft		case	subpack
2.5	10	D	180	90
3.5	12	D	180	90
6	20	D	150	75
9	30	D	120	60
12	40	D	100	50
15	50	D	90	45
18	60	D	70	35

- Length rounded to nearest one-half meter.
- Case weight varies by length & delay; see case label for exact weight.

Case Dimensions

Detpak (D)

subpack	44 x 22 x 25 cm	17½ x 8¾ x 10 in
strapped case	44 x 45 x 25 cm	17½ x 17⅝ x 10 in

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NONEL® Starter

Technical Information

Nonelectric Shock Tube & Detonator Assembly



Product Description

NONEL STARTER is a nonelectric detonator consisting of a spooled length of yellow shock tube with a Standard (#8) detonator attached to one end and the other end sealed. The detonator is housed in a plastic bunch block which facilitates easy connection to both shock tube and detonating cord.

NONEL STARTER is designed to provide controlled, nonelectric initiation of surface and underground blast rounds.

Application Recommendations

For detailed application recommendations, **ALWAYS** request a copy of Dyno Nobel's *Product Manual: NONEL® and PRIMACORD®* from your Dyno Nobel representative.

- **ALWAYS** trim excess lengths of detonating cord from bunch block. Detonating cord tails lying across outgoing trunkline can interfere with normal function.
- **ALWAYS** use NONEL Lead Line to splice onto the NONEL Starter unit to make up a custom length nonelectric starter assembly whenever the length of NONEL STARTER unit is not sufficient to position the blaster safely.
- **ALWAYS** use the plastic connector sleeves packaged in each NONEL Lead Line case to make a reliable splice connection to NONEL STARTER unit.

Properties

MSDS #1122

Net Explosive Content per 100 units	0.0570 kg 0.1254 lbs

Hazardous Shipping Description

Detonator Assemblies nonelectric, 1.4B,
UN 0361 PG II



See Product Disclaimer on page 2.

DYNO® Dyno Nobel

Groundbreaking Performance™

NONEL® Starter

Technical Information

Application Recommendations (continued)

- **ALWAYS** hook the NONEL STARTER bunch block to the blast round after all equipment and non-essential personnel are clear of the blast area.
- **ALWAYS** unspool NONEL STARTER unit by hand if the bunch block has been attached to the blast round.
- **ALWAYS** place the bunch block so the lid is face down and cover the bunch block with drill cuttings or other inert material to help prevent shrapnel cut-off after attaching the bunch block to detonating cord or shock tube.
- **NEVER** attempt to initiate more than eight (8) NONEL shock tubes or one (1) detonating cord trunkline with the bunch block. Misfires may result.
- **NEVER** place detonating cord and shock tube in the same NONEL STARTER bunch block. Misfires may result.
- **NEVER** attach the NONEL Starter bunch block to the blast round until after the NONEL STARTER shock tube deployment is complete whenever a NONEL STARTER unit is to be unspooled by any method other than by hand.
- **NEVER** run over NONEL STARTER detonators with equipment. This may damage the shock tube and may cause a misfire. **ALWAYS** replace the NONEL STARTER if it is damaged.
- When using NONEL STARTER detonators with a detonating cord trunkline, **ALWAYS** place the detonating cord in the bunch block parallel to the detonator with the detonator pointing in the desired direction of initiation.

Transportation, Storage and Handling

- NONEL STARTER must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL STARTER must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Packaging

Length		Case Type	Spools / Case	Weight / Case	
m	ft			kg	lbs
61	200	N	8	5	10
153	500	NL	8	10	21
305	1000	NL	4	9	19

- Length rounded to nearest one-half meter.

Case Dimensions

N	27 x 27 x 25 cm	10 ¾ x 10 ¾ x 9 ¾ in
NL	43 x 43 x 18 cm	17 x 17 x 7 ¼ in

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Material Safety Data Sheet

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CANUTEC (CANADA) 613-996-6666

MSDS # 1122
Date 06/13/12

Supercedes
MSDS # 1122 12/15/11

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s):
NONEL® MS
NONEL® MS ARCTIC
NONEL® LP
NONEL® SL
NONEL® TD
NONEL® MS CONNECTOR
NONEL® TWINPLEX™
NONEL® STARTER
NONEL® EZ DET®
NONEL® EZTL™
NONEL® EZ DRIFTER ®
NONEL® SUPER

Product Class: NONEL® Non-electric Delay Detonators

Product Appearance & Odor: Aluminum cylindrical shell with varying length and diameter of attached colored plastic tubing. The detonator may be enclosed in a plastic housing, and an assembly may contain two detonators. Odorless.

DOT Hazard Shipping Description: UN0029 Detonators, non-electric 1.1B II
-or- UN0360 Detonator assemblies, non-electric 1.1B II
-or- UN0361 Detonator assemblies, non-electric 1.4B II

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

		Occupational Exposure Limits	
Ingredients	**CAS#**	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Pentaerythritol Tetranitrate (PETN)	78-11-5	None[1]	None[2]
Lead Azide	13424-46-9	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Lead	7439-92-1	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Silicon	7440-21-3	15 mg / m^3 (total dust) 5 mg / m^3 (respirable fraction)	10 mg / m^3
Selenium	7782-49-2	0.2 mg/m^3	0.2 mg/m^3
Red Lead (Lead tetroxide)	1314-41-6	0.05 mg (Pb)/m^3	0.05 mg (Pb)/m^3
Titanium dioxide	13463-67-7	15 mg/m^3	10 mg/m^3
Barium Chromate	10294-40-3	1 mg (CrO_3)/10m^3 (ceiling) 0.5 mg (Ba)/m^3	0.01 mg (Cr)/m^3 0.5 mg (Ba)/m^3
Lead Chromate	7758-97-6	0.05 mg (Pb)/m^3 1 mg (CrO_3)/10m^3 (ceiling)	0.15 mg (Pb)/m^3 0.012 mg (Cr)/m^3
Barium Sulfate	7727-43-7	0.5 mg (Ba)/m^3	10 mg/m^3
Potassium Perchlorate[3]	7778-74-7	None[1]	None[2]
Silica (crystalline)	61790-53-2	See Note Below	0.05 mg/m^3 (resp frac)

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Molybdenum	7439-98-7	None[1]	None[2]
Tungsten	7440-33-7	None[1]	5 mg/m^3 (TWA) 10 mg/m^3 (STEL)
Aluminum	7429-90-5	15 mg/m^3 (total dust) 5 mg/m^3 (respirable fraction)	5 mg/m^3
Antimony	7440-36-0	0.5 mg/m^3	0.5 mg/m^3
Cyclotetramethylene Tetranitramine (HMX)	2691-41-0	None[1]	None[2]
Diazodinitrophenol	4682035	No value established	No value established

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3 .
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3 .
Note: The OSHA PEL for crystalline silica is calculated as follows:
Quartz, respirable: 10 mg/m^3 [e] / % SiO_2 + 2 Quartz, total dust: 30 mg/m^3 / % SiO_2 + 2
[3] Not all delay periods contain perchlorate. Those that do contain between from about 4 to a maximum of about 60 mg perchlorate per detonator.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Percent Volatile by Volume: Not Applicable
Evaporation Rate (Butyl Acetate = 1): Not Applicable
Vapor Pressure: Not Applicable
Density: Not Applicable
Solubility in Water: Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable **Flammable Limits:** Not Applicable
Extinguishing Media: (See Special Fire Fighting Procedures section.)
Special Fire Fighting Procedures: Do not attempt to fight fires involving explosive materials. Evacuate all personnel to a predetermined safe, distant location. Allow fire to burn unless it can be fought remotely or with fixed extinguishing systems (sprinklers).
Unusual Fire and Explosion Hazards: Can explode or detonate under fire conditions. Burning material may produce toxic vapors.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to the explosive material under normal conditions of use. Exposure concerns are primarily with post-detonation reaction products, particularly heavy metal compounds.

Eyes: No exposure to chemical hazards anticipated with normal handling procedures. Particulates in the eye may cause irritation, redness, swelling, itching, pain and tearing.
Skin: No exposure to chemical hazards anticipated with normal handling procedures. Exposure to post-detonation reaction products may cause irritation.

Ingestion: No exposure to chemical hazards anticipated with normal handling procedures. Post-detonation reaction product residue is toxic by ingestion. Symptoms may include gastroenteritis with abdominal pain, nausea, vomiting and diarrhea. See systemic effects below.

Inhalation: Not a likely route of exposure. See systemic effects below.
Systemic or Other Effects: None anticipated with normal handling procedures. Repeated inhalation or ingestion of post-detonation reaction products may lead to systemic effects such as respiratory tract irritation, ringing of the ears, dizziness, elevated blood pressure, blurred vision and tremors. Heavy metal (lead) poisoning can occur.
Carcinogenicity: ACGIH classifies Lead as a "Suspected Human Carcinogen" and insoluble Chromium VI as "Confirmed Human Carcinogen". NTP, OSHA, and IARC consider components contained in this detonator carcinogenic.

Perchlorate: Perchlorate can potentially inhibit iodide uptake by the thyroid and result in a decrease in thyroid hormone. The National Academy of Sciences (NAS) has reviewed the toxicity of perchlorate and has concluded that even the most sensitive populations could ingest up to 0.7 microgram perchlorate per kilogram of body weight per day without adversely affecting health. The USEPA must establish a maximum contaminant level (MCL) for perchlorate in drinking water by 2007, and this study by NAS may result in a recommendation of about 20 ppb for the MCL.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Seek medical attention.
Inhalation: Not applicable.
Special Considerations: None

SECTION VI - REACTIVITY DATA

Stability: Stable under normal conditions, may explode when subjected to fire, supersonic shock or high-energy projectile impact.
Conditions to Avoid: Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock. Do not attempt to disassemble.
Materials to Avoid (Incompatibility): Corrosives (acids and bases or alkalis).
Hazardous Decomposition Products: Carbon Monoxide (CO), Nitrous Oxides (NO_x), Sulfides, Chromates, Lead (Pb), Antimony (Sb) and various oxides and complex oxides of metals.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate all personnel to a safe distant area and allow to burn or fight fire remotely. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, and product is undamaged and/or uncontaminated, repackage product in original packaging or other clean DOT approved container. Ensure that a complete account of product has been made and is verified. If loose explosive powder is spilled, such as from a broken detonator, only properly qualified and authorized personnel should be involved with handling and clean-up activities. Spilled explosive powder is extremely sensitive to initiation and may detonate. Follow applicable Federal, State, and local spill reporting requirements.

Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: None required for normal handling. Provide enhanced ventilation after use if in underground mines or other enclosed areas.

Respiratory Protection: None required for normal handling.

Protective Clothing: Cotton gloves are recommended.

Eye Protection: Safety glasses are recommended.

Other Precautions Required: None.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Only properly qualified and authorized personnel should handle and use explosives. Keep away from heat, flame, ignition sources, impact, friction, electrostatic discharge and strong shock.

Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.

Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

Material Safety Data Sheet

ECTION X - SPECIAL INFORMATION

These products contain the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	Max. lbs/1000 units
Lead	7439-92-1	39.4
	(Use Toxic Chemical Category Code)	
Lead Compounds	N420	2.0
Barium Compounds	N040	1.8
Chromium Compounds	N090	1.9

Range* of Section 313 Chemicals in each product

Product	lb Pb per 1000 detonators	lb Pb compounds per 1000 detonators	lb Ba compounds per 1000 detonators	lb Cr compounds per 1000 detonators
NONEL® MS	**0 - 27**	**0.3 – 1.5**	**0 – 0.9**	**0 – 0.9**
NONEL® LP	**0 - 30**	**0.3 – 2.0**	**0 - 1.8**	**0 - 1.9**
NONEL® SL	**7 - 27**	**0.3 – 1.5**	**0**	**0**
NONEL® TD	**0 - 18**	**0.3 – 0.7**	**0**	**0**
NONEL® MS Connector	**5 - 16**	**0.3 – 0.4**	**0**	**0**
NONEL® TWINPLEX™	**5 - 15**	**0.3 – 0.7**	**0**	**0**
NONEL® STARTER	**0**	**0.3**	**0**	**0**
NONEL® EZ DET®	**22 - 36**	**2.0**	**0**	**0**
NONEL® EZTL™	**5 - 15**	**0.5 – 0.7**	**0**	**0**
NONEL® EZ DRIFTER	**39.4**	**1.3**	**1.2**	**1.3**
NONEL® SUPER	**019**	**0.35**	**1.1**	**1.4**

*** The exact quantity and weight percent of Section 313 Chemicals in each delay period and tubing length for each product is available upon request.**

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NONEL® Lead Line

Technical Information

Nonelectric Shock Tube



Product Description

NONEL LEAD LINE is NONEL shock tube spooled at the factory in 763 meter (2,500 foot) lengths for easy application and deployment. NONEL LEAD LINE shock tube is a small diameter, three-layer plastic tube coated on the innermost wall with a reactive explosive compound. When initiated, NONEL shock tube propagates a low energy signal, similar to a dust explosion, at approximately 2000 m/sec (6,500 ft/sec) along the tube's length with minimal disturbance to the outside of the tube. The signal is transmitted from one NONEL shock tube to another through field-assembled splices.

NONEL LEAD LINE provides maximum flexibility to the blaster in choosing a position of safety from which to initiate nonelectric blast rounds in either underground or surface applications. NONEL LEAD LINE is the only NONEL product that can be cut and spliced into a NONEL detonator product to construct a custom length nonelectric starter assembly.

Application Recommendations

- **ALWAYS** splice NONEL LEAD LINE to NONEL EZTL™ nonelectric trunkline delay detonators, NONEL EZ DET® nonelectric blast initiation system, NONEL TD or NONEL Starter detonators to make-up the nonelectric starter assembly when using

Properties

MSDS #1124

Net Explosive Content per 100 units 0.0795 kg
0.1752 lbs

Length		Spools / Case
m	ft	
762	2500	2

- Length rounded to nearest one-half meter.
- See case label for exact case weight.

Hazardous Shipping Description

Articles, Explosives, N.O.S. (HMX, Aluminum), 1.4S, UN 0349, PG II



NONEL® Lead Line

Technical Information

Application Recommendations (continued)

NONEL LEAD LINE as the primary initiator for NONEL blast rounds.

- **ALWAYS** trim at least 3 m [10 ft] of tubing before inserting into a nonelectric shock tube starting device or whenever dirt and/or moisture may have compromised the open tube ends before making a splice connection.
- **ALWAYS** replace the plastic tube closure over the open end of any NONEL LEAD LINE that remains on the spool and is intended to be used to make up another nonelectric starter assembly.
- **ALWAYS** make the final hook-up of the nonelectric starter assembly to the blast round only after all equipment and non-essential personnel are clear of the blast area.
- **ALWAYS** unspool NONEL LEAD LINE by hand if the starter assembly has been spliced to it and is attached to the blast round.
- **ALWAYS** keep any NONEL LEAD LINE tube ends sealed and free from dirt and moisture since dirt or moisture in the shock tube may cause a misfire.
- **NEVER** use NONEL LEAD LINE for in-hole use. NONEL LEAD LINE is for use outside the borehole only.
- **NEVER** attempt to knot different lengths of shock tube together. Shock tube will not initiate itself through knot connections. It must be spliced.
- **NEVER** remove the plastic tube closure from the NONEL LEAD LINE shock tube until just before splicing.
- **NEVER** attach the starter assembly to the blast round until after the LEAD LINE deployment is complete whenever NONEL LEAD LINE is to be unspooled by any method other than by hand,
- **NEVER** run over NONEL LEAD LINE with equipment. This may damage the shock tube and may cause a misfire. **ALWAYS** replace the NONEL LEAD LINE if it is damaged.
- When making a nonelectric starter assembly using NONEL LEAD LINE, **ALWAYS** remove the plastic tube closure and save for later use. Splice two freshly-cut ends of NONEL shock tube together (one from the NONEL LEAD LINE and the other from the NONEL detonator) by inserting them into opposite ends of the plastic connector sleeve and pushing them toward one another until they are both at least ½ cm (¼ in) in the splice.

Application Recommendations (continued)

Transportation, Storage and Handling

- NONEL LEAD LINE must be transported, stored, handled and used in conformity with all federal, state, provincial and local laws and regulations.
- For maximum shelf life (3 years), NONEL LEAD LINE must be stored in a cool, dry, well ventilated magazine. Explosive inventory should be rotated. Avoid using new materials before the old. For recommended good practices in transporting, storing, handling and using this product, see the booklet "Prevention of Accidents in the Use of Explosive Materials" packed inside each case and the Safety Library Publications of the Institute of Makers of Explosives.

Case Dimensions

51 x 25 x 28 cm 20 x 9 ⅞ x 10 ⅞ in

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MSDS # 1124
Date 09/16/10

Supercedes
MSDS # 1124 08/13/08

SECTION I - PRODUCT IDENTIFICATION

Trade Name(s): NONEL® LEAD LINE

Product Class: Shock Tube

Product Appearance & Odor: Hollow plastic tubing (normally yellow) with dusty inner coating of HMX and aluminum. No detectable odor.

DOT Hazard Shipping Description: **UN0349** Articles, explosive, n.o.s. (HMX) 1.4S II.
For 10,000 ft spools with Wire Lock Terminations only: Not regulated as an explosive, 0000

NFPA Hazard Classification: Not Applicable (See Section IV - Special Fire Fighting Procedures)

SECTION II - HAZARDOUS INGREDIENTS

			Occupational Exposure Limits	
Ingredients:	**CAS#**	**% (Range)**	**OSHA PEL-TWA**	**ACGIH TLV-TWA**
Cyclotetramethylene Tetranitramine (HMX)	2691-41-0	0.35	None[1]	None[2]
Aluminum (dust)	7429-90-5	0.04	15 mg/m^3 (total) 5 mg/m^3 (respirable)	10 mg/m^3

[1] Use limit for particulates not otherwise regulated (PNOR): Total dust, 15 mg/m^3 ; respirable fraction, 5 mg/m^3.
[2] Use limit for particulates not otherwise classified (PNOC): Inhalable particulate, 10 mg/m^3 ; respirable part., 3 mg/m^3.
Note: The above hazardous dust mixture is present at approximately 15 mg per meter of tubing.

Ingredients, other than those mentioned above, as used in this product are not hazardous as defined under current Department of Labor regulations, or are present in deminimus concentrations (less than 0.1% for carcinogens, less than 1.0% for other hazardous materials).

SECTION III - PHYSICAL DATA

Boiling Point: Not Applicable
Vapor Density: Not Applicable
Melting Point: HMX decomposes violently at melting pt., about 278°C
Evaporation Rate (Butyl Acetate = 1): Not Applicable
Vapor Pressure: Not Applicable
Density: Not Applicable
Solubility in Water: Not Soluble
Percent Volatile by Volume: Not Applicable

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point: Not Applicable
Flammable Limits: Not Applicable
Extinguishing Media: Water, inert powder, CO_2
Special Fire Fighting Procedures: For shock tube only, consider initial isolation of at least 15 meters (50 feet) in all directions. Fight fire with normal precautions and methods used for plastic fires from a reasonable distance. IF DETONATORS OR OTHER EXPLOSIVES ARE PRESENT, DO NOT FIGHT FIRE.
Unusual Fire and Explosion Hazards: May burn vigorously with localized detonations and projection of fragments, with effects usually confined to the immediate vicinity of packages. Toxic smoke from combustion of the plastic material may be emitted. If product functions, high heat and pressure are released from the end of the tube if not covered or enclosed, typically by a metal device.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

This is a packaged product that will not result in exposure to hazardous ingredients (inner coating materials) under normal conditions of use.
Eyes: Not a likely route of exposure. Dust particles may be irritating.
Skin: Not a likely route of exposure. Dust particles may cause skin irritation.
Ingestion: Not a likely route of exposure. Ingestion of large amounts of the reactive powder (HMX) is poisonous and may cause cardiovascular collapse.
Inhalation: Not a likely route of exposure. Breathing dust can cause respiratory irritation. During manufacture and at processing temperatures, irritating fumes may evolve.
Systemic or Other Effects: None known.
Carcinogenicity: No constituents are listed by NTP, IARC or OSHA.

Emergency and First Aid Procedures

Eyes: Irrigate with running water for at least fifteen minutes. If irritation persists, seek medical attention.
Skin: Wash with soap and water.
Ingestion: Not Applicable
Inhalation: Not Applicable
Special Considerations: None.

SECTION VI - REACTIVITY DATA

Stability: Stable
Conditions to Avoid: Keep away from heat, flame, impact, friction, ignition sources and strong shocks. Also avoid stretching to failure.
Materials to Avoid (Incompatibility): Incompatible with strong oxidizers and acids.
Hazardous Decomposition or Combustion Products: Hazardous carbon monoxide (CO), nitrogen oxide (NO_X) gases and products of plastic decomposition produced.
Hazardous Polymerization: Will not occur.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be taken in Case Material is Released or Spilled: Protect from all ignition sources. In case of fire evacuate area not less than 50 feet in all directions. Notify authorities in accordance with emergency response procedures. Only personnel trained in emergency response should respond. If no fire danger is present, repackage undamaged devices in original packaging, accounting for every device. If the ends or tube wall have been opened such that powder may have

been released from the tube, isolate the spill area. Contamination of the HMX/Aluminum powder with sand, grit or dirt will render the material more sensitive to detonation. Carefully wet down and clean "loose" powder spills using a damp sponge or rag, avoid applying friction or pressure to the explosive, and place in a (Velostat) electrically conductive bag. Follow applicable Federal, State, and local spill reporting requirements.
Waste Disposal Method: Disposal must comply with Federal, State and local regulations. If product becomes a waste, it is potentially regulated as a hazardous waste as defined under the Resource Conservation and Recovery Act (RCRA) 40 CFR, part 261. Review disposal requirements with a person knowledgeable with applicable environmental law (RCRA) before disposing of any explosive material.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation: None normally required. Provide enhanced ventilation if used in underground mines, indoors or other enclosed areas.
Respiratory Protection: None normally required. Extended testing of the product indoors or in enclosed areas may necessitate respiratory protection.
Protective Clothing: None normally required. Wear chemical-resistant gloves during post-detonation cleanup or spill cleanup operations.
Eye Protection: Safety glasses or goggles are recommended for handling, testing or cleanup.
Other Precautions Required: None

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in handling and storage: Store in cool, dry, well-ventilated location. Store in compliance with Federal, State, and local regulations. Keep away from heat, flame, ignition sources and strong shock. Only properly qualified and authorized personnel should handle and use Shock Tube.
Precautions to be taken during use: Use accepted safe industry practices when using explosive materials. Unintended detonation of explosives or explosive devices can cause serious injury or death. Avoid breathing the fumes or gases from detonation of explosives. Detonation in confined or unventilated areas may result in exposure to hazardous fumes or oxygen deficiency.
Other Precautions: It is recommended that users of explosive materials be familiar with the Institute of Makers of Explosives Safety Library Publications.

SECTION X - SPECIAL INFORMATION

This product contains the following substances that are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

Chemical Name	CAS Number	% By Weight
None		

Disclaimer

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Operational Forms

ACQUISITION RECORD

DATE	NAME OF MANUFACTURER OR BRAND	DATE CODE MARKS OR I.D.	QUANTITY	DESCRIPTION	DEALER ADDRESS LICENSE NO.

DISPOSITION RECORD

DATE	NAME OF MANUFACTURER OR BRAND	DATE CODE MARKS OR I.D.	QUANTITY	DESCRIPTION	DEALER ADDRESS LICENSE NO.

CDB MAGAZINE INVENTORY		Magazine #:				
Project:						
PRODUCT	DATE CODE	IN	OUT	BALANCE	DATE	NAME

BLAST REPORT

Project : _____

Blast No. _____ **Date** _____
Type _____ **Day of Wk** _____
Location _____ **Weather** _____
Time of Blast _____ **Temp.** _____
No. of Holes _____
Hole Diameter _____
Depth _____
Spacing _____
Burden _____
Max Lbs/Hole _____
Max Lbs/Delay _____
Max Holes/Delay _____
Total Delays _____
Total Pounds _____
Powder Factor _____

Explosives Used

Product	Size	# of sticks	total pounds

Detonators Used

Type	Length	# used

yes **no**
Diagram Attached

Blast Monitoring Results

	Station 1	Station 2
Location		
Instrument S.N.		
Calibration Date		
Distance from Shot (ft)		
Peak Overpressure (psi)		
Peak Air Blast (dB)		
PVS (ips)		
PPV - Transverse (ips)		
PPV - Vertical (ips)		
PPV - Longitudinal (ips)		
Max. PPV		

NOTES: _____

_____
Blaster Date

BLAST LOCATION SKETCH

DAILY MONITORING REPORT

Contractor: _____ Contract #: _____

Project: _____ File #: _____

Location: _____ Location #: _____

_____ Sheet _____ of _____

Address:

Date	Time	Eqpt. S/N	Blast Number	dB	PPV	PSI	Remarks

Technician _____ Date: _____

Engineer _____ Date: _____

MONITORING EQUIPMENT LOCATION

Contractor: _____ Contract No: _____

Project: _____ Pier #: _____

Location: _____ Sheet _____ of _____

Date Placed		RASS Box #		File No.	
Date Removed		Equipment S/N		Roll No.	
Address		Station No.		Negative No.	

Equipment Location Sketch

Technician: _____ Date: _____

DRILLING & BLASTING

SAFETY PLAN

TABLE OF CONTENTS

PAGE NO.

1. INTRODUCTION 3

2. DRUGS & ALCOHOL 3

3. BLASTER IN CHARGE 4

4. HAZARD AND RISK ASSESSMENT 4

5. EXPLOSIVE STORAGE 5

6. ON-SITE EXPLOSIVE TRANSPORTATION 6

7. BLAST DESIGN 6

8. BLAST PLANNING 8

9. DRILLING and BLASTING SAFETY 8

10. INITIATION SYSTEM HOOKUP PROCEDURES 12

11. BLAST AREA CLEARING AND SECURITY PROCEDURES 12

12. MISFIRE PROCEDURES 14

13. BLAST EMERGENCY PLAN 14

TABLE OF CONTENTS

PAGE NO.

14. BLAST REPORTS.....15

15. EMPLOYEE ACKNOWLEDGEMENT…… 16

1. INTRODUCTION

Contract Drilling & Blasting LLC (CDB) is committed to providing a safe workplace for its employees and all others at or near our work sites. Our goal is to conduct blasting operations in the safest manner possible while minimizing the risk of injuries and damage to property. This blasting safety plan defines our company policy regarding all work in which explosives are stored, transported, and used. This safety policy will be communicated to our employees, contractors, and suppliers through on-site training and regular safety meetings. These policies do not supersede any federal, state, or local regulations regarding explosives and blasting work. Compliance with these policies and all applicable federal, state, and local regulations will be strictly enforced.

All employees are responsible to perform their work in a safe manner and will immediately report all accidents and/or near misses to their supervisor / safety representative.

Many policy guidelines refer to the "blast site." For the purposes of this safety plan, and federal regulations, the blast site is defined as:

"The area where explosive material is handled during loading including an area extending 50 feet in all directions from loaded blast holes or explosive materials."

2. DRUGS & ALCOHOL

All potential employees will be subject to a drug screening prior to employment. Those failing the drug screening (1 or more positive results) will be refused employment. During the course of employment with CDB all employees are subject to random drug / alcohol screening. Any employee found to be under the influence of drugs or alcohol on the job or while operating a company vehicle will be terminated. All persons involved in a job related accident will be screened for drugs and alcohol, positive results will result in termination. Any employee suspecting another employee of being under the influence of drugs or alcohol while on the job or operating a company vehicle shall report the individual to a supervisor / safety representative.

3. BLASTER IN CHARGE

The designated Blaster-in-charge shall have complete authority over all personnel within the blast site and is responsible for all blasting activities that occur at the project. The blaster-in-charge shall hold all required blasting licenses, have appropriate experience and training, and generally be responsible for:

3.1. Maintaining an explosives storage and transportation system that is safe and in compliance with all applicable regulations.

3.2. Implementing the specific blast plans that have been approved for the project.

3.3. Overseeing that all drilling and blasting work is done in a safe and efficient manner.

3.4. Inspecting field equipment to ensure its safety readiness.

3.5. Blast clearing and guarding operations.

3.6. Continuously monitoring the work habits of the blasting crew, and providing corrective actions when necessary.

3.7. Ensuring that all appropriate blasting plans, reports, and explosive storage records are kept and submitted as required by the project documents and regulatory agencies.

3.8. Ensure that all site first-aid kits are at full supply and all employees know the location of the first-aid kits.

4. HAZARD AND RISK ASSESSMENT

The general and site specific blasting hazards and environmental impacts will be defined for each blasting site. Blasting plans and procedures will incorporate all reasonable measures necessary to eliminate negative impacts on persons and minimize negative impacts on property and the environment. The following general hazard areas shall be reviewed to help identify potential site-specific hazards and controls for each blast site.

4.1. Define public and commercial access, and traffic volumes.

4.2. Determine the relative location and condition of nearby structures.

4.3. Determine vibration and air overpressure limits (or peak water pressure limits—if blast is under water).

4.4. Determine public and regulatory notification requirements.

4.5. Know the location and condition of all nearby utilities that are above and below the ground or water surface.

4.6. Define who is responsible for any damage, or claims of damage, to any nearby property.

4.7. Study the local area blasting history with respect to incidents, damage claims, or litigation.

4.8. Determine specific environmental impacts that might require special blasting control measures.

4.9. Define hazardous material notification requirements for employees, and develop a program to implement it.

4.10. Stray current tests will be performed at blast sites before any electric detonators are used.

If extraneous electricity causes current flow exceeding 0.05 amperes at a blast site, Electric detonators must not be used!

5. EXPLOSIVE STORAGE

If temporary explosive storage magazines are used on or near the site, the blaster-in-charge will ensure that full compliance with federal, state, and local regulations governing explosive storage is maintained.

5.1. The blaster-in-charge will thoroughly review and understand all regulations enforced by Federal Bureau of Alcohol, Tobacco, Firearms and Explosives (ATF) regulations, as described in the Organized Control Act of 1970, Title XI – Regulation of Explosives – Public Law 91-492 as amended by the SAFE EXPLOSIVES ACT on November 25, 2003 with regard to:

5.1.1. Magazine construction requirements

5.1.2. Locking requirements

5.1.3. Inventory record keeping requirements

5.1.4. Explosive loss reporting requirements. Immediately report by calling**:** **1-888-ATF-BOMB** and the local authorities.

5.1.5. Table of distance requirements

5.2. Required magazine permits will be obtained as required by local or state authorities.

5.3. Emergency action plans will be submitted to local emergency response agencies.

6. ON-SITE EXPLOSIVE TRANSPORTATION

The blaster-in-charge will ensure that:

All vehicles hauling explosives will be properly loaded and display adequate explosives warning signs as specified by either OSHA, MSHA, DOT—whichever is applicable.

6.1. All vehicles will have appropriate safety equipment, as required by state and federal regulations.

6.2. Passengers shall not accompany explosives.

6.3. Equipment or other materials must never share the same cargo space with explosives.

6.4. Explosive vehicles, safety equipment, and day boxes shall be regularly inspected, maintained and cleaned.

6.5. All explosives, and any traces of explosives, must be removed from transportation equipment before it is serviced.

6.6. Explosives day boxes shall be properly built and marked as required by OSHA regulations.

6.7. When detonators and explosives are transported in a day box, they shall be separated by a four-inch hardwood, or equivalent, partition.

6.8. Only vehicles authorized by the Blaster-in-Charge shall be allowed on the blast site.

6.9. Proper shipping papers shall accompany explosives when they are delivered to and from the job site.

6.10. Explosive transportation must be undertaken under the supervision of a person who is familiar with the hazards involved, and the actions required in the event of fire or other abnormal occurrence.

7. BLAST DESIGN

In many blast applications, it is often impossible to fully satisfy all of the design objectives. Therefore, some sort of trade-off analysis is needed to balance design sacrifices based on priority. In blast design work, there are usually two general types of goals: 1) safety goals and 2) operational goals. Whenever safety goals conflict with operational goals, the safety concerns

shall have the highest priority. For instance, producing minus 12-inch rock might be an operational objective while controlling flyrock is a safety goal. Since the safety goals must have the highest priority, the blast plan might specify the use of conservative amount of stemming to control rock movement, thus sacrificing rock fragmentation in the collar area. The following guidelines shall be used to evaluate all blast design choices:

7.1 General Blast Design Considerations:

7.1.1 Blast designs shall never compromise safety, and safety goals shall have the highest design priority.

7.1.2 While satisfying all primary design objectives, blast designs shall be as simple as possible.

7.1.3 The blast designer(s) must have thorough knowledge and understanding of the blast requirements and constraints for each individual application. If the lead blaster is unfamiliar with a particular application, design, or product, outside help shall be obtained from a consultant or explosive-supplier representative who is familiar with the application or product.

7.1.4 Blast design geometry shall be appropriate for the application. The geology of the blast site and area control requirements must be considered when selecting hole size, explosive diameter, stemming height, and all other design dimensions.

7.2 Initiation System Guidelines:

7.2.1 Initiation systems must provide adequate protection against stray current hazards.

7.2.2 Delay timing schemes shall be as simple as possible, while providing adequate burden relief and sufficiently advanced in-hole energization to prevent surface cut-off failures.

8. BLAST PLANNING

Good advance planning and preparation work will improve blasting productivity and safety. Blast planners shall:

8.1. Determine the number, skill and experience requirements of drillers, blasters, and helpers required to perform the work.

8.2. Prepare a blasting work schedule that allows for unforeseen problems or delays.

8.3. Develop plans for dealing with special environmental conditions might occur during this work. Examples are lightning, floods, cold or hot weather, etc.

8.4. Define and obtain any special equipment that may be needed for the blasting work.

8.5. Plan to have back-up units to replace critical instruments like blasting machines and non-electric initiating devices.

8.6. The functionality of all critical instruments like blasting machines, testers, and seismographs shall be tested the day before each scheduled blast.

8.7. Spare batteries and other essential parts for blasting instruments shall be kept at the job site.

8.8. Evaluate local services and carefully screen potential product and service providers.

8.9. Investigate explosive storage and delivery options. If it is necessary to establish a temporary magazine site, allow several months of time to negotiate leases and for permitting.

9. DRILLING and BLASTING SAFETY

Use of the following personal protective equipment is mandatory:

Protective Head gear – hard hat

Protective Footwear – steel/molded toed boots

Protective eye wear -- safety glasses

The following protective equipment may be used, and under certain conditions, supervisors may require their use.

Gloves

Ear Protection – plugs or muffs

Protective clothing

Respirators

Personal Floatation Devices

Fall Protection

9.1 Drilling

9.1.1 All drillers must have adequate experience and operating knowledge about each drill before operating it.

9.1.2 Drillers shall perform safety inspections and on all drills before they are operated. Any conditions that might cause unsafe operation shall be corrected before drill is put into service.

9.1.3 Drills must be routinely serviced and lubricated as specified by the manufacturer.

9.1.4 All safety equipment, like hose release guards, must be properly installed.

9.1.5 Drillers shall monitor bit wear and penetration rates, and they shall vary feed pressure, hammer rates, and other operating variables to achieve maximum bit life.

9.1.6 The blaster-in-charge shall establish a system for marking hole collar locations. Drillers shall collar holes as close as possible to the designed collar location and they shall carefully align the drill boom to guide the drill stem along the intended hole path.

9.1.7 The driller's primary goal is to drill properly aligned and clean holes. Driller should vary hole-flushing rates and determine which drill settings are producing the cleanest and most accurately placed holes.

9.1.8 Holes shall never be drilled in any positions where there is any chance they might intersect another live hole. Unless a specific variance is granted, the minimum collar distance from a loaded hole must 50 feet or 2 x the hole depth, whichever is greatest.

9.1.9 For surface blasting, drillers shall note any unusual conditions or adjustments to the original plan. Drill log information shall be submitted to the blaster-in-charge at the end of each drilling shift.

9.2 Loading Shots

9.2.1 Safety Review Meetings:

The blaster-in-charge shall assemble all blast crew personnel to conduct a safety review meeting before explosive loading work begins. The following issues shall be addressed at each safety review meeting.

- Identify the blaster-in-charge
- Review personal safety responsibilities
- Review site specific hazards
- Review loading plans and procedures
- Assign work responsibilities
- Review equipment requirements and safe operation procedures
- Review emergency and site security procedures
- Review requirement that open flames or sparks must not occur on the blast site, and that smoking is absolutely prohibited.
- Confirm that the crew has the proper tools to safely perform loading and site security tasks. Equipment not specifically approved for blasting work shall not be used. Check the following (tool requirements will vary):
    - Non-sparking loading poles, powder punches, knives, etc.
    - Blasting machines or non-electric starters
    - Testing equipment; blasters galvanometers/multimeters
    - Measuring tapes with non-sparking weights

- Warning sirens
- Radios, blasting area warning signs, traffic vests, first aid kit, and drinking water

9.2.2 Blast Site Inspection:

The blaster-in-charge and loading crew shall inspect the blast site before loading begins. Hazards or conditions that might expose explosives to excessive pressure, heat, or friction shall be corrected prior to loading. If the inspection reveals that blast hole re-drilling is required, the re-drilling shall be done before loading commences.

9.2.3 All needed explosives, stemming material and other supplies shall be brought to the blast site before commencing hole-charging operations. All mobile equipment, not expressly used and approved for hole-charging charging operations shall always be kept a safe distance away from blast holes once loading begins.

9.2.4 All equipment and all non-essential equipment and people shall be removed from blast sites once loading operations begin.

9.2.5 Blast holes will be inspected before holes are loaded.

9.2.6 Primers shall be prepared just before they are loaded.

9.2.7 When column separation is suspected, a second primer using the same delay detonator as the first primer shall be loaded into the separated portion of the column.

9.2.8 If damage to an initiator lead is suspected, the hole shall be re-primed with a similar primer.

9.2.9 When it is necessary to operate mobile equipment on the blast site, the blaster-in-charge shall closely monitor every movement and setup. Extreme care must be taken to ensure that detonators, initiator leads, and explosives are not run over, snagged, or otherwise damaged by mobile equipment. No non-essential vehicles shall be allowed on the blast site.

9.2.10 No sparking materials or loose rocks shall be allowed to enter blast holes after they contain explosives.

9.2.11 Crewmembers shall immediately report any dangerous conditions, such as overloaded holes, to the blaster-in-charge who shall develop measures to safely control the condition.

9.2.12 Records detailing the quantities of explosives brought to the site and used each day shall be accurately kept.

10 INITIATION SYSTEM HOOK-UP PROCEDURES

10.1 Blasting machines and non-electric starters must be stored away from the blast area while blasts are loaded and tied in.

10.2 Only persons designated by the blaster-in-charge shall participate in blast hookups. All other persons shall vacate the blast site.

10.3 Blast crews shall only use connections and hookups that are approved by the product manufacturer.

10.4 Blast hookup shall not begin until all holes have been loaded and stemmed, the blast site is clear of all vehicles and unnecessary people, and no hazards that might delay the blast exist in the blasting security zone.

10.5 The blaster-in-charge, and one other crewmember, shall independently inspect and double-check all hookups.

10.6 To prevent hook-up mistakes caused by rushing to meet a blasting time limit; blasting work schedules shall allow adequate time for careful blast hook-up work.

10.7 When blast hookups are completed more than one half hour before blast time, the hookup shall be inspected again just prior to detonation.

11 BLAST AREA CLEARING AND SECURITY PROCEDURES

11.1 Pre-blast Review Meeting:

Before blasting, the blaster-in-charge shall assemble all blast crew personnel to review the blast area security plan and blast emergency plan. The blaster-in-charge shall cover the following issues and responsibilities at each pre-blast meeting.

11.1.2 Acknowledge the shot is properly loaded, hooked up, secured, and ready for detonation.

11.1.3 Review the blasting firing time schedule.

11.1.4 Review tagout procedures that will ensure no persons are underground when the blast occurs.

11.1.5 The blaster-in-charge shall specify who shall fire the shot and define the safe shot initiation location.

11.1.6 Review the communication system that shall be used between the blaster-in-charge and all blast area security personnel.

11.1.7 Specify what signals shall be used to announce:

- Preblast Warnings
- Blast Time
- All Clear
- Blast Countdown Suspension

11.1.8 Outline general emergency plans that shall be used in the event of an accident or other unplanned event.

11.1.9 Review procedures for handling misfires.

11.2 Clearing And Guarding Procedures: Blaster-in-Charge's responsibility.

11.2.1 The Blaster-In-Charge shall coordinate blasts, with all concerned parties, on an approved blasting schedule.

11.2.2 A tagout procedure will be used to ensure no persons are underground when blasts occur. A safe area around the shaft collar or tunnel portal will be established, cleared and secured.

11.2.3 When the area is secure, a primary initiating device shall be connected to the shot approximately five minutes before the scheduled blasting time.

11.2.4 The blaster-in-charge shall then have the five-minute blast warning signal given to warn all in the area that a blast is impending.

11.2.5 Four minutes later, the one minute blast warning signal shall be given if all persons, including the shot-initiator, are in a safe location and all guards confirm that the blast area is still secure.

11.2.6 At blast time, if the blast area is secure, the blaster-in-charge shall fire or instruct the designated shot firer to fire the blast.

11.2.7 After post blast fumes have dissipated to safe levels – as verified by testing -- the blaster-in-charge shall inspect the shot area. This examination shall look for:

- Dangerous rock conditions
- The presence of undetonated explosives and/or initiators
- Abnormal blast conditions and any other hazards

11.2.8 If misfires or other hazards are present, the blaster-in-charge shall supervise the removal of the hazard by the most appropriate means available.

11.2.9 When the area is clear of hazards the blaster-in-charge shall give the all clear signal allowing work to resume in the area.

12 MISFIRE PROCEDURES

When blasting misfires occur, or are suspected, their existence and extent must be carefully established under the direction of the blaster-in-charge. Under these circumstances, the blaster-in-charge shall:

12.1 Ensure that no one enters the blast area, and it remains secured, for at least 30 minutes.

12.2 Develop a plan involving minimum people to safely re-fire, wash out, or recover un-shot explosives, before any other normal work resumes near the blast site.

12.3 Record the location of any potentially un-detonated explosives on the blast report.

12.4 Expand the blast security area if flyrock potential is increased when misfires are re-blasted.

13 BLAST EMERGENCY PLAN

The elements of specific blast emergency plans shall vary based on the unique conditions that exist at each job site. Emergency plans shall:

13.1 Include a posted list of all emergency response telephone numbers including; ambulance, hospital, OSHA or MSHA district office, police, state regulatory authorities, and home phone numbers of all site employees.

13.2 Be clearly communicated to and understood by all site workers and supervisors.

13.3 Define notification procedures for contacting supervisors, family, and regulatory agencies based on the nature of an incident or accident.

13.4 For each work site, the location of first aid kits and the identity of trained first aid providers shall be known by all workers at the site.

14 BLAST REPORTS

Individual blast reports shall be prepared for each blast. Blast reports shall include the following:

14.1 Blast date, time, and location.

14.2 Blast geometry, including, but not limited to, hole size(s), hole depths, drill pattern, number of holes, bench height, and sub-drilling.

14.3 Blast hole loading summaries, including typical hole loads, explosive types, primers, detonator delays, stemming type and quantity, and total explosive consumption by product.

14.4 Shot volume and powder factor calculations.

14.5 Initiation timing scheme, including in-hole delays, surface delays, and planned hole firing times.

14.6 Blast effect monitoring data (if applicable), such as ground vibration levels, air overpressure, and peak water pressures [IF APPLICABLE].

14.7 Notes about blast results, unusual conditions, occurrences, or special precautions.

14.8 Name and signature of the blaster-in-charge.

EMPLOYEE ACKNOWLEDGEMENT

I, _____, (employee) have read and understand the Blasting Operations Safety Plan for Contract Drilling & Blasting LLC. I also acknowledge that failure to comply with the policies outlined in the Plan or to endanger the safety and well being of other employees, workers or public through my actions will result in the following disciplinary actions;

Minor Offenses (non-injury causing, non life threatening)

	Action
First Offense	Written Warning
Second Offense	3 day suspension from work with no pay
Third Offense	Immediate Termination

Major Offenses (injury causing, life threatening, drug/alcohol use)

	Action
First Offense	Immediate Termination

EMPLOYEE SIGNATURE _____.

DATE _____.

Imperiled Species and Marine Mammal Watch Plan

This Imperiled Species and Marine Mammal Watch Plan (IS/MMWP), a part of the overall Blast and Watch Plan (BWP), has been developed by Land & Sea Group, Inc. (LSG) for American Bridge Company. Its intent is to meet the permit requirements for the blasting demolition of the old bridge piers of SR 679 (Pinellas Bayway Structure E) over Boca Ciega Bay South (Run 24) a part of Tampa Bay in Pinellas County, Florida.

Watch Team Information

LSG has assembled a Watch Team that is highly experienced in providing IS/MMWP for bridge demolitions in the State of Florida. The following are the qualifications of the team, resumes may be found in Attachment A.

Team Leaders

Janice Sands Ash, P.E.
Primary Coordinator
Experienced Marine Mammal Observer (MMO), President, The Land & Sea Group, Inc, BS Civil Engineering, MS Civil Engineering

Tom Ash
Primary Observer (Aerial – in helicopter)
Experienced aerial observer, General Manager, Environmental Protection Commission of Hillsborough County (EPC), BS Marine Biology

Observers

Jorden Mericle
Experienced Marine Mammal Observer (MMO)

Kristina Haselier
Experienced MMO

Tony Corbett
Experienced MMO/ Photographer

Kevin Shelton
Experienced Aerial Observer

Britt'ne K. Mericle
MMO Trainee

Qualifications and Contact Information

The following is a summary of the pertinent Blast experience (shown in purple) for each team member and other recent Imperiled Species and Marine Mammal Observation experience. Detailed resumes that show additional MMO experience are included in Attachment A.

Observer Name	Role	Blast Project Name	Date	Client
Tom Ash	Primary Aerial Observer	Bayway Bridge Structure C Demolition	6/13/2013	Orion Contractors
813-927-3812	Primary Aerial Observer	US-19 Bridge Demolition over Cross FL Barge Canal	7/20/2010	Cone & Graham, Inc.
	Primary Aerial Observer	Belleair Bridge Demolition	7/15/2009	Misener Marine Construction
	Primary Aerial Observer	John's Pass Bridge Demolition	12/16/2008	Flatiron Constructors
	Primary Aerial Observer	Treasure Island Causeway Bridge Demolition	3/1/2006	Johnson Bros. Corp
Janice Sands Ash, PE	Experienced MMO/ coordinator	Captiva Island 5.7 mi Subaqueous Cable Project	6/1/2018	Lee Co Electric Coop
813-927-0617	Experienced MMO-Coordinator	Bayway Bridge Structure C Demolition	6/13/2013	Orion Contractors
	Experienced MMO	US-19 Bridge over Cross FL Barge Canal	7/20/2010	Cone & Graham, Inc.
	Experienced MMO	Belleair Bridge Demolition	7/15/2009	Misener Marine Construction
	Experienced MMO-Coordinator	John's Pass Bridge Demolition	12/16/2008	Flatiron Constructors
	Experienced MMO-Coordinator	Treasure Island Causeway Bridge Demolition	3/1/2006	Johnson Bros. Corp
Judy Mericle	Experienced MMO	Jacksonville Harbor Deepening Project	10/1/2019	Great Lakes Dredge Company
813-394-1688	Experienced MMO	Canaveral Harbor Deepening Project	6/1/2019	Norfolk Dredge Company
	Experienced MMO	Captiva Island 5.7 mi Subaqueous Cable Project	6/1/2018	Lee Co Electric Coop
	Experienced MMO	Bayway Bridge Structure C Demolition	6/13/2013	Orion Contractors
	Experienced MMO	US-19 Bridge over Cross FL Barge Canal Demolition	7/20/2010	Cone & Graham, Inc.
Kristina Hasselier	Experienced MMO	Jacksonville Harbor Deepening Project	10/1/2019	Great Lakes Dredge Company
863-899-3979	Experienced MMO	Canaveral Harbor Deepening Project	6/1/2019	Norfolk Dredge Company
	Experienced MMO	Captiva Island 5.7 mi Subaqueous Cable Project	6/1/2018	Lee Co Electric Coop
	Experienced MMO	Chevron Pascagoula Oil Project	7/22/2011	Weeks Marine
Anthony Corbett	Experienced MMO- Photographer	Bayway Bridge Structure C Demolition	6/13/2013	Orion Contractors
813-291-1592	Experienced MMO-	US-19 Bridge over Cross FL Barge Canal	7/20/2010	Cone & Graham, Inc.
	MMO Trainee	John's Pass Bridge Demolition	12/16/2008	Flatiron Constructors
	MMO Trainee	Treasure Island Causeway Bridge Demolition	3/1/2006	Johnson Bros. Corp
Kevin Shelton	Experienced aerial observer	Bayway Bridge Structure C Demolition	6/13/2013	Orion Contractors
863-272-4879	Experienced MMO - Coordinator	US-19 Bridge over Cross FL Barge Canal	7/20/2010	Cone & Graham, Inc.
	Experienced MMO - Coordinator	Belleair Bridge Demolition	7/15/2009	Misener Marine Construction
	Experienced MMO	John's Pass Bridge Demolition	12/16/2008	Flatiron Constructors
	Bridge Blast Demolition projects			
MMO	Marine Mammal Observer			

Watch Program

Prior to Event

American Bridge will place red and yellow buoys east and west of the bridge demarcating the exclusion zone as shown on Figure 1. The safety radius based on calculations defined in the Blast Design is a 1863-foot exclusion zone and a 300 foot buffer zone.

Land & Sea Group, Inc. (LSG) will coordinate with American Bridge to organize one (1) formal watch coordination meeting to be held at least two days prior to the blast event. Attendees will receive written notification from LSG as to when and where the meeting will take place. Teleconferencing or Zoom Conference will be utilized for this meeting where applicable. Attendees will include the observers, construction contractors, demolition subcontractors, and other interested parties (i.e. USCG, NOAA, FWC and USFWS).

The Primary Coordinator will host the meeting and inform all attendees about the possible presence of manatees, dolphins, marine turtles, sturgeon, small-tooth sawfish, giant manta ray or whales in the blasting area. It will be made clear that civil and/or criminal penalties can result from harassment, injury, and/or death of an endangered species.

Day of Event

LSG will provide a team of at least five (5) observers, including one aerial observer, for the watch program. One observer (Tom Ash) will be designated as "Primary Observer" and will be stationed in a helicopter above the area. The Primary Coordinator (Janice Ash) will be stationed on the top of the new bridge. Additional observers will be positioned on the bridge at the best vantage points, one facing east and one facing west on the new bridge. Two observers will be positioned on boats, one roaming boat and one stationed in the northwest quadrant of the safety perimeter amongst the adjacent islands. All observers will have contact with the Primary Coordinator by 2-way radio. Primary Coordinator and Boat Observers will have direct contact with the aerial observer by 2-way radio. Please see Figure 1 for Exclusion Zone diagram and observer positions.

The watch program shall begin at least one hour prior to the scheduled start of the blasting to identify the possible presence of manatees, dolphins, marine turtles, sturgeons, small-tooth sawfish, giant manta ray or whales (herein referred to as animals) located in the near shore area. All observers will be on-location at the watch start time and annotate time they are on station in their Observation Log.

The aerial observer will do a pre-event surveillance sweep one hour prior to the blast. This sweep will cover 1 mile beyond the safety perimeter (i.e., the exclusion zone plus 300 feet) to identify any animals approaching the exclusion zone. This sweep will be repeated 30 minutes prior to the blast if animals are found to be moving toward the safety perimeter. If no animals are present, the aerial observer will restrict his observation to the safety perimeter. If animals are detected within, or approaching the exclusion zone, the aerial observer and one boat observer will mobilize to the location of the animal. The observers will track the animal as they transit through; and have safely exited the exclusion zone. No blasting will occur if an animal is present in the safety zone. All animals must be clear of the safety perimeter for a period of 30 minutes prior to detonation.

All protected species will be tracked, and no blasting will occur until all observed animals are clear of the blast zone and safety perimeter. The size of this zone will be determined in accordance with the State accepted calculations based on charge size. Should an animal be last observed within the safety perimeter, no blasting will occur until the animal is observed outside of the area or not observed for 30 minutes.

The aerial observer will provide an "Start 30-minute countdown" to the team when all animals have exited the area. If an animal enters the safety perimeter, the aerial observer will order "Countdown halted". The countdown will start over after the animal has safely exited the safety perimeter. If no animals are sited within the exclusion zone for a period of 30 minute, the aerial observer will issue an "All Clear" to the team, and the detonation may commence.

The watch program shall continue until at least one-half hour after detonation(s) is complete. The observers will be in close communication via two-way radio or cellular phone with each other, American Bridge, and the blasting sub-contractor (the blaster). All observers will be always equipped with the following items.

- Working two-way radio
- Cell phone,
- Polarized sunglasses,
- Safety Work Vest
- Binoculars,
- Red flag for backup communication, and

- Sighting log with a map to record sightings (See Attachment B)

If for any reason the helicopter is delayed (mechanically, logistically or weather- related) or must leave the site for refueling, a boat observer will be deployed to perform observation in the areas covered by the helicopter. Coordination with the Primary coordinator and blaster will occur 15 minutes prior to departure so boat observer will be deployed to provide the coverage. If available, a drone may be deployed until the helicopter arrives on-site.

During the watch program all blasting events will be weather dependent. The team of observers will determine if climatic conditions are suitable for optimal viewing conditions. An "all clear" signal must be obtained from the aerial observer before detonation can occur.

Primary Coordinator and Aerial Observer will be in contact via 2-way radio with the Blaster. Radio Checks will be taken at the top of each hour.

All observers will remain at station until 30 minutes after the final detonation. During at such time the observers will continue to survey their designated area and document any animals potentially impacted or show behavioral changes as a result of the blast.

Thirty minutes post blast, the Primary Coordinator will declare "stand-down". A post-mortem meeting onsite will be performed to gather all log sheets, equipment and debrief on the event.

Post-Event Report

The primary coordinator shall submit a report to the FWC, NMFS, and the USFWS providing a description of the event, number and location of the animals observed, and what actions were taken when animals were seen. Any problems with the event and suggestions for improvements will be documented in the report.

LAND & SEA GROUP, INC.
ENGINEERS & SCIENTISTS
2828 66th Terrace South
St. Petersburg, FL 33712
813-927-0617 janlandsea@gmail.com



FIG. 1.0 - AERIAL MAP

Pinellas County, Florida
December 2020

LAND & SEA GROUP, INC.
ENGINEERS & SCIENTISTS
2828 66th Terrace South
St. Petersburg, FL 33712
813-927-0617 janlandsea@gmail.com

Attachment A
Observer Resumes

Janice Sands Ash, PE
President – Land & Sea Group, Inc.



Total Experience

40 Years

Registrations

Registered Professional Engineer, FL, #42730, 1990

Florida General Contractor, CGC1519893

Education

MS, Civil/Environmental Engineering, University of South Florida, 1990

BS, Engineering Science, University of South Florida, 1987

Memberships

American Society of Civil Engineers, Utilities Subcommittee, Chairman

Florida Utilities Coordinating Committee

Transportation Research Board

University of South Florida Engineering Alumni Association

Jan brings an impressive array of engineer and scientific experience any project. Her expertise is built upon more than four decades of work in civil and environmental engineering for public and private sector infrastructure; subsurface utility engineering; utility infrastructure design, construction management, and inspection; and water resources, marine, ecological, and environmental engineering. Her ecological experience starts as a trainee at the US Corp of Engineers Regulatory Division in the early 1980's and spans to current day.

As the founder of Land & Sea Group, Inc. (LSG) and the Ash Group before it became part of Ayres Associates, Jan has been practicing a hands-on management approach in which her more than 40 years of engineering design, project management, and quality control experience benefits every project under her supervision. She made sure LSG resources are efficiently and effectively applied to projects to make project execution cost-effective, timely, and of consistent quality. Jan's demonstrated leadership abilities have benefited the Tampa metropolitan area and the professional organizations in which she has been active.

Related Projects – Imperiled Species and Marine Mammal Observation

Protected Species and Marine Mammal Observation Projects

North Captiva Island 5.7 Mile Subaqueous Power Cable Installation, Lee County Electric Cooperative, Collier County, Florida

Position: Observer, Environmental Compliance Officer and Project Manager

Provided Observation services and managed a team of 3 observers during the installation of 5.7 miles of electrical lines installed in Pine Island Sound by Directional Drill and Hydro Plow. Performed turbidity monitoring, provided observation for Manatees, Sea Turtles, Cetaceans, and Small Tooth Sawfish. Prepared Daily, Weekly and monthly reports, along with final reporting and as-built.

Event Watch Programs

Ye Mystic Krewe of Gasparilla, Gasparilla Boat Parade Manatee Watch Programs Annually 1994 – 2017) , Hillsborough County, FL.

Position: Observer coordinator and Primary Marine Mammal Observer(MMO).

Responsible for coordination and training of staff, volunteers, and the USCG Auxiliary for the Gasparilla Manatee Watch Program. Coordinated one aerial observer and twenty water-based observers to monitor manatee

activity in and around the parade route. Scope of work included managing volunteers and staff, coordinating permit requirements, documenting event, coordinating observation locations, attending coordination meetings with USCG and other law enforcement, coordinating public notices and press releases, and preparing Post Manatee Watch Report for submittal to permitting agencies. Observation area covered approximately 36 square miles to ensure manatee safety.

"The Punisher" Film Production, Pinellas County, Florida,
Position: Marine Mammal Observer(MMO).
Coordinated and conducted monitoring of Gulf of Mexico waters surrounding Fort DeSoto Pier for presence of manatees and other listed marine species during explosion scenes for the film "The Punisher." Assisted film coordinator in FDEP permit compliance procedures regarding listed species.

Bridge Blast Demolition Watch Programs
Responsible for coordinating the Manatee Watch Program for the underwater blasting demolition of each bridge listed below. Coordinated one aerial observer and four water and land-based observers to monitor manatee activity in and around the demolition area. Scope of work included managing observers, coordinating permit requirements, documenting event, coordinating observation locations, attending coordination meetings with USCG and other law enforcement, and preparing Post Manatee Watch Report for submittal to permitting agencies. Observation area covered approximately one square mile to ensure manatee safety.

- **Johnson Bros., Inc, Manatee Watch Program, Treasure Island Bridge, Pinellas County, FL.**
  Position: *Primary MMO and Coordinator.*
- **Orion Contracting, Manatee Watch Program, Bayway Bridge Structure "C", St. Petersburg, FL.**
  Position: *Primary MMO and Coordinator*
- **Cone & Graham, Manatee Watch Program, US-19 over Cross-Florida Barge Canal, Crystal River, Florida**
  Position: *Experienced MMO*
- **Flatiron Constructors, Inc, Manatee Watch Program, Johns Pass Bridge, Madiera Beach, Pinellas County, FL.**
  Position: *Primary MMO and Coordinator.*
- **Misener Marine, Inc, Manatee Watch Program, Bellair Bridge, Bellaire, Pinellas County, FL.**
  Position: *Primary MMO.*

Beach Nesting Bird & Shorebird Monitoring
Ash provided environmental monitoring services for the dredging of various areas and beach renourishment projects. Ash monitored the confined disposal facility for bird activity. This included daily monitoring of species present as well as any breeding and nesting observations. Ms. Ash oversaw the preparation of daily reports and weekly summaries which were submitted to the USACE to satisfy permitting requirements. Once each month a comprehensive point-count survey was conducted and reported. A final report of all observations and nesting success was developed and submitted. During these projects, several birds began nesting within close proximity to the construction site. Ash negotiated with permitting agencies to develop and implement a plan to protect those nests while allowing dredge operations to continue.

- **Orion Dredging Services, LLC, Port Manatee Dredge Project, Manatee County, FL**
  Position: Observer and Project Manager.
- **Great Lakes Dredge & Dock Co, Gasparilla Island Beach Renourishment Project, Lee County, FL**
  Position: Observer and Project Manager.
- **Great Lakes Dredge & Dock Co./Coastal Systems International, Inc, Hillsboro & Deerfield Beach Renourishment,**
  Position: Project Manager

Thomas Ash

Tom Ash brings a wide range of experience both from his work with the Environmental Protection Commission of Hillsborough County and his work throughout the State and region. He is a degreed Marine Biologist with extensive field training in most aspects of environmental sampling and data collection. Tom is known for special projects and time-critical assignments. He has worked in marine resource management for the past 35 years. Mr. Ash has over 30 years of Marine Science experience in the Tampa Bay area, performing Protected Species/ Marine Mammal Observations (MMO) and Watches, endangered and threatened species surveys, submerged aquatic species surveys, benthic analysis and other scientific services.

Years of Experience: 35

CREDENTIALS:

Areas of Expertise:

- Marine Sciences
- Laboratory Management
- Artificial Reef Design and Construction
- Manatee Protection Plans and Watch Programs (MMO/PSO)
- Fish and Benthic Taxonomy
- Submerged Aquatic Vegetation Surveys

Education:

- Marine Biology, Richard Stockton State College, New Jersey, 1986

Certificates/Training:

- United States Coast Guard Licensed Captain / 6-pack (Expired)
- Advanced SCUBA Diver
- Private pilot, single engine / land

Associations:

- Tampa Bay Regional Planning Council Agency on Bay Management
- Tampa Bay Estuary Program
- FLERA (Florida Local Environmental Resource Agencies)
- AOPA (Aircraft Owners & Pilots Association)

PROFESSIONAL EXPERIENCE:

EPC of Hillsborough County Roger P. Stewart Center Offices & Laboratories, Tampa, FL
Role: General Manager / Assistant Director Water Management Division
Design and operation of water chemistry and biology laboratories and associated staff offices for the Environmental Protection Commission of Hillsborough County. Construction supervision and coordination with architects and contractors as owner representative and end user. Specified layout, cabinetry, counter tops, sinks, flooring, and instrumentation. Supervises 12-20 scientists and specialists performing water and sediment quality analyses, benthic infauna and plankton taxonomy, and maintenance and calibration of water monitoring instrumentation.

Pinellas Bayway Bridge – Structure C Marine Mammal/Blast Watch, Pinellas County, FL
Role: Primary MMO / Certified Aerial Observer
Blast Related Endangered Species Surveys
Performed endangered species survey, manatee watch services and formal watch coordination for the blasting monitoring of the Demolition of the Pinellas Bayway Bridge, Pinellas County. Stationed as the Primary Aerial Observer in helicopter during the blasting event. Sighted 5 manatees and 4 dolphins.

Treasure Island Bridge Demolition Marine Mammal/Blast Watch, Pinellas County, FL
Role: Primary MMO / Certified Aerial Observer
Blast Related Endangered Species Surveys
Performed endangered species survey, manatee watch services and formal watch coordination for the blasting monitoring of the demolition of the Pinellas Bayway Bridge, Pinellas County. Stationed as the Primary Aerial Observer in helicopter during the blasting event. Sited 2 manatees, 10 dolphins and 2 turtles.

Belleair Bridge Demolition Marine Mammal/ Blast Watch, Pinellas County, Florida,
Role: Primary MMO / Certified Aerial Observe
Blast Related Endangered Species Surveys
Provided Primary Aerial Observer Services for this bridge demolition Project and underwater blasting demolition of the Belleair Causeway Bridge. Stationed as the Primary Aerial Observer in helicopter during the blasting event. Sited 5 dolphins and 1 manatee.

Johns Pass Bridge Demolition Marine Mammal/ Blast Watch, Pinellas County, Florida,
Role: Primary MMO / Certified Aerial Observer

Blast Related Endangered Species Surveys

Provided Primary Aerial Observer Services for underwater blasting demolition of the Johns Pass Bridge between Madeira Beach and Treasure Island. Stationed as the Primary Aerial Observer in helicopter during the blasting event. Sited 4 dolphins and 2 manatees

U.S. 19/Cross Florida Barge Canal Bridge Demolition Marine Mammal/ Blast Watch, Citrus County, Florida
Role: Primary MMO / Certified Aerial Observer
Blast Related Endangered Species Surveys
Provided Primary Aerial Observer Services for underwater blasting demolition of the Johns Pass Bridge between Madeira Beach and Treasure Island. Stationed as the Primary Aerial Observer in helicopter during the blasting event. No observations

Ye Mystic Krewe of Gasparilla, Gasparilla Boat Parade Manatee Watch Programs Annually 1990 – 2017), Hillsborough County, FL.
Position: Observer coordinator, Primary Aerial Observer and Primary Marine Mammal Observer (MMO).
Event Related Endangered Species Surveys
Responsible for coordination and training of staff, volunteers, and the USCG Auxiliary for the Gasparilla Manatee Watch Program. Coordinated one aerial observer and twenty water-based observers to monitor manatee activity in and around the parade route. Scope of work included managing volunteers and staff, coordinating permit requirements, documenting event, coordinating observation locations, attending coordination meetings with USCG and other law enforcement, coordinating public notices and press releases, and preparing Post Manatee Watch Report for submittal to permitting agencies. Observation area covered approximately 36 square miles to ensure manatee safety. Thousands of manatees and dolphins observed over the 26 year period.

Florida Offshore Boat Race/Poker Run, Sarasota County, Florida,
Role: Primary MMO / Certified Aerial Observer
Event Related Endangered Species Surveys
Served as aerial observer for offshore boat race. Observed multiple manatees and dolphins during the event outside the exclusion zone.

U.S. Navy Air & Sea Spectacular, Jacksonville, Duval County, Florida,
Role: Primary MMO / Certified Aerial Observer
Event Related Endangered Species Surveys
Served as aerial observer for Navy Demonstration & Recruiting event in the St. Johns River. Observed multiple manatees and dolphins during the event outside the exclusion zone.

Manatee River Boat Race, Bradenton, Florida,
Role: Primary MMO / Certified Aerial Observer
Event Related Endangered Species Surveys
Served as Primary observer coordinator for in river boat race, stationed on bridge. Observed dolphins during the event outside the exclusion zone.

"The Punisher" Film Production, Pinellas County, Florida,
Role: Primary MMO/ On-boat Observer
Event Related Endangered Species Surveys
Coordinated and conducted monitoring of Gulf of Mexico waters surrounding Fort DeSoto Pier for presence of manatees and other listed marine species during explosion scenes for the film "The Punisher." Assisted film coordinator in FDEP permit compliance procedures regarding listed species.

Judy "Jordan" Mericle

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jordanmericle@yahoo.com

- PSO Certification #100807-051709-13701511 by PartnerPlast, Inc., July 9, 2015
- TWIC #17390034
- ODESS Certification by USACE, May 17, 2019
- FL Shorebird Database Entry Certification by Florida Shorebird Alliance, Feb. 2013
- BOSIET (w/ HUET and EBS) Certification #00735700080715903626 by Falck Safety Services, July 8, 2015

Marine Mammal/Protected Species Observer and Turbidity Monitor Projects, Feb. 2010 – present:

- **Marine Mammal/Protected Species Observer (MMO/PSO): Fernandina Harbor Maintenance Dredging, Great Lakes Dredge & Dock Co./Tide Environmental, LLC.: Oct. – Nov. 2020**
  - 348 hours of day-shift, nearshore observation on clamshell Dredges #58 off of Fernandina Beach, FL
  - 2 sea turtles and 1 manatee observed within project perimeter; 2 shutdowns required

- **Marine Mammal/Protected Species Observer (MMO/PSO): Jacksonville Harbor Construction Dredging, Great Lakes Dredge & Dock Co./ REMSA, Inc. and Tide Environmental, LLC.: April 2019 – present**
  - FDEP Permit #0129277-017-BI and USACE Permit #W912EP-18-C-0021
  - 2,750 hours of day- and night-shift, nearshore observation on clamshell Dredges #55 and #53, and excavator Dredge New York in Jacksonville Harbor and St. John's River, FL
  - 280+ dolphin sighted

- **Marine Mammal/Protected Species Observer (MMO/PSO): Norfolk Harbor Navigational Improvements in Thimble Shoal Channel, VA, Weeks Marine/ Tide Environmental, LLC.: June 17 – July 7, 2020**
  - USACE Norfolk District
  - 336 hours of day- and night-shift observation on hopper Dredge BE Lindholm
  - 2 Incidental takes of sea turtle species; 44+ dolphin sighted

- **Marine Mammal/Protected Species Observer (MMO/PSO): Charlotte/Sarasota Regional Beach Renourishment Project, Great Lakes Dredge & Dock Co./ Tide Environmental, LLC.: March 1 – 14, 2020**
  - Nearshore off of Manasota Key, FL
  - 168 hours of day-shift observation on hopper Dredge Padre Island
  - 20+ dolphin sighted

- **Turbidity Monitor: Tampa Harbor Comprehensive Maintenance Dredging, Dredge, Great Lakes Dredge & Dock Co./ REMSA, Inc.: May 19 – June 1, 2019**
  - FDEP Permit #0157891-021-BN and USACE Contract #W912EP-18-C-0023
  - 156 hours of turbidity monitoring in and upstream of plumes from trailing suction hopper dredge Terrapin Island in Egmont Channel and Mullet Channel and outflow pipes on Egmont Key, FL
  - No water quality violations recorded for– samples collected twice daily at surface, mid-column, and bottom at ambient upstream location and within plume
  - YSI DSS Pro Turbidimeter calibrated to 10 NTUs: ID# 15C100314

- **<u>Marine Mammal/Protected Species Observer (MMO/PSO)</u>: Tampa Harbor Big Bend Channel Dredge, Great Lakes Dredge & Dock Co./ REMSA, Inc.: Feb. – April 2019**
  - Permit #0157891-017-BI and Modification #0157891-020-BM
  - 350 hours of night-shift, nearshore observation on hydraulic cutter suction dredge Carolina in Tampa Harbor, FL
  - 1 manatee sighted outside project permit perimeter; 40+ dolphin sighted

- **<u>Marine Mammal/Protected Species Observer (MMO/PSO)</u>: Town of Jupiter Island Beach Nourishment, Weeks Marine/ Marine Ventures International, Inc.: Jan. – Feb. 2019**
  - Permit #s: FDEP 0186991-0087; USACE #SAJ-1992-07140 (MOD-LCK) Modification-3
  - 180 hours of night-shift, offshore vessel-based observation on live-aboard hopper dredge BE Lindholm in Atlantic Ocean off of Jupiter Island, Martin County FL
  - 1 manatee sighted outside project permit perimeter; 10+ dolphin sighted

- **<u>Marine Mammal/Protected Species Observer (MMO/PSO)</u>: Tampa Harbor Big Bend Channel Dredge, Great Lakes Dredge & Dock Co./ Marine Ventures International, Inc.: Dec. 2018 – Jan. 2019**
  - Permit #0157891-017-BI and Modification #0157891-020-BM
  - 300 hours of night-shift, nearshore observation on hydraulic cutter suction dredge Alaska in Tampa Harbor, FL
  - 30+ dolphin sighted

- **<u>Marine Mammal/Protected Species Observer (MMO/PSO) and Turbidity Monitor</u>: Captiva Island Subaqueous Power Cable Installation, Lee County Electric Cooperative/ Ayers Associates, Inc.: June – Sept. 2018**
  - Permit #0340508-001-EI
  - 900 hours of daytime, nearshore observation and turbidity monitoring on hydraulic jet plow sled dredge Catherine in Pine Island Sound, FL
  - Severe Red Tide event during project – 1 live manatee and ~20 live dolphin sighted outside the project perimeter
  - Shorebird surveys conducted daily
  - No permit violations recorded for water quality – samples collected twice daily at surface, mid-column, and bottom at ambient upstream location and within 5 feet of dredging plow
  - Turbidimeter calibrated to 10 NTUs

- **<u>USCG (United States Coast Guard) Communications Coordinator and Marine Mammal & Sea Turtle Observer (MMO/PSO)</u>: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2016**
  - 12 hours of daytime, land and boat-based observation in Hillsborough Bay, FL
  - Group of 5 manatee sighted near Apollo Beach aggregation area and upper Hillsborough Bay

- **<u>USCG (United States Coast Guard) Marine Mammal & Sea Turtle Observer (MMO/PSO):</u> Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2015**
  - 10 hours of daytime, boat-based observation in Hillsborough Bay, FL
  - Observed herd of about 35+ manatee near Apollo Beach aggregation area and in Hillsborough Bay

- **<u>Beach Nesting Bird & Shorebird Monitor</u>: Gasparilla Island Beach Renourishment Project, Great Lakes Dredge & Dock Co./ The Ash Group, Inc.: Nov. 2013**

- Permit #0174403-001-JC
- 45 hours of onshore beach-nesting bird monitoring and FL Shorebird Database entries

- **<u>Sea Turtle & Marine Mammal Observer (MMO/PSO)</u>: Captiva Island Beach Renourishment, Great Lakes Dredge & Dock Co./ Coastwise Consulting, Inc.: Sept. – Nov. 2013**
  - 320 hours of daytime, nearshore observation on a hopper dredge in Gulf of Mexico, Captiva Island, FL
  - 5 manatees, 4 Loggerhead, and 2 Green sea turtles sighted outside project perimeter; 80+ dolphin sighted

- **<u>Marine Mammal/Protected Species Observer (MMO/PSO)</u>: Bayway Bridge Blast, The Ash Group, Inc.: June 2013**
  - Permit #SAJ-2002-02432
  - 12 hours of daytime, bridge-based observation in lower Tampa Bay Main Channel, Pinellas, FL
  - ~15 dolphin sighted

- **<u>USCG (United States Coast Guard) Marine Mammal & Sea Turtle Observer (MMO/PSO)</u>: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2013**
  - 12 hours of land-based observation in lower Hillsborough River, FL
  - Group of 3 manatee and ~8 dolphin sighted

- **<u>USCG (United States Coast Guard) Marine Mammal & Sea Turtle Observer (MMO/PSO)</u>: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2012**
  - 12 hours of land-based observation in lower Hillsborough River, FL
  - 2 manatee and ~10 dolphin sighted

- **<u>Marine Mammal/Protected Species Observer (MMO/PSO)</u>: Chevron Pascagoula Base Oil Project (PBOP), Chevron Corporation/Weeks Marine, Inc./ ECOES, Inc.: Jul. 22, 2011 – Sept. 16, 2011**
  - Permit # SAM-2008-00603-JBM
  - 252 hours of daytime, nearshore observation on clamshell dredge in Gulf of Mexico, Pascagoula, MS
  - 100+ dolphin sighted inside and outside project perimeter; no shutdown required

- **<u>FWC Beach-Nesting Bird/Shorebird Monitor</u>: Hillsboro & Deerfield Beach Renourishment, Great Lakes Dredge & Dock Co./Coastal Systems International, Inc./Ash Engineering, Inc.: Apr. 1, 2011 – May. 15, 2011**
  - USACE Permit #0289706-001-JC
  - 55 hours of onshore beach-nesting bird monitoring and FL Shorebird Database entries

- **<u>Marine Mammal & Sea Turtle Observer (MMO)</u>: Hillsboro & Deerfield Beach Renourishment, Great Lakes Dredge & Dock Co./Coastal Systems International, Inc./Ash Engineering, Inc.: Feb. 26, 2011 – May 15, 2011**
  - USACE Permit #0289706-001-JC
  - 720 hours of daytime, nearshore observation on a cutter suction dredge Illinois in Atlantic, Hillsboro & Deerfield Beaches, FL
  - 1 Loggerhead sea turtle sighted – shutdown required; 30+ dolphin sighted outside project perimeter

- **<u>FWC Marine Mammal & Sea Turtle Observer (MMO)</u>: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), Ash Engineering, Inc.: Jan. 2011**
  - USCG Permit #SP-002-11
  - 10 hours of boat-based observation in Hillsborough Bay, FL
  - 3 manatee sighted near Apollo Beach aggregation area and in upper McKay Bay

- **<u>FWC Marine Mammal & Sea Turtle Observer (MMO)</u>: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), Ash Engineering, Inc.: Feb. 2010**
  - 10 hours of boat-based observation in Hillsborough Bay, FL
  - Observed groups of manatee averaging 20+ manatees near Apollo Beach aggregation area and in lower McKay Bay

Kristina Haselier

4047 NW 13th Ave.
Gainesville, FL 32605
khaselier@yahoo.com

Tel: 863-899-3979

EXPERIENCE & TRAINING

- MMO/PSO: Marine Mammal Observer/Protected Species Observer, FWC Approved in 2018
- TWIC (Transportation Worker Identification Credential) Card
- PSO Certification training, PartnerPlast, Inc.
- Migratory & Shorebird Monitoring, FWC Approved Monitor
- Project Management, Logistics Coordination, & Work Flow Development
- Community Planning, Public Relations, Marketing Development, & Design
- Budgeting, Resource Allocation, Scoping, Risk Management, & Deliverables
- Data Entry & Analyses; Quality Assurance/Quality Control (QA/QC) Management

EDUCATION

- M.S. Community Planning for Nature-Based Recreation, August 2015
  University of Florida, Gainesville, FL
- B.A. Biology and B.A. Philosophy; April 2006
  Florida Southern College, Lakeland, FL
- Desktop Publishing/Graphic Design Certification: University of South Florida,
  Tampa, FL – November 2010
- Web Design & Development Certification: University of South Florida,
  Tampa, FL – July 2011

WORK HISTORY

- University of Florida, School of Forest Resources & Conservation, **Academic Advisor and Lecturer**: Nov. 2011 – present
  - Fall 2020 professor of FNR3020 *Professional Practice in Natural Resources*
  - Academic Advisor for 4 majors: Forest Resources & Conservation, Natural Resource Conservation, Marine Sciences, and Geomatics

- D&G Forestry Services, Inc., **Environmental Scientist & Project/Logistics Coordinator**: Jul. 2010 – Oct. 2020
  - QA/QC Manager & Data Entry Team Coordinator of Statewide Tree Survey Data for Citrus Canker Assessment Project

- Independent Contractor, **Protected Species/Marine Mammal Observer and Environmental Compliance Officer**, Jan. 2009 – Aug. 2018:

  - **Marine Mammal/Protected Species Observer (MMO/PSO), Jacksonville Harbor Deepening Project, Great Lakes Dredge & Dock Co./REMSA, Inc.: Oct. 2019**
    - 12 hours of nearshore observation on excavator dredge New York in St. Johns River, Jacksonville, FL
    - No protected species sighted inside the project perimeter

- **Marine Mammal/Protected Species Observer (MMO/PSO), Canaveral Harbor Deepening Project, Norfolk Dredging Company/Marine Ventures International: June 2019**
    - 36 hours of nearshore observation on clamshell dredge Atlantic off Atlantic Coast, Cape Canaveral, FL
    - 5 sea turtles sighted inside and outside the project perimeter – 2 shutdowns required
- **Marine Mammal/Protected Species Observer (MMO/PSO), Turbidity Monitor, and Environmental Compliance Officer (ECO): Captiva Island Subaqueous Power Cable Installation, Lee County Electric Cooperative/ Ayers Associates, Inc.: June – Sept. 2018**
    - Permit #0340508-001-EI
    - 96 hours as ECO observing landward bore activities encroaching upon tidal mangrove wetland
    - 12 hours of nearshore observation and turbidity monitoring on hydraulic jet plow sled dredge Catherine in Pine Island Sound, FL
    - Over 20 live dolphin sighted outside the project perimeter during red tide
    - No permit violations recorded for water quality – samples collected twice daily at surface, mid-column, and bottom at ambient upstream location and within 5 feet of dredging plow; Turbidity meter calibrated to 10 NTUs
- **USCG (United States Coast Guard) MMO/PSO: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2016**
    - 12 hours of land and boat-based observation in Hillsborough Bay, FL
    - Group of 5 manatee sighted near Apollo Beach aggregation area and upper Hillsborough Bay
- **USCG MMO/PSO: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2015**
    - 10 hours of boat-based observation in Hillsborough Bay, FL
    - Observed herd of 35 manatee near Apollo Beach aggregation area and in Hillsborough Bay
- **USCG MMO/PSO: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2013**
    - 12 hours of land-based observation in lower Hillsborough River, FL
    - Group of 3 manatee and 8 dolphin sighted
- **USCG MMO/PSO: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2012**
    - 12 hours of land-based observation in lower Hillsborough River, FL
    - 2 manatee and 10 dolphin sighted
- **MMO/PSO: Chevron Pascagoula Base Oil Project (PBOP), Chevron Corporation/Weeks Marine, Inc./ ECOES, Inc.: Jul. 22, 2011 – Sept. 16, 2011**
    - Permit # SAM-2008-00603-JBM
    - 252 hours of night-shift nearshore observation on clamshell dredge in Gulf of Mexico, MS
    - Over 100 dolphin sighted inside and outside project perimeter; no shutdown required
- **FWC Beach-Nesting Bird/Shorebird Monitor: Hillsboro & Deerfield Beach Renourishment, Great Lakes Dredge & Dock Co./Coastal Systems International, Inc./Ash Engineering, Inc.: Apr. 1, 2011 – May. 15, 2011**
    - USACE Permit #0289706-001-JC
    - 55 hours of onshore beach-nesting bird monitoring and FL Shorebird Database entries

- **MMO/PSO: Hillsboro & Deerfield Beach Renourishment, Great Lakes Dredge & Dock Co./Coastal Systems International, Inc./Ash Engineering, Inc.: Feb. 26, 2011 – May 15, 2011**

    - USACE Permit #0289706-001-JC
    - 720 hours of night-shift, nearshore observation on a cutter suction dredge Illinois in Atlantic, Hillsboro & Deerfield Beaches, FL
    - Over 40 dolphin sighted outside project perimeter; 1 Loggerhead sea turtle sighted – shutdown required
- **FWC MMO/PSO: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), Ash Engineering, Inc.: Jan. 2011**
    - USCG Permit #SP-002-11
    - 10 hours of boat-based observation in Hillsborough Bay, FL
    - 3 manatee sighted near Apollo Beach aggregation area and in upper McKay Bay
- **FWC MMO/PSO: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), Ash Engineering, Inc.: Feb. 2010**
    - 10 hours of boat-based observation in Hillsborough Bay, FL
    - Observed groups of manatee averaging 20+ manatees near Apollo Beach aggregation area and in lower McKay Bay
- **FWC MMO/PSO Communications Coordinator: Ye Mystic Krewe Gasparilla Boat Parade (flotilla), Ash Engineering, Inc.: Jan. 2009**
    - 10 hours of boat-based observation in Hillsborough Bay, FL
    - Observed group of 3 manatee and 1 single manatee near Apollo Beach aggregation area and in lower McKay Bay

- Birkitt Environmental Services, Inc., **Environmental Scientist & Project Manager**: June 25, 2007 – Feb. 26, 2009
    - Project management, coordination, & QA/QC management for pipeline, development, & restoration monitoring projects
    - MMO/PSO: Marine Mammal & Sea Turtle Watch Program Trainer & Coordinator
    - College Intern Program Coordinator – Intern Supervisor & Trainer
    - Species specific surveys such as wading/migratory birds, Audubon's crested caracara, & gopher tortoise surveys
    - Wetland delineation, qualitative and quantitative monitoring, & UMAM/WRAP analyses
    - Marketing development & company branding design

- Ash Engineering, Inc., **Project Manager & Field Scientist**: Aug. 16, 2006 – June 6, 2007
    - Project manager for bridge & dock environmental resource permitting & utility cable crossing exemptions projects
    - MMO/PSO: FWC Marine Mammal & Sea Turtle Watch Official & USCG Communications Coordinator
    - Species specific surveys, relocation, and protection/management plans for species such as sea whip, manatee, & gopher tortoise
    - Marine benthic surveys, including seagrasses, oyster beds, & sea whips GPS mapping

- FL Southern College, **Construction Design Reviewer for Ecological Resource Impacts**, The Lake Hollingsworth Project: Southern Landing, 2003-2006

PUBLICATIONS

- "Exploring Environmental Ethics Regarding Lake Hollingsworth." Ed. Haldeman, John and Bernard Quetchenbach. *Lake Hollingsworth: Reflections and Studies on a Florida Landmark*. Charleston: History Press, 2005.
- Photo Documentation, *Lake Hollingsworth* (as cited above).
- "Environmental Ethics and Lake Hollingsworth Restoration." *LakeWatch*. Vol. XIX: 3. Lakeland: Lakes Education/ Action Drive, 2004.
- Featured in *Eagle's View*, Lake Region Audubon Society, 2003.
- United States Green Building Council (USGBC), FL Gulf Coast Ch., Member since Apr. 2009

Anthony Corbett

WORK HISTORY

Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2016
Position: Marine Mammal Observer, Photographer.
12 hours of land and boat-based observation in Hillsborough Bay, FL
Group of 5 manatee sighted near Apollo Beach aggregation area and upper Hillsborough Bay

Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2015
Position: Marine Mammal Observer, Photographer.
10 hours of boat-based observation in Hillsborough Bay, FL
Observed herd of 35 manatee near Apollo Beach aggregation area and in Hillsborough Bay

Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2013
Position: Marine Mammal Observer, Photographer.
12 hours of land-based observation in lower Hillsborough River, FL
Group of 3 manatee and 8 dolphin sighted

Ye Mystic Krewe Gasparilla Boat Parade (flotilla), The Ash Group, Inc.: Jan. 2012
Position: Marine Mammal Observer, Photographer.
12 hours of land-based observation in lower Hillsborough River, FL
2 manatee and 10 dolphin sighted

Treasure Island Bridge Marine Mammal/ Blast Watch Program, , Pinellas County, FL.
Position: Marine Mammal Observer, Photographer.
Stationed on bridge as Observer for marine mammal protection.

Bayway Bridge Structure "C", Manatee Watch Program, St. Petersburg, FL.
Position: Marine Mammal Observer, Photographer.
Stationed on bridge as Observer for marine mammal protection.

US-19 over Cross-Florida Barge Canal Manatee Watch Program, Crystal River, Florida
Position: Experienced MMO
Stationed on bridge as Observer for marine mammal protection.

Johns Pass Bridge Manatee Watch Program, , Madiera Beach, Pinellas County, FL.
Position: Primary MMO and Coordinator.
Stationed on bridge as Observer for marine mammal protection.

Kevin Shelton, PWS, CERP

Senior Scientist/Project Manager

Professional Summary

Mr. Kevin Shelton has more than 30 years of ecological experience with a focus on state and federal regulatory permitting requirements. Mr. Shelton has experience in wetland delineations including use of methods defined by 62-340, F.A.C. and USACE 1987 Manual and its regional supplements. He has conducted benthic surveys including seagrasses, benthic infauna, and corals. He has a wide variety of experience with wildlife surveys and monitoring including listed species such as crested caracara, Florida sand skink, shorebirds, and manatees. He is an FWC-approved primary observer for marine endangered species observations including explosive underwater demolitions and aerial surveys.

Qualifications

Education

- Bachelor of Science, Environmental Science and Policy, 2015

Registrations / Certifications / Licenses

- Professional Wetland Scientist, No. 2814
- Certified Ecological Restoration Practitioner, No. 0261
- United States Coast Guard Licensed Captain 50 Gross Ton Master
- PADI Divemaster
- FDEP Lake Vegetation Index

Marine Endangered Species Observation Experience

Project Manager/Primary Scientist

Marine Endangered Species Observation – Treasure Island Causeway Bridge Demolition, Johnson Bros., Inc., Pinellas County, Florida, $5,700 (2006)

Coordinated Marine Endangered Species Watch Program for underwater blasting demolition of the Treasure Island Causeway Bridge bascules. Coordinated one aerial observer and four water- and land-based observers to monitor manatee and other protected species' activity in and around the demolition area. Managed observers, coordinated permit requirements, documented event, coordinated observation locations, attended coordination meetings with USCG and other law enforcement, and prepared Final Action Report for submittal to permitting agencies. Observation area covered approximately one square mile.

Experience

- Industry: 1989

Languages

- English

Professional Associations

- Society of Wetland Scientists
- Society for Ecological Restoration International
- Florida Association of Environmental Professionals
- Tampa Bay Association of Environmental
- American Association of Zoo Keepers
- Tampa Bay Estuary Program Manatee Awareness Coalition
- National Military Fish and Wildlife Association
- Tampa Bay Regional Planning Council Agency on Bay Management

Areas of Expertise

- Wetland delineation and evaluation
- Environmental resource permitting and compliance
- Ecosystem restoration
- Wildlife impact assessment

Project Manager/Primary Scientist

Marine Endangered Species Observation – Belleair Bridge Demolition, Johnson Bros./Misener Marine JV, Pinellas County, Florida, $5,700 (2009)

Managed the Marine Endangered Species Watch Program for the underwater blasting demolition of the Belleair Causeway Bridge. Coordinated one aerial observer and four water- and land-based observers to monitor manatee and other protected species' activity in and around the demolition area. Managed observers, coordinated permit requirements, documented event, coordinated observation locations, attended coordination meetings with USCG and other law enforcement, and prepared Final Action Report for submittal to permitting agencies. Observation area covered approximately one square mile.

Project Manager/Primary Scientist

Marine Endangered Species Observation – U.S. 19/Cross Florida Barge Canal Bridge Demolition, Cone and Graham, Inc., Citrus County, Florida, $10,000 (2010)

Coordinated the Marine Endangered Species Watch Program, permitting and blasting plan for underwater blasting demolition of the U.S. 19 Bridge over the Cross Florida Barge Canal. Developed the blasting plan, including hazard minimizations. Obtained expedited permit modifications to allow for blasting demolition of pier footers from SWFWMD, FWC, and USFWS to keep project on schedule. Coordinated aerial observer and water/land-based observers to monitor manatee and other protected species' activity in and around the demolition area. Managed observers, obtained permits, documented event, coordinated observation locations, attended coordination meetings with USCG and other law enforcement, and prepared Final Action Report for submittal to permitting agencies.

Project Manager/Primary Scientist

Marine Endangered Species Observation – John's Pass Bridge Demolition, Flatiron Construction Corp., Pinellas County, Florida, $5,700 (2008)

Coordinated Marine Endangered Species Watch Program for underwater blasting demolition of the John's Pass Bridge bascules. Coordinated one aerial observer and four water- and land-based observers to monitor manatee and other protected species' activity in and around demolition area. Managed observers, coordinated permit requirements, documented event, coordinated observation locations, attended coordination meetings with USCG and other law enforcement, and prepared Final Action Report for submittal to permitting agencies. Observation area covered approximately one square mile.

Project Manager/Primary Scientist

Marine Endangered Species Observation – Annual Gasparilla Pirate Invasion, Ye Mystic Krewe of Gasparilla, Hillsborough County, Florida, $2,500 (1995 to 2018)

Coordinated and trained staff, volunteers, and USCG Auxiliary for the Gasparilla Manatee Watch Program. Coordinated one aerial observer and 20 water- and land-based observers to monitor manatee activity in and around the parade route. Managed volunteers and staff, coordinated permit requirements, documented event, coordinated observation locations, attended coordination meetings with USCG and other law enforcement, produced and distributed public notices and press releases, and prepared Final Action Report for submittal to permitting agencies. Observation area covered approximately 36 square miles. Served as primary aerial observer, secondary water observer, and watch coordinator.

Project Scientist

Evaluation of Sonar Detection of Manatee and Dolphin during Dredge Operations, U.S. Army Corp of Engineers, Brevard County, Florida, $18,300 (2010)

Performed a highly detailed manatee and dolphin survey during testing of various sonar devices to evaluate effectiveness of automated detection systems within Port Canaveral. Recorded all visually observed animals with high-time accuracy to compare to recorded sonar detections. Documented all observations using a video camera, including timestamps and voice description of animal presence, size, direction of travel, and speed. Transcribed all observations to spreadsheets and maps for delivery to client. Performed 15 days of observation during various climatic conditions and dredge simulations.

Project Manager/Primary Scientist

Marine Endangered Species Observation – "The Punisher" Film Production, Pinellas County, Florida, $2,800 (2003)

Coordinated and conducted monitoring of Gulf of Mexico waters surrounding Fort DeSoto Pier for presence of manatees and other listed marine species during explosion scenes for the film "The Punisher." Assisted film coordinator in FDEP permit compliance procedures regarding listed species.

Project Manager/Primary Scientist

Marine Endangered Species Observation – Communications Line Replacement at Alafia River, TECO Peoples Gas, Hillsborough County, Florida, $1,700 (2008)

Conducted a Marine Endangered Species Watch Program during installation of overhead communications cables across the Alafia River. Coordinated permit requirements, documented event, and prepared Final Action Report for submittal to permitting agencies.

Project Manager/Primary Scientist

Marine Endangered Species Observation – Ammonia Pipeline Installation at Bullfrog Creek, Tampa Pipeline Corporation, Hillsborough County, Florida, $1,700 (2009)

Conducted a Marine Endangered Species Watch Program during installation of subaqueous anhydrous ammonia pipeline across Bullfrog Creek. Coordinated permit requirements, documented event, and prepared Final Action Report for submittal to permitting agencies.

Project Manager/Primary Scientist

Marine Endangered Species Observation – Florida Offshore Boat Race/Poker Run, Sarasota County, Florida, $5,000 (2002 to 2003)

Coordinated and trained staff, volunteers, and USCG Auxiliary for Marine Endangered Species Watch. Coordinated one aerial observer and multiple water-based observers to monitor manatee and other protected species' activity in and around racecourse. Managed volunteers and staff, coordinated permit requirements, documented event, conducted coordination meetings with USCG and other law enforcement, and prepared a Final Action Watch Report for submittal to permitting agencies. Served as primary aerial observer.

Primary Scientist

Marine Endangered Species Observation – Port Sutton Maintenance Dredge, Misener Marine, Hillsborough County, Florida, $1,200 (2004)

Conducted a marine endangered species watch during clamshell dredging of the Port Sutton berths within Tampa Harbor. Responded quickly to a last-minute request from client to keep the project on schedule and avoid down-time delay costs. Served as sole observer.

Attachment B

Imperiled Species/ Marine Mammal Watch Observer Sighting Log and Map

Imperiled and Marine Mammal Species Watch
Observer Sighting Log

This document is to be utilized in conjunction with a sighting map to record all observations during the marine event.

- Event #: Mark the map with a consecutive series of numbers for each sighting and correspond that number with this sighting log. Also use the Event column for the following events: Please indicate:
  - RC for any radio checks initiated
  - FS for fish scare
  - DEL for blast delay
  - BL for time of blast
  - AC for all Clear

- Time: Record the time that the animal or event was observed.
- Species and #: Record the species of the animal observed and how many were observed. If you know the exact species record this in the notes section. For example if three manatees were observed record M3.
  - M = Manatee
  - T = Turtle (loggerhead, green, leatherback, hawksbill, Kemp's Ridley)
  - C = Cetacean (dolphin, whale)
  - M= Giant Manta Ray
  - O = Other Species _____
- Direction of Travel: Indicate the direction that the animal was heading when you observed it. This can be a compass heading in degrees or north, south, east, west.
- Notes: Note any observation that may be helpful in determining the danger potential to the animal from the marine event.

Date of Event: _____

Observer Name: _____

Observer Location: _____

Observer Radio Call: _____

Time on-station: _____

Time of Off-station: _____

Event #	Time	Species and # Observed	Direction of Travel	Notes

Event #	Time	Species and #	Direction of Travel	Notes



FIG. 1.0 - AERIAL MAP

Pinellas County, Florida
December 2020

LAND & SEA GROUP, INC.
ENGINEERS & SCIENTISTS
2828 66th Terrace South
St. Petersburg, FL 33712
813-927-0617 janlandsea@gmail.com

Imperiled Species and Marine Mammal Watch Plan (IS/MMWP) Report

Pinellas County Bayway (SR 679) Bridge Structure E Demolition

May 18, 2021



Prepared For:

American Bridge Company
5411 West Tyson Avenue
Tampa, FL 33611

Attention: Jonathan Yates
Phone: 813-538-8012

Prepared By:

Land & Sea Group, Inc.
2828 66th Terrace South
St. Petersburg, FL 33712
813-927-0617

Janice Sands Ash, P.E.

LAND & SEA GROUP, INC.
ENGINEERS AND SCIENTISTS

Overview

Janice Sands Ash, P.E., President of Land & Sea Group, Inc. (LSG), Project Manatee Watch Coordinator, coordinated the Imperiled Species and Marine Mammal Watch Plan (IS/MMWP) for the Pinellas Bayway (SR 679) Structure E Bridge demolition performed on May 18, 2021. The program was established at the request of American Bridge Company. Aerial, boat, and land-based manatee surveys/watches were conducted prior to, during and after the event to assess potential impacts on protected marine species including West Indian manatee (*Trichechus manatus*), cetaceans, Giant Manta Ray, marine turtles, small-toothed sawfish, or Gulf sturgeon. No adverse effect to listed species identified in the area was noted.

Environmental Considerations

Overall survey conditions were good. The May 18, 2021 event was preceded by several days of mild (82-89 °F) weather. The water temperature in the Intracoastal Waterway on May 18th was approximately 81°F and air temperatures were in the mid 80's °F. Clear skies and easterly winds at 12 MPH with gusts of 15 MPH were present. Due to the Bayway causeway obstruction to the winds, there was calm water conditions present throughout the day resulting in good observation conditions. The tide was outgoing with a moderate flow.

Event Summary

May 18 Event:

The blasting was scheduled to occur at 1:30pm. A meeting was held at 12:00 noon to review the schedule and safety/ watch procedures for all employees and watch officials. The Manatee Watch/Imperiled Species Watch (M/ISW) commenced at 12:39 pm. All Clear was called at 1:39 pm. The blast occurred at 1:42pm. The watch continued until 2:15 pm.

Observation Team and Positions

LSG assembled a Watch Team that is highly experienced in providing IS/MMWP for bridge demolitions in the State of Florida. All team members proposed in the plan were in attendance on the day of the event

Janice Sands Ash, P.E., Primary Coordinator, Experienced Marine Mammal/ Imperiled Species Observer (MM/ISO)
Observer Location: Mid-span on New Bridge facing west

Tom Ash, Primary Observer, Experienced Aerial MM/ISO
Observer Position: Aerial in R-22 Helicopter viewing the entire site and 1 mile radius continually throughout the watch event.

Jorden Mericle, Experienced Marine Mammal Observer (MMO)
Observer Position: Boat Observer -eastern bay area

Kristina Haselier, Experienced MMO

Observer Position: South and western sector of new bridge

Tony Corbett, Experienced MMO/ Photographer
Observer Position: Midspan on new bridge facing east

Kevin Shelton, Experienced MMO/Aerial Observer
Observer Position: Boat Observer – Northwestern bay area

Britt'ne K. Mericle, MMO Trainee
Observer Position: Midspan of New Bridge shadowing Primary Coordinator

Summary of Manatee Watch Program Activities

May 11, 2021: A formal MM/IS Plan coordination meeting was held at 10:00am at the Zoom meeting. In attendance were the MM/IS Primary coordinator and observers, explosives engineer, construction superintendent, law enforcement representatives, and various agency representatives. All participants were briefed on the possible presence of protected marine species in the area, the logistics of the detonation schedule, details of the aerial survey, potential civil fines for harassment, and the communications plan. The agenda for the meeting may be found in Attachment A.

May 18, 2021: Blast Day Event details are provided below.

10:30 - 11:30 am: Coordinators and observers arrived at the Bayway Structure E Bridge.

12:00 Noon- Safety and Watch Plan Briefing: A meeting was held to review the schedule and safety procedures for all employees and watch officials. Observers were provided with safety equipment, vests, hard hats, radios, a red flag for back up communications, and the attached map and sighting log. Observers maintained radio and/or cellular telephone contact with the primary observer throughout the watch.

12:20 pm- Aerial Observer on Station: Aerial observer begins 1 mile sweep. Notified Primary Coordinator of presence of 3 Manatees east of condominiums east of the exclusion zone in the grass flats. Four manatees were sited northwest of the exclusion zone. Please see Attachment B for Event Day Map with location of sightings/observers and a combined observer log sheets.

12:30 pm – all Observers on station: The primary coordinator was positioned midspan on the new bridge with the observer trainee. Two observers were positioned on each side of the bridge over the main channel: one facing west, and one facing east. One boat observer patrolled the area east of the bridge, the other patrolled the northwest quadrant of the bay. The aerial observer flew during the entire event at approximately 500-800 feet above ground level. Radio check was performed.

12:39 – 1:39 pm: MM/IS Watch of the project site was conducted. 30-minute count down was commenced at 1:09pm. No manatees or marine turtles were seen within or approaching the exclusion zone or safety buffer. Several manatees were present in the seagrass areas outside of the exclusion zone, they were stationary or moved off away from the exclusion zone. Throughout the event, aerial observer provided account of manatee numbers, locations, movement and final disposition. Please see Event Combined Log sheet in Attachment B for details.

1:30 pm: All traffic was closed from the bridge

1:36 pm: All on-bridge observers and construction crews vacated the bridge. Boat observers moved to safe distance.

1:39 pm: All clear called by Aerial Observer and Primary Coordination.

1:40 pm: Detonation occurred

1:42 pm: All MM/IS Observers were back on station checking the area for injured marine species. Aerial observer verified all manatees previously sited were present at their pre-blast locations, no harm evident. Observers remained in position until 2:15pm

2:15 pm Watch Conclusion: Primary Coordinator called Stand Down, all observers to return to rally area to return equipment and collect log sheets.

No protected animals were seen to be dead or injured. The watch concluded at 2:15 pm. A total of 14 manatees were seen on adjacent seagrass beds during the watch.

Documentation

Documentation and photographs are archived with the primary coordinator at Land & Sea Group, Inc. including all observer sighting logs and maps.

Comments and Recommendations

SUMMARY: Good weather resulted in optimal observation conditions. No manatees, small-tooth sawfish, giant manta rays, whales, dolphins, gulf sturgeon or turtles were observed within the safety radius or buffer zone. Several manatees were present at various times but remained clear of the safety zone prior to blasting. The event went well with no apparent injury to protected species.

1. The use of hand-held radios worked very well for primary communication. When radios were unavailable, cellular telephones were used. Aerial communications via aircraft transceiver and handheld unit were likewise very useful.

2. Safety protocols were adhered to and understood by all participants.

3. The use of a sighting log and map was useful to the coordinator in producing the final report.

4. A small pre-blast charge was not used for this event. This pre-blast charge may startle turtles or manatees into moving. This movement could make a previously detected animal not visible to observers.

Photos



Overall Project site



Pre-blast preparations, observers on station



1:40 pm Detonation



Log Event #4 – Nine (9) Manatees on grass flats NW of Exclusion/Safety Radius. See Attachment B for location map



Event #5 – Two Manatees of the 5 sited near the grass flat of Llttle Bird Key

ATTACHMENT A

Pre- Blast Meeting Agenda May 11, 2021

Pre-Blast Meeting

May 11, 2021 10:00 am

- Introduction.
- Blast schedule Overview (AB/CDB)
    - Day before Blast.
        - Notice to the Public (Message Board) “05/18/21 intermittent bridge closure”.
    - Blast day.
        - Timeline.
        - Bridge Closure. (Vehicular/Pedestrian)
        - Chanel Closure
        - Team Locations
        - After Blast
- Watch Coordination program (Land and Sea/AB)
    - Event day
    - Parking location
    - On-site safety meeting and briefing
    - Observer Locations
    - Equipment Requirements
    - Communication Plan
    - Species Protected and Observed
    - Civil Penalties for harassment of species (i.e., No Herding)
    - Recording Data on Log Sheets
    - Recommendations to other Participants.

- Closing Statements
    - Questions
    - Comments

Blasting Agenda

May 17, 2021 – day 1 of loading explosives into the piers

- 6:00 am.
    - Explosives arrive on site escorted to the trestle where it will be driven onto the winch barge (explosives barge). (AB/CDB)
      USCG will established safety perimeter with additional AB Carpenter barge Support.
    - The explosives barge will be pushed by tug boat to the west side of the north pier. (AB)
- 7:00 am to 4:00
    - Explosives will be carried by hand from the barge to the pier on an as-needed basis and loaded in holes per approved sequence.
      (CDB/AB)
    - Once the loading of the North Pier is complete the explosives barge will be moved to the South Pier for loading of explosives in the pier.
- 4pm to 5:00 pm
    - Remaining explosives will be carried back to truck, Explosives barge will be moved back to trestle, truck driven off barge, onto trestle and back to Dyno's Magazine site.
      (AB/CDB)
    - USCG closes Safety Perimeter.
    - Overnight guarding of loaded Structure in the water.

Blast Day Thursday, May 18, 2021

- 6:00am
    - Explosives arrive on site escorted to the trestle where it will be driven on to winch barge (explosives barge).
    - Explosives barge will be tug boat to the west of south pier.
- 7:00 am to 10:00 am
    - Explosives will be carried by hand and loaded in holes per approved sequence.
    - Once all holes are loaded remaining explosives will be carry back to truck, explosives barge will be moved back to trestle, truck driven on to trestle and back to Magazine site.
- 10:00 am to 11:00 am
    - Now that all holes are loaded hole to hole connections will be made on both piers.
- 11:00 am to 12:00 pm
    - Blast mats will be placed and the connector line from north pier to south pier will be ran.
    - Lead line will be ran to the location chosen by the Blaster-in-Charge.
- 12:00 pm
    - Watch Program Meet and Safety briefing and stage in assigned locations.
- 12:30pm
    - Watch Program begins. (Aerial Sweep)
- 1:00pm
    - Connection from Pier to Pier will be made.
    - Watch Program Second Aerial Sweep 30Min countdown Starts

- 1:15pm
    - Pedestrian traffic stops
    - Bridge sweep for pedestrians.
- 1:30pm
    - Watch Program “All Clear”
    - Bridge Traffic stops
    - 5 Min Warning (3ea 3 seconds Air horn)
- 1:34pm
    - 1 Min Warning (2ea 3 seconds Air horn)
- 1:35 pm
    - BLAST.
    - Blaster inspection.
    - Blaster “All Clear” (1ea 10 seconds Air horn)
- 2:00pm
    - Watch Program “Stand Down” Post-mortem meeting and debrief.

ATTACHMENT B

Compiled Log Sheet and Siting/ Observer Map

Imperiled and Marine Mammal Species Watch
Observer Sighting Log

This document is to be utilized in conjunction with a sighting map to record all observations during the marine event.

- Event #: Mark the map with a consecutive series of numbers for each sighting and correspond that number with this sighting log. Also use the Event column for the following events: Please indicate:
  - RC for any radio checks initiated
  - FS for fish scare
  - DEL for blast delay
  - BL for time of blast
  - AC for all Clear

- Time: Record the time that the animal or event was observed.
- Species and #: Record the species of the animal observed and how many were observed. If you know the exact species record this in the notes section. For example if three manatees were observed record M3.
  - M = Manatee
  - T = Turtle (loggerhead, green, leatherback, hawksbill, Kemp's Ridley)
  - C = Cetacean (dolphin, whale)
  - G= Giant Manta Ray
  - O = Other Species _____
- Direction of Travel: Indicate the direction that the animal was heading when you observed it. This can be a compass heading in degrees or north, south, east, west.
- Notes: Note any observation that may be helpful in determining the danger potential to the animal from the marine event.

Date of Event: 5-18-2021

Observer Name: Compiled from All Observers

Observer Location: Aerial (A), Boat 1 and 2 (B1 & B2), Observer Bridge-east (BE), Observer Bridge-West (BW), Primary Coordinator Mid-span on Bridge (PC)

Time On-Station: 12:39 PM

Time of Off-station: 2:15 pm

Event #	Time	Species and # Observed	Direction of Travel	Notes
	12:00p			On-site Safety meeting
Wheels up	12:10p			Aerial Observer in helicopter mobilizing to project site. (A)
Aerial	12:17p			Aerial Observer On station (A) performing 1 mile sweep
Onsite	12:39p			All bridge observers on-station (PC)
1	12:20p	4M	none	4 manatees east of SE condos in grass flats (A) Outside of exclusion Zone

Event #	Time	Species and #	Direction of Travel	Notes
2	12:20p	2M	none	2m SE of 1st st E along road seawall.
3	12:20p	7M	none	NW of Bridge – outside of exclusion zone (A)
	1:09p			30-minute Countdown initiated (PC)
	1:09p			Aerial sweep of 1 mile perimeter (A)
4	1:12p	9M	none	2M joined 7M on grass flats NW of exclusion zone (A)(B1)
5	1:17p	5M	none	Southeast grass flats outside of exclusion zone (A)(B1)
6	1:19p	1M	SE	Moving away from SE seagrass bed outside exclusion zone (A)
7	1:30p	9M	none	Same group as event #3, no movement (A)
8	1:30p	5M	none	Same group as event #4, no movement (A)
AC	1:39p			All Clear Called (PC) verified by Aerial Observer
BL	1:40p			Time of Detonation
	1:42p			All Observers Back on-station, Commence 30-minute post- blast watch (PC)
9	1:43p	14M	none	All manatees previously located in events #4 and #5 were verified in location, no movement, no erratic behavior (A)
10	1:48p	O	circling	3 large tarpon swimming erratically and circling (PC)
	1:58p	14M		All manatees previously located in events #4 and #5 were verified in location, no movement, no erratic behavior (A)
	1:59p			Helicopter low on fuel – Demobilized from Site (A)
	2:15p			Manatee Watch Concluded – Stand down (PC)



FIG. 1.0 - AERIAL MAP

Pinellas County, Florida
December 2020

LAND & SEA GROUP, INC.
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APPENDIX D

OSW AND MANGROVE PHOTOGRAPHIC LOG

AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 1

Date: 6/27/**2023**

Description: Photograph of OSW 5 (looking east).



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 2

Date: 6/27/2023

Description: Photograph of OSW 7 (looking west).



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 3

Date: 6/27/2023

Description: Photograph (looking east) of the occasional mangrove saplings/propagules within the riprap shoreline adjacent to the existing seawall on the south side of the causeway island.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 4

Date: 6/27/2023

Description: Photograph (looking west) along the riprap shoreline on the south side of the causeway island. Note the occasional mangrove saplings/propagules within the riprap shoreline.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 3

Date: 6/27/2023

Description: Photograph of mangrove propagules located within the riprap on the north side of the causeway island.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 5

Date: 6/27/2023

Description: Photograph (looking west) along the riprap shoreline on the north side of the causeway island. Note the occasional mangrove saplings/propagules within the riprap shoreline.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 6

Date: 6/27/2023

Description: Photograph of mangrove propagules located in the riprap on the south side of the causeway island.



APPENDIX E

2023 QUANTITATIVE BENTHIC SURVEY REPORT

2023 Quantitative Benthic Survey Report

TOWN OF BAY HARBOR ISLANDS

BROAD CAUSEWAY BRIDGE REPLACEMENT
PROJECT DEVELOPMENT & ENVIRONMENT STUDY



Prepared for:

Town of Bay Harbor Islands, Florida

October 31, 2023

Financial Project Identification Number:	452428-1-21-01
Federal Project Number:	N/A
FDOT Efficient Transportation Decision Making (ETDM) Number:	14520
Town of Bay Harbor Islands Project Number:	BC-160

2023 Quantitative Benthic Survey Report

October 31, 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 Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated May 26, 2022, and executed by Federal Highway Administration (FHWA) and FDOT.

Prepared for:
Town of Bay Harbor Islands

Prepared by:
AtkinsRéalis

TABLE OF CONTENTS

1.0 PROJECT OVERVIEW 1-1

1.1 PROJECT DESCRIPTION AND INTRODUCTION 1-1

1.2 AUGUST 2022 PRELIMINARY BENTHIC SURVEY FINDINGS 1-3

2.0 METHODS 2-1

2.1 SURVEY TIMING AND SURVEY AREA 2-1

2.2 QUALITATIVE DATA COLLECTION – TRANSECT SWIMS 2-3

2.3 QUANTITATIVE DATA COLLECTION 2-5

2.3.1 Seagrass Assessment 2-5

2.3.1.1 Seagrass Edge-of-Bed Delineation 2-5

2.3.1.2 In-situ SAV Quadrats 2-5

2.3.2 Coral Assessment 2-8

3.0 RESULTS 3-1

3.1 BENTHIC COMMUNITY TYPES 3-1

3.1.1.1 Community 1 - Macroalgal Beds 3-3

3.1.1.2 Community 2 - Seagrass Beds/Patches 3-3

3.1.1.3 Community 3 - Live Bottom 3-3

3.1.1.4 Community 4 - Coral Habitat Adjacent to the Seawalls 3-4

3.1.1.5 Community 5 – Existing Seawalls and Bridge Piers 3-4

3.2 SEAGRASS 3-5

3.2.1 Seagrass Bed/Patch Locations 3-5

3.2.2 SAV Quadrat Data 3-12

3.3 CORALS 3-15

3.3.1 Coral Belt Transects 3-16

3.3.2 Corals in Community 3 – Live Bottom 3-16

3.3.3 Corals in Community 4 –Coral Habitat Adjacent to the Seawalls 3-23

3.3.4 Corals in Community 5 – Existing Seawalls and Bridge Piers 3-27

3.3.4.1 Existing Seawalls 3-27

3.3.4.2 Existing Bridge Piers 3-31

4.0 SUMMARY OF FINDINGS 4-1

4.1 BENTHIC COMMUNITY TYPES 4-1

4.2 SEAGRASS QUANTITATIVE DATA 4-2

4.3 CORAL QUANTITATIVE DATA 4-2

4.3.1 Community 3 – Live Bottom 4-3
4.3.2 Community 4 – Coral Habitat Adjacent to the Seawalls 4-4
4.3.3 Community 5 – Existing Seawalls and Bridge Piers 4-5

5.0 APPENDICES 5-1

LIST OF FIGURES

Figure 1-1 Project Location Map 1-2

Figure 2-1 2023 Benthic Survey Area Map 2-2

Figure 2-2 Transect Swim Locations Map 2-4

Figure 3-1 Benthic Community Types Map 3-2

Figure 3-2 Seagrass Beds/Patches in the Northeast and Southeast Quadrants of the Bridge (Beds SA, SB, SQ, SK, SL & SR) 3-8

Figure 3-3 Seagrass Beds/Patches in the Southeast Quadrant of the Bridge (Beds SI, SJ, SM, SN & SO) 3-9

Figure 3-4 Seagrass Beds/Patches in the Southwest Quadrant of the Bridge (Beds SF, SG & SH) 3-10

Figure 3-5 Seagrass Beds/Patches Along the South Side of the Causeway Island (Beds SC, SD, SE & SP) 3-11

Figure 3-6 SAV Quadrat Locations 3-13

Figure 3-7 Coral Belt Transect Locations Map 3-17

Figure 3-8 Summary of Coral Data from Community 3 (Live Bottom) and Community 4 (Coral Habitat Adjacent to the Seawalls) 3-19

Figure 3-9 Summary of Coral Data from Community 5 (Existing Seawalls and Bridge Piers) 3-30

LIST OF TABLES

Table 2-1 Braun-Blanquet (B-B) Density Scores for SAV Categories with < 5% cover. 2-7

Table 3-1 Seagrass Documented within the Survey Area 3-7

Table 3-2 SAV Quadrat Data Summary 3-14

Table 3-3 Coral Belt Transects 3-18

Table 3-4 Community 3 (Live Bottom) - Coral Colony Summary Data 3-20

Table 3-5 Community 3 (Live Bottom) - No. of Coral Colonies Documented by Species* 3-21

Table 3-6 Community 3 (Live Bottom) – Summary of Coral Colony Health Data 3-22

Table 3-7 Community 4 (Coral Habitat Adjacent to the Seawalls) - Coral Colony Summary Data 3-24

Table 3-8 Community 4 (Coral Habitat Adjacent to the Seawalls) - No. of Coral Colonies Documented by Species 3-25

Table 3-9 Community 4 (Coral Habitat Adjacent to the Seawalls) - Summary of Coral Colony Health Data 3-26

Table 3-10 Community 5 - Corals Documented on the Exiting Seawalls within the Survey Area 3-28

Table 3-11 Community 5 - Health Data for Corals Documented on the Existing Seawalls within the Survey Area 3-29

ACRONYMS AND ABBREVIATIONS

A		
B	**BBAP**	Biscayne Bay Aquatic Preserve
	B-B	Braun-Blanquet
C		
D		
E	**EFH**	Essential Fish Habitat
	ETDM	Efficient Transportation Decision Making
F	**FDEP**	Florida Department of Environmental Protection
	FDOT	Florida Department of Transportation
	FHWA	Federal Highway Administration
	FMP	Fishery Management Plan
G	**GIS**	Geographic Information System
	GPS	Global Positioning System
H	**HAPC**	Habitat Area of Particular Concern
I	**ICW**	Intracoastal Waterway
	ID	Identification
J		
K		
L		
M		
N	**NEPA**	National Environmental Policy Act
	NMFS	National Marine Fisheries Service
O	**OFW**	Outstanding Florida Waters
P	**PD&E**	Project Development and Environment
	PVC	Polyvinyl Chloride
Q		
R		
S	**SCUBA**	Self-Contained Underwater Breathing Apparatus

	SWEPT	StateWide Environmental Project Tracker
T		
U	**USCG**	U.S. Coast Guard
V		
W		
X		
Y		
Z		
V		

1.0 PROJECT OVERVIEW

1.1 Project Description and Introduction

The project involves the potential replacement of the Broad Causeway Bridge connecting the Town of Bay Harbor Islands with the City of North Miami, within Miami-Dade County. The roadway is classified as "Urban Minor Arterial" and extends to the Village of Bal Harbour and Town of Surfside and connects those commuters to the mainland. The limits of the project are from Broad Causeway Island to East of West Broadview Drive. The FDOT bridge Identification (ID) Number is 875101. A graphic depicting the location of the bridge is provided as **Figure 1-1**. The project is approximately 0.97 mile in length.

The existing bridge consists of four lanes (two in each direction), the four travel lanes are 10-foot wide, without a raised median. The outside travel lanes also include shared-use markings to accommodate bicycles. In addition, a raised sidewalk is present on each side of the bridge, with a width that varies from 22 to 36 inches. There are no guardrails separating the sidewalk from the travel lane. Crossing over the Intracoastal Waterway, the bridge has a maximum vertical clearance of 18.00 feet at Mean Low Water and a minimum vertical clearance of 16.00 feet at Mean High Water at the Bascule crossing. The Intracoastal Waterway at the bridge crossings is deemed a navigable waterway by the United States Coast Guard (USCG). The bridge bascule is required by the USCG to open at :15 and :45 minutes of each hour to allow boat traffic.

The existing bridge, constructed in 1951, has been determined to be functionally obsolete, and contains fracture critical components based on a Bridge Inspection Reports prepared in January 2023 by FDOT. In 2017, major structural repairs were performed to the bridge at a construction cost of approximately $17 million. As a result of a 2020 inspection carried out by Florida Department of Transportation (FDOT), a design to address additional repairs has been completed and it has been determined that the cost to perform these repairs will amount to $3.0 million. It is expected that major costly repairs will be needed more frequently as the bridge ages to prevent closure or severe damages. Because of the structure type, the number of structural deficiencies, and high maintenance costs, the Town of Bay Harbor Islands is considering replacement of the bridge. Therefore, the Project Development and Environment (PD&E) Study will evaluate bridge replacement alternatives. Future bridge concepts will include provisions for new dedicated bicycle lanes and sidewalks to comply with ADA requirements and guardrails for the safety of pedestrians. Additional right-of way is not anticipated to accommodate the replacement bridge. Included in the Town Charter by the Senate Bill No. 865, the State of Florida surrendered and granted to the Town of Bay Harbor Islands any claim or control over all tidewaters and other lands, and all bayous and bay bottoms, beaches, waters, waterways and water bottoms, and all riparian rights within and adjacent to the Town limits for municipal purposes only, a strip of 300 feet wide from Kane Concourse, westwardly across Biscayne Bay to approximately 123rd Street in the City of North Miami.

Figure 1-1 Project Location Map



Over the course of the project, benthic surveys within the proposed project area will help to inform the National Environmental Policy Act (NEPA) analysis, design, and environmental permitting efforts. Benthic surveys serve to delineate and characterize the benthic communities (i.e., submerged aquatic vegetation (SAV), including seagrasses and rhizophytic macroalgae; scleractinian corals; and octocorals) which may be affected by the project. Construction of bridge support piers would represent primary direct impacts to benthic resources from the construction of a new bridge, while secondary impacts such as shading from the bridge deck (once complete) and temporary impacts from construction activities may also occur. Additional direct impacts to existing benthic resources will occur as the project requires that the current bridge and piers be removed once the new bridge is constructed. The results of the 2023 quantitative benthic survey will assist in quantifying project-related impacts to these resources and will aid resource agencies in determining appropriate compensatory mitigation to offset project impacts.

An August 2022 preliminary benthic survey was conducted to identify benthic habitats and resources present within the project area. See *Section 1.2* for a brief summary of the August 2022 preliminary benthic survey findings. A subsequent quantitative benthic survey was conducted in July-August 2023 to obtain additional detail on the benthic habitats within the survey area, including quantitative seagrass data (quadrat data) and quantitative coral data (transect data). This report will present the findings of the July-August 2023 quantitative benthic survey.

1.2 August 2022 Preliminary Benthic Survey Findings

A preliminary benthic survey was previously conducted in August 2022 to identify benthic habitats and resources within the project area. The August 2022 preliminary survey area extended 200 ft north and south of the existing bridge centerline; 30 ft north of the edge of water along the entire length of the north side of the causeway island; and 50 ft south of the edge of water along the entire length of the south side of the causeway island. During the August 2022 preliminary benthic survey, biologists conducted transect swims and visual inspections of the existing bridge piers, seawalls, and scour protection materials. Four species of seagrasses, including *Halodule wrightii* (shoal grass), *Halophila decipiens* (paddle grass), *Syringodium filiforme* (manatee grass), and *Thalassia testudinum* (turtle grass) were documented (mapped) within the 2022 survey area. In addition, both scleractinian corals and octocorals were observed within the 2022 survey area (i.e., on the seawalls, bridge piers, scour protection materials, and natural substrate), including the listed coral species, *Orbicella franksi* (boulder star coral). The findings of the August 2022 preliminary benthic survey are detailed in the *Broad Causeway 2022 Preliminary Benthic Survey Technical Memorandum,* dated November 20, 2022, and provided in **Appendix A**. Based on the results of the 2022 benthic survey event, it was apparent to the PD&E team that additional benthic survey efforts would be required for the PD&E Study, including the collection of quantitative data on seagrasses and corals. It should be noted that the data obtained from the July-August 2023 quantitative benthic survey are more recent and contain more detailed information and are intended to replace the August 2022 preliminary benthic survey results.

2.0 METHODS

Prior to the 2023 quantitative benthic survey field event, the National Marine Fisheries Service (NMFS) Geographic Information System (GIS) data layers, as well as the NMFS Essential Fish Habitat (EFH) mapper, were reviewed to conduct a preliminary determination of potential resources within the project area. The results of these database searches indicated that the areas adjacent to the bridge have the potential to contain EFH for species within Fishery Management Plans (FMPs) for the Shrimp, Snapper-Grouper Complex, Spiny Lobster, Red Drum, Highly Migratory Species, and Coastal Migratory Pelagics. The project area is also located within the NMFS' designated EFH-Habitat Area of Particular Concern (EFH-HAPC) for Coastal Inlets (penaied shrimp habitat), Biscayne Bay (coral, coral reefs, and live/hard bottom habitat), and *Phragmatopoma* "worm reefs" (coral, coral reefs, and live/hard bottom habitat). The project location is in an area designated by U.S. Fish and Wildlife Service as critical habitat for the West Indian Manatee (*Trichechus manatus*). In addition, this project occurs within the Biscayne Bay Aquatic Preserve (BBAP), which is also classified by the Florida Department of Environmental Protection (FDEP) as Outstanding Florida Waters (OFW).

On July 12, 2023, an agency coordination meeting was conducted with the NMFS, FDOT, and AtkinsRéalis. The purpose of the meeting was to review and discuss the 2023 benthic survey methodology prior to the field event. During the meeting, the NMFS made requests for several minor modifications to the survey methodology which were incorporated into the 2023 benthic survey protocol. The meeting minutes from the July 12, 2023 meeting are provided in the StateWide Environmental Project Tracker (SWEPT) project file**.**

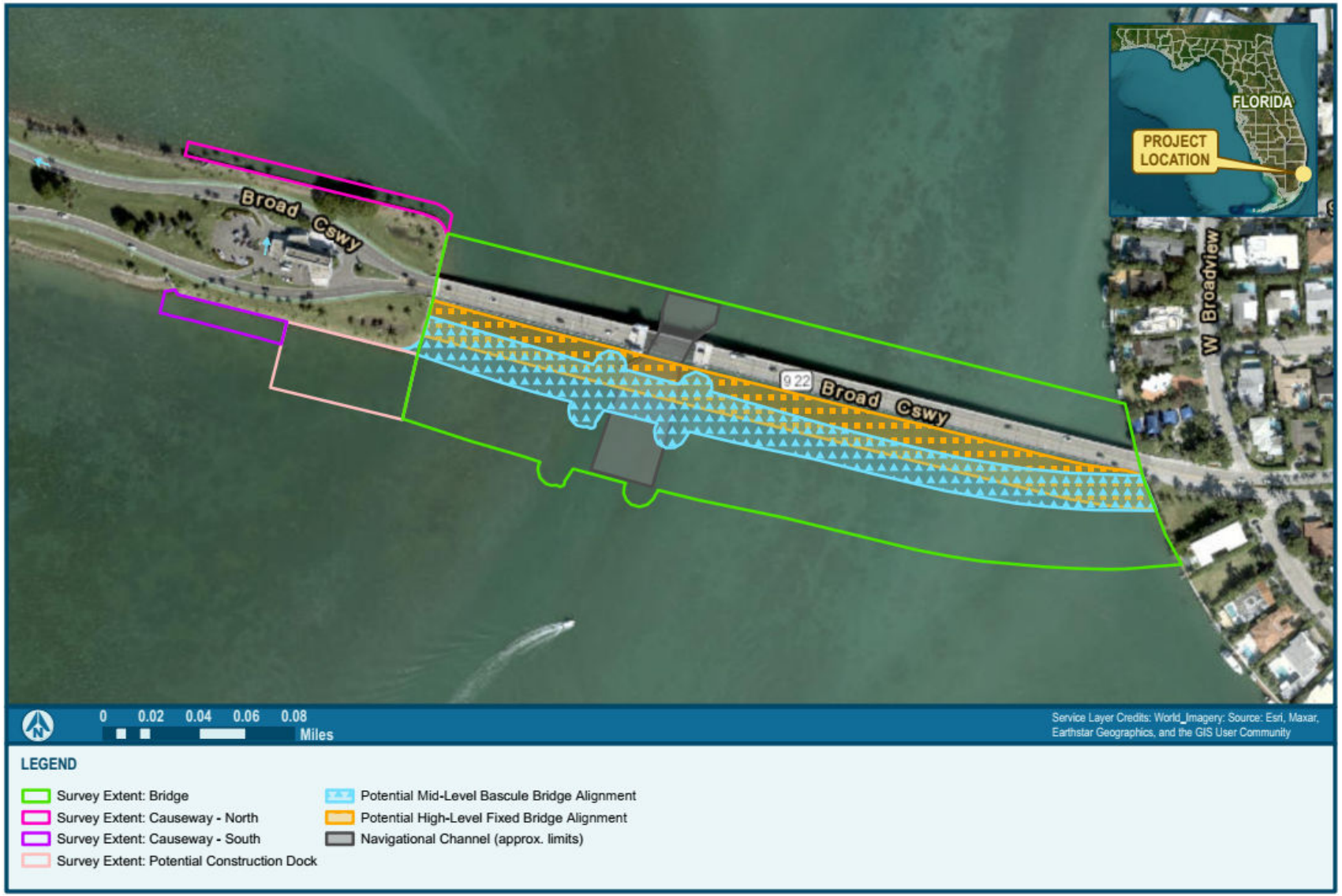
The 2023 benthic survey began with qualitative data collection (transect swims) to document the benthic habitat types within the survey area. Once the benthic habitats were qualitatively assessed, the location of seagrasses were documented, and quantitative methods (i.e., quadrats and transects) were conducted to further characterize the seagrasses and corals present within the survey area.

2.1 Survey Timing and Survey Area

The benthic survey field effort occurred from July 17-21 and August 3, 4 and 11, 2023. All field work was conducted within the peak seagrass growing season (i.e., June 1-September 30). The 2023 benthic survey area accounts for the potential new bridge alignments and potential in-water work areas. The benthic survey area is depicted in **Figure 2-1.** The benthic survey area was assessed by two AtkinsRéalis field teams, each consisting of three qualified AtkinsRéalis biologists, along with a boat captain. Benthic survey tasks were completed by biologists using the most effective survey gear for the water depth and water visibility (i.e., SCUBA equipment, snorkeling gear, or a combination of both).

For the bridge portion of the project, the survey area extended 100 ft, or approximately 30 meters (m), north of the existing bridge and 150 ft (45 m) south of the edge of proposed new bridge alignments (see **Figure 2-1**). This survey extent encompassed the two proposed new bridge alignment alternative footprints, as well as the potential barge work areas during construction and demolition.

Figure 2-1 2023 Benthic Survey Area Map



For the portion of the project along the causeway island west of the existing bridge, the survey area extends 30 ft (9 m) north of the edge of the existing seawall on the north side of the causeway island, and 50 ft (15 m) south of the edge of the existing seawall on the south side of the causeway island (see **Figure 2-1**). This survey extent encompassed any in-water work areas if replacement of the existing seawall is determined to be necessary for the project. In addition, a potential construction dock area (measuring 300 ft east-to-west and 150 ft north-to-south) located adjacent to the southeast portion of the causeway island was also assessed. **Figure 2-1** shows the extent of the survey area adjacent to the causeway island, including the potential construction dock area. It should be noted that in-water work is not anticipated west of the existing seawall located on the east end of the causeway island. For diver safety reasons (i.e., extensive boat traffic), the navigation channel was excluded from the benthic survey area (see **Figure 2-1**). The water depths, substrate type, and heavy currents present within the navigation channel, along with regular channel dredging by the U.S. Army Corps of Engineers, prevent colonization by seagrass and corals.

2.2 Qualitative Data Collection – Transect Swims

Based on the substantial size of the survey area [~16.1 acres (ac)], the initial survey activity involved conducting diver transect swims to document the various benthic habitat types occurring within the survey area. **Figure 2-2** depicts the locations of the transect swims within the survey area. For the bridge portion of the survey area, the transect swims were located at approximately 15 m spacing between transects. For diver safety reasons (i.e., extensive boat traffic), the navigation channel was excluded from the survey area. For the causeway island and potential construction dock portions of the survey area, transect swims were conducted at ≤15-m spacing.

During the transect swims, biologists collected the following qualitative data:

- The general location of the various benthic habitat types, including seagrass beds/patches, as well as areas where corals/octocorals were observed. The qualitative benthic habitat information collected during the transect swims was used to inform the subsequent seagrass mapping effort and the seagrass and coral quantitative data collection efforts.
- Species observations were recorded for macroalgae, sponges, scleractinian corals, octocorals, fish, and other groups observed during the transect swims.

In addition to the transect swims, the existing seawalls, bridge piers, and scour protection materials at the base of the seawalls were also visually assessed for the presence of corals, as described in *Section 2.3.2* of this document.

Figure 2-2 Transect Swim Locations Map



2.3 Quantitative Data Collection

2.3.1 Seagrass Assessment

The location of seagrasses within the survey area were documented, and quantitative methods (i.e., quadrats) were conducted to further characterize the seagrasses present within the survey area.

2.3.1.1 Seagrass Edge-of-Bed Delineation

A team of two AtkinsRéalis biologists swam along each pre-determined transect swim line. In areas where seagrass was observed, the location of each seagrass bed/patch within the survey area was documented. The biologists then delineated the extent of each seagrass bed/patch by collecting GPS positions along the outer extent of the seagrass bed/patch. In shallow portions of the survey area (e.g., along the existing causeway), the seagrass edge-of-bed was recorded as one biologist snorkeled over the seagrass edge with a Trimble R1 Global Positioning System (GPS) unit while a second biologist followed behind and collected data points with a GPS data collection unit (i.e., a Samsung Galaxy Tab S3 or iPad mini running Esri Collector Software) (see **Exhibit 1A**). In deeper portions of the survey area (e.g., in some areas of the bridge section), the seagrass edge-of-bed was recorded as one biologist using scuba gear detected the seagrass edge and signaled to a second biologist snorkeling above the diver and holding a Trimble R1 GPS unit mounted on a floating buoy (see **Exhibit 1B**). The snorkeler then communicated to an assistant on the boat to collect data points with the GPS data collection unit at the appropriate position. The polygon GIS data collected along the edge of seagrass was added to ArcGIS Online. All map figures were generated in ArcGIS Pro 2.9.5.

2.3.1.2 In-situ SAV Quadrats

In areas where seagrass beds/patches were delineated, quantitative data were collected via *in-situ* SAV quadrats using a stratified random sampling design. Quadrats were assigned to each individually delineated seagrass resource area (hereafter referred to as a "bed") by calculating the area of each bed in square meters, calculating the number of 1-m^2 quadrats required to meet 3% sampling coverage of that area, and then using the "Create Random Points" geoprocessing tool in ArcGIS Pro to place the requisite number of quadrats within the bed. Coordinates (latitude/longitude) were determined for each quadrat location prior to conducting the *in-situ* quadrats.

Biologists used a GNSS unit to navigate to each of the pre-determined random *in-situ* quadrat locations and a buoy was deployed to mark the quadrat location. At each pre-determined quadrat location, a biologist deployed a 1-m^2 PVC quadrat (divided into 100, 10-cm^2 grid cells for percent cover estimation) to collect quantitative SAV data (see **Exhibit 2**).

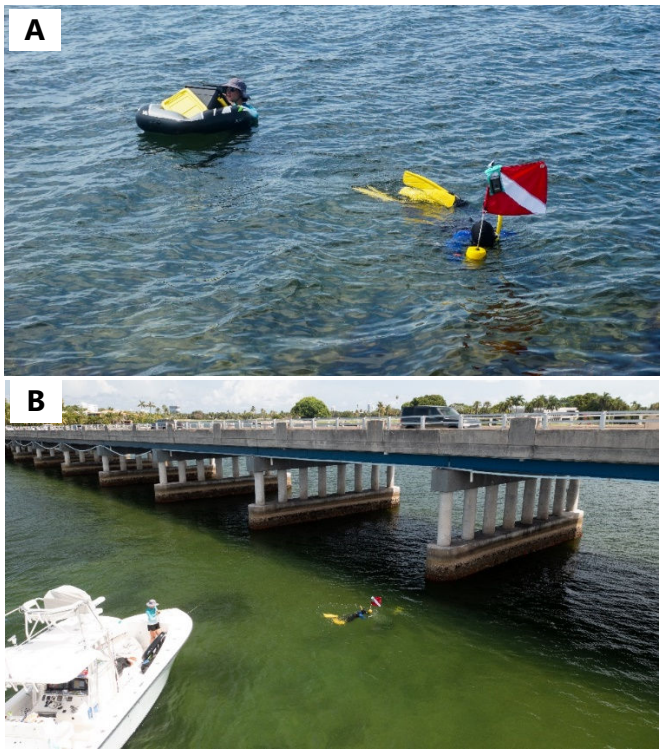


Exhibit 1. Seagrass edge-of-bed delineation. (A) biologists mapping seagrasses in shallow areas with one biologist snorkeling over the seagrass edge with a Trimble R1 GPS unit and a second biologist collecting the data using a GPS data collection unit; **(B)** biologists mapping seagrasses in deeper areas with a biologist diver locating the seagrass bed, a second biologist snorkeling over the seagrass edge with a Trimble R1 GPS unit, and an assistant on the boat collecting the data points with a GPS data collection unit.

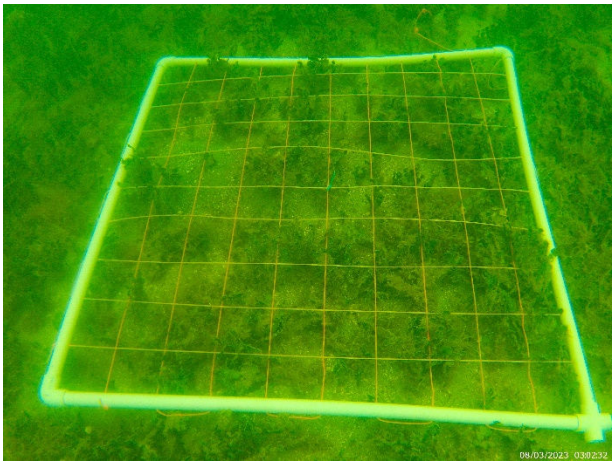


Exhibit 2. A 1-m^2 PVC *in-situ* SAV quadrat deployed in a seagrass bed within the survey area.

Within each *in-situ* SAV quadrat, biologists collected quantitative data using the following methods:

- Any drift algae present within a quadrat was recorded and then removed prior to assessing the quadrat for seagrass and rhizophytic macroalgae.
- Within each quadrat, a visual estimate of percent cover of SAV resources was collected. SAV abundance values were collected for each seagrass species, total seagrass, and total rhizophytic macroalgae. The abundance of seagrasses and rhizophytic macroalgae was estimated using a combination of the following methods based on SAV percent cover values:
    - A percent cover value (as estimated to the nearest 5% cover) was collected for any SAV category with ≥ 5% cover.
    - A Braun-Blanquet (B-B) density score was collected for any SAV category with < 5% cover (see **Table 2-1** for definitions).
    - If total SAV coverage includes both methods (e.g., seagrass cover estimated to nearest 5% and macroalgae with < 5% cover scored with B-B scores), then total SAV was estimated to the nearest 5%.
- Divers also recorded additional data for each SAV quadrat: water depth; substrate type (sand, silt, shell hash, rubble, hardbottom, other); sediment accumulation (none, light, moderate, or heavy); epiphyte coverage (yes/no); seagrass flowering (yes/no); and qualitative notes and signs/indicators of potential impacts to the seagrass bed (e.g., disease, bioturbation, propeller scars, scouring, shoaling, exposed rhizomes, burial, etc.). Sediment accumulation was considered "light" when there was a minimal amount of sediment present on SAV (i.e., SAV is lightly dusted with sediment), "moderate" when there was a thin layer of sediment present on SAV and/or there was a build-up of sediment at the base of SAV or between seagrass blades, and "heavy" when there was a substantial layer of sediment present on the SAV or partial burial was evident.
- A representative photograph of each quadrat was collected.

Data from the random SAV quadrat datasheets were entered into ESRI Survey123 application forms for incorporation into a project geodatabase. The Survey123 forms mimicked the datasheets used during field data collection.

Table 2-1 Braun-Blanquet (B-B) Density Scores for SAV Categories with < 5% cover

B-B Score	Definition
0	Taxa absent from quadrat
0.1	Taxa represented by a solitary shoot, < 5% cover
0.5	Taxa represented by a few (≤ 5) shoots, < 5% cover
1	Taxa represented by many (> 5) shoots, < 5% cover

2.3.2 Coral Assessment

Biologists completed an assessment of the coral and octocoral species within the survey area (i.e., attached to the natural substrate, seawalls, bridge piers, and submerged scour protection materials). For the purposes of this assessment, documented corals were defined by size and species. Coral data collection focused on the following colony size criteria for documentation:

- Scleractinian (stony) corals: ≥ 5 centimeters (cm) in diameter
- Octocorals (soft corals): ≥ 10 cm in height
- Federally listed coral species: all colonies documented regardless of size

These coral colony size criteria were utilized because they represent the minimum size for non-listed scleractinian corals and octocorals to be relocated from an impact area (based on the agency-approved coral mitigation plans for other local projects with coral impacts). Scleractinian corals were identified to species and octocorals were identified at least to genus. Any colonies of the seven federally threatened coral species (i.e., *Acropora cervicornis, Acropora palmata, Mycetophyllia ferox, Dendrogyra cylindrus, Orbicella annularis, Orbicella faveolata*, and *Orbicella franksi*) were documented regardless of colony size since all listed coral colonies are typically required to be relocated from an impact site.

A 100% visual survey for the presence of attached corals within the size criteria specified above was conducted for each of the existing seawalls and bridge piers within the survey area. The colony size (diameter/height) and colony health notes were documented for all coral colonies documented within the size criteria.

To obtain quantitative coral data for corals occurring on the natural substrate and on the scour protection materials adjacent to the seawalls, a series of 10-m-long belt transects were conducted. The width of the belt transects varied (1-m-wide or 2-m-wide) based on the width of the substrate being evaluated (i.e., 1-m-wide belt transects were conducted in the narrow areas of coral habitat occurring at base of the existing seawalls, while 2-m-wide belt transects were conducted in the live bottom habitat and off the northeast portion of the causeway island where concrete slabs extended further offshore). A 1-m-long PVC pipe was used as a visual guide for an accurate transect width (see **Exhibits 3A** and **3B**).

For each coral/octocoral colony (within the specified size criteria) documented on the existing seawall, on the bridge piers, and within the belt transects, the following information was collected:

- Scleractinian corals ≥ 5 cm in diameter were identified to species (for listed corals – all colonies were documented regardless of size); Octocorals ≥ 10 cm in height were identified at least to genus.
- A colony size measurement was documented [i.e., the maximum diameter for scleractinian corals (**Exhibit 3C**) and the maximum height for octocorals (**Exhibit 3D**)].
- Colony health information was documented (e.g., bleaching, paling, disease, predation, macroalgal or sponge overgrowth, or no apparent visual coral stressors, etc.).

It should be noted that based on the bushy and carpeting growth nature of the octocoral *Carijoa riisei* (snowflake coral), individual colony measurements were not collected; rather, the presence of this species was noted when encountered on coral belt transects and during the evaluation of the bridge piers and seawalls.

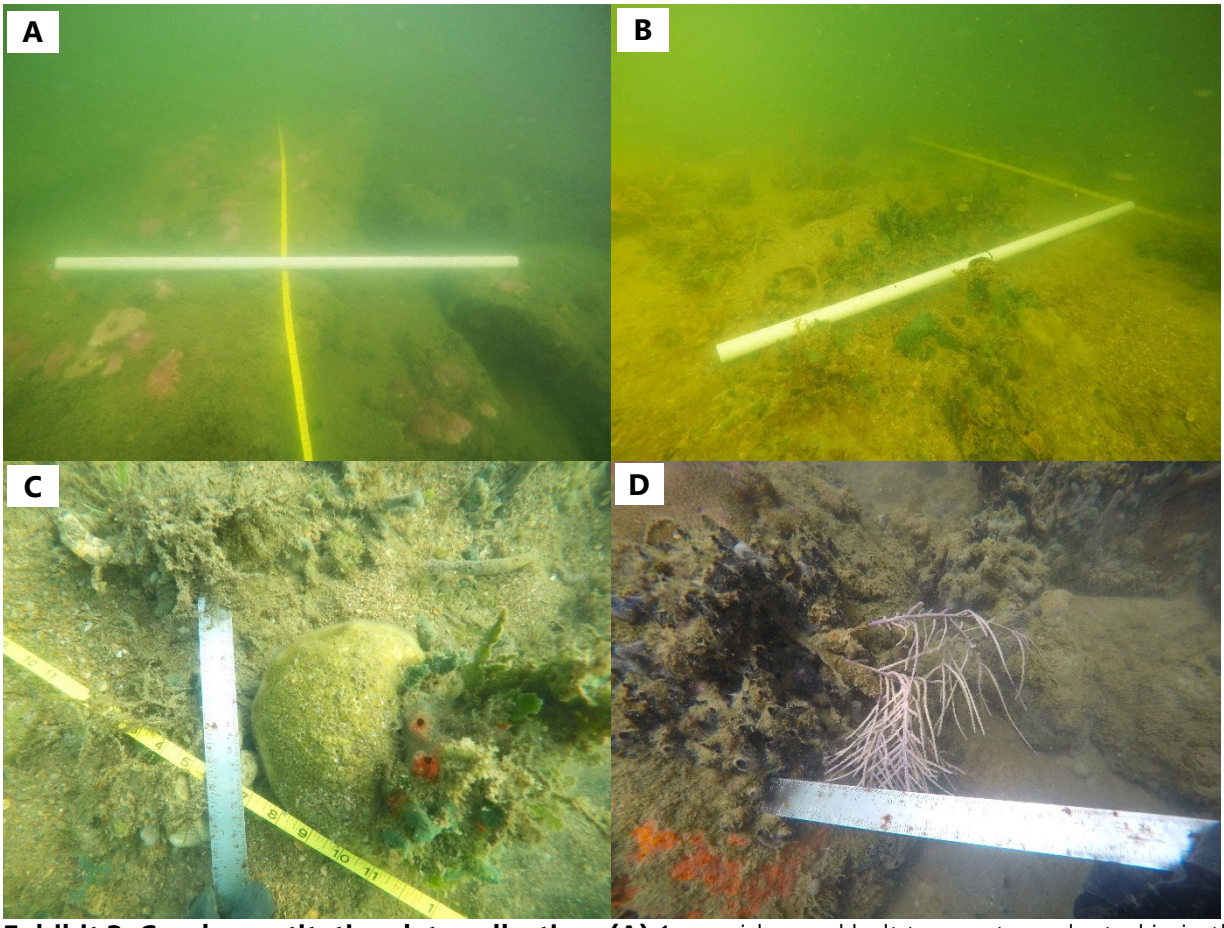


Exhibit 3. Coral quantitative data collection. (A) 1-m-wide coral belt transect conducted in in the narrow areas of coral habitat occurring at base of the existing seawalls (PVC pipe used as a visual guide for transect width); **(B)** 2-m-wide coral belt transect conducted in the live bottom community adjacent to the bridge (PVC pipe used as a visual guide for transect width); **(C)** diameter measurement of a scleractinian coral colony (*Solenastrea bournoni*); **(D)** height measurement of an octocoral (*Antillogorgia* sp.).

3.0 Results

AtkinsRéalis completed the 2023 quantitative benthic survey in July and August 2023 (specifically, July 17-21 and August 3, 4 and 11). The weather during the survey event was typically partly cloudy/sunny in the morning and early afternoon, changing to overcast with some passing thunderstorms and rain showers at mid-afternoon. Depending upon the tidal stage and location within the survey area, currents ranged from mild to very strong and water clarity varied from excellent to poor. Water depths within the surveyed area ranged from approximately 0-15 ft. Divers noted a murky surface layer on July 18-21 (likely associated with freshwater canal discharges), which impacted the water clarity within the project area. The visibility on the incoming tide during this time period was notably lower than visibility during the previous August 2022 preliminary benthic survey.

No listed threatened or endangered species (i.e., sturgeons, smalltooth sawfish, Nassau grouper, sharks, giant manta ray, manatees or other marine mammals, sea turtles, or corals) were encountered within the survey area during the 2023 quantitative benthic survey event. However, it should be noted two individual colonies of *Orbicella franksi* (boulder star coral, a federally listed threatened coral species) were previously observed within the 2022 preliminary benthic survey area, suggesting that this species is potentially present within the project area in extremely low numbers. A future benthic survey will be conducted prior to construction which will include a very thorough assessment and identification of coral colonies within the project impact area, including any listed coral colonies.

No colonies of listed coral species were encountered within the survey area during the 2023 quantitative benthic survey event; however, Orbicella franksi (a federally listed threatened species) was previously observed within the 2022 preliminary benthic survey area, suggesting that this species is potentially present within the project area in extremely low numbers.

3.1 Benthic Community Types

During the transect swims, biologists documented the locations of the various benthic community types occurring within the survey area. Divers collected additional GPS datapoints to delineate the extent of each seagrass bed/patch and the extent of different habitats occupied by corals. Five distinct benthic community types were identified within the survey area. **Figure 3-1** shows the benthic community types that were documented within the survey area. Each benthic community type is described below. Natural substrate types within the survey area included sand and silt. A list of benthic marine species observed during the 2023 quantitative benthic survey is provided in **Appendix B**.

Figure 3-1 Benthic Community Types Map



3.1.1.1 Community 1 - Macroalgal Beds

The dominant community type within the survey area was comprised of sandy substrate colonized by moderate-to-dense macroalgal beds. As shown in **Figure 3-1**, this community type was found through the majority of the survey area. The macroalgal beds were primarily dominated by the calcareous green alga, *Halimeda tuna*, and the red alga, *Laurencia* sp. Additional rhizophytic macroalgae observed within these macroalgal beds included the green algae, *Halimeda incrassata*, *H. opuntia*, *Caulerpa sertularoides*, *Caulerpa verticillata*, *Penicillus* sp., and *Acetabularia* sp.; the brown algae, *Dictyota* sp. and *Padina* sp.; and the red algae, *Halymenia* sp. and *Gracilaria* sp. Heavy epiphyte growth and some cyanobacterial overgrowth was observed within the macroalgal beds, suggesting high nutrient availability within this community. The macroalgal beds also contained sponges, as well as very rare instances of scleractinian corals and octocorals. Representative photographs from this Community 1 are provided in the **Photo Log – Page 1** in **Appendix C**. The benthic organisms observed within this community included:

- Sponges: row pore rope sponge (*Callyspongia tenerrima*), fire sponge (*Tedania* sp.), *Amphimedon viridis*, *Niphates* spp.
- Scleractinian corals: smooth star coral (*Solenastrea bournoni*), lesser starlet coral (*Siderastrea radians*)
- Octocorals: sea plume (*Antillogorgia* sp.), sea whip (*Leptogorgia* sp.)
- Other Species: variegated urchin (*Lytechinus variegatius*), Florida fighting conch (*Strombus alatus*)

3.1.1.2 Community 2 - Seagrass Beds/Patches

Within the survey area, seagrass beds/patches were documented in the northeast, southeast, and southwest quadrants of the bridge, as well as along the south side of the causeway island. See **Figure 3-1** for a map showing the locations of the Community 2 seagrass beds/patches within the survey area. Three seagrass species were documented within these beds/patches: *Halophila decipiens* (paddle grass), *Syringodium filiforme* (manatee grass), and *Thalassia testudinum* (turtle grass). Rhizophytic macroalgae were interspersed with the seagrasses in every seagrass bed/patch (i.e., the same macroalgal species found within Community 1, particularly *Halimeda* spp. And *Laurencia* sp.). Representative photographs from Community 2 are provided in the **Photo Log – Page 2** in **Appendix C**. Details on each seagrass bed/patch, including quantitative data, are provided in *Section 3.2* of this document.

3.1.1.3 Community 3 - Live Bottom

Along the existing bridge, areas of live bottom habitat were observed in close proximity to the existing bridge structure in all four quadrants of the bridge. **Figure 3-1** shows the extent of Community 3 – Live Bottom. On the west side of the bridge, the live bottom community was observed along a majority of the bridge. On the east side of the bridge, the extent of the live bottom community was substantially smaller and only observed adjacent to the eastern bascule pier. The substrate in this habitat consists of sand and shell fragments with scattered small rubble. No exposed hard or rocky substrate was observed (besides rubble), indicating that this is a live bottom community, rather than

a hard bottom community. Sponges were the dominant benthic component, with macroalgae, hydroids, corals, and tunicates also documented. Both scleractinian corals and octocorals were observed within this community type. Coral colony counts, along with colony size and health data are provided in **Section 3.3** of this document. Representative photographs from Community 3 are provided in the **Photo Log – Page 3** in **Appendix C**. The benthic organisms observed within this community included:

- Sponges: row pore rope sponge (*C. tenerrima*), fire sponge (*Tedania* sp.), orange-veined encrusting sponge (*Clathria curacaoensis*), *A. viridis*, *Niphates* spp., black ball sponge (*Ircinia strobilina*), stinker sponge (*Ircinia felix*), vase sponge (*Ircinia campana*), loggerhead sponge (*Spheciospongia vesparium*)
- Scleractinian corals: smooth star coral (*Solenastrea bournoni*), knobby star coral (*Solenastrea hyades*), lesser starlet coral (*Siderastrea radians*)
- Octocorals: sea plumes (*Antillogorgia* sp.), sea whips (*Leptogorgia* sp.), snowflake coral (*C. riisei*)
- Other Species: branching hydroid (*Sertularella* sp.), variegated urchin (*Lytechinus variegatius*), long-spined sea urchin (*Diadema antillarum*)

The substrate directly beneath the existing bridge was comprised of a similar benthic community dominated by sponges; however, the shading beneath the bridge has prevented colonization by scleractinian corals and octocorals, with the exception of the octocoral *Carijoa riisei*, which lacks algal symbionts and is able to grow in shaded environments.

3.1.1.4 Community 4 - Coral Habitat Adjacent to the Seawalls

Benthic habitat suitable for coral colonization is located adjacent to the seawalls within the survey area. **Figure 3-1** shows the extent of Community 4 – Coral Habitat Adjacent to the Seawalls. Scour protection materials are located immediately adjacent to the base of the seawalls present within the project area. These scour protection materials provide suitable substrate for coral colonization and both scleractinian corals and octocorals were observed to have colonized this habitat. At the base of the seawall on the east side of the survey area, the scour protection materials were interspersed with sand and rubble and consisted of riprap, rubble, and concrete blocks. At the base of the western seawall along the causeway island, scour protection materials (e.g., intermittent riprap, rubble, and concrete blocks and slabs) are interspersed with sandy substrate and rubble occupied by macroalgae and corals. Very large concrete blocks and slabs were concentrated at the base of the seawall in the southeastern portion of the causeway island. In addition, along the north side of the causeway island there is an area of large concrete slabs on the substrate with corals attached (see **Figure 3-1**). Representative photographs from Community 4 are provided in the **Photo Log – Page 4** in **Appendix C**.

3.1.1.5 Community 5 – Existing Seawalls and Bridge Piers

The existing seawalls and bridge piers within the survey area provide suitable habitat for coral colonization.

Seawalls. Existing sheet pile seawalls are located along the land boundary on the causeway island on the west side of the bridge and the land boundary on the east side of the bridge (see **Figure 3-1** for the location of the seawalls within the survey area). The existing seawalls (wall and associated support pilings) are heavily colonized by sponges and turf algae. Corals were also observed to be attached to the seawalls. It should be noted that at the time of the survey, biologists were not able to assess the very northern extent of the seawall on the east side of the bridge (i.e., the private seawall located within the boundaries of private property at 9640 W Broadview Drive) due to a docked vessel (this area is depicted on **Figure 3-1**). Coral colony counts, along with colony size and health data are provided in *Section 3.3* of this document. Representative photographs from Community 5 are provided in the **Photo Log – Page 5** in **Appendix C**. The organisms attached to the seawalls included:

- Sponges: *Iotrochota arenosa*, *Plakortis* sp., *A. viridis*, *Clinoa* sp., orange-veined encrusting sponge (*C. curacaoensis*), variable boring sponge (*Siphonodictyon coralliphagum*)
- Scleractinian corals: lesser starlet coral (*S. radians*), ivory bush coral (*Oculina diffusa*)
- Octocorals: snowflake coral (*C. riisei*)
- Other Species: mangrove tunicate (*Ecteinascidia turbinata*), long-spined sea urchin (*D. antillarum*), split-crown feather duster (*Anamobaea oerstedii*)

Bridge Piers. There are a total of 29 individual bridge piers associated with the existing bridge, including eight bridge piers on the west side of the existing drawbridge, 19 bridge piers on the east side of the existing drawbridge, and two existing bascule piers (one east bascule pier and one west bascule pier) on either side of the existing drawbridge. The existing bridge piers are heavily encrusted by sponges, hydroids, and tunicates which generally interferes with coral colonization; however, small numbers of corals were documented on the outer edges of the bridge piers exposed to sunlight. Coral colony counts, along with colony size and health data are provided in **Section 3.3** of this document. Representative photographs of the bridge piers are provided in the **Photo Log – Page 5** in **Appendix C**. The organisms attached to the bridge piers included:

- Sponges: *I. arenosa*, fire sponge (*Tedania* sp.), *A. viridis*, *Desmapsamma anchorata*, *Plakortis* sp., *Callyspongia* spp., *Clinoa* spp.
- Scleractinian corals: lesser starlet coral (*S. radians*), ivory bush coral (*O. diffusa*), smooth star coral (*S. bournoni*),
- Octocorals: snowflake coral (*C. riisei*)
- Other Species: mangrove tunicate (*E. turbinata*), long-spined sea urchin (*D. antillarum*)

3.2 Seagrass

3.2.1 Seagrass Bed/Patch Locations

Biologists observed seagrass in water depths of ~3-13 ft in three quadrants of the bridge (i.e., northeast, southeast, and southwest), as well as south of the causeway island (see **Figure 3-1**). A total of 18 separate seagrass beds (named as SA-SR) were delineated within the survey area,

representing 5,410.35 m^2 or 1.34 ac. Three species of seagrass were documented within the survey area: *H. decipiens* (paddle grass), *S. filiforme* (manatee grass), and *T. testudinum* (turtle grass). **Table 3-1** presents the size and species composition of each of the seagrass beds observed within the survey area.

Figures 3-2, 3-3, 3-4, and **3-5** present maps of each seagrass bed/patch, along with species composition. As shown in **Table 3-1**, the majority of seagrasses observed within the project area were located in the southeast quadrant of the bridge (~0.74 ac), followed by the southwest quadrant of the bridge (~0.42 ac), the south side of the causeway island (~0.13 ac), and finally the northeast quadrant of the bridge (~0.05 ac). *H. decipiens* was by far, the most common seagrass species observed within the survey area, found within 17 of the 18 documented seagrass beds/patches. *T. testudinum* and *S. filiforme* were found on the south side of the survey area in only five beds and one bed, respectively (**Table 3-1**).

Two species of seagrass, *H. decipiens* and *T. testudinum*, were documented on the east side of the bridge. In the northeast quadrant of the bridge, three small seagrass beds/patches of *H. decipiens* (Bed SA, SB, and SQ) were documented, totaling 225.78 m^2 (0.053 ac) (see **Figure 3-2**). In the southeast quadrant of the bridge, eight seagrass beds/patches (Beds SI-SO and SR) were documented, totaling 2,978.80 m^2 (0.74 ac) (see **Figures 3-2** and **3-3**). Except for seagrass Bed SM, these beds were comprised entirely of *H. decipiens*. Seagrass Bed SM was observed by the biologists to be comprised of very sparse *T. testudinum*. In the southwest quadrant of the bridge, three seagrass patches/beds (Beds SF-SH) totaling 1,697.57 m^2 (0.42 ac) were documented (see **Figure 3-4**). All three beds (Beds SF-SH) were observed to contain both *H. decipiens* and *T. testudinum*.

Within the survey area on the south side of the causeway island, four seagrass beds/patches (Beds SC-SE and SP) ranging in size from 5.20 - 307.54 m^2 (0.001 - 0.08 ac), were observed (see **Figure 3-5**). Seagrass species observed in the largest seagrass bed (Bed SD) on the south side of the causeway island included all three species of seagrass: *T. testudinum*, *S. filiforme,* and *H. decipiens*. The remaining three seagrass beds/patches (Bed SC, SE, and SP) were comprised entirely of *H. decipiens*.

The largest seagrass beds within the survey area (Beds SH, SK, and SI) were located on the southwest and southeast quadrants of the bridge and were comprised of beds of *H. decipiens* (Beds SK and SI) and a mixed bed of *T. testudinum* and *H. decipiens* (Bed SH) (see **Figures 3-2, 3-3,** and **3-4**).

Table 3-1 Seagrass Documented within the Survey Area

General Location within the Survey Area	Seagrass Bed	Total Area (m^2)	Total Area (ac)	Seagrass Species
NE Quadrant of Bridge	SA	164.26	0.04	*Halophila decipiens*
	SB	48.33	0.01	*Halophila decipiens*
	SQ	13.19	0.003	*Halophila decipiens*
	Total	**225.78**	**0.05**	***Halophila decipiens***
SE Quadrant of Bridge	SI	894.39	0.22	*Halophila decipiens*
	SJ	670.03	0.17	*Halophila decipiens*
	SK	989.42	0.24	*Halophila decipiens*
	SL	240.89	0.06	*Halophila decipiens*
	SM	8.82	0.002	*Thalassia testudinum*
	SN	31.24	0.007	*Halophila decipiens*
	SO	143.91	0.04	*Halophila decipiens*
	SR	0.10	0.00002	*Halophila decipiens*
	Total	**2978.80**	**0.74**	***Halophila decipiens Thalassia testudinum***
SW Quadrant of Bridge	SF	345.78	0.09	*Halophila decipiens Thalassia testudinum*
	SG	179.39	0.04	*Halophila decipiens Thalassia testudinum*
	SH	1172.40	0.29	*Halophila decipiens Thalassia testudinum*
	Total	**1697.57**	**0.42**	***Halophila decipiens Thalassia testudinum***
South Side of Causeway Island	SC	162.49	0.04	*Halophila decipiens*
	SD	307.54	0.08	*Halophila decipiens Syringodium filiforme Thalassia testudinum*
	SE	32.97	0.008	*Halophila decipiens*
	SP	5.20	0.001	*Halophila decipiens*
	Total	**508.20**	**0.13**	***Halophila decipiens Syringodium filiforme Thalassia testudinum***
Entire Survey Area	**18**	**5410.35**	**1.34**	***Halophila decipiens, Syringodium filiforme Thalassia testudinum***

Figure 3-2 Seagrass Beds/Patches in the Northeast and Southeast Quadrants of the Bridge (Beds SA, SB, SQ, SK, SL & SR)

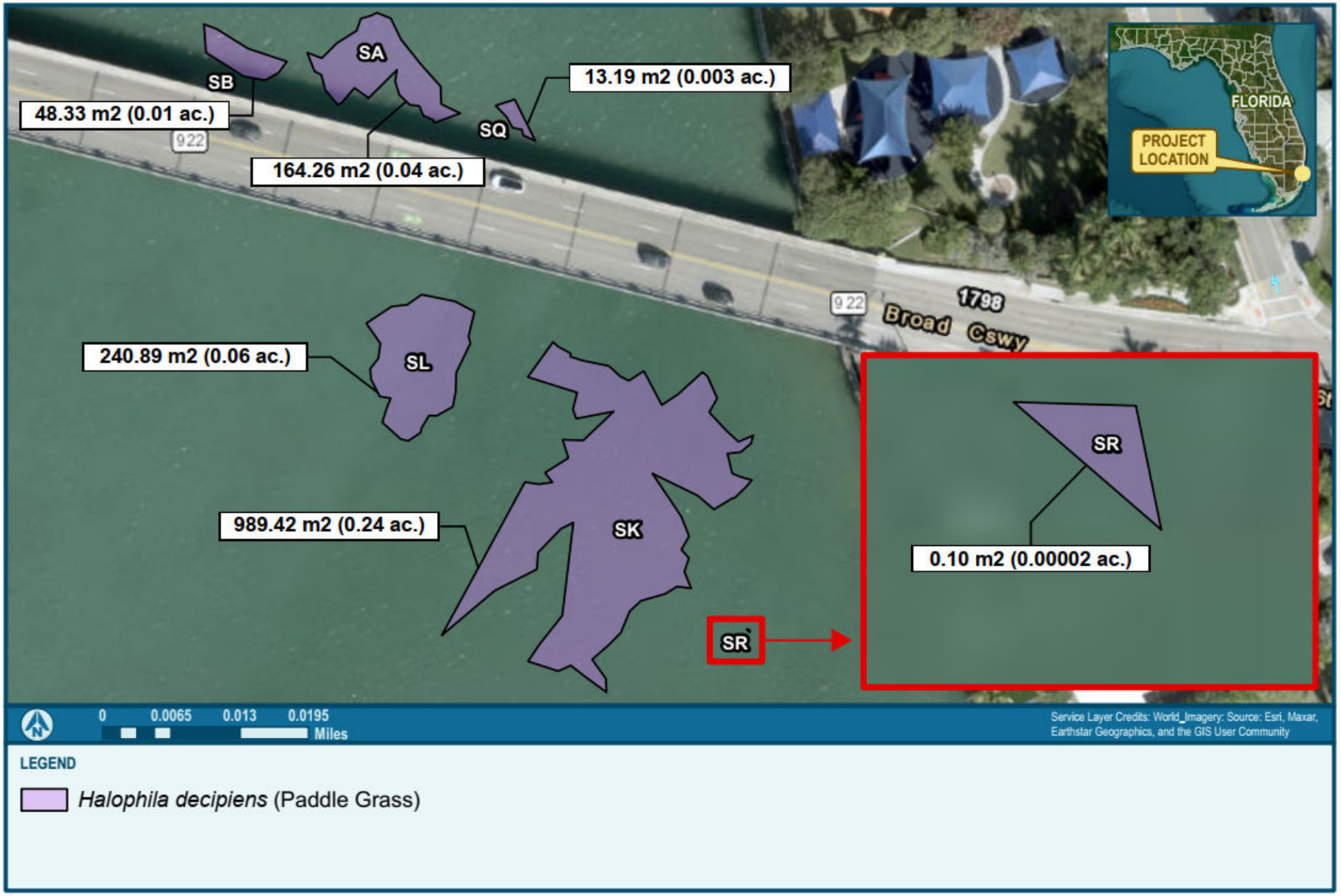


Figure 3-3 Seagrass Beds/Patches in the Southeast Quadrant of the Bridge (Beds SI, SJ, SM, SN & SO)

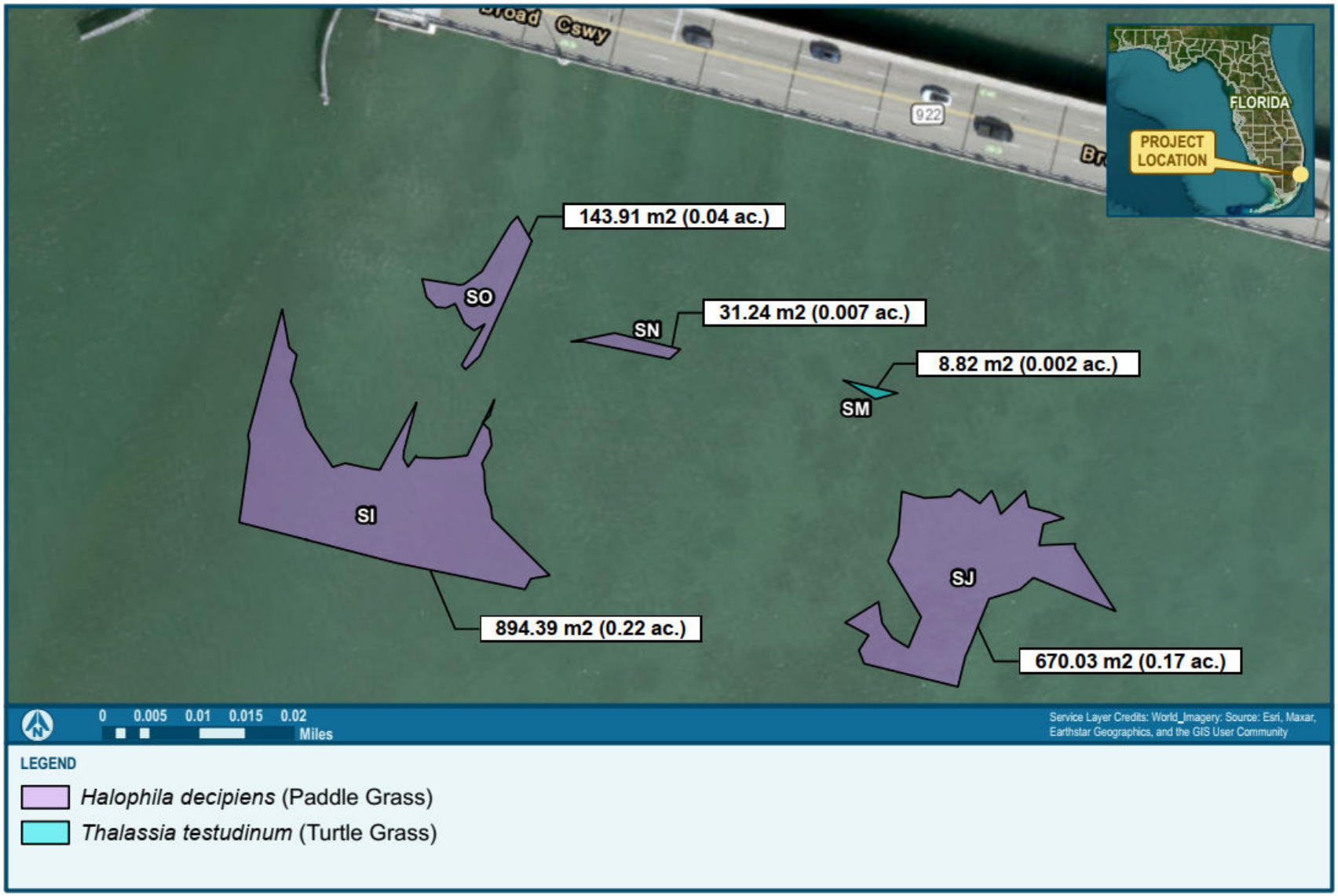


Figure 3-4 Seagrass Beds/Patches in the Southwest Quadrant of the Bridge (Beds SF, SG & SH)

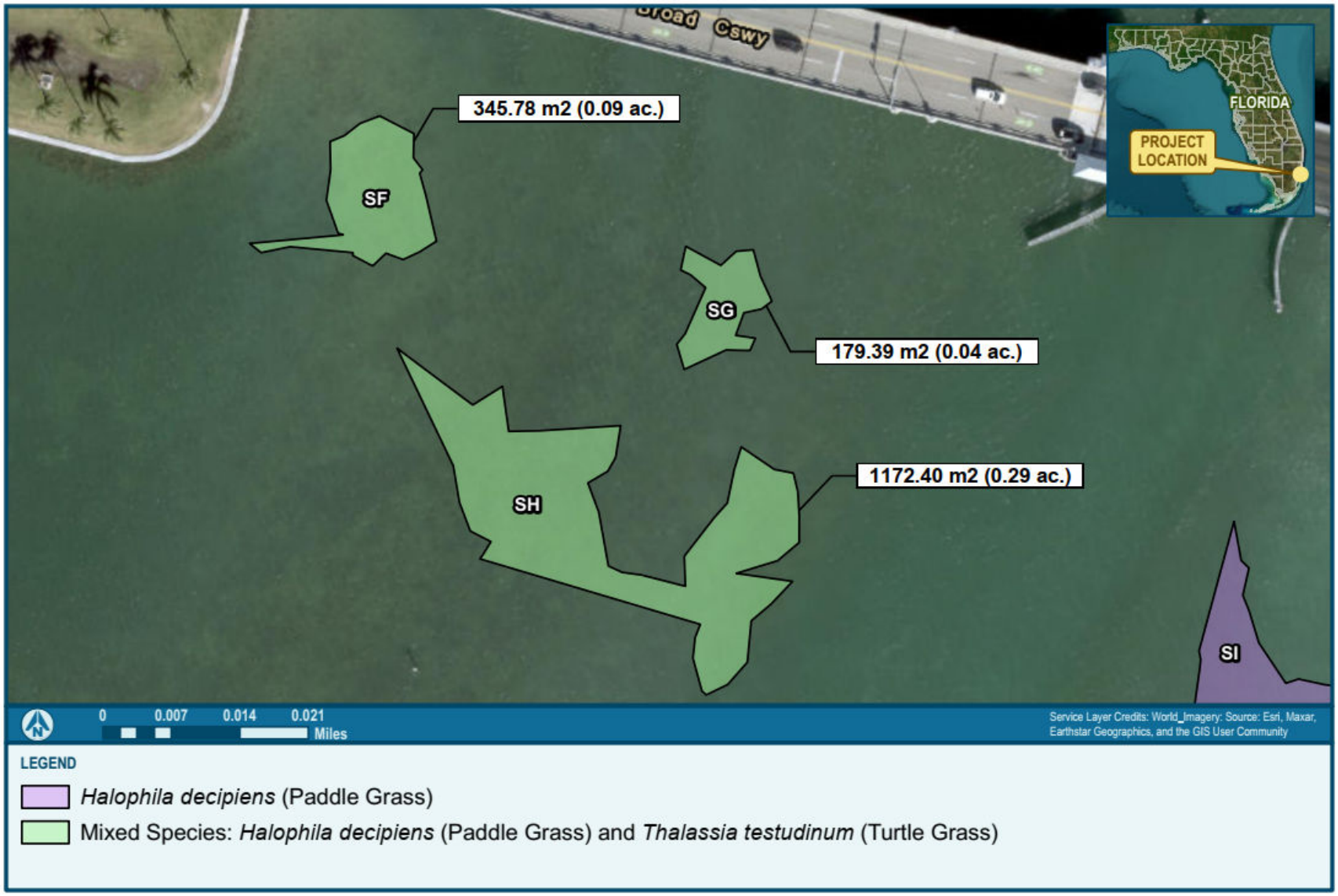
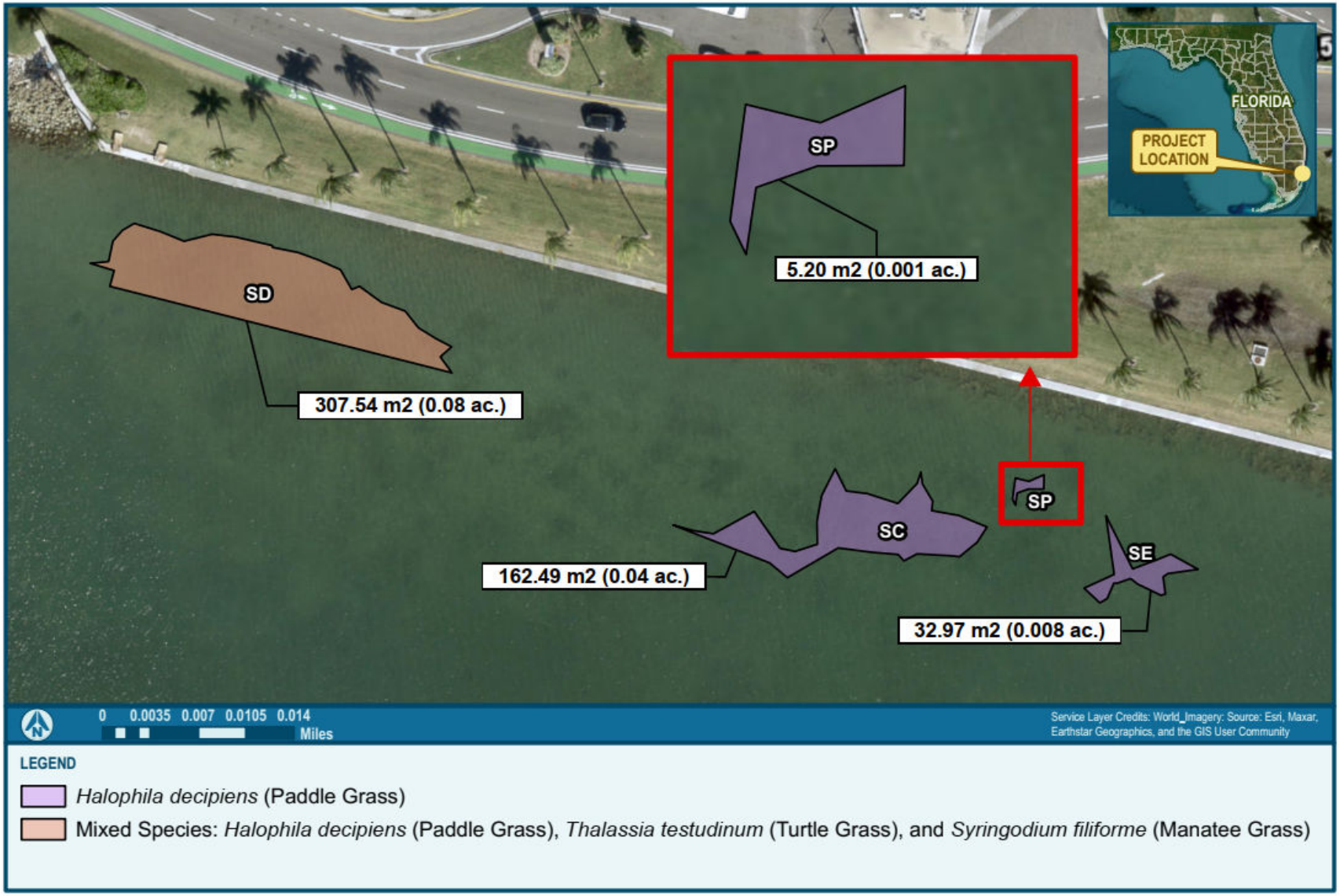


Figure 3-5 Seagrass Beds/Patches Along the South Side of the Causeway Island (Beds SC, SD, SE & SP)



3.2.2 SAV Quadrat Data

A total of 161 *in-situ* SAV quadrats were conducted within 15 seagrass beds (Beds SA-SO), which represents a sampling coverage of ~3% of the total seagrass area mapped within the survey area (~5410 m^2). **Figure 3-6** shows the locations of the 161 SAV quadrats conducted within the survey area. No quadrats were conducted within three of the 18 seagrass beds (Beds SP, SQ, and SR) based on the random quadrat casting completed in ArcGIS Online which is based on bed size and shape (i.e., a bed size of less than 15 m^2 or with an irregular shape in which a 1-m^2 quadrat could not be randomly placed within the bed without being at least 1-meter from the boundary of the bed [3-m total width]). The *in-situ* quadrat data were analyzed to determine seagrass densities and other associated data for the seagrass beds within the survey area. To calculate the mean percent cover of seagrass, any recorded B-B scores (representing percent cover values below 5% cover) were converted to percent cover values via interpolation of the midpoint. Thus, a B-B score of "1" was assigned a percent cover value of 3% (halfway point between 1% and 5%). A B-B score of "0.5" and "0.1" were assigned a percent cover value of 1%. **Table 3-2** provides a summary of the SAV quadrat data observed within the seagrass beds in the survey area.

The mean percent cover of total seagrass across all 161 SAV quadrats was ~9.61%. Total seagrass densities within the seagrass beds (mean percent cover of total seagrass) ranged from 0.00% (Beds SM and SN) to ~44.11% (Bed SD). It should be noted that while there was no seagrass recorded within the quadrats conducted in Beds SM and SN, biologists did observe seagrass within these beds, suggesting that the seagrasses were very sparse within Beds SM and SN. When considering all seagrass within the entire survey area, *H. decipiens* had the highest seagrass density (mean total percent cover of ~5.85%), followed by *S. filiforme* (~2.42%), and *T. testudinum* (~1.34%).

In the northeast quadrant of the bridge, a total of six quadrats were conducted within two seagrass beds (Beds SA and SB). These seagrass beds were comprised entirely of *H. decipiens* with a total mean percent cover of seagrass of ~4.00%. The mean percent coverage of total seagrass was ~4.60% for Bed SA and ~1.00% for Bed SB.

In the southeast quadrant of the bridge, a total of 90 quadrats were conducted within seven seagrass beds/patches (Beds SI-SO). The mean percent cover of total seagrass for these 90 quadrats was the lowest in the survey area (~3.01%) and ranged from 0.00% (Beds SM and SN – suggesting very sparse seagrass densities) to ~4.50% (Bed SI). Only *H. decipiens* was recorded within the quadrats within these seven seagrass beds; however, it should be noted that biologists did visually observe *T. testudinum* within Bed SM.

In the southwest quadrant of the bridge, a total of 50 quadrats were conducted within three seagrass beds/patches (Beds SF, SG, and SH). The mean percent cover of total seagrass for these 50 quadrats was ~16.98% and ranged from ~1.00% (Bed SG) to ~20.90% (Bed SF). Within these three beds, *H. decipiens* had a mean percent cover of ~12.80% and *T. testudinum* had a mean percent cover of ~4.18%. Of these three seagrass beds/patches, the quadrats within Bed SF only contained *T. testudinum* present; however, biologists also observed *H. decipiens* within this bed. Similarly, the quadrats within Beds SG and SH were found to contain only *H. decipiens*; however, biologists also observed *T. testudinum* within these beds/patches.

Figure 3-6 SAV Quadrat Locations

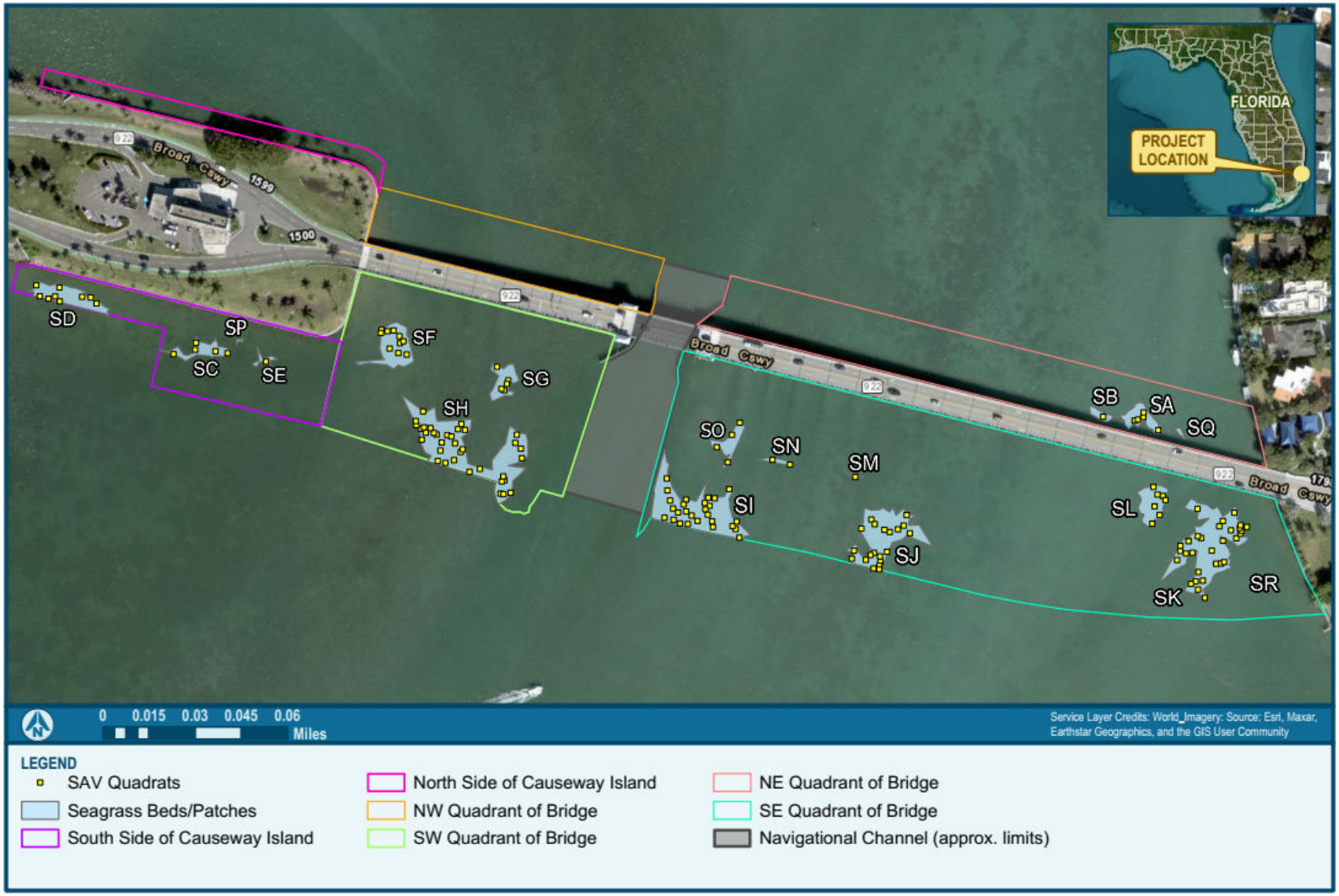


Table 3-2 SAV Quadrat Data Summary

General Location within the Survey Area	Seagrass Bed	Total No. of Quadrats	Mean Total % Cover of Seagrass	Mean % Cover of Halophila decipiens	Mean % Cover of Syringodium filiforme	Mean % Cover of Thalassia testudinum	Mean Total % Cover of Macroalgae	% of Quadrats with Drift Algae	% of Quadrats with Light or Moderate Sedimentation	% of Quadrats with Epiphytes	% of Quadrats with Cyanobacteria
Northeast Quadrant of Bridge	SA	5	4.60%	4.60%	--	--	16.60%	40.00%	100.00%	40.00%	80.00%
	SB	1	1.00%	1.00%	--	--	95.00%	--	100.00%	100.00%	--
	SQ	--	--	--	--	--	--	--	--	--	--
	Total	**6**	**4.00%**	**4.00%**	**0.00%**	**0.00%**	**29.67%**	**20.00%**	**100.00%**	**70.00%**	**40.00%**
Southeast Quadrant of Bridge	SI	26	4.50%	4.50%	--	--	83.38%	61.54%	100.00%	100.00%	--
	SJ	20	1.85%	1.85%	--	--	72.75%	40.00%	100.00%	100.00%	--
	SK	30	2.60%	2.60%	--	--	38.37%	13.33%	100.00%	70.00%	56.67%
	SL	7	4.14%	4.14%	--	--	17.29%	14.29%	100.00%	100.00%	85.71%
	SM	1	--	--	--	--	100.00%	--	100.00%	100.00%	--
	SN	2	--	--	--	--	97.50%	--	100.00%	100.00%	--
	SO	4	2.50%	2.50%	--	--	83.75%	50.00%	100.00%	100.00%	50.00%
	SR	--	--	--	--	--	--	--	--	--	--
	Total	**90**	**3.01%**	**3.01%**	**0.00%**	**0.00%**	**61.39%**	**25.59%**	**100.00%**	**95.71%**	**27.48%**
Southwest Quadrant of Bridge	SF	10	20.90%	--	--	20.90%	56.50%	80.00%	100.00%	100.00%	--
	SG	5	1.00%	1.00%	--	--	92.00%	60.00%	80.00%	100.00%	--
	SH	35	18.14%	18.14%	--	--	76.14%	94.29%	91.43%	100.00%	--
	Total	**50**	**16.98%**	**12.80%**	**0.00%**	**4.18%**	**73.80%**	**78.10%**	**92.00%**	**100.00%**	**0.00%**
South Side of Causeway Island	SC	5	1.00%	1.00%	--	--	95.00%	100.00%	100.00%	100.00%	20.00%
	SD	9	44.11%	0.11%	43.33%	0.67%	54.22%	55.56%	100.00%	100.00%	--
	SE	1	1.00%	1.00%	--	--	90.00%	--	100.00%	100.00%	--
	SP	--	--	--	--	--	--	--	--	--	--
	Total	**15**	**26.87%**	**0.44%**	**24.38%**	**1.31%**	**70.20%**	**51.85%**	**100.00%**	**100.00%**	**6.67%**
Entire Survey Area		**161**	**9.61%**	**5.85%**	**2.42%**	**1.34%**	**64.88%**	**54.04%**	**97.52%**	**92.55%**	**18.63%**

Along the south side of the causeway island, a total of 15 quadrats were conducted within three seagrass beds/patches (Beds SC, SD, and SE). The mean percent cover of total seagrass for these 15 quadrats was the highest in the survey area (~26.87%) and ranged from ~1.00% (Beds SC and SE) to ~44.11% (Bed SD). Within these 15 quadrats, *S. filiforme* had the highest mean percent cover of ~24.38%, followed by *T. testudinum* (~1.31%), and *H. decipiens* (~0.44%). While the largest seagrass bed within the survey area (Bed SD) contained a mixture of *S. filiforme* (mean percent cover of ~43.33%), *T. testudinum* (mean percent cover of ~0.67%), and *H. decipiens* (mean percent cover of ~0.11%), the other seagrass beds/patches located south of the causeway island were comprised entirely of sparse *H. decipiens*.

The mean total percent cover of macroalgae within all 161 SAV quadrats was substantial (~64.88%) and ranged from ~16.60% (Bed SA) to 100.00% (Bed SM). The density of macroalgae was highest in the southwest quadrant of the bridge (mean total percent cover of ~73.80%), followed by the south side of the causeway island (~70.20%), the southeast quadrant of the bridge (~61.39%), and the northeast quadrant of the bridge (~29.67%). The sediment type documented within quadrats included both "sand" (~57.14% of quadrats) and "silt" (~42.86% of quadrats, documented only within Beds SD, SE, SI, SK, SL, SN, and SO south of the bridge). Drift algae was present in over half (~54.04%) the SAV quadrats. Sediment accumulation was noted within the vast majority (~97.52%) of the SAV quadrats (i.e., light sedimentation in ~74.53% of quadrats; moderate sedimentation in ~22.98% of quadrats; heavy sedimentation in 0.00% of quadrats; and no sedimentation in 2.48% of quadrats). Epiphyte presence was very common and present within 92.55% of the 161 SAV quadrats. Cyanobacteria was noted to be present within ~18.63% of the 161 SAV quadrats and was most common in the quadrats on the east side of the bridge (i.e., (~40.00% of quadrats had cyanobacteria present in the northeast quadrant of the bridge and ~27.48% of quadrats in the southeast quadrant of the bridge). Cyanobacteria was noted to be absent from the SAV quadrats in the southwest quadrant of the bridge.

3.3 Corals

Quantitative coral data were obtained via coral belt transects and 100% visual assessments. Coral belt transects were conducted to collect quantitative coral data within Community 3 - Live Bottom and Community 4 – Coral Habitat Adjacent to the Seawalls. Within Community 5 – Existing Seawalls and Bridge Piers, a 100% visual assessment of the seawalls and bridge piers was conducted. Because the macroalgal beds within the survey area contained only very rare instances of scleractinian corals and octocorals, qualitative coral data were not collected within the macroalgal bed community type. It should be noted that a future benthic survey will be conducted prior to construction which will include a very thorough assessment and identification of coral colonies within the project impact area, including any corals that would be impacted within Community 1 – Macroalgal Beds.

As mentioned previously, it should be noted that no colonies of listed coral species were encountered within the survey area during the 2023 quantitative benthic survey event; however, two individual colonies of *O. franksi* (federally listed threatened coral species) were previously observed within the 2022 preliminary benthic survey area, suggesting that this species is potentially present within the project area in extremely low numbers. A future benthic survey will be conducted prior to

construction which will include a very thorough assessment and identification of coral colonies within the project impact area, including any listed coral colonies.

3.3.1 Coral Belt Transects

A total of 19 quantitative coral belt transects (i.e., T1-T19) were conducted within the survey area. The location of the coral belt transects were haphazardly placed in the field in an effort to provide adequate sampling coverage of the coral habitat within the survey area (i.e., live bottom and coral habitat adjacent to the seawalls). **Figure 3-7** shows the locations of each of the 19 coral transects. As described in *Section 2.3.2* of this document, the width of the belt transects varied (1-m-wide or 2-m-wide) based on the width of the substrate being evaluated. Of the 19 quantitative coral transects, 10 were 1-m-wide and the remaining nine transects were 2-m-wide. **Table 3-3** summarizes the general location and sampling area for each of the coral belt transects. The 19 coral belt transects sampled a total area of ~280 m^2, which is ~7.48% of the ~3,744 m^2 of benthic coral habitat documented (i.e., Community 3 - Live Bottom and Community 4 – Coral Habitat Adjacent to the Seawalls). **Figure 3-8** summarizes the findings of the coral data within Community 3 – Live Bottom and Community 4 – Coral Habitat Adjacent to the Seawalls.

3.3.2 Corals in Community 3 – Live Bottom

Eight belt transects (T8-T13 and T18-T19, each 10-m-long x 2-m-wide) were conducted within Community 3 – Live Bottom (see **Figure 3-7**). A total of 33 coral colonies (32 scleractinian coral colonies and one octocoral colony) were documented within the eight belt transects. This provides a mean coral colony density of ~0.21 colonies/m^2 for all of Community 3 (**Table 3-4**). Eight scleractinian coral species (i.e., *S. bournoni, S. radians, S. siderea, S. hyades, S. intersepta, Pseudodiploria clivosa, Porites astreoides,* and *O. diffusa*) and one octocoral genus (i.e., *Antillogorgia* sp.) were documented within the eight live bottom coral transects (**Table 3-5**). In addition, the octocoral *Carijoa riisei* was documented in coral transects in the southwest (T9) and northeast (T19) quadrants of the bridge. *S. bournoni* was the dominant coral species, comprising ~48.48% of the 33 colonies, followed by *S. radians* (~24.24%), *S. siderea* and *S. hyades* (each ~6.06%), and a single colony each (~3.03%) of *S. intersepta, P. clivosa, P. astreoides, O. diffusa*, and *Antillogorgia* sp. The majority (~69.70%) of the 33 coral colonies showed visual signs of coral stress, including macroalgal overgrowth (3.03%), sponge overgrowth (9.09%), boring organisms (9.09%), bleaching (15.15%), partial bleaching (12.12%), and paling (21.21%; **Table 3-6**). The most common visual coral stressor was colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted half of the recorded colonies (~48.48%) in Community 3.

The vast majority of coral colonies documented within the Community 3 coral belt transects were documented on the east side of the bridge, specifically in the southeast quadrant of the bridge (coral transect T18) where there was a substantial amount of bridge debris, cables, and other hard structures located within the transect. A total of 26 scleractinian coral colonies were documented within T18 on the southeast side of the bridge (mean coral colony density of ~1.30 colonies/m^2) (**Table 3-4** and **Figure 3-8**). These 26 colonies were comprised of eight scleractinian coral species: *S. bournoni, S. radians, S. siderea, S. hyades, Stephanocoenia intersepta, P. clivosa, P. astreoides,* and *O. diffusa* (**Table 3-5**). There were no octocorals documented within T18 in the southeast quadrant

Figure 3-7 Coral Belt Transect Locations Map

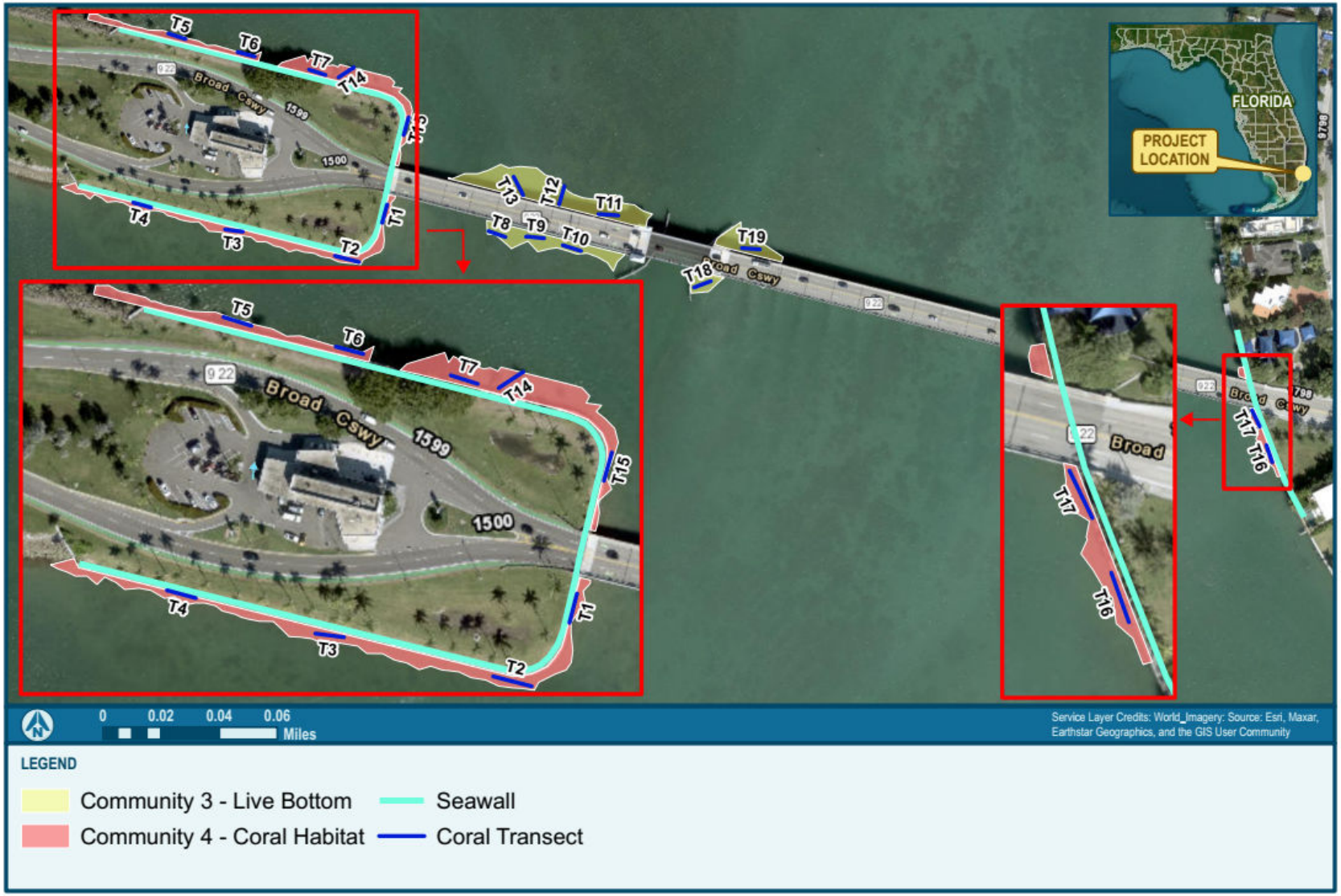
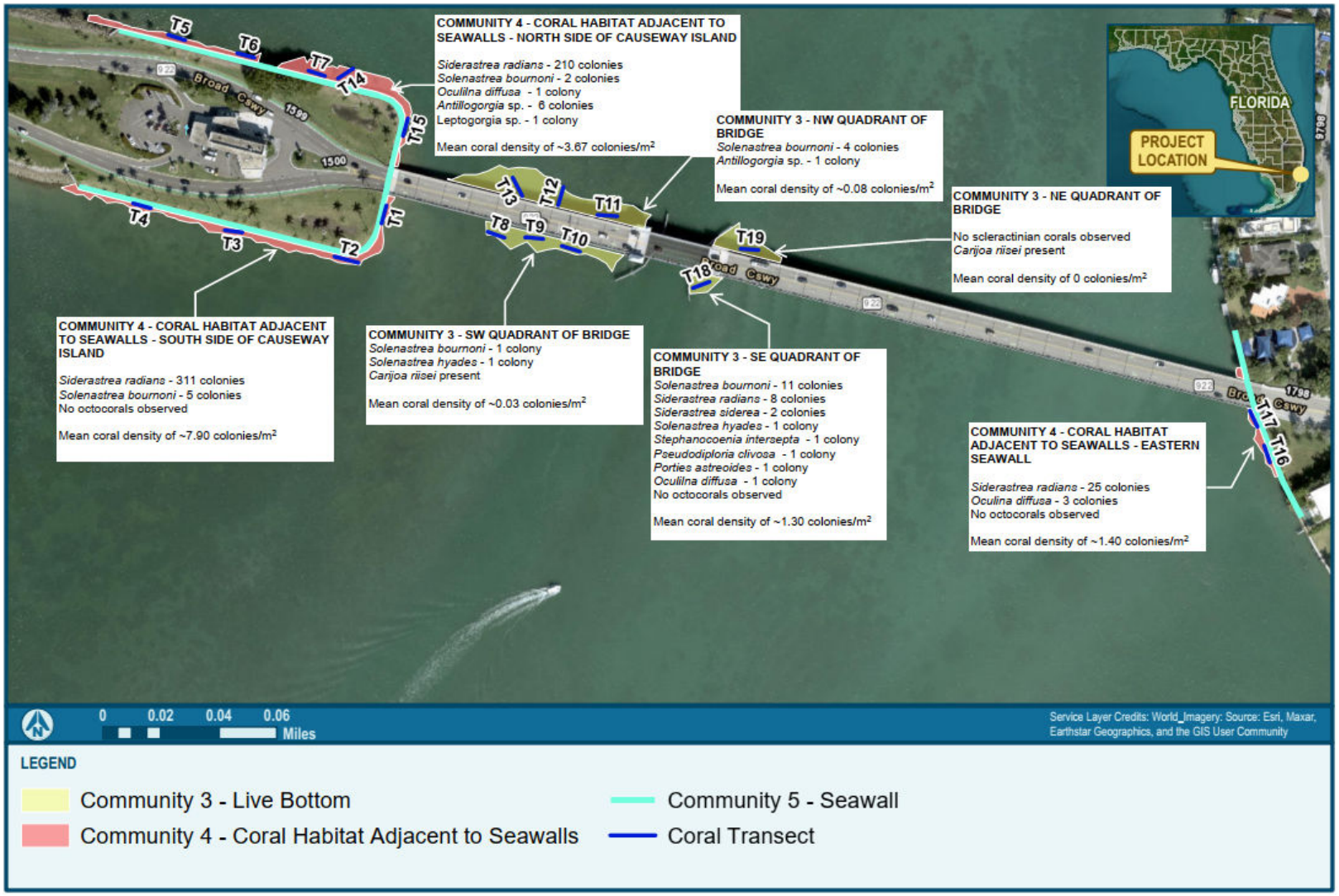


Table 3-3 Coral Belt Transects

Coral Belt Transect	Community Type	General Location within the Project Area	Area Sampled
T 1	Community 4 – Coral Habitat Adjacent to Seawalls	South Side of Causeway Island	10 m^2
T 2	Community 4 – Coral Habitat Adjacent to Seawalls	South Side of Causeway Island	10 m^2
T 3	Community 4 – Coral Habitat Adjacent to Seawalls	South Side of Causeway Island	10 m^2
T 4	Community 4 – Coral Habitat Adjacent to Seawalls	South Side of Causeway Island	10 m^2
T 5	Community 4 – Coral Habitat Adjacent to Seawalls	North Side of Causeway Island	10 m^2
T 6	Community 4 – Coral Habitat Adjacent to Seawalls	North Side of Causeway Island	10 m^2
T 7	Community 4 – Coral Habitat Adjacent to Seawalls	North Side of Causeway Island	10 m^2
T 8	Community 3 – Live Bottom	Southwest Quadrant of Bridge	20 m^2
T 9	Community 3 – Live Bottom	Southwest Quadrant of Bridge	20 m^2
T 10	Community 3 – Live Bottom	Southwest Quadrant of Bridge	20 m^2
T 11	Community 3 – Live Bottom	Northwest Quadrant of Bridge	20 m^2
T 12	Community 3 – Live Bottom	Northwest Quadrant of Bridge	20 m^2
T 13	Community 3 – Live Bottom	Northwest Quadrant of Bridge	20 m^2
T 14	Community 4 – Coral Habitat Adjacent to Seawalls	North Side of Causeway Island	20 m^2
T 15	Community 4 – Coral Habitat Adjacent to Seawalls	North Side of Causeway Island	10 m^2
T 16	Community 4 – Coral Habitat Adjacent to Seawalls	Adjacent to Eastern Seawall	10 m^2
T 17	Community 4 – Coral Habitat Adjacent to Seawalls	Adjacent to Eastern Seawall	10 m^2
T 18	Community 3 – Live Bottom	Southeast Quadrant of Bridge	20 m^2
T 19	Community 3 – Live Bottom	Northeast Quadrant of Bridge	20 m^2
Total Area Sampled with Coral Belt Transects			**280 m^2**

Figure 3-8 Summary of Coral Data from Community 3 (Live Bottom) and Community 4 (Coral Habitat Adjacent to the Seawalls)



of the bridge. The majority (~69.23%) of the 26 coral colonies were showing visual signs of coral stress, with the most common visual coral stressor being colony color change which impacted half of colonies (~50.00%) (**Table 3-6**). The only coral species observed within the coral transect (T19) on the northeast side of the bridge was *Carijoa riisei* (**Table 3-3** and **Figure 3-8**).

Only seven coral colonies were documented within the coral belt transects conducted on the west side of the bridge. In the coral belt transects in southwest quadrant of the bridge (T8-T10), only two coral colonies were documented (mean coral colony density of ~0.03 colonies/m^2) (**Table 3-4** and **Figure 3-8**), including a single colony each of *S. bournoni* and *S. hyades* (**Table 3-5**). The *S. bournoni* colony was exhibiting sponge overgrowth and the *S. hyades* colony was observed to have no visual signs of coral stress (**Table 3-6**). In the coral belt transects in northwest quadrant of the bridge (T11-T13), five coral colonies were documented (mean coral colony density of ~0.08 colonies/m^2) (**Table 3-4** and **Figure 3-8**), including four colonies of *S. bournoni* and a single colony of *Antillogorgia* sp. (**Table 3-5**). Three of the four *S. bournoni* colonies were fully bleached and the *Antillogorgia* sp. colony was observed to have sponge overgrowth (**Table 3-6**).

Table 3-4 Community 3 (Live Bottom) - Coral Colony Summary Data

General Location within the Project Area	Coral Belt Transect	No. Coral Colonies	No. Scleractinian Coral Colonies	No. Octocoral Colonies*	*Carijoa riisei* Present (Y/N)	Coral Species Richness	No. Corals per m^2
SW Quadrant of Bridge	T8	1	1	0	N	1	0.05
	T9	1	1	0	Y	2	0.05
	T10	0	0	0	N	0	0.00
	Total	**2**	**2**	**0**	**Y**	**3**	**0.03**
NW Quadrant of Bridge	T11	0	0	0	N	0	0.00
	T12	1	0	1	N	1	0.05
	T13	4	4	0	N	1	0.20
	Total	**5**	**4**	**1**	**N**	**2**	**0.08**
SE Quadrant of Bridge	T18	26	26	0	N	8	1.30
NE Quadrant of Bridge	T19	0	0	0	Y	1	0.00
Total for Community 3		**33**	**32**	**1**	**Y**	**10**	**0.21**

*Excluding *Carijoa riisei*

*Table 3-5 Community 3 (Live Bottom) - No. of Coral Colonies Documented by Species**

Coral Type	Coral Species	Southwest Quadrant of Bridge				Northwest Quadrant of Bridge				Southeast Quadrant of Bridge	Northeast Quadrant of Bridge	Entire Community 3		
		T8	T9	T10	Total	T11	T12	T13	Total	T18	T19	Total No. Coral Colonies	Percentage	Mean Colony Maximum Diameter/Height (cm)
Scleractinian Corals	*Siderastrea radians*	0	0	0	**0**	0	0	0	**0**	8	0	**8**	24.24%	7.00
	Siderastrea siderea	0	0	0	**0**	0	0	0	**0**	2	0	**2**	6.06%	5.50
	Solenastrea bournoni	1	0	0	**1**	0	0	4	**4**	11	0	**16**	48.48%	12.06
	Solenastrea hyades	0	1	0	**1**	0	0	0	**0**	1	0	**2**	6.06%	17.50
	Oculina diffusa	0	0	0	**0**	0	0	0	**0**	1	0	**1**	3.03%	13.00
	Stephanocoenia intersepta	0	0	0	**0**	0	0	0	**0**	1	0	**1**	3.03%	7.00
	Porites astreoides	0	0	0	**0**	0	0	0	**0**	1	0	**1**	3.03%	17.00
	Pseudodiploria clivosa	0	0	0	**0**	0	0	0	**0**	1	0	**1**	3.03%	17.00
Octocorals	*Antillogorgia* sp.	0	0	0	**0**	0	1	0	**1**	0	0	**1**	3.03%	34.00
Total for Community 3		**1**	**1**	**0**	**2**	**0**	**1**	**4**	**5**	**26**	**0**	**33**	**100.00%**	**N/A**

*Excluding *Carijoa riisei*

Table 3-6 Community 3 (Live Bottom) – Summary of Coral Colony Health Data

Coral Health Notes	SW Quadrant of Bridge			NW Quadrant of Bridge			SE Quadrant of Bridge	NE Quadrant of Bridge	Entire Community 3
	T8	T9	T10	T11	T12	T13	T18	T19	
No Apparent Visual Coral Stressors	--	100.00%	--	--	--	25.00%	30.77%	--	**30.30%**
Macroalgal Overgrowth	--	--	--	--	--	--	3.85%	--	**3.03%**
Sponge Overgrowth	100.00%	--	--	--	100.00%	--	3.85%	--	**9.09%**
Boring Organisms	--	--	--	--	--	--	11.54%	--	**9.09%**
Full bleaching	--	--	--	--	--	75.00%	7.69%	--	**15.15%**
Partial Bleaching	--	--	--	--	--	--	15.38%	--	**12.12%**
Paling	--	--	--	--	--	--	26.92%	--	**21.21%**
Predation	--	--	--	--	--	--	--	--	**--**
Total	**100.00%**	**100.00%**	**--**	**--**	**100.00%**	**100.00%**	**100.00%**	**--**	**100.00%**

3.3.3 Corals in Community 4 –Coral Habitat Adjacent to the Seawalls

Eleven belt transects (T1-T7, T14-T17) were conducted within Community 4 – Coral Habitat Adjacent to the Seawalls (**Figure 3-7**). These coral belt transects were each 10-m-long x 1m-wide with the exception of T14 which was 10-m-long x 2-m-wide due to the presence of large concrete slabs in this area. A total of 564 coral colonies (557 scleractinian coral colonies and seven octocoral colonies) were documented within the 11 coral belt transects. This provides a mean coral colony density of ~4.70 colonies/m^2 for all of Community 4 (**Table 3-7**). Three scleractinian coral species (i.e., *S. radians, S. bournoni,* and *O. diffusa*) and two octocoral genera (i.e., *Antillogorgia* sp. and *Leptogorgia* sp.) were documented within the 11 Community 4 coral transects (**Table 3-8**). *Carijoa riisei* was not observed within any of the coral belt transects within this habitat. *S. radians* was by far the dominant coral species in Community 4, comprising ~96.81% of the 564 colonies. The mean scleractinian maximum colony diameter was ~8.22 cm for *S. radians,* ~20.00 cm for *S. bournoni*, and ~7.25 cm for *O. diffusa.* The mean maximum octocoral height was ~35.50 cm for *Antillogorgia* sp. and ~33.00 cm for *Leptogorgia* sp. The majority (~70.57%) of the 564 coral colonies showed visual signs of coral stress, including macroalgal overgrowth (51.42%), sponge overgrowth (2.48%), boring organisms (11.88%), full bleaching (0.89%), partial bleaching (0.35%), and paling (3.55%; **Table 3-9**). The most common visual coral stressor in the coral habitat adjacent to the seawalls was macroalgal overgrowth which impacted the majority of colonies (~51.42%) in Community 4 (**Table 3-9**).

In the western portion of the project area, nine coral belt transects (T1-T7 and T14-T15) were conducted within the coral habitat (scour protection materials) adjacent to the base of the causeway island seawall, including eight 10-m-long x 1-m-wide transects which were placed parallel to the seawall, and a single 10-m-long x 2-m-wide transect (T14) which ran at an angle away from the seawall through the area of large concrete slabs which had corals attached (**Figure 3-7**). A total of 536 coral colonies (529 scleractinian corals and seven octocorals) were documented within the nine belt transects conducted in this habitat (a mean of ~5.36 colonies/m^2). Three scleractinian coral species (i.e., *S. radians, S. bournoni,* and *O. diffusa*) and two octocoral genera (i.e., *Antillogorgia* sp. and *Leptogorgia* sp.) were documented within the coral transects along the causeway island (**Table 3-8**). *S. radians* was by far the dominant coral species, comprising ~97.20% of the colonies, followed by *S. bournoni* (1.31%), *Antillogorgia* sp. (1.12%), *O. diffusa* (0.19% - a single colony), and *Leptogorgia* sp. (0.19% - a single colony). There were substantially more coral colonies documented in the coral habitat along the south side of the causeway island (316 colonies or ~7.90 corals/m^2) than on the north side (220 colonies or ~3.67 colonies/m^2) (**Table 3-7** and **Figure 3-8**). The coral habitat along the north side of the causeway island also had a higher percentage of colonies with visual signs of coral stress (79.09%) than the south side of the causeway island (63.61%) (**Table 3-9**). The most common visual coral stressors observed in corals on both the north and south sides of the causeway island were macroalgal overgrowth (documented in ~54.55% and ~53.48% of colonies, respectively) and boring organisms (documented in ~16.36% and ~9.81% of colonies, respectively) (**Table 3-9**).

It should be noted that two tagged colonies of *Solenastrea bournoni* were observed within belt transect T2, located adjacent to the southeastern corner of the causeway island (see **Photo Log – Page 6, photo F**). These two coral colonies appear to be previously relocated corals. Discussions with Town officials indicate that the Town is unaware of the presence of relocated corals on their property. No other tagged corals were observed during the course of the survey.

Table 3-7 Community 4 (Coral Habitat Adjacent to the Seawalls) - Coral Colony Summary Data

Location	Coral Belt Transect	No. Coral Colonies	No. Scleractinian Coral Colonies	No. Octocoral Colonies*	*Carijoa riisei* Present (Y/N)	Coral Species Richness	No. Corals per m^2
South Side of Causeway Island	T1	45	45	0	N	1	4.50
	T2	64	64	0	N	2	6.40
	T3	140	140	0	N	1	14.00
	T4	67	67	0	N	1	6.70
	Total	**316**	**316**	**0**	**N**	**2**	**7.90**
North Side of Causeway Island	T5	75	75	0	N	1	6.70
	T6	4	4	0	N	1	0.40
	T7	2	2	0	N	1	0.20
	T14	18	15	3	N	3	0.90
	T15	121	117	4	N	4	12.10
	Total	**220**	**213**	**7**	**N**	**5**	**3.67**
Total Community 4 Causeway Island		**536**	**529**	**7**	**N**	**5**	**5.36**
Eastern Seawall	T16	10	10	0	N	2	1.00
	T17	18	18	0	N	2	1.80
	Total	**28**	**28**	**0**	**N**	**2**	**1.40**
Total for Community 4		**564**	**557**	**7**	**N**	**5**	**4.70**

*Excluding *Carijoa riisei*

Table 3-8 Community 4 (Coral Habitat Adjacent to the Seawalls) - No. of Coral Colonies Documented by Species

Coral Type	Coral Species	South Side of the Causeway Island					North Side of the Causeway Island						Eastern Seawall			Entire Community 4		
		T1	T2	T3	T4	Total	T5	T6	T7	T14	T15	Total	T16	T17	Total	Total No. Coral Colonies	Percentage	Mean Colony Maximum Diameter/Height (cm)
Scleractinian Corals	*Siderastrea radians*	45	59	140	67	**311**	74	4	2	14	116	**210**	9	16	**25**	**546**	96.81%	8.22
	Siderastrea siderea	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	--
	Solenastrea bournoni	--	5	--	--	**5**	1	--	--	1	--	**2**	--	--	**--**	**7**	1.24%	20.00
	Solenastrea hyades	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	--
	Oculina diffusa	--	--	--	--	--	--	--	--	--	1	**1**	1	2	**3**	**4**	0.71%	7.25
	Stephanocoenia intersepta	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	--
	Porites astreoides	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	--
	Pseudodiploria clivosa	--	--	--	--	--	--	--	--	--	--	--	--	--	**--**	--	--	--
Octocorals	*Antillogorgia* sp.	--	--	--	--	--	--	--	--	3	3	**6**	--	--	**--**	**6**	1.06%	35.50
	Leptogorgia sp.	--	--	--	--	--	--	--	--		1	**1**	--	--	**--**	**1**	0.18%	33.00
	Carijoa riisei present (Y/N)	N	N	N	N	**--**	N	N	N	N	N	**N**	N	N	**N**	--	--	--
Total No. Colonies		**45**	**64**	**140**	**67**	**316**	**75**	**4**	**2**	**18**	**121**	**220**	**10**	**18**	**28**	**564**	**100.00%**	**--**

Table 3-9 Community 4 (Coral Habitat Adjacent to the Seawalls) - Summary of Coral Colony Health Data

Coral Health Notes	South Side of Causeway Island					North Side of Causeway Island						Eastern Seawall			Entire Community 4
	T1	T2	T3	T4	Total	T5	T6	T7	T14	T15	Total	T16	T17	Total	
No Apparent Visual Coral Stressors	28.89%	73.44%	30.71%	17.91%	**36.39%**	37.33%	50.00%	100.00%	16.67%	9.92%	**20.91%**	0.00%	27.78%	**17.86%**	29.43%
Macroalgal Overgrowth	68.89%	23.44%	51.43%	76.12%	**53.48%**	34.67%	50.00%	--	38.89%	70.25%	**54.55%**	--	5.56%	**3.57%**	51.42%
Sponge Overgrowth	2.22%	--	--	--	**0.32%**	6.67%	--	--	--	5.79%	**5.45%**	--	5.56%	**3.57%**	2.48%
Boring Organisms	--	3.13%	17.86%	5.97%	**9.81%**	21.33%	--	--	27.78%	11.57%	**16.36%**	--	--	**--**	11.88%
Full bleaching	--	--	--	--	**--**	--	--	--	--	--	**0.00%**	30.00%	11.11%	**17.86%**	0.89%
Partial Bleaching	--	--	--	--	**--**	--	--	--	--	--	**0.00%**	10.00%	5.56%	**7.14%**	0.35%
Paling	--	--	--	--	**--**	--	--	--	16.67%	2.48%	**2.73%**	60.00%	44.44%	**50.00%**	3.55%
Predation	--	--	--	--	**--**	--	--	--	--	--	**--**	--	--	**--**	--
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Two belt transects (T16 and T17, each 10-m-long x 1-m-wide) were conducted within the coral habitat adjacent to the base of the eastern seawall (see **Figure 3-7**). A total of 28 scleractinian coral colonies were documented within these two coral belt transects (a mean of ~1.4 colonies/m^2) (**Table 3-7** and **Figure 3-8**). No octocoral colonies were documented within these coral belt transects. The scleractinian corals documented included *S. radians* and *O. diffusa*. *S. radians* was by far the dominant coral species, comprising ~89.29% of the colonies, with *O. diffusa* comprising the remaining ~10.71% of colonies. The mean maximum diameter was ~8.02 cm for *S. radians* and ~8.33 cm for *O. diffusa*. The coral health data for these colonies indicate that the vast majority (~82.14%) of these colonies were showing visual signs of coral stress, including macroalgal overgrowth (3.57%), sponge overgrowth (3.57%), bleaching (17.86%), partial bleaching (7.14%), and paling (50.00%; **Table 3-9**). The most common visual coral stressor was indicated by colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted the majority of colonies (~75.00%) in this habitat (**Table 3-9**).

3.3.4 Corals in Community 5 – Existing Seawalls and Bridge Piers

Quantitative coral data were collected during the 100% visual assessment of the existing seawalls within the survey area and on the existing bridge piers.

3.3.4.1 Existing Seawalls

The seawalls within the survey area were evaluated for the presence of attached corals within the designated size criteria. **Table 3-10** summarizes the coral data collected for the seawalls within the survey area. There are ~1,703 linear ft (~519 linear m) of seawall within the survey area, including ~1,340 ft (~408 m) along the causeway island (western seawall) and ~363 ft (~111 m) along the shoreline east of the bridge (eastern seawall).

A total of 427 coral colonies were documented to have colonized the seawalls within the entire survey area, comprised of only two scleractinian coral species, *Siderastrea radians* and *Oculina diffusa*. **Figure 3-9** presents information regarding corals documented on the existing seawalls. *S. radians* was by far the dominant coral species documented, comprising ~95.32% of the colonies, with *O. diffusa* comprising the remaining ~4.68% of colonies. The mean number of colonies per linear distance of seawall is approximately 0.25 colonies/ft (0.82 colonies/m). The only octocoral observed to have colonized the seawalls within the survey area is *Carijoa riisei* and it was only observed along the western seawall. The coral health data for these colonies indicate that ~70.02% of colonies showed visual signs of coral stress, including macroalgal overgrowth (5.85%), sponge overgrowth (2.58%), boring organisms (13.11%), bleaching (9.84%), partial bleaching (17.80%), paling (19.44%), and predation (1.41%). The most common visual coral stressor was indicated by colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted nearly half of colonies (~47.08%) attached to the seawalls within the survey area. **Table 3-11** summarizes the health data collected for the coral colonies attached to the seawalls within the survey area.

On the eastern seawall, biologists documented a total of 165 coral colonies (**Table 3-10**). No octocoral colonies were documented to have colonized the eastern seawall, and the scleractinian corals documented included *S. radians* and *O. diffusa*. *S. radians* was by far the dominant coral

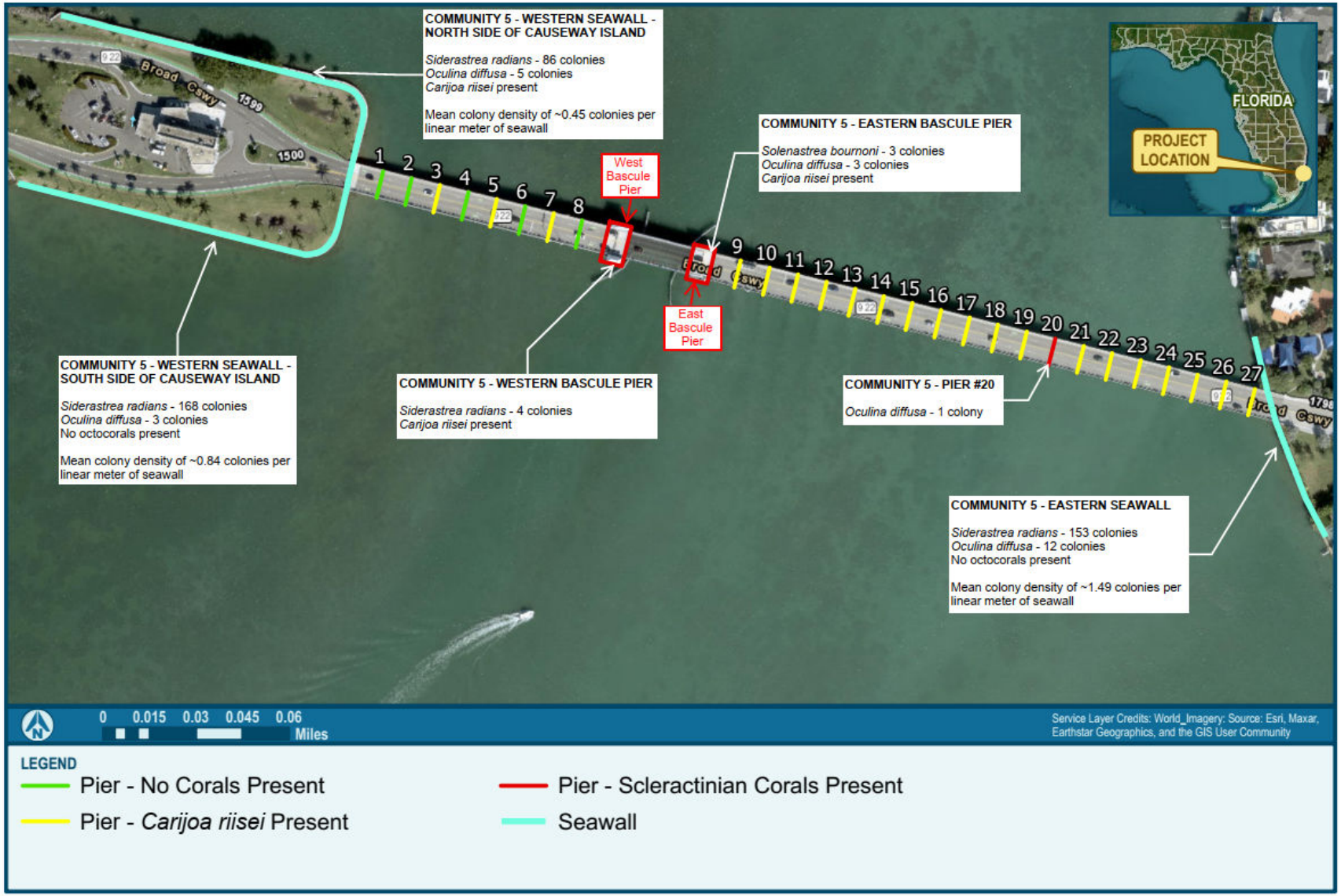
Table 3-10 Community 5 - Corals Documented on the Exiting Seawalls within the Survey Area

Seawall Location	Total No. Coral Colonies	*Siderastrea radians*		*Oculina diffusa*		*Carijoa riisei* Present (Y/N)	Coral Species Richness	Mean No. Colonies Per Linear Meter of Seawall
		No. Colonies	Percentage of Colonies	No. Colonies	Percentage of Colonies			
All Seawalls	**427**	**407**	**95.32%**	**20**	**4.68%**	**Yes**	**3**	**0.82**
Eastern Seawall	165	153	92.73%	12	7.27%	No	2	1.49
Western Seawall – Total	**262**	**254**	**96.95%**	**8**	**3.05%**	**Yes**	**3**	**0.64**
Western Seawall – North Side of Causeway Island	91	86	94.51%	5	5.49%	Yes	3	0.45
Western Seawall – South Side of Causeway Island	171	168	98.25%	3	1.75%	No	2	0.84

Table 3-11 Community 5 - Health Data for Corals Documented on the Existing Seawalls within the Survey Area

Coral Health Notes	Western Seawall			Eastern Seawall	All Seawalls
	North Side of Causeway Island	South Side of Causeway Island	Total		
No Visual Coral Stressors	36.26%	47.37%	**43.51%**	8.48%	**29.98%**
Macroalgal Overgrowth	5.49%	4.09%	**4.58%**	7.88%	**5.85%**
Sponge Overgrowth	6.59%	1.75%	**3.44%**	1.21%	**2.58%**
Boring Organisms	24.18%	11.70%	**16.03%**	8.48%	**13.11%**
Full bleaching	0.00%	2.92%	**1.91%**	22.42%	**9.84%**
Partial Bleaching	8.79%	5.26%	**6.49%**	15.76%	**17.80%**
Paling	18.68%	23.39%	**21.76%**	35.76%	**19.44%**
Predation	0.00%	3.51%	**2.29%**	0.00%	**1.41%**
Total	**100.00%**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Figure 3-9 Summary of Coral Data from Community 5 (Existing Seawalls and Bridge Piers)



species documented on the eastern seawall, comprising ~92.73% of the colonies, with *O. diffusa* comprising the remaining ~7.27% of colonies. Along the eastern seawall, the mean number of colonies per linear foot of seawall is approximately 0.45 colonies/ft (1.49 colonies/m). The coral health data for these colonies indicate that the vast majority (~91.52%) of the corals on the eastern seawall showed visual coral stress, including macroalgal overgrowth, sponge overgrowth, boring organisms, bleaching, partial bleaching, and paling (**Table 3-11**). The most common visual coral stressor was indicated by colony color change. (i.e., full bleaching, partial bleaching, and paling) which impacted the majority of colonies (~73.94%) attached to the eastern seawall.

On the western seawall, biologists documented a total of 262 coral colonies (**Table 3-10**). Two scleractinian coral species, *Siderastrea radians* and *Oculina diffusa*, and one octocoral species (*Carijoa riisei*) were documented to have colonized the western seawall. *S. radians* was by far the dominant coral species documented, comprising ~96.95% of the colonies, with *O. diffusa* comprising the remaining ~3.05% of colonies. Along the western seawall, the mean number of colonies per linear foot of seawall is approximately 0.20 colonies/ft (0.64 colonies/m). The coral health data for these colonies indicate that ~56.49% of colonies showed visual signs of coral stressors, including macroalgal overgrowth (~4.58%), sponge overgrowth (~3.44%), boring organisms (~16.03%), full bleaching (~1.91%), partial bleaching (~6.49%), paling (~21.76%), and predation (~2.29%). The most common visual coral stressor was indicated by colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted the majority of colonies (~30.15%) attached to the western seawall.

There were nearly twice as many coral colonies documented on the seawall along the south side of the causeway island (171 colonies or ~0.84 colonies/m) than on the north side (91 colonies or ~0.45 colonies/m) (**Table 3-10** and **Figure 3-10**). The seawall on the north side of the causeway island also had a higher percentage of colonies with visual signs of coral stress (63.74%) than the seawall on the south side of the causeway island (52.63%). The most common visual coral stressor observed in corals on the seawall on both the north and south sides of the causeway island was colony color change (i.e., full bleaching, partial bleaching, and paling) at ~27.47% and ~31.57%, respectively. The frequency of coral boring organisms was also notably higher on the seawall on the north side of the island (~24.18%) than on the south side (11.70%). Colonies of *Carijoa riisei* were only observed on the seawall on the north side of the causeway island.

3.3.4.2 Existing Bridge Piers

There are a total of 29 individual bridge piers associated with the existing bridge, including eight piers on the west side of the existing drawbridge, 19 piers on the east side of the existing drawbridge, and two bascule piers. All of the existing piers were examined for the presence of corals and octocorals. A total of 11 scleractinian coral colonies were documented on the existing bridge structure, including four colonies of *S. radians* (~36.36%), four colonies of *O. diffusa* (~36.36%), and three colonies of *S. bournoni* (~27.27%). These colonies were found on the outer edges (i.e., areas exposed to sunlight) of only three of the bridge piers: four colonies on the west bascule pier, six colonies on the east bascule pier, and one colony on piling #20 on the east side of the bridge. **Figure 3-9** identifies each of the individual bridge piers and the corals documented on each. The coral health data for these colonies indicate that nine of the 11 colonies (~81.82%) showed visual signs of coral stress. Eight of the colonies (72.73%) were partially bleached and one colony (9.09%) was fully bleached. The octocoral *Carijoa riisei* was documented to have colonized 23 of the 29

bridge piers (~79%) (see **Figure 3-9**). No other octocorals were documented to have colonized the bridge piers.

4.0 SUMMARY OF FINDINGS

The 2023 quantitative benthic survey was completed in July and August 2023 (specifically, July 17-21 and August 3, 4 and 11) in association with the Broad Causeway Bridge Replacement PD&E Study in the Town of Bay Harbor Island, Miami-Dade County, Florida. A previous August 2022 preliminary benthic survey identified the presence of seagrasses and corals within the survey area. The purpose of the 2023 quantitative benthic survey was to obtain more detailed information on the benthic habitats within the survey area, including quantitative seagrass data (quadrat data) and quantitative coral data (belt transect data). The results of the 2023 quantitative benthic survey will assist in quantifying project-related impacts to these resources and will aid resource agencies in determining appropriate compensatory mitigation to offset project impacts.

4.1 Benthic Community Types

Five distinct benthic community types were identified within the survey area:

- **Community 1 - Macroalgal Beds**: this was the dominant community type within the survey area and was comprised of sandy substrate colonized by moderate-to-dense macroalgal beds primarily comprised of the calcareous green algae, *Halimeda tuna*, and the red alga, *Laurencia* sp. Heavy epiphyte growth and some cyanobacterial overgrowth was observed within the macroalgal beds, suggesting high nutrient loads within this community. The macroalgal beds also contained sponges, as well as very rare instances of scleractinian corals and octocorals.
- **Community 2 - Seagrass Beds/Patches**: seagrass beds/patches were observed in the northeast, southeast, and southwest quadrants of the bridge, as well as along the south side of the causeway island. *Halophila decipiens* (paddle grass), *Syringodium filiforme* (manatee grass), and *Thalassia testudinum* (turtle grass) were documented in these seagrass beds and were interspersed with rhizophytic macroalgae, typically *Halimeda* spp. and *Laurencia* sp.
- **Community 3 - Live Bottom**: areas of live bottom habitat were observed in close proximity to the existing bridge structure in all four quadrants of the bridge. The substrate in this habitat consists of sand and shell fragments with scattered small rubble. No exposed hard or rocky substrate was observed (besides rubble). This community was dominated by sponges, which occurred along with macroalgae, hydroids, corals, and tunicates. Both scleractinian corals and octocorals were observed within this community type.
- **Community 4 - Coral Habitat Adjacent to the Seawalls**: the scour protection materials located immediately adjacent to the base of the seawalls (e.g., intermittent riprap, rubble, and concrete blocks and slabs) provide suitable substrate for coral colonization. The scour protection materials are interspersed with sandy substrate occupied by macroalgae and corals. Both scleractinian corals and octocorals were observed within this community type.
- **Community 5 – Existing Seawalls and Bridge Piers**: existing sheet pile seawalls are located along the land boundary on the causeway island on the west side of the bridge and the land boundary on the east side of the bridge. The existing seawalls (wall and associated support pilings) are heavily colonized by sponges and turf algae and provide suitable habitat for corals. In addition, there are a total of 29 individual bridge piers associated with the

existing bridge. The existing bridge piers are heavily encrusted by sponges, hydroids, and tunicates. Infrequent corals were documented on the bridge piers.

4.2 Seagrass Quantitative Data

Biologists observed seagrass in water depths of ~3-13 ft in a total of 18 seagrass beds (Beds SA-SR) located in the northeast, southeast, and southwest quadrants of the bridge, as well as south of the causeway island. The total area of seagrass documented within the survey area was 5,410.35 m^2 or 1.34 acres (ac) and included three species of seagrass: *Halophila decipiens* (paddle grass), *Syringodium filiforme* (manatee grass), and *Thalassia testudinum* (turtle grass). The vast majority of the seagrasses within the seagrass beds/patches observed within the survey area were interspersed with macroalgae.

The majority of seagrasses observed within the project area were located in the southeast quadrant of the bridge (~0.74 ac), followed by the southwest quadrant of the bridge (~0.42 ac), the south side of the causeway island (~0.13 ac), and finally the northeast quadrant of the bridge (~0.05 ac). *H. decipiens* was by far, the most common seagrass species observed within the survey area, found within 17 of the 18 documented seagrass beds/patches. *T. testudinum* was found only in five beds on the south side of the survey area (Beds SD, SF, SG, SH, and SM) and *S. filiforme* was found in only one bed on the south side of the causeway island (Bed SD).

A total of 161 *in situ* SAV quadrats were conducted within 15 seagrass beds (Beds SA-SO). The mean percent cover of total seagrass across all 161 SAV quadrats was ~9.61%. Total seagrass densities within the seagrass beds (mean percent cover of total seagrass) ranged from 0.00% (Beds SM and SN) to ~44.11% (Bed SD). When considering all seagrass within the entire survey area, *H. decipiens* had the highest seagrass density (mean total percent cover of ~5.85%), followed by *S. filiforme* (~2.42%), and *T. testudinum* (~1.34%).

The mean total percent cover of macroalgae within all 161 SAV quadrats was substantial (~64.88%). The high density of macroalgae and epiphytes within the SAV quadrats suggests the potential for substantial nutrient availability within the survey area.

4.3 Coral Quantitative Data

Corals were documented within Community 3 - Live Bottom, Community 4 – Coral Habitat Adjacent to the Seawalls, and Community 5 – Existing Seawalls and Bridge Piers. No colonies of listed coral species were encountered within the survey area during the 2023 quantitative benthic survey event. However, two individual colonies of *Orbicella franksi* (a federally listed threatened coral species) were previously observed within the 2022 preliminary benthic survey area, suggesting that this species is potentially present within the project area in extremely low numbers. A future benthic survey will be conducted prior to construction which will include a very thorough assessment and identification of coral colonies within the project impact area, including any listed coral colonies.

Coral quantitative data were collected within Communities 3, 4, and 5. To obtain quantitative coral data within these habitats, coral belt transects were conducted in Communities 3 and 4, and a 100% visual assessment was conducted within Community 5. Because the macroalgal beds within the survey area contained only very rare instances of scleractinian corals and octocorals, quantitative coral data were not collected within Community 1. It should be noted that a future benthic survey will be

conducted prior to construction which will include a very thorough assessment and identification of coral colonies within the project impact area, including any corals that would be impacted within Community 1.

A total of 19 quantitative coral belt transects (i.e., T1-T19) were conducted within the survey area in Communities 3 and 4. The width of the belt transects varied (1-m-wide or 2-m-wide) based on the substrate being evaluated.

4.3.1 Community 3 – Live Bottom

A total of 33 coral colonies (32 scleractinian coral colonies and one octocoral colony) were documented within the eight belt transects (each 10-m-long x 2-m-wide) in Community 3. Community 3 had the highest coral species richness within the survey area (10), with eight scleractinian coral species (i.e., *Solenastrea bournoni, Siderastrea radians, Siderastrea siderea, Solenastrea hyades, Stephanocoenia intersepta, Pseudodiploria clivosa, Porites astreoides,* and *Oculina diffusa*) and one octocoral genus (i.e., *Antillogorgia* sp.) documented within the eight live bottom coral transects. In addition, the octocoral *Carijoa riisei* was documented in coral transects in the southwest (T9) and northeast (T19) quadrants of the bridge. *S. bournoni* was by far the dominant coral species, comprising ~48.48% of the 33 colonies, followed by *S. radians* (~24.24%), *S. siderea and S. hyades* (each ~6.06%), and a single colony each (~3.03%) of *S. intersepta, P. clivosa, P. astreoides, O. diffusa*, and *Antillogorgia* sp.

The vast majority of coral colonies documented within the Community 3 coral belt transects were documented in the southeast quadrant of the bridge (T18) where a total of 26 scleractinian coral colonies were documented and comprised of eight scleractinian coral species: *S. bournoni, S. radians, S. siderea, S. hyades, S. intersepta, P. clivosa, P. astreoides,* and *O. diffusa*. The only coral species observed within the coral transect (T19) on the northeast side of the bridge was *Carijoa riisei*. In the coral belt transects in southwest quadrant of the bridge (T8-T10), only two coral colonies were documented, including a single colony each of *S. bournoni* and *S. hyades*. In the coral belt transects in northwest quadrant of the bridge (T11-T13), five coral colonies were documented, including four colonies of *S. bournoni* and a single colony of *Antillogorgia* sp.

The mean coral colony density for all of Community 3 is ~0.21 colonies/m^2. With the exception of the live bottom habitat in the southeast quadrant of the bridge, corals densities appear to be generally low in Community 3, with mean coral colony densities of ~0.00 colonies/m^2, ~0.08 colonies/m^2, and ~0.03 colonies/m^2 in the northeast, northwest, and southwest quadrants of the bridge, respectively. In comparison, coral colony density was substantially higher in the southeast quadrant of the bridge (1.30 colonies/m^2) where there was a substantial amount of bridge debris, cables, and other hard structures within the coral transect T18.

The majority (~69.70%) of the 33 coral colonies documented within Community 3 showed visual signs of coral stress, including macroalgal overgrowth, sponge overgrowth, boring organisms, bleaching, partial bleaching, and paling. The most common visual coral stressor was colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted the majority of colonies (~48.48%) in Community 3.

4.3.2 Community 4 – Coral Habitat Adjacent to the Seawalls

Within Community 4, a total of 564 coral colonies (557 scleractinian coral colonies and seven octocoral colonies) were documented within the 11 coral belt transects conducted (10 belt transects were 10-m-long x 1m-wide and one (T14) was 10-m-long x 2-m-wide). Three scleractinian coral species (i.e., *S. radians, S. bournoni,* and *O. diffusa*) and two octocoral genera (i.e., *Antillogorgia* sp. and *Leptogorgia* sp.) were documented within the 11 Community 4 corals transects. *C. riisei* was not observed within any of the coral belt transects within this habitat. *S. radians* was by far the dominant coral species in Community 4, comprising ~96.81% of the documented colonies.

The vast majority of the corals documented in Community 4 were located in the western portion of the project area (adjacent to the seawall along the causeway island). A total of 536 coral colonies (529 scleractinian corals and seven octocorals) were documented within the nine coral belt transects conducted within the coral habitat adjacent to the base of the causeway island seawall, including three scleractinian coral species (i.e., *S. radians, S. bournoni,* and *O. diffusa*) and two octocoral genera (i.e., *Antillogorgia* sp. and *Leptogorgia* sp.). *S. radians* was by far the dominant coral species, comprising ~97.20% of the colonies, followed by *S. bournoni* (1.31%), *Antillogorgia* sp. (1.12%), *O. diffusa* (0.19% - a single colony), and *Leptogorgia* sp. (0.19% - a single colony). In the two coral belt transects conducted in the eastern portion of the survey area, adjacent to the base of the eastern seawall, a total of 28 scleractinian coral colonies were documented, including two species *S. radians* and *O. diffusa.* No octocoral colonies were documented within these coral belt transects adjacent to the base of the eastern seawall. *S. radians* was by far the dominant coral species, comprising ~89.29% of the colonies.

The mean coral colony density for all of Community 4 was ~4.70 colonies/m^2. In the western portion of the survey area adjacent to the causeway island, the mean coral density within Community 4 was relatively high (~5.36 colonies/m^2). Furthermore, there were substantially higher density of coral colonies documented in the coral habitat along the south side of the causeway island (316 colonies or ~7.90 corals/m^2) than on the north side (220 colonies or ~3.67 colonies/m^2). In the eastern portion of the survey area adjacent to the eastern seawall, the mean coral density within Community 4 was notably lower (a mean of ~1.4 colonies/m^2) than in the western portion of Community 4.

The majority (~70.57%) of the 564 coral colonies documented in Community 4 showed visual signs of coral stress, including macroalgal overgrowth, sponge overgrowth, boring organisms, full bleaching, partial bleaching, and paling. The most common visual coral stressor in Community 4 was macroalgal overgrowth which impacted the majority of colonies (~51.42%). In the western portion of the survey area adjacent to the causeway island, the corals on the north side of the causeway island had a higher percentage of colonies with visual signs of coral stress (79.09%) than the south side of the causeway island (63.61%). The most common visual coral stressors observed in corals on both the north and south sides of the causeway island were macroalgal overgrowth (documented in ~54.55% and ~53.48% of colonies, respectively) and boring organisms (documented in ~16.36% and ~9.81% of colonies, respectively). In the eastern portion of the survey area adjacent to the eastern seawall, visual signs of coral stress were very high, impacting ~82.14% of colonies and the most common visual coral stressor was indicated by colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted ~75.00% of colonies in this habitat.

4.3.3 Community 5 – Existing Seawalls and Bridge Piers

Existing Seawalls

Quantitative coral data were collected during the 100% visual assessment of the existing seawalls within the survey area and on the existing bridge piers. A total of 427 coral colonies were documented to have colonized the seawalls within the entire survey area, comprised of only two scleractinian coral species, *Siderastrea radians* and *Oculina diffusa*. *S. radians* was by far the dominant coral species documented, comprising ~95.32% of the colonies. The only octocoral observed to have colonized the seawalls within the survey area is *Carijoa riisei* and it was only observed along the western seawall. On the eastern seawall, a total of 165 scleractinian coral colonies were documented. The scleractinian corals documented included *S. radians* and *O. diffusa*. *S. radians* was by far the dominant coral species documented on the eastern seawall, comprising ~92.73% of the colonies. On the western seawall, a total of 262 coral colonies comprised of two scleractinian coral species, *Siderastrea radians* and *Oculina diffusa*, were documented. *S. radians* was by far the dominant coral species documented on the western seawall, comprising ~96.95% of the colonies.

When considering the entirety of the seawalls within the survey area (~1,703 linear ft), the mean number of colonies per linear distance of seawall is approximately 0.82 colonies/m. The density of corals is notably higher along the eastern seawall (a mean number of colonies per linear distance of seawall is 1.49 colonies/m) than on the western seawall (~0.64 colonies/m). Furthermore, there were nearly twice as many coral colonies documented on the seawall along the south side of the causeway island (~0.84 colonies/m) as on the north side (~0.45 colonies/m).

The seawalls on the north side of the causeway island also had a higher percentage of colonies with visual signs of coral stress (63.74%) than the south side of the causeway island (52.27%). The most common visual coral stressor observed in corals on the seawall on both the north and south sides of the causeway island was colony color change (i.e., full bleaching, partial bleaching, and paling) at ~27.47% and ~31.57%, respectively. The frequency of coral boring organisms was also notably higher on the north side of the island (~24.18%) than on the south side (11.70%). Colonies of *C. riisei* were only observed on the seawall on the north side of the causeway island.

The majority (~70.02%) of the 427 coral colonies documented on the seawalls in Community 5 showed visual signs of coral stress, including macroalgal overgrowth, sponge overgrowth, boring organisms, bleaching, partial bleaching, paling, and predation. The most common visual coral stressor was indicated by colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted nearly half of colonies (~47.08%) attached to the seawalls within the survey area. On the eastern seawall, the vast majority (~91.52%) of corals showed signs of visual coral stress, with the most common visual coral stressor (~73.94% of colonies) indicated by colony color change (i.e., full bleaching, partial bleaching, and paling). On the western seawall, the majority of coral colonies (~56.49%) showed visual coral stressors, with the most common visual coral stressor was indicated by colony color change (i.e., full bleaching, partial bleaching, and paling) which impacted the majority of colonies (~30.15%) attached to the western seawall. The seawall on the north side of the causeway island also had a higher percentage of colonies with visual signs of coral stress (63.74%) than the seawall on the south side of the causeway island (52.63%). Colony color change was most

common visual coral stressor observed in corals on the seawall on both the north and south sides of the causeway island.

Existing Bridge Piers

The 29 individual bridge piers associated with the existing bridge were examined for the presence of corals and octocorals. A total of 11 scleractinian coral colonies were documented on the existing bridge structure, including four colonies of *S. radians* (~36.36%), four colonies of *O. diffusa* (~36.36%), and three colonies of *S. bournoni* (~27.27%). These colonies were found on the outer edges (i.e., areas exposed to sunlight) of only three of the bridge piers: four colonies on the west bascule pier, six colonies on the east bascule pier, and one colony on piling #20 on the east side of the bridge. The majority of these 11 colonies (~81.82%) showed visual signs of coral stress. Eight of the colonies (72.73%) were partially bleached and one colony (9.09%) was fully bleached. The octocoral *C. riisei* was documented to have colonized 23 of the 29 bridge piers (~79%). No other octocorals were documented to have colonized the bridge piers.

5.0 APPENDICES

APPENDIX A – Broad Causeway 2022 Preliminary Benthic Survey Technical Memorandum

APPENDIX B – Marine Species Observed

APPENDIX C – Photo Log

APPENDIX A

Broad Causeway 2022 Preliminary Benthic Survey Technical Memorandum

SNC·LAVALIN

Technical Memorandum

To:	Maria Lasday, Town of Bay Harbor Islands		
From:	Beth Zimmer	Email:	Beth.Zimmer@atkinsglobal.com
Date:	30 November 2022	Phone:	305 514 3254
Subject:	Broad Causeway 2022 Preliminary Benthic Survey		
cc:	Wendy Lasher and David Konz (Atkins)		

1. Project Background and Introduction

The Broad Causeway Bridge (#875101) connects the Town of Bay Harbor Islands (Town) with the City of North Miami, within Miami-Dade County, Florida. The existing drawbridge has been determined to be functionally obsolete and contains fracture critical components, based on the Florida Department of Transportation's (FDOT) January 2022 Bridge Inspection Report. The Town selected Atkins North America, Inc. (Atkins) to conduct a Project Development and Environment (PD&E) Study for the proposed drawbridge replacement. The proposed project includes the replacement of the existing four-lane, low level bascule bridge which extends over Biscayne Bay and the Intracoastal Waterway (ICW) with a new, widened four-lane fixed bridge which will accommodate a shoulder, sidewalk, and bike lane in each direction. The new Broad Causeway Bridge will have a greater vertical clearance over the ICW to meet U.S. Coast Guard navigational guide clearance requirements.

To support the upcoming PD&E Study, the Town requested that Atkins complete a 2022 preliminary benthic survey within the proposed Broad Causeway Bridge Replacement project area. The goal of the 2022 preliminary benthic survey is to identify and qualitatively describe the benthic habitats within the survey area. The resulting benthic survey data will be used to inform the PD&E Study and alternative evaluations.

2. Benthic Survey Methods

2.1. Survey Approach

Atkins completed a 2022 preliminary benthic survey between August 8-11, 2022, during the seagrass growing season (i.e., June 1 – September 30). The purpose of the 2022 preliminary benthic survey is to locate and qualitatively describe biological resources within and adjacent to the project area. The biological resources of significance for documentation are represented by submerged aquatic vegetation (SAV), specifically seagrasses, attached to the substrate within the benthic survey area, as well as corals, including scleractinian corals (stony corals) and octocorals (soft corals), attached to the natural substrate, seawalls, bridge structures, and scour protection within the benthic survey area.

For the purposes of the 2022 preliminary benthic survey, the benthic survey area was divided into two sections, each with varied survey limits:

- **Bridge section –** this section of the survey area extends between the eastern and western Broad Causeway bridge abutments. The survey boundary within the bridge section of the survey area extends 200 feet (ft) to either side of the bridge centerline. For safety reasons (i.e., extensive boat traffic), the navigation channel was excluded from the survey area.
- **Causeway section –** this section of the survey area extends north and south along the island causeway between the western Broad Causeway bridge abutment and the small bridge located west of the island causeway. The survey boundary on the north side of the causeway section extends 30 feet north of the edge of water. The survey boundary on the south side of the causeway section extends 50 feet south of the edge of water.

Please refer to **Figure 1** in the Appendix for a depiction of the benthic survey area extent.

The benthic survey area was assessed by two Atkins dive teams, each consisting of three qualified Atkins biologists along with a boat captain. Benthic survey tasks were completed by biologists using the most effective survey gear for the depth and water visibility (i.e., SCUBA, snorkeling gear, or a combination of both). Qualified biologists conducted a series of transect swims to qualitatively assess the benthic resources (i.e., seagrass and corals) within the survey area:

- **Bridge section –** ten pre-determined transects were conducted within this section of the survey area. See **Figure 2** in the Appendix for a depiction of the transect locations.
- **Causeway section –** On the north side of the causeway island, biologists conducted two pre-determined transects within the area extending 30 feet north of the edge of water (see **Figure 2** in the Appendix for transect locations). On the south side of the causeway island, biologists conducted three pre-determined transects within the area extending 50 feet south of the edge of water (see **Figure 2** in the Appendix for transect locations).

In addition to the transect swims, the seawalls, scour protection, and existing bridge pilings within the survey area were also visually assessed for the presence of corals, as described in **Section 2.3** of this document.

2.2. Seagrass Assessment

Each team of two Atkins biologists swam along each pre-determined transect to complete a visual reconnaissance and identify the location of seagrasses within the survey area. In areas where seagrass was observed, the location of each seagrass bed/patch within the survey area was documented. In shallow portions of the survey area (e.g., along the existing causeway), the seagrass edge-of-bed was recorded as one biologist snorkeled over the seagrass edge with a Trimble R1 GPS unit while a second biologist followed behind and collected data points with a GPS data collection unit (i.e., a Samsung Galaxy Tab S3 or iPad mini running ESRI Collector Software) (see **Exhibit 1A**). In deeper portions of the survey area (e.g., in some areas of the bridge section), the seagrass edge-of-bed was recorded as one biologist using scuba gear detected the seagrass edge and signaled to a second biologist snorkeling above the diver and holding a Trimble R1 GPS unit (see **Exhibit 1B**). The snorkeler then communicated to an assistant on the boat to collect data points with the GPS data collection unit at the appropriate position. The biologists delineated the extent of each seagrass bed/patch by collecting GPS positions along the outer extent of the seagrass bed. The polygon GIS data collected along the edge of seagrass was added to ArcGIS Online. All map figures were generated in ArcGIS Pro 2.9 Patch 3 (2.9.3).

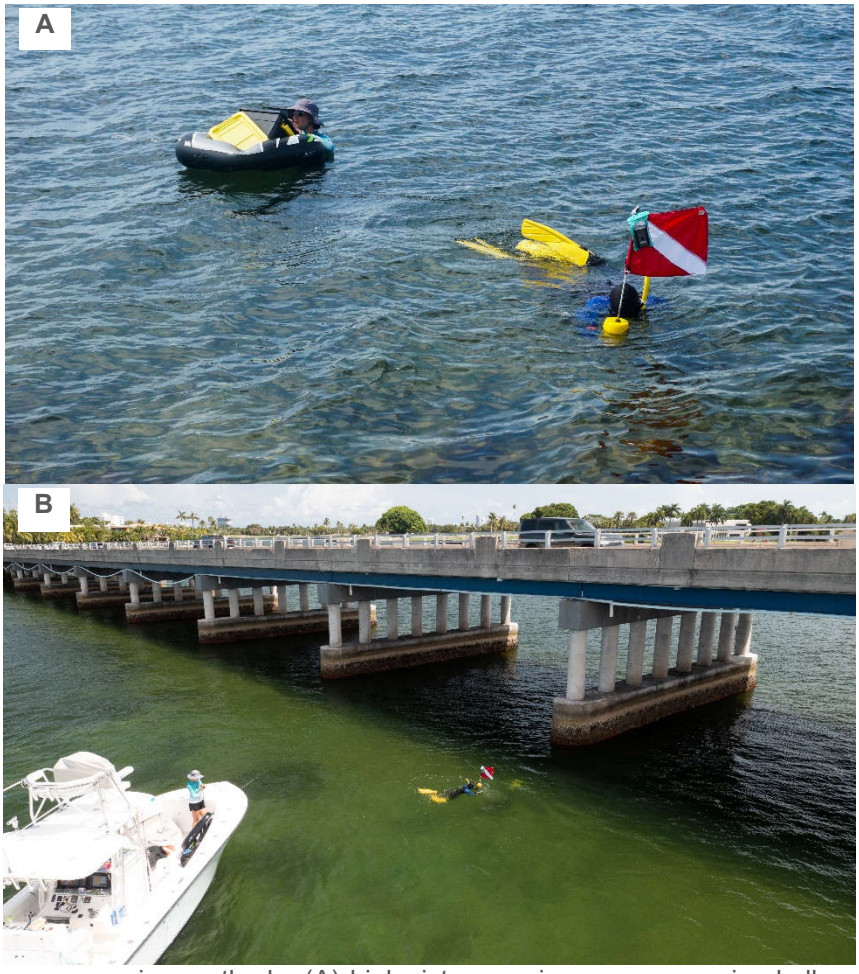


Exhibit 1. Seagrass mapping methods. (A) biologists mapping seagrasses in shallow areas with one biologist snorkeling over the seagrass edge with a Trimble R1 GPS unit and a second biologist collecting the data using a GPS data collection unit; (B) biologists mapping seagrasses in deeper areas with a biologist diver locating the seagrass bed, a second biologist snorkeling over the seagrass edge with a Trimble R1 GPS unit, and an assistant on the boat collecting the data points with a GPS data collection unit.

2.3. Coral Assessment

For the coral assessment, the focus of the investigation was to document the presence/absence of coral species within the survey area (i.e., attached to the natural substrate, seawalls, bridge pilings, and submerged materials, including riprap and concrete blocks). Each team of two biologists documented the coral species encountered during the pre-determined survey transects. In addition, the biologist teams also conducted a thorough visual assessment of structures within the survey area that may have attached corals. Each of the bridge pilings was thoroughly inspected for the presence of attached corals. The seawall structures on the east and west sides of the bridge were also thoroughly inspected for the presence of attached corals,

along with the scour protection materials (riprap and concrete blocks) located at the base of these seawalls. For the purposes of this assessment, documented corals were defined by size and species. Atkins focused on scleractinian corals greater than 10 centimeters (cm) in diameter and octocorals greater than 10 cm in height. These 10 cm coral size criteria were utilized because they represent the minimum size for non-listed scleractinian corals and octocorals to be relocated from an impact area (based on the agency-approved coral mitigation plans for other local projects with coral impacts). Scleractinian corals were identified to genus and species and octocorals were identified to genus. Seven coral species (i.e., *Acropora cervicornis, Acropora palmata, Mycetophyllia ferox, Dendrogyra cylindrus, Orbicella annularis, Orbicella faveolata*, and *Orbicella franksi*) were a major focus of the coral documentation because these species are federally listed threatened species under the Endangered Species Act. Encounters of any listed coral species were documented regardless of colony size since all listed coral colonies are typically required to be relocated from an impact site.

Atkins biologists first conducted a preliminary benthic site reconnaissance in the various potential substrate types (i.e., natural substrate, seawalls, bridge pilings, and submerged scour protection) to determine the general location and density of corals within the survey area. Because the preliminary in-water site reconnaissance revealed that a significant majority of corals within the survey area are present on the submerged scour protection (i.e., concrete rubble and blocks) in the vicinity of the seawall on the west side of the bridge (easternmost portion of the causeway island), for project planning purposes, Atkins decided to develop a preliminary general estimate of the density of corals located in this area. To complete this task, biologists conducted eight coral belt transects, each 10 meters (m) long and 1m wide, in the area of scour protection adjacent to the seawall west of the bridge (see **Figure 4** in the Appendix for the coral belt transect locations). The locations of the eight belt transects were distributed through the area of scour protection (four on the north side of the island and four on the south of the causeway) and were determined in the office and uploaded to ArcGIS prior to data collection in the field. In the field, at each belt transect location a 10m-long measuring tape was laid out on the substrate. Using SCUBA gear, a biologist counted all corals within the designated size criteria within a 1m-wide transect centered on the measuring tape (see **Exhibit 2**).

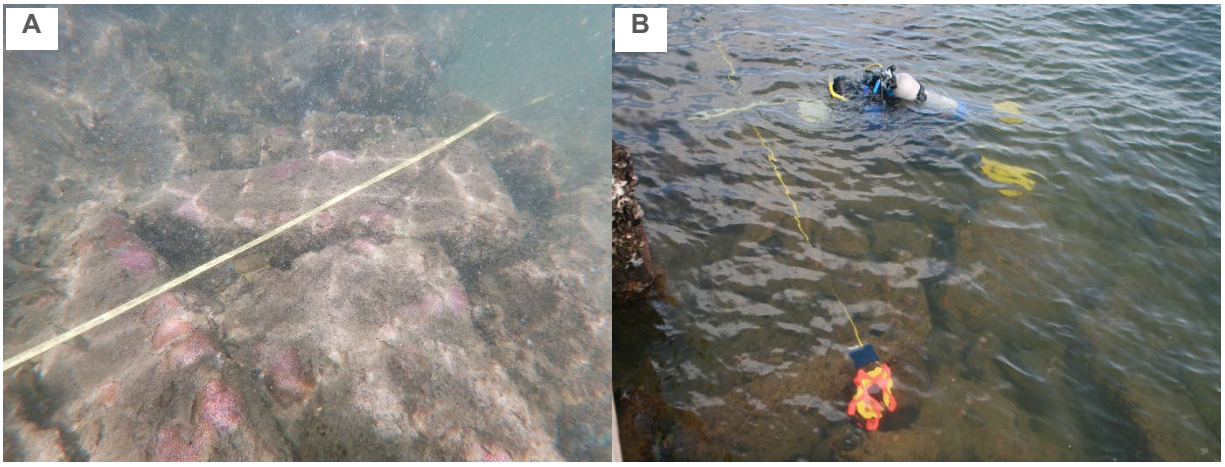


Exhibit 2. Biologists conducted coral belt transects in the area of scour protection and sediment adjacent to the seawall west of the bridge. (A) measuring tape laid out on the scour protection; (B) biologist collecting data along a coral belt transect.

3. Benthic Survey Results

Atkins completed the 2022 preliminary benthic survey between August 8-11, 2022. The weather during the four-day survey event was typically partly cloudy/sunny in the morning and early afternoon, changing to overcast with some passing rain showers at mid-afternoon. Depending upon the tidal stage, currents ranged from mild to very strong and water clarity varied from excellent to poor. Water depths within the surveyed area ranged from approximately 0-15 ft.

3.1. Substrate – Bridge Section

The shoreline along the east side of the bridge consists of a seawall with scour protection at the base (e.g., rubble and concrete blocks), and an underwater concrete ledge along the southern quarter of the seawall. The substrate in both the northeast and southeast quadrants of the bridge was comprised of a combination of shell, rubble, and sand occupied by macroalgae and turf algae with small beds of seagrass and corals along the seawall and riprap. Representative photographs of the substrates and resources documented on the east side of the bridge are provided in **Exhibit 3**.

The shoreline along the west side of the bridge consists of a seawall with scour protection and sediment at the base. The scour protection consisted of intermittent riprap and concrete blocks

located within 0-3 m waterward of the seawall. The substrate in both the southwest and northwest quadrants of the bridge was comprised of a combination of sand and rubble occupied by macroalgae, sponges, hydroids, and occasional scleractinian and octocoral colonies. Representative photos of the substrates and resources documented on the southwest and northwest quadrants of the bridge are provided in **Exhibit 4** and **Exhibit 5**, respectively. An area of substantial debris, including submerged boat wreckage, was also observed in the northwest quadrant of the bridge (see **Exhibit 4E**).

Seagrass beds were observed in all four quadrants of the bridge (i.e., northeast, southeast, northwest, and southwest). Refer to **Section 3.3** of this document for a description of the seagrass results.

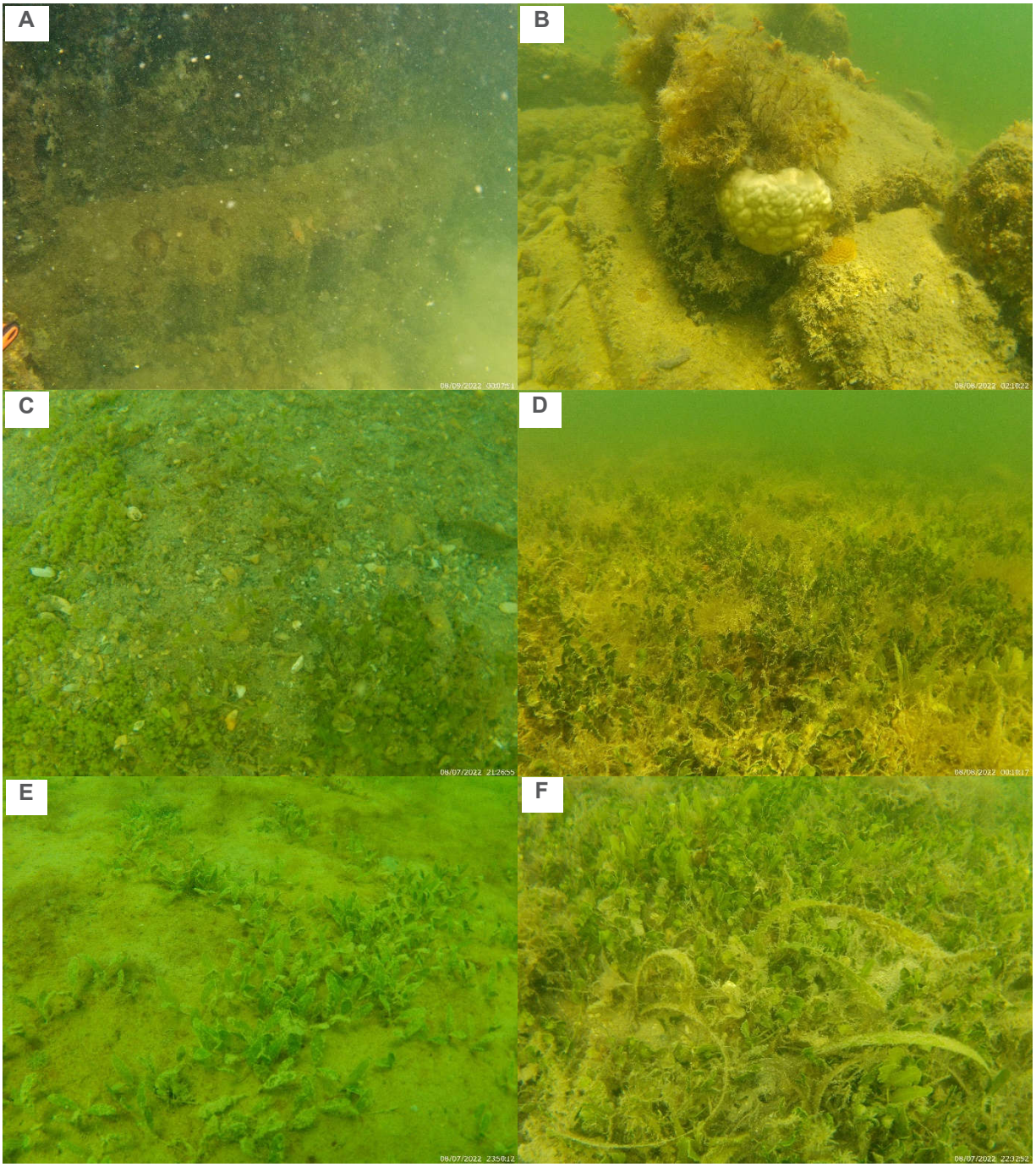


Exhibit 3. Benthic substrates and resources observed within the southeast and northeast quadrants of the bridge. (A) seawall with ledge and encrusting scleractinian coral colonies; (B) scour protection with encrusting scleractinian corals at the base of the seawall; (C) sand; (D) macroalgae bed; (E) paddle grass (*Halophila decipiens*); and (F) a turtle grass (*Thalassia testudinum*) and macroalgae bed.

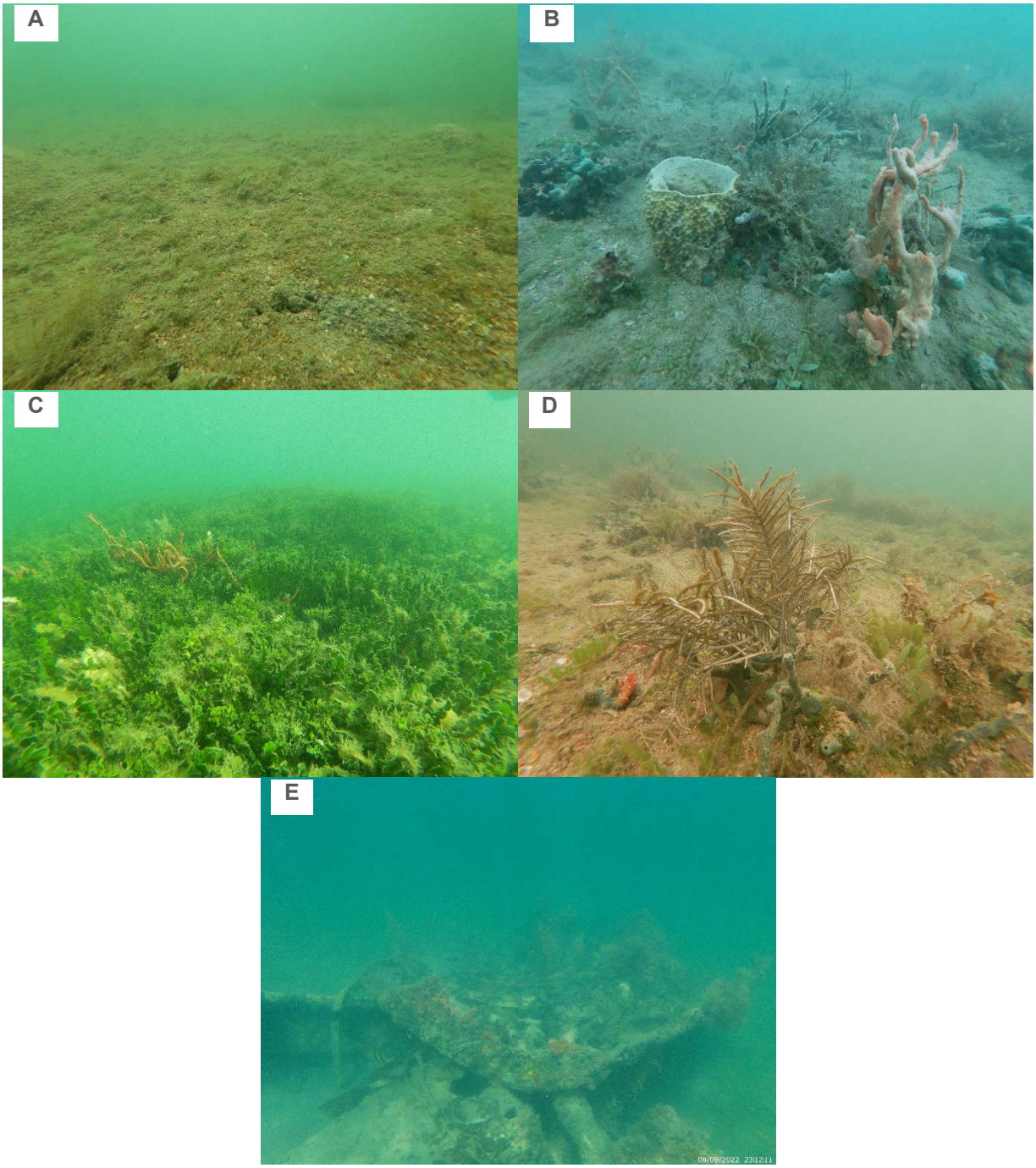


Exhibit 4. Benthic substrates and resources observed within the northwest quadrant of the bridge. (A) sand with turf algae; (B) sand with sponges and macroalgae; (C) macroalgae bed; (D) octocoral (*Antillogorgia* sp.) with sponges and macroalgae; and (E) submerged boat wreckage.

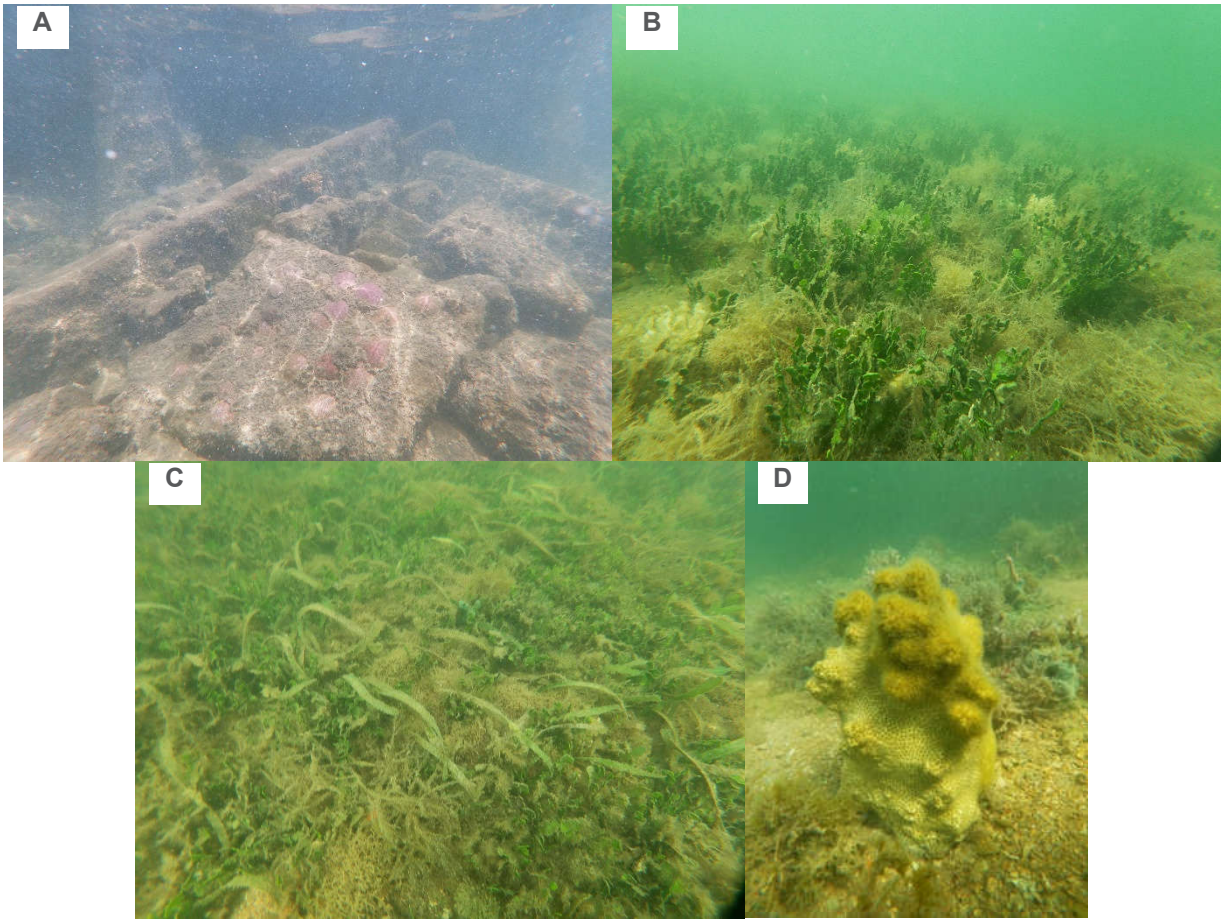


Exhibit 5. Benthic substrates and resources observed within the southwest quadrant of the bridge. (A) seawall with concrete blocks and encrusting scleractinian corals; (B) macroalgae bed; (C) turtle grass (*Thalassia testudinum*) and macroalgae bed; and (D) scleractinian coral (*Solenastrea hyades*) with macroalgae, sponges, and hydroids.

3.2. Substrate – Causeway Island Section

The shorelines along the north and south sides of the causeway island are similar and consist of a seawall along the eastern third of the island, with the western two-thirds of the shoreline consisting of riprap boulders and sandy substrate (see **Figure 1** in the Appendix and **Exhibit 6**). The substrate on both the north and south sides of the causeway island were very similar and comprised of a combination of sand, shell, and rubble occupied by macroalgal beds interspersed with seagrass beds and extremely infrequent coral colonies. Refer to **Section 3.3** of this document for a description of the seagrass findings.

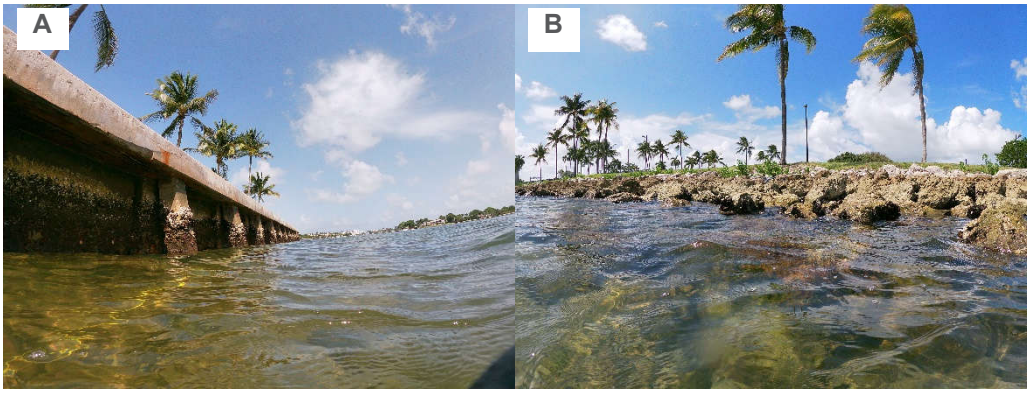


Exhibit 6. (A) seawall along the eastern third of the causeway island and (B) riprap shoreline along the majority of the causeway island.

3.3. Seagrass

During the visual reconnaissance of the survey area, biologists observed seagrass in the shallow areas (water depths of ~1-10 ft) in all four quadrants of the bridge (i.e., northeast, southeast, northwest, and southwest), as well as both north and south of the causeway island (**Figures 3-3**, **3-4**, and **3-5 3** in the Appendix). The seagrasses observed within the survey area appeared generally healthy with moderate-to-heavy epiphyte growth and some herbivore grazing observed in the causeway island section of the survey area. A total of ~3,051 m² or ~0.754 acres (ac) of seagrass were documented within the entire survey area, including four species of seagrass: *Halodule wrightii* (shoal grass), *Halophila decipiens* (paddle grass), *Syringodium filiforme* (manatee grass), and *Thalassia testudinum* (turtle grass). The majority of the seagrasses within the seagrass beds/patches observed within the survey area were interspersed with macroalgae. See **Table 1** for a breakdown of the seagrass acreages observed within the survey area. The seagrass extents were mapped and can be found in **Figures 3-1** to **3-5** in the Appendix.

Table 1. Area of Seagrasses Documented within the Survey Area (m² and ac)

Survey Area	Total (m²)	Total (ac)
Bridge – NE quadrant	140.76	0.0348
Bridge - NW quadrant	9.00	0.0022
Bridge - SE quadrant	678.3	0.1676
Bridge - SW quadrant	301.7	0.0746
Causeway Island – South Side	1848.83	0.4569
Causeway Island – North Side	72.61	0.0179
Entire Survey Area	**3051.02**	**0.754**

In the northeast quadrant of the bridge (**Figure 3-1** in the Appendix), three small patches/beds of seagrass were documented totaling 140.76 m^2 (0.0348 ac), including one bed of *T. testudinum* and two small patches of *H. decipiens*. In the southeast quadrant of the bridge (**Figure 3-1** in the Appendix), nine seagrass beds/patches were documented, totaling 678.3 m^2 (0.1676 ac). This included three beds/patches of *T. testudinum*, five beds/patches of *H. decipiens*, and one bed containing a mix of these two species (*H. decipiens* and *T. testudinum*). In the northwest quadrant of the bridge (**Figure 3-2** in the Appendix), a single small patch (9.0 m^2 or 0.0022 ac) of *H. decipiens* was documented adjacent to the bridge. In the southwest quadrant of the bridge (**Figure 3-2** in the Appendix), two seagrass patches/beds comprised of *T. testudinum* were documented, totaling 301.7 m^2 (0.0746 ac) of seagrass.

On both the north and south sides of the causeway island, the substrate was colonized by macroalgal beds that are dominated by *Halimeda* sp. (see **Exhibit 7A**). Within the survey area on the northwest side of the causeway island, three seagrass beds/patches containing *T. testudinum*, ranging in size from 15.54 - 36.02 m^2 (0.04 - 0.09 ac), were observed (**Figure 3-3** in the Appendix). On the south side of the causeway island, 17 seagrass beds/patches were observed ranging in size from 0.009 - 693.66 m^2 (0.00002 - 0.17 ac) (**Figures 3-4 and 3-5** in the Appendix). Seagrass species observed in the seagrass beds on the south side of the causeway island included all four species of seagrass: *T. testudinum*, *Syringodium filiforme, Halodule wrightii*, and *Halophila decipiens*. The largest seagrass beds within the survey area were located on the south side of the island causeway and were comprised of a mix of seagrass species (see **Figure 3-4** in the Appendix and **Exhibit 7B** below).

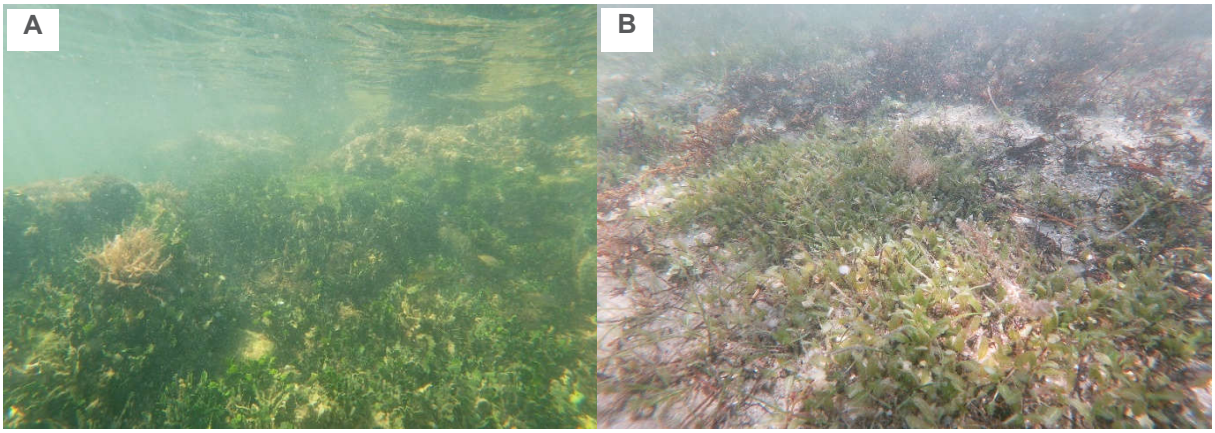


Exhibit 7. (A) Macroalgal bed dominated by *Halimeda* sp. located adjacent to the riprap on the south side of the causeway island; (B) a seagrass bed consisting of *Halophila decipiens* and *Halodule wrightii* documented on the south side of the island causeway.

3.4. Corals

The preliminary in-water site reconnaissance revealed that scleractinian and octocorals generally occurred sporadically throughout the survey area in low numbers; however, a significant majority of corals observed are present on the submerged scour protection (i.e., concrete rubble and blocks) in the vicinity of the seawall on the west side of the bridge (easternmost portion of the causeway island).

This survey focused on documenting coral species of a designated size criteria (i.e., scleractinian corals greater than 10 cm in diameter and octocorals greater than 10 cm in height), with the exception of listed coral species which were documented regardless of colony size. During the pre-determined transect swims within the survey area, both scleractinian corals and octocorals meeting this size criteria were observed. **Table 2** below presents the corals that were observed within the benthic survey area. Representative coral photographs are provided in **Exhibit 8.**

Table 2. Corals Documented within the Survey Area

	Scientific Name	**Common Name**
Scleractinian Corals	*Oculina diffusa*	ivory bush coral
	**Orbicella franksi*	boulder star coral
	Porites astreoides	mustard hill coral
	Pseudodiploria clivosa	knobby brain coral
	Pseudodiploria strigosa	symmetrical brain coral
	Siderastrea radians	lesser starlet coral
	Siderastrea siderea	massive starlet coral
	Solenastrea bournoni	smooth star coral
	Solenastrea hyades	knobby star coral
	Stephanocoenia michelini	blushing star coral
Octocorals	*Antillogorgia* sp.	sea plume
	Carijoa sp.	snowflake coral

*Federally listed threatened species

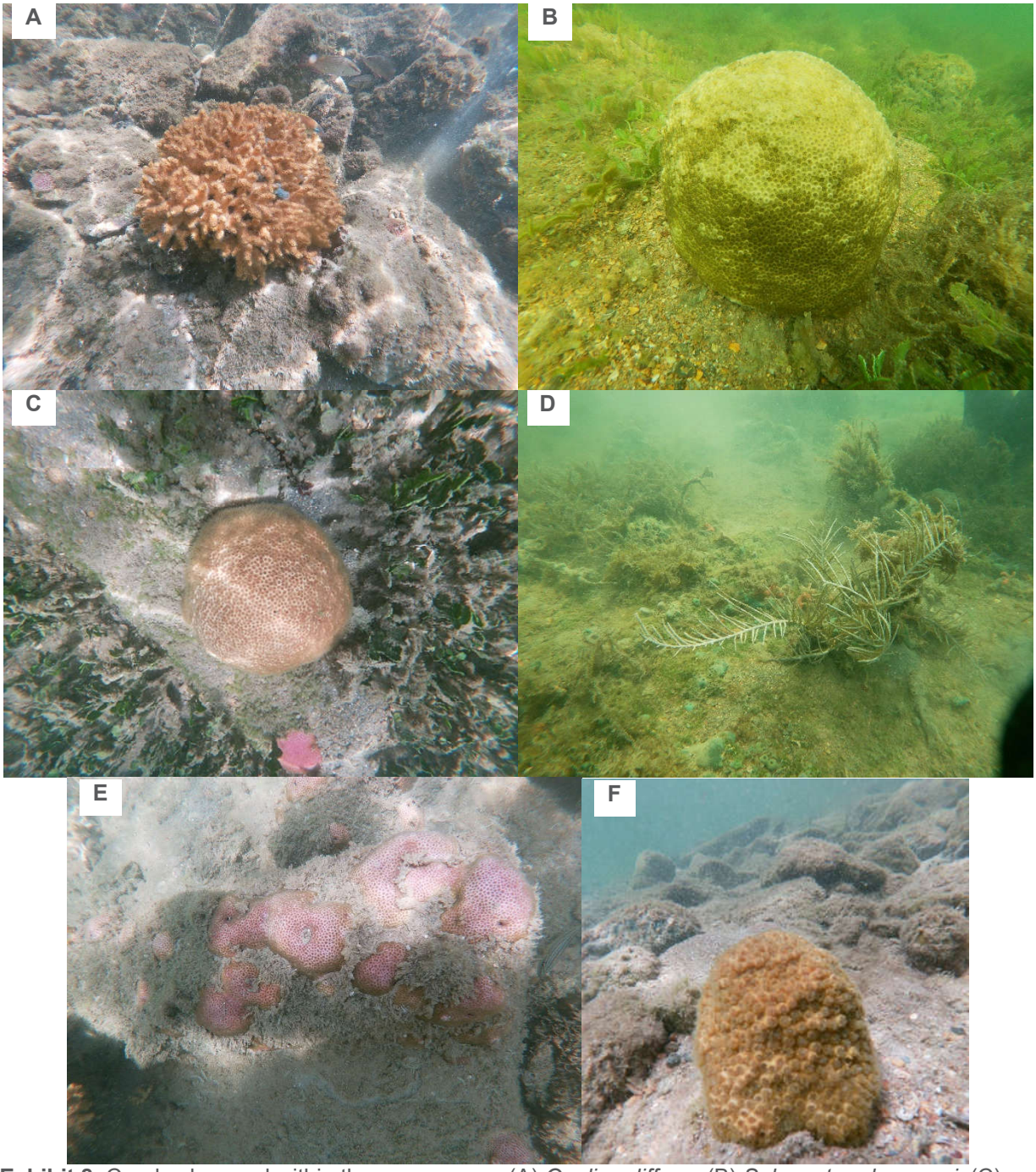


Exhibit 8. Corals observed within the survey area. (A) *Oculina diffusa*, (B) *Solenastrea bournoni*, (C) *Stephanocoenia michelini*, (D) Antillogorgia sp., (E) *Siderastrea radians*, and (F) *Orbicella franksi*.

On the bridge structure itself (pilings), only three scleractinian corals were documented. One colony of *Solenastrea bournoni* was documented on the southern face of the west bascule pier. On the east bascule pier, one colony of *Pseudodiploria clivosa* and one colony of

Stephanocoenia michelini were documented. Dense areas of the octocoral *Carijoa* sp. were observed on some areas of the bridge structure and immediately adjacent to the bridge.

On the eastern seawall and the associated scour protection at the base of that seawall, the following scleractinian coral species were observed: *Oculina diffusa*, *Siderastrea radians*, *S. bournoni*, *Pseudodiploria strigosa*, and *Porites astreoides*. In the substrate on the northwest and southwest quadrants of the bridge, both scleractinian corals (i.e., *S. bournoni*, *Solenastrea hyades, S. radians*, *S. michelini,* and *Orbicella franksi*) and octocorals (*Antillogorgia* sp. and *Carijoa* sp.) were documented during the transect swims. The only listed coral species observed within the survey area was *Orbicella franksi*.

The significant majority of corals were observed on the submerged scour protection in the vicinity of the seawall on the west side of the bridge. Eight coral belt transects (shown in **Figure 4** in the Appendix) were conducted to obtain a preliminary general estimate of the density of corals located in this higher density coral area. A total of 102 scleractinian coral colonies within the designated size criteria were documented within the belt transects, which equates to approximately 1.3 corals per square meter. These corals were predominantly comprised of *S. radians* (95 colonies and ~93% of the corals documented), followed by *S. michelini* (5 colonies and ~5% of the corals documented). One colony each of *O. diffusa* and *O. franksi* were documented within the coral belt transects, each accounting for ~1% of the corals documented. No octocorals were documented within the coral belt transects.

It should be noted that coral bleaching (both partial and full bleaching) was observed on the majority of scleractinian corals observed within the survey area (see **Exhibit 9**).

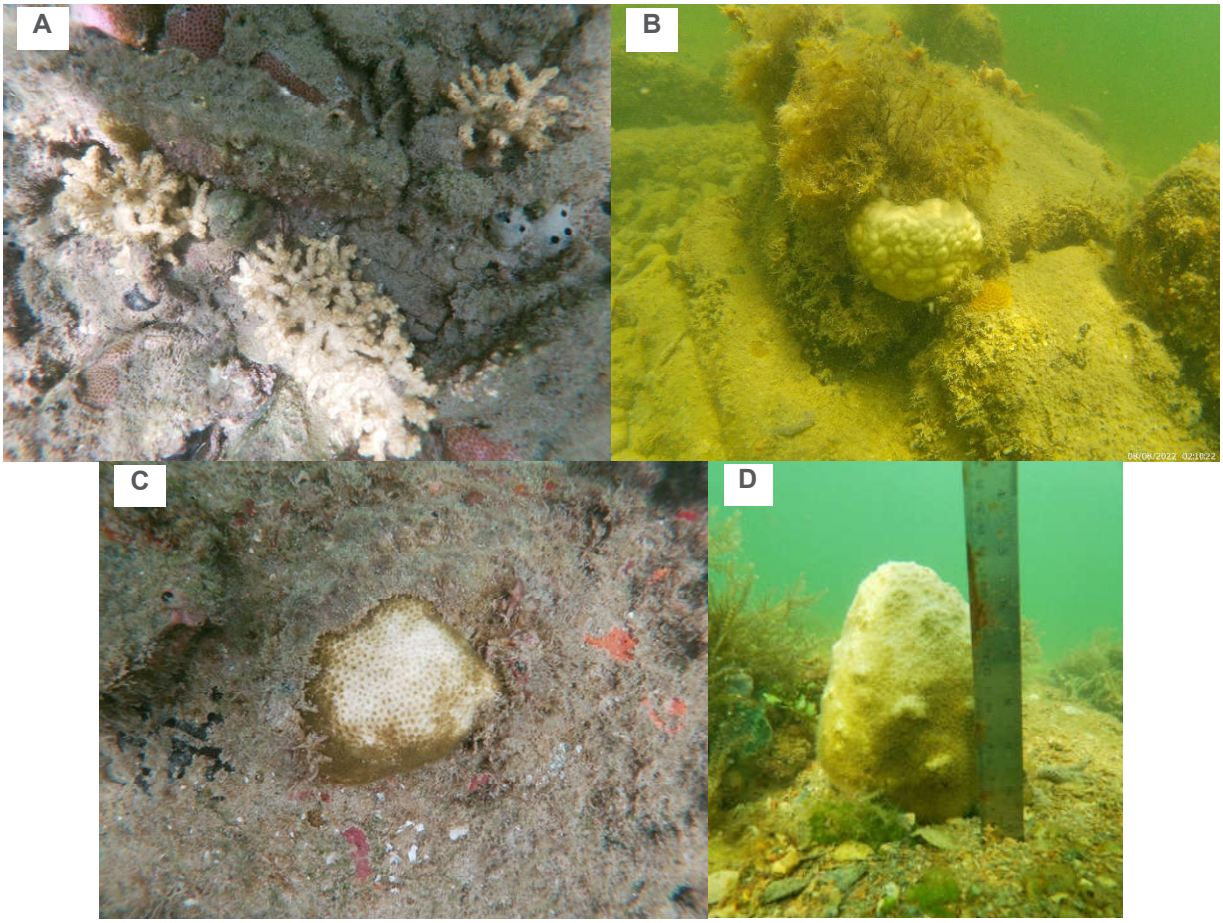


Exhibit 9. Bleached corals observed within the survey area. (A) *Oculina diffusa*, (B) *Porites astreoides*, (C) *Solenastrea bournoni*, and (D) *Orbicella franksi*.

4. Summary

Atkins completed a 2022 preliminary benthic survey between August 8-11, 2022. The purpose of the 2022 preliminary benthic survey is to locate and qualitatively describe biological resources within and adjacent to the project area. The substrate in both the northeast and southeast quadrants of the bridge was comprised of a combination of shell, rubble, and sand occupied by macroalgae and turf algae with small beds of seagrass and corals along the seawall and riprap. The substrate in both the southwest and northwest quadrants of the bridge was comprised of a combination of sand and rubble occupied by macroalgae, sponges, hydroids, and occasional scleractinian and octocoral colonies. The substrate on both the north and south sides of the causeway island were very similar and comprised of a combination of sand, shell, and rubble

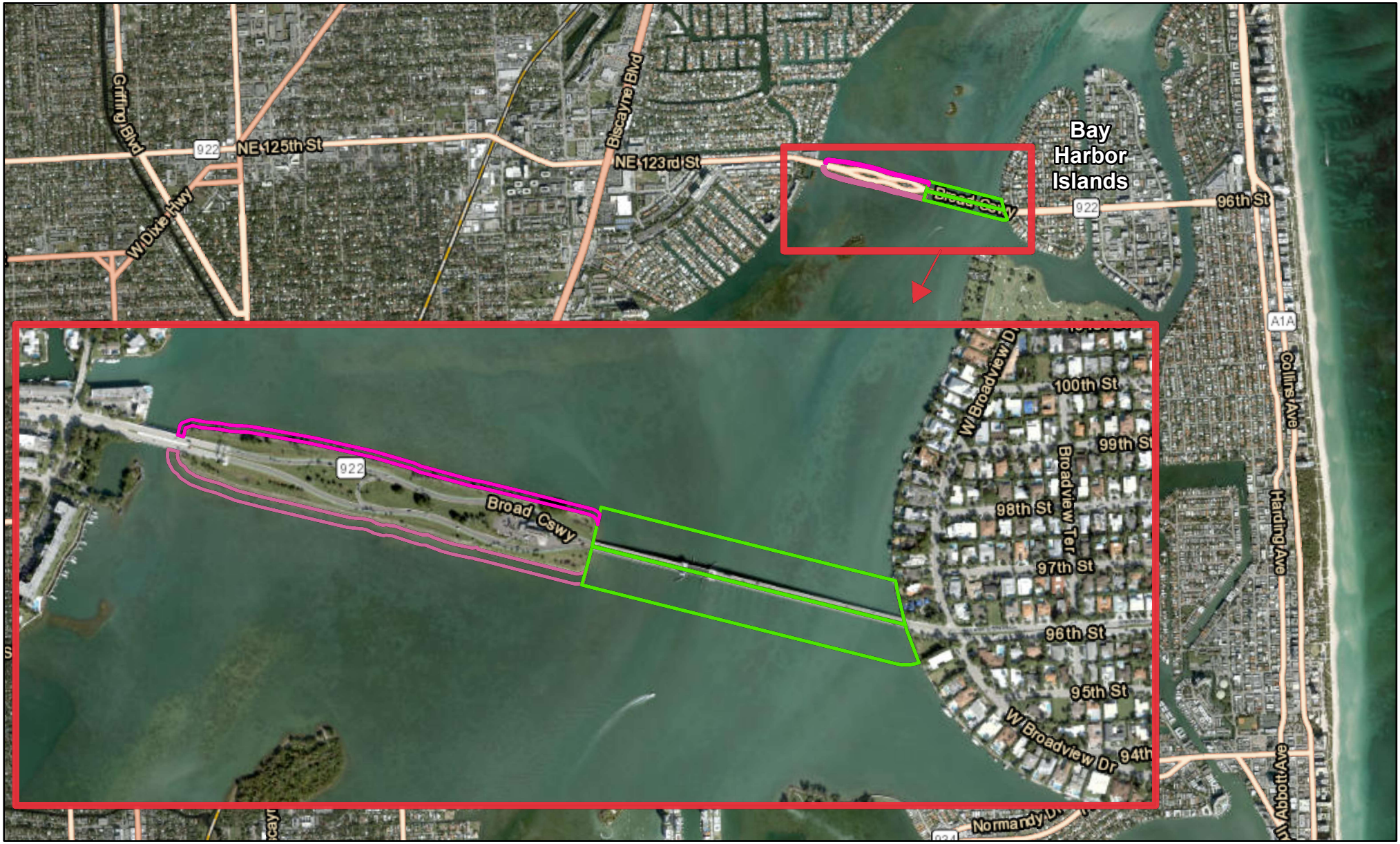
occupied by macroalgal beds interspersed with seagrass beds and extremely infrequent coral colonies.

Seagrasses were documented in all four quadrants of the bridge (i.e., northeast, southeast, northwest, and southwest), as well as both north and south of the causeway island. A total of ~3,051 m² or ~0.754 acres of seagrass were documented within the entire survey area, including four species of seagrass: *Halodule wrightii*, *Halophila decipiens*, *Syringodium filiforme,* and *Thalassia testudinum*.

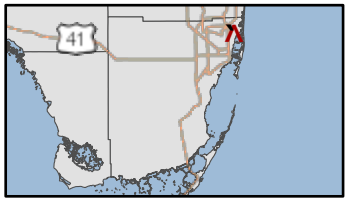
Both scleractinian corals and octocorals meeting the designated size criteria for this survey (i.e., scleractinian corals greater than 10 cm in diameter and octocorals greater than 10 cm in height) were observed within the survey area. These size criteria were utilized because they represent the minimum size for non-listed scleractinian corals and octocorals to be relocated from an impact area (based on the agency-approved coral mitigation plans for other local projects with coral impacts). Scleractinian corals and octocorals generally occurred sporadically throughout the survey area in low numbers; however, a significant majority of the scleractinian corals observed are present on the submerged scour protection (i.e., concrete rubble and blocks) in the vicinity of the seawall on the west side of the bridge (easternmost portion of the causeway island). Coral belt transects within this higher density coral area provide a preliminary general estimate of scleractinian coral density of ~1.3 corals per square meter. Encounters of any listed coral species were documented regardless of colony size since all listed coral colonies are typically required to be relocated from an impact site. The federally listed scleractinian coral species, *Orbicella franksi,* was observed in the northwest and southwest quadrants of the bridge, and along the north-eastern portion of the island causeway.

Appendix

Figures



Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

- Survey Extent: Bridge
- Survey Extent: Causeway - North
- Survey Extent: Causeway - South

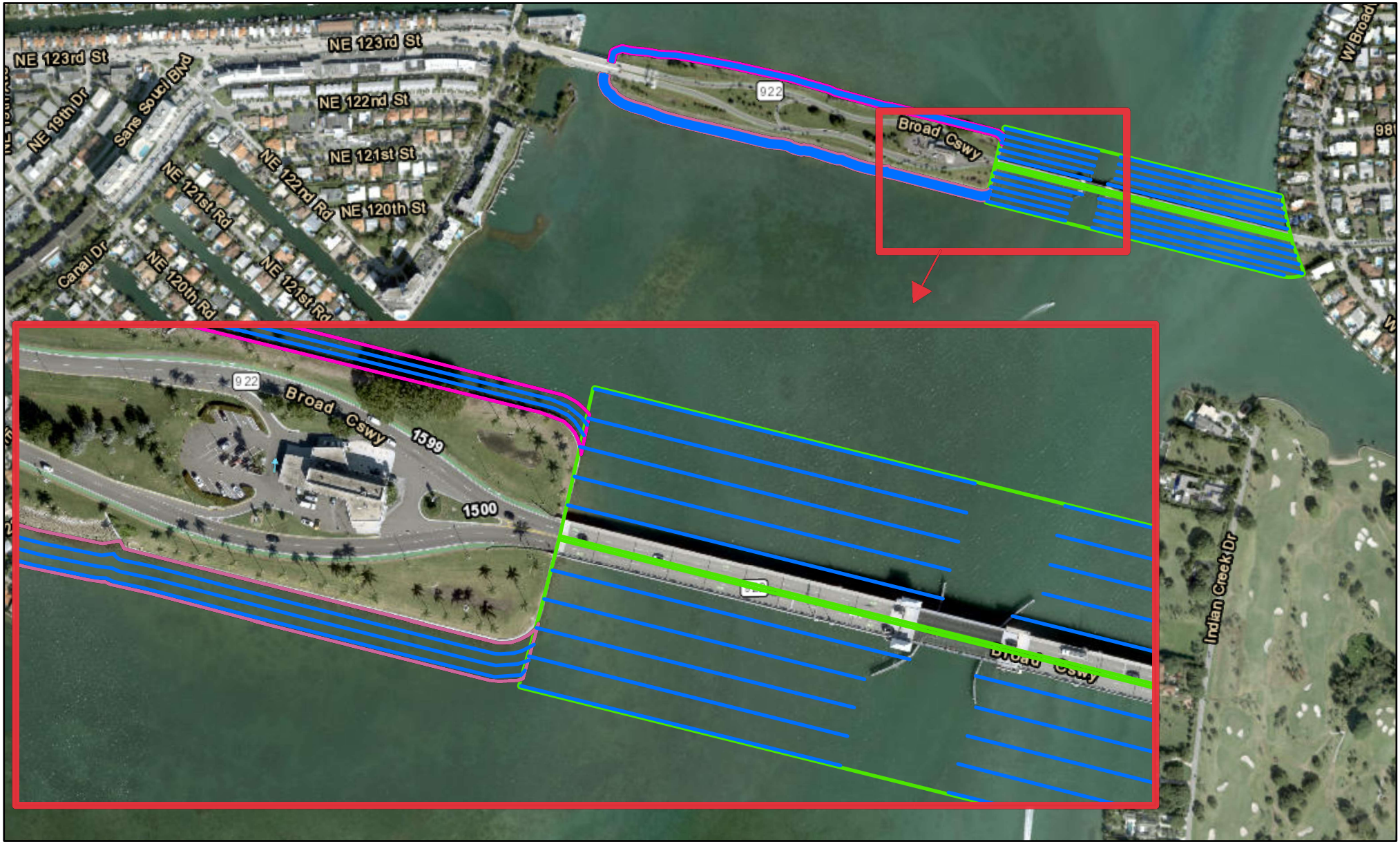
Figure 1: Project Location & Benthic Survey Area Map

1 inch=349,879 feet

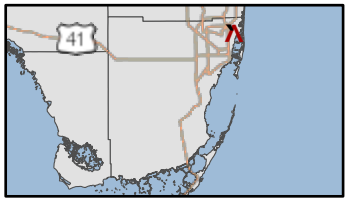
Prepared By: Atkins N.A. Ecological Sciences

ATKINS
Member of the SNC-Lavalin Group

Date: November 18, 2022



Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

Survey Extent: Causeway - North
Survey Extent: Bridge
Transect Lines
Survey Extent: Causeway - South

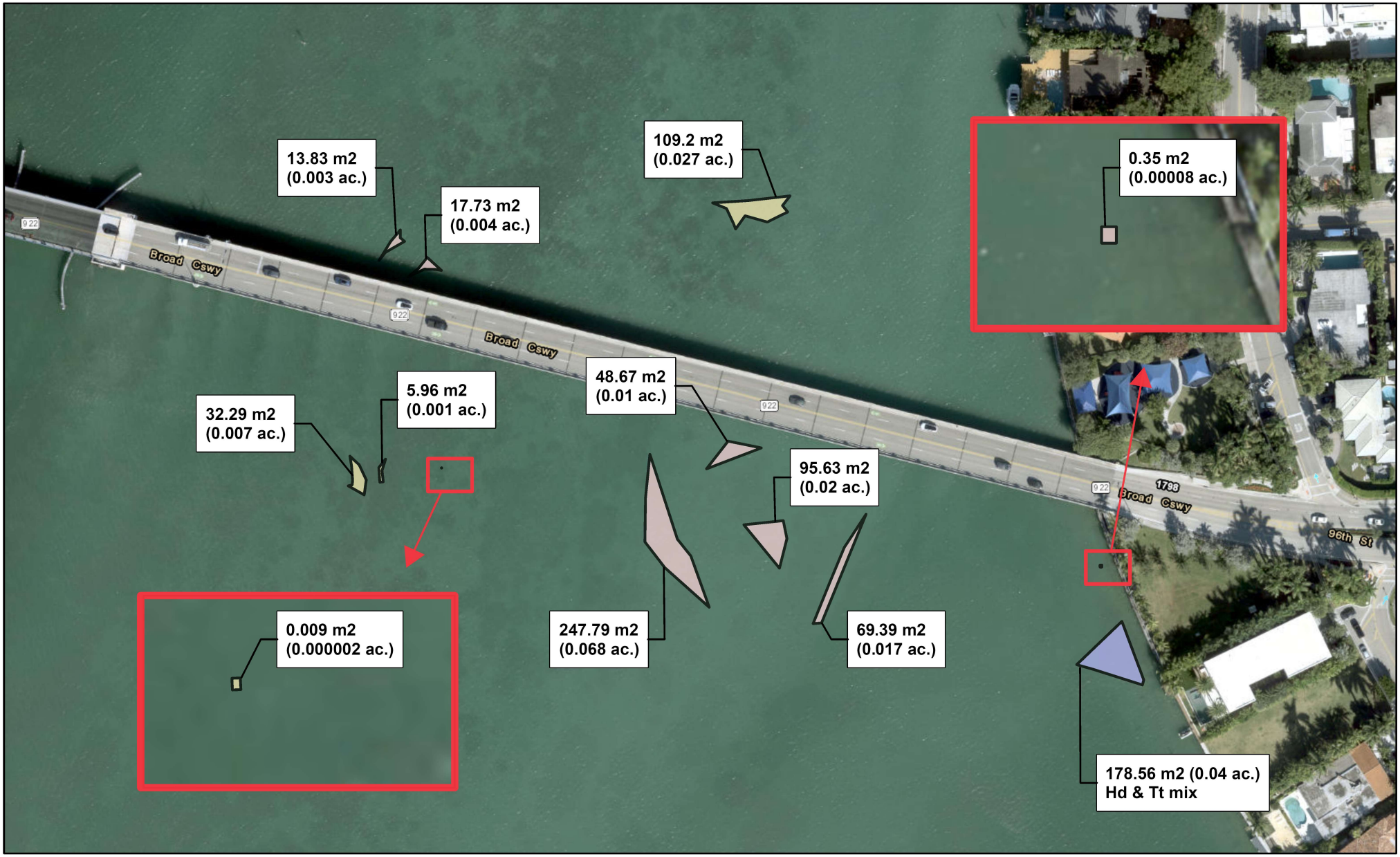
Figure 2: Transect Map

1 inch=349,879 feet

Prepared By: Atkins N.A. Ecological Sciences

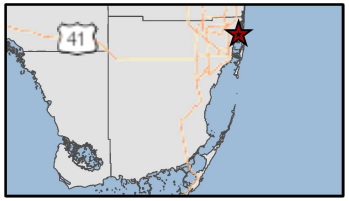
ATKINS
Member of the SNC-Lavalin Group

Date: November 30, 2022



Benthic Survey Data: Atkins, August 2022

Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

- *Halophila decipiens* (Paddle Grass)
- Mixed Species Seagrass Bed
- *Thalassia testudinum* (Turtle Grass)

Figure 3-1: Seagrass Location Map
NE and SE Bridge Quadrants

1 inch=132 feet

Prepared By: Atkins N.A. Ecological Sciences

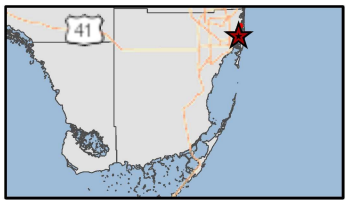
ATKINS
Member of the SNC-Lavalin Group

Date: November 30, 2022



Benthic Survey Data: Atkins, August 2022

Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

Halophila decipiens (Paddle Grass)

Thalassia testudinum (Turtle Grass)

Figure 3-2: Seagrass Location Map
NW and SW Bridge Quadrants

1 inch=70 feet

Prepared By: Atkins N.A. Ecological Sciences

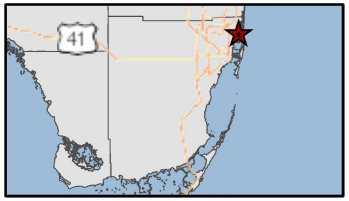
ATKINS
Member of the SNC-Lavalin Group

Date: November 30, 2022



Benthic Survey Data: Atkins, August 2022

Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

- *Halophila decipiens* (Paddle Grass)
- Mixed Species Seagrass Bed
- *Syringodium filiforme* (Manatee Grass)
- *Thalassia testudinum* (Turtle Grass)

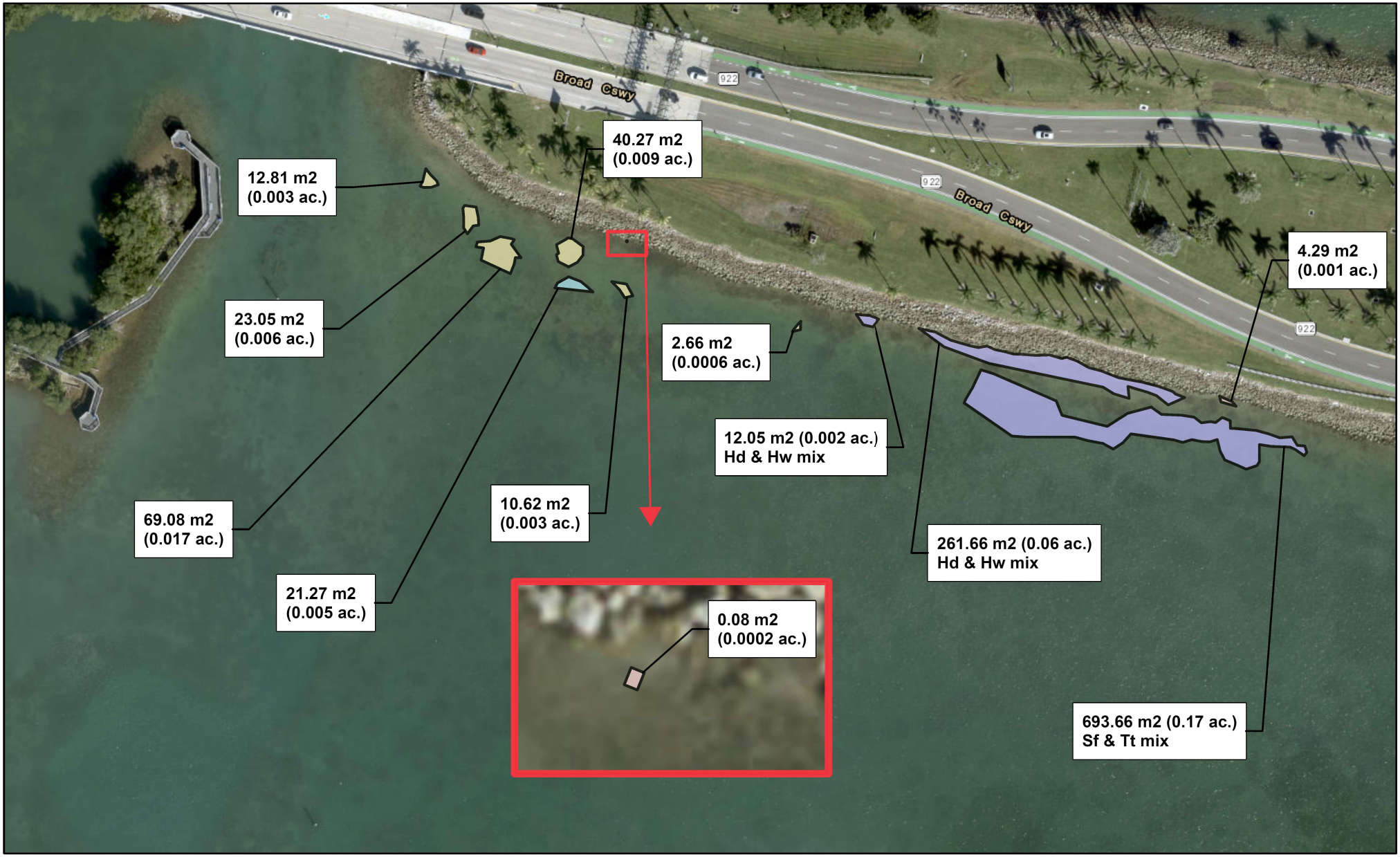
Figure 3-3: Seagrass Location Map
North Causeway

1 inch=502 feet

Prepared By: Atkins N.A. Ecological Sciences

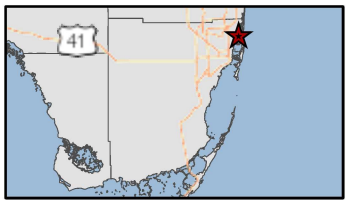
ATKINS
Member of the SNC-Lavalin Group

Date: November 18, 2022



Benthic Survey Data: Atkins, August 2022

Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

- *Halophila decipiens* (Paddle Grass)
- *Syringodium filiforme* (Manatee Grass)
- Mixed Species Seagrass Bed
- *Thalassia testudinum* (Turtle Grass)

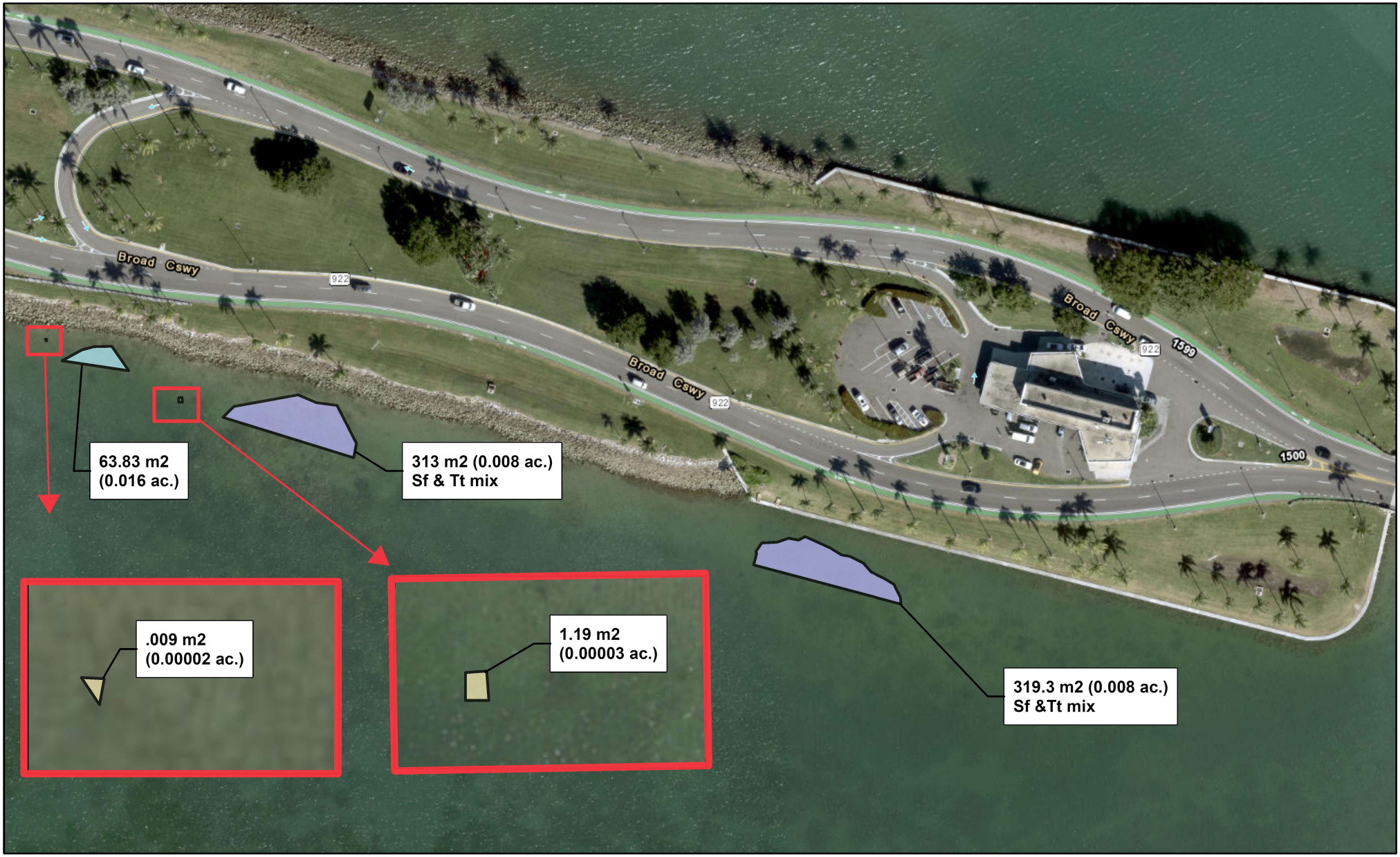
Figure 3-4: Seagrass Location Map
Southwest Causeway

1 inch=117 feet

Prepared By: Atkins N.A. Ecological Sciences

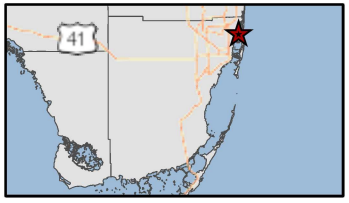
ATKINS
Member of the SNC-Lavalin Group

Date: November 18, 2022



Benthic Survey Data: Atkins, August 2022

Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

- Mixed Species Seagrass Bed
- *Syringodium filiforme* (Manatee Grass)
- *Thalassia testudinum* (Turtle Grass)

Figure 3-5: Seagrass Location Map
Southeast Causeway

1 inch=117 feet

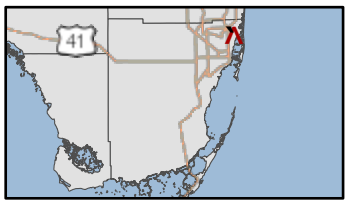
Prepared By: Atkins N.A. Ecological Sciences

ATKINS
Member of the SNC-Lavalin Group

Date: November 18, 2022



Imagery: NAIP 2021



Miami-Dade County, Florida

Broad Causeway 2022 Benthic Survey
Town of Bay Harbor Islands, Miami-Dade County, Florida

- Coral Belt Transects
- Survey Extent: Causeway - North
- Survey Extent: Bridge
- Survey Extent: Causeway - South

Figure 4: Coral Belt Transect Map

1 inch=349,879 feet

Prepared By: Atkins N.A. Ecological Sciences

ATKINS
Member of the SNC-Lavalin Group

Date: November 18, 2022

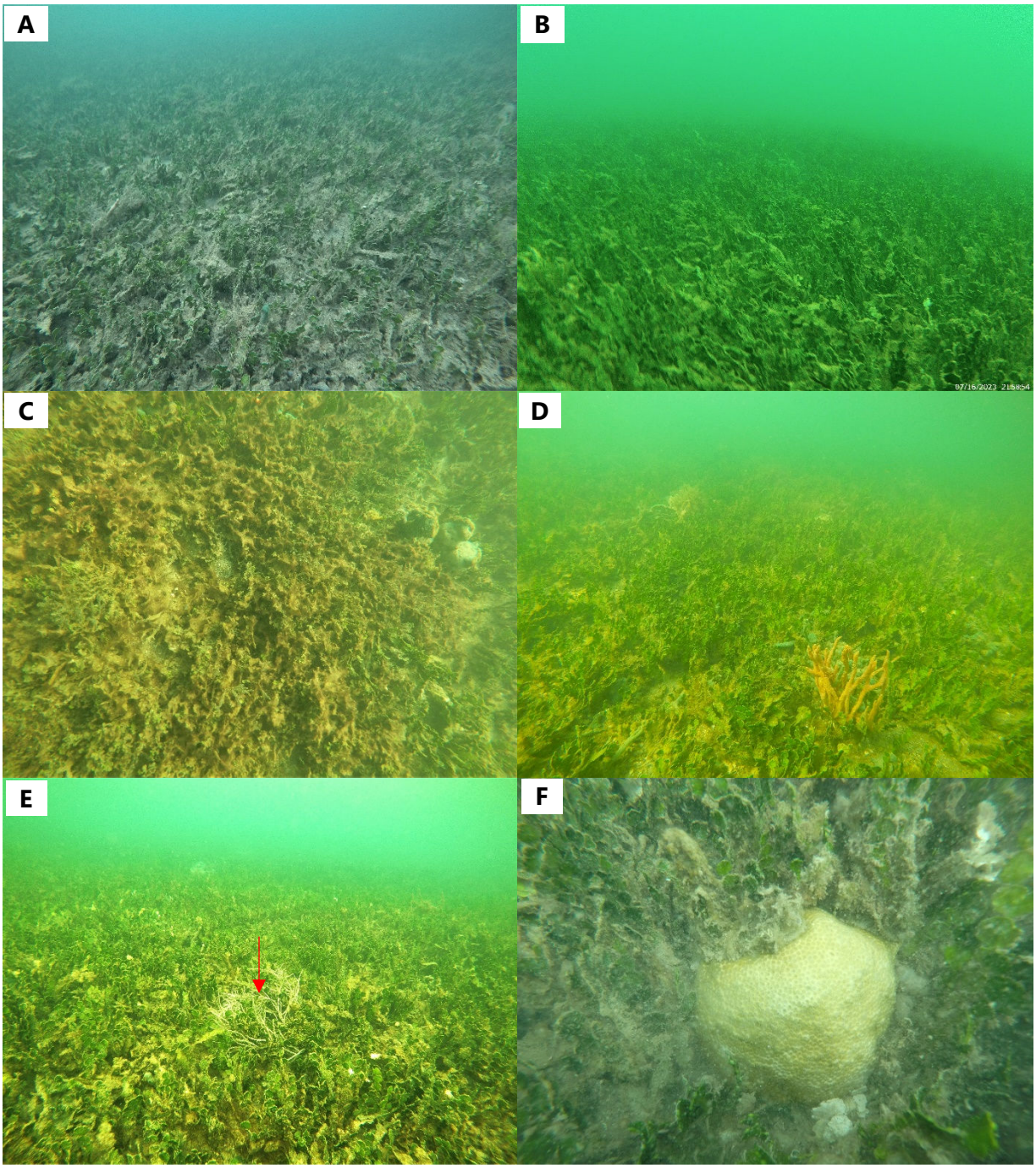
APPENDIX B
Marine Species Observed

Species (common name)	Occurrence		
	Rare	Frequent	Abundant
MACROALGAE			
Halimeda tuna			X
Halimeda opuntia		X	
Halimeda incrassata		X	
Laurencia sp.			X
Caulerpa sertularoides		X	
Caulerpa verticillata		X	
Penicillus sp.		X	
Acetabularia sp.	X		
Dictyota sp.	X		
Padina sp.	X		
Halymenia sp.	X		
Gracilaria sp.	X		
SEAGRASS			
Halophila decipiens (paddle grass)		X	
Thalassia testudinum (turtle grass)		X	
Syringodium filiforme (manatee grass)	X		
SPONGES			
Callyspongia tenerrima			X
Tedania sp.			X
Amphimedon viridis			X
Niphates spp.	X		
Clathria curacaoensis		X	
Iotrochota arenosa			X
Plakortis sp.			X
Clinoa sp.		X	
Ircinia strobilina	X		
Ircinia felix	X		
Ircinia campana	X		
Spheciospongia vesparium	X		
Siphonodictyon coralliphagum	X		

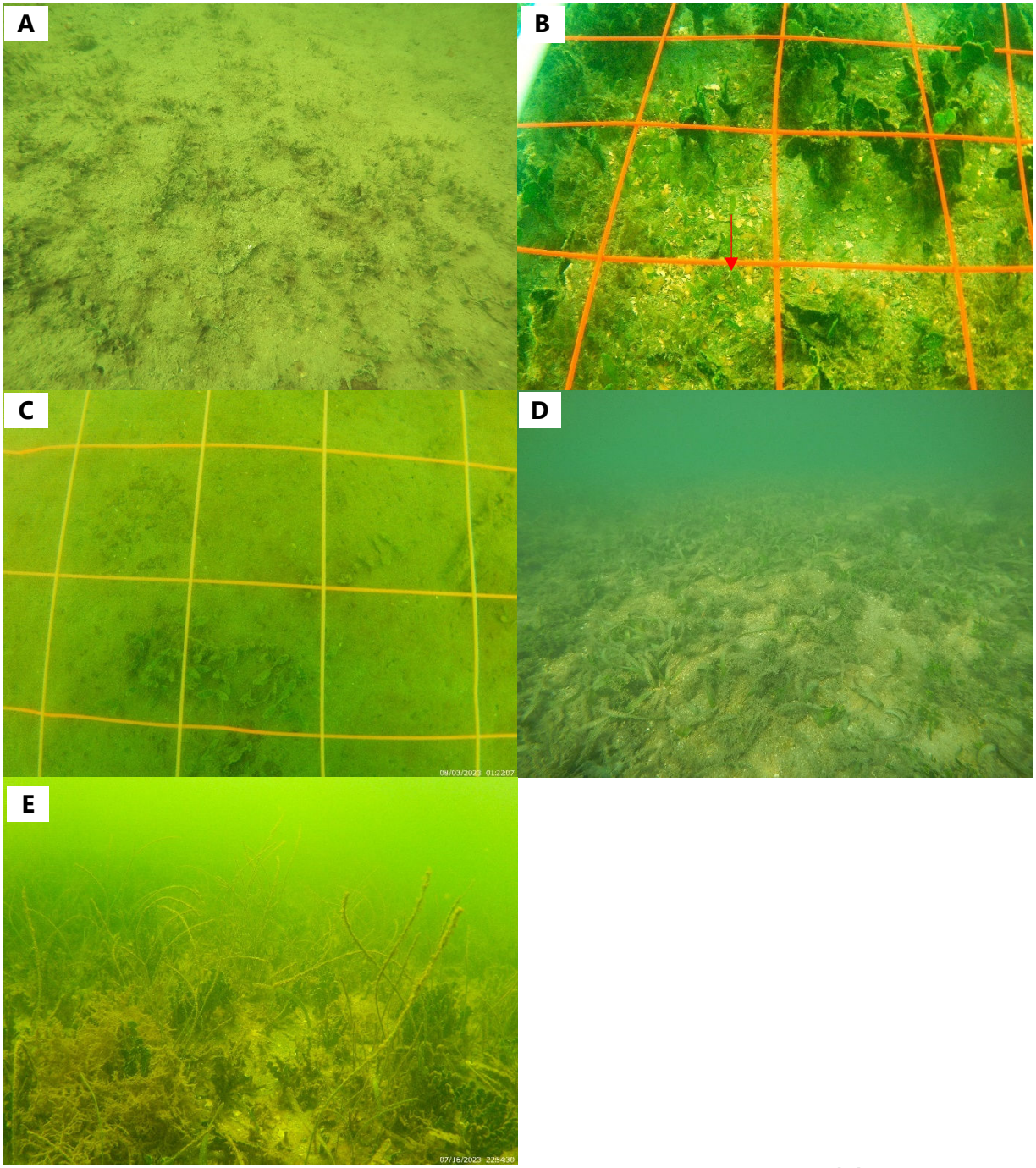
Species (common name)	Occurrence		
	Rare	Frequent	Abundant
SCLERACTINIAN CORALS			
Siderastrea radians (lesser starlet coral)			X
Siderastrea siderea (massive starlet coral)	X		
Solenastrea bournoni (smooth star coral)		X	
Solenastrea hyades (knobby star coral)	X		
Oculina diffusa (ivory bush coral)		X	
Stephanocoenia intersepta (blushing star coral)	X		
Montastraea cavernosa (great star coral)	X		
Porites astreoides (mustard hill coral)	X		
Pseudodiploria clivosa (knobby brain coral)	X		
OCTOCORALS			
Antillogorgia sp. (sea plume)	X		
Leptogorgia sp. (sea whip)	X		
Carijoa riisei (snowflake coral)		X	
OTHER INVERTEBRATES			
Anamobaea oerstedii (split-crown feather duster)	X		
Cassiopea sp. (upside-down jellyfish)			
Diadema antillarum (long-spined sea urchin)	X		
Ecteinascidia turbinata (mangrove tunicate)	X		
Lytechinus variegatus (variegated urchin)	X		
Menippe sp. (stone crab)	X		
Panulirus argus (Caribbean spiny lobster)	X		
FISH, RAYS, AND EELS			
Abudefduf saxatilis (sergeant major)			X
Acanthostracion quadricornis (scrawled cowfish)	X		
Anisotremus virginicus (porkfish)			X
Balistes capriscus (gray triggerfish)	X		
Caranx ruber (bar jack)	X		
Eques punctatus (spotted drum)	X		
Gymnothorax funebris (green moray)	X		
Halichoeres bivittatus (slippery dick)	X		

Species (common name)	Occurrence		
	Rare	Frequent	Abundant
Haemulon aurolineatum (tomtate)			X
Haemulon flavolineatum (French grunt)			X
Haemulon sciurus (bluestriped grunt)			X
Lachnolaimus maximus (hogfish)	X		
Lutjanus analis (mutton snapper)	X		
Lutjanus analis (gray snapper)		X	
Megalops atlanticus (tarpon)	X		
Monacanthus ciliates (fringed filefish)	X		
Ocyurus chrysurus (yellowtail snapper)	X		
Pomacanthus arcuatus (gray angelfish)	X		
Pterois volitans (red lionfish)		X	
Scarus iseri (striped parrotfish)		X	
Scorpaenidae sp. (scorpionfish)	X		
Sphoeroides spengleri (bandtail puffer)		X	
Sphoeroides testudineaus (checkered puffer)		X	
Sphyraena barracuda (great barracuda)	X		
Urobatis jamaicensis (yellow stingray)		X	

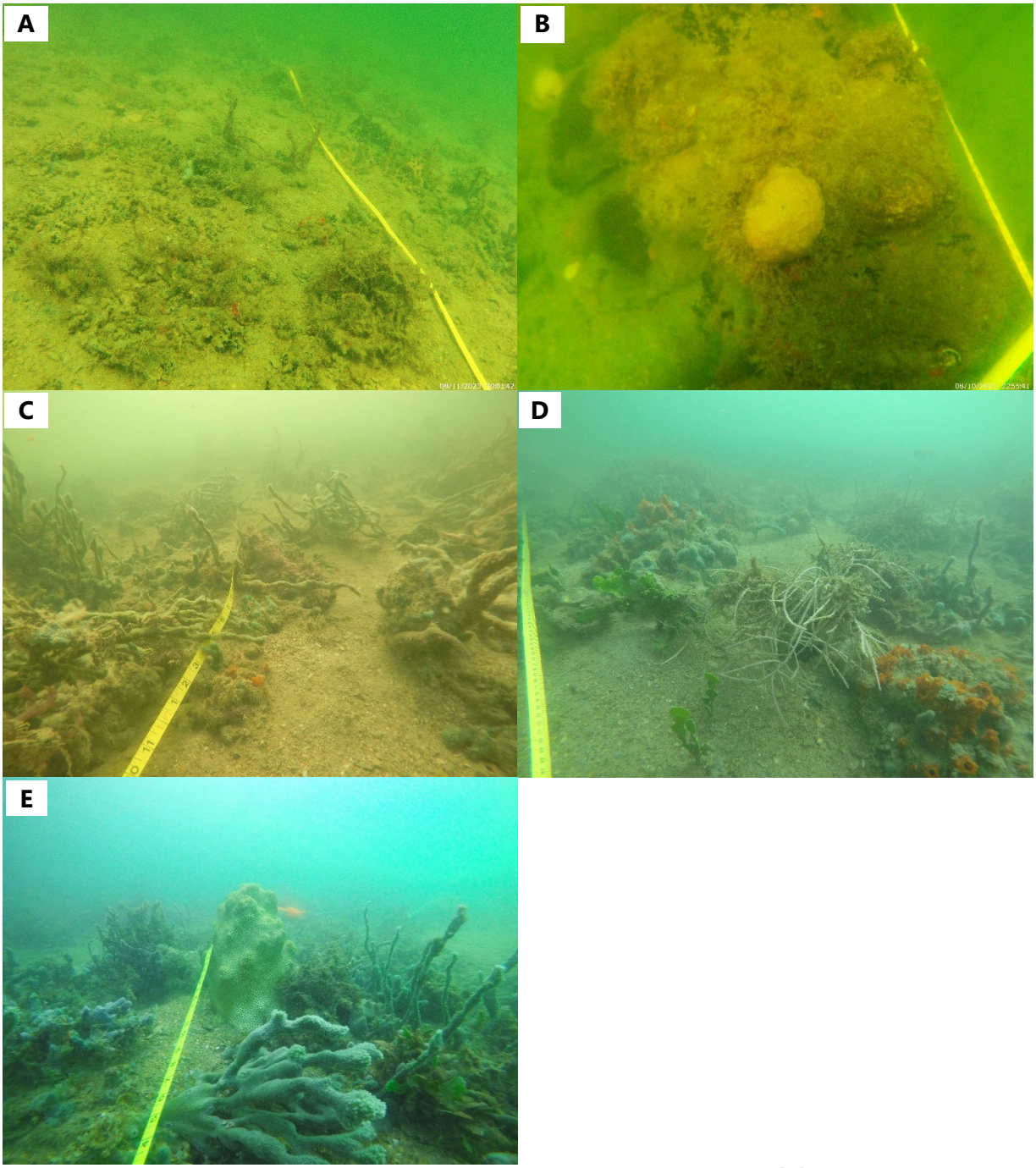
APPENDIX C
Photo Log



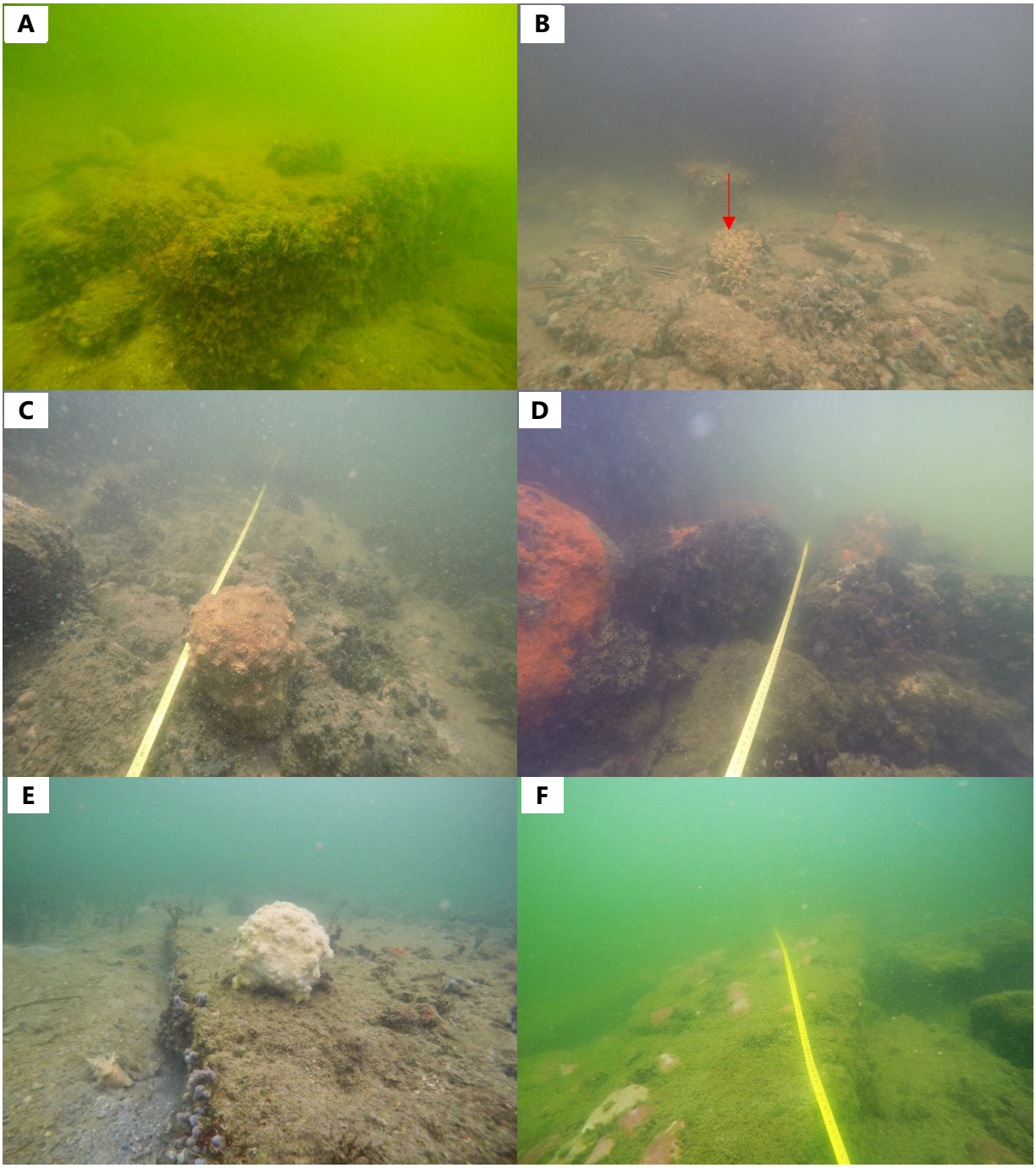
Page 1. Benthic resources observed within Community 1 – Macroalgal Beds. (A) dense macroalgal bed in the northeast quadrant of the bridge (note heavy epiphyte growth); **(B)** dense macroalgal bed in the southwest quadrant of the bridge; **(C)** cyanobacterial overgrowth on the macroalgal bed in the northwest quadrant of the bridge; **(D)** sponges within the macroalgal bed in the southwest quadrant of the bridge; **(E)** a colony of *Antillogorgia* sp. (paling) (see arrow) within the macroalgal bed in the northwest quadrant of the bridge; and **(F)** a colony of *Solenastrea bournoni* (paling) within the macroalgal bed in the northwest quadrant of the bridge.



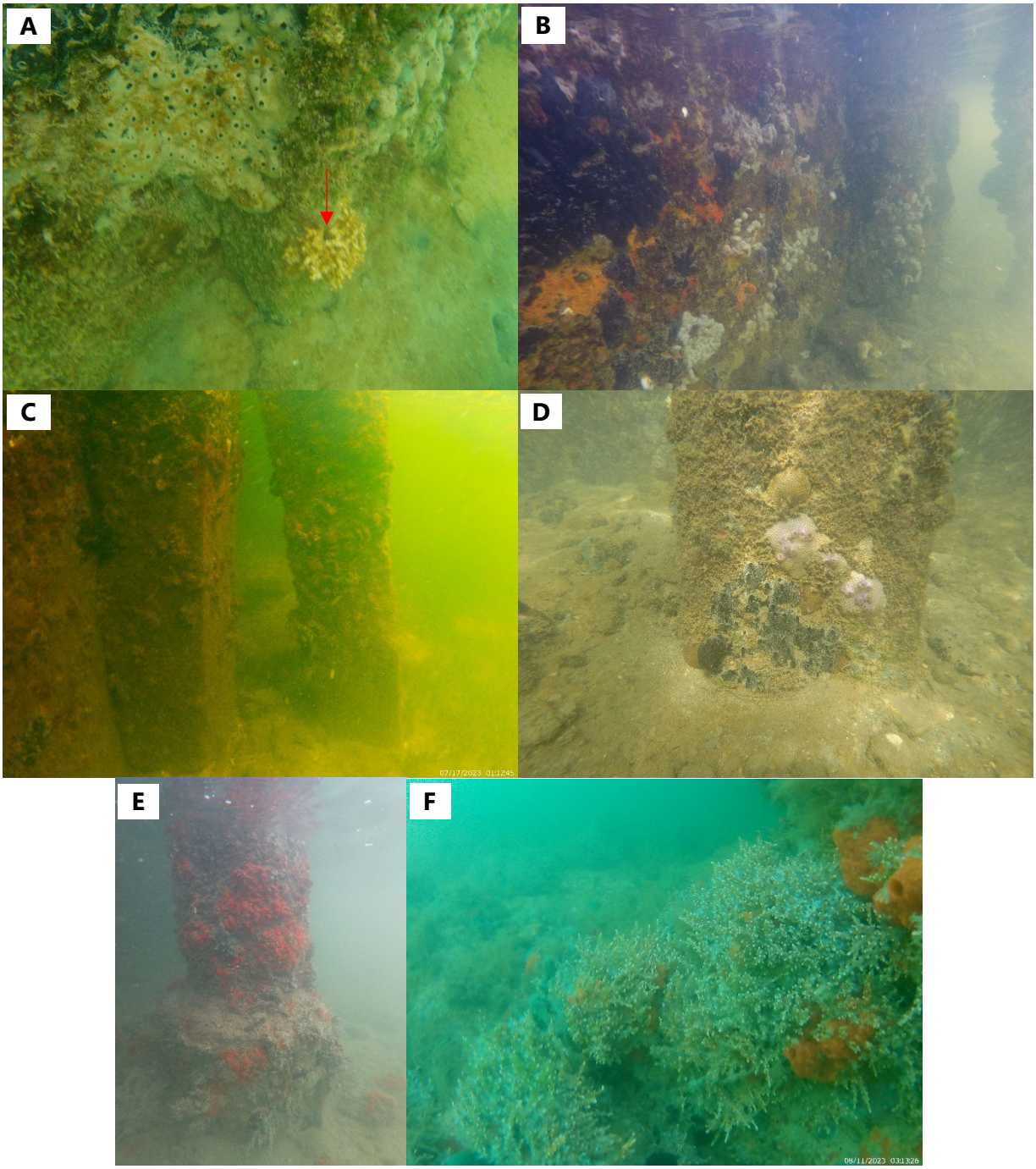
Page 2. Representative photos within Community 2 – Seagrass Beds/Patches. (A) *Halophila decipiens* in the northeast quadrant of the bridge; **(B)** *H. decipiens* in the southeast quadrant of the bridge (Bed SJ- see Figure 3-3); **(C)** *H. decipiens* in the southeast quadrant of the bridge (Bed SK – see Figure 3-2); **(D)** seagrass bed containing *Thalassia testudinum* in the southwest quadrant of the bridge; **(E)** *T. testudinum* and *Syringodium filiforme* in a seagrass bed south of the causeway island (Bed SD – Figure 3-5).



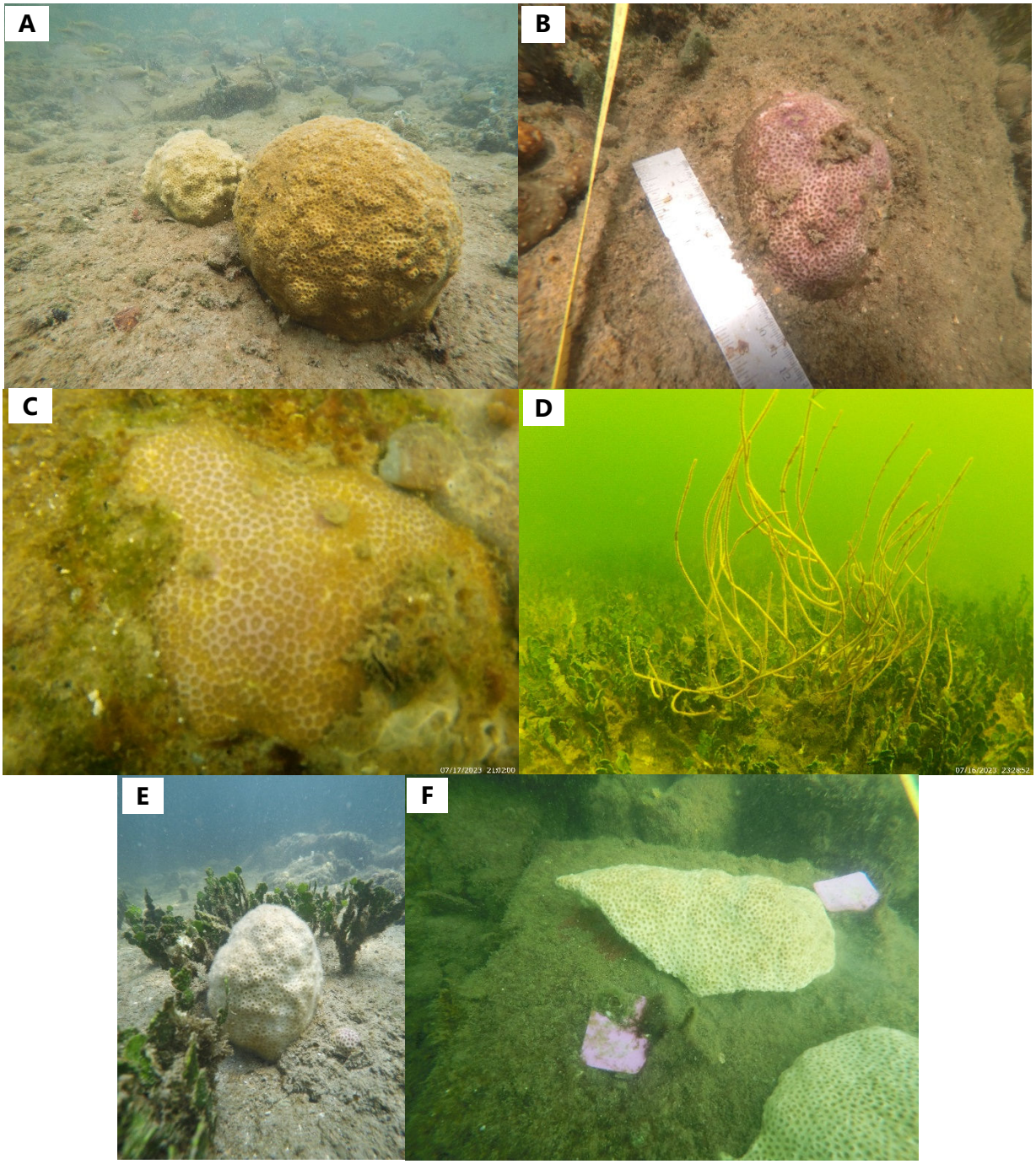
Page 3. Benthic resources observed within Community 3 – Live Bottom. (A) Macroalgae and sponges occurring in the live bottom community in the northeast quadrant of the bridge (transect T19 – Figure 3-7); **(B)** corals observed on hard structures within the live bottom community in the southeast quadrant of the bridge (transect T18 – Figure 3-7); **(C)** the sponge-dominated live bottom habitat along transect T11 (Figure 3-7) in the northwest quadrant of the bridge; **(D)** an octocoral (*Antillogorgia* sp.) documented within the live bottom habitat in the northwest quadrant of the bridge (transect T13 – Figure 3-7); **(E)** sponges and a *Solenastrea hyades* colony located on transect T9 (Figure 3-7) in the live bottom community in the southwest quadrant of the bridge.



Page 4. Benthic resources observed within Community 4 – Coral Habitat Adjacent to the Seawalls. **(A)** scour protection materials adjacent to the eastern seawall; **(B)** rubble and a coral colony (*Oculina diffusa* – red arrow) at the base of the seawall on the north side of the causeway island; **(C)** coral (*Solenastrea bournoni*) colonizing the coral habitat at the base on the seawall on the north side of the causeway island (transect T5 – Figure 3-7); **(D)** rubble and riprap at the base of the seawall on the north side of the causeway island (transect T7 – Figure 3-7); **(E)** large concrete slab with attached coral (*Solenastrea bournoni* – partial bleaching) located off of the seawall on the north side of the causeway island; **(F)** large concrete blocks colonized by corals (*Siderastrea radians*) on the south side of the causeway island (transect T3 – Figure 3-7).



Page 5. Benthic resources observed within Community 5 – Existing Seawall Structures and Bridge Piers. (A) sponges and coral (*Oculina diffusa* – red arrow) colonizing the seawall on the southeast side of the bridge; **(B)** heavy colonization of sponges on the seawall on the north side of the causeway island; **(C)** sponges and turf algae colonizing the seawall and associated support piling on the north side of the causeway island; **(D)** corals (*Siderastrea radians*), sponges, and turf algae colonizing a seawall support piling on the north side of the causeway island; **(E)** bridge pier heavily colonized by sponges and turf algae; **(F)** thick carpet of the octocoral, *Carijoa riisei*, at the base of a bridge pier.



Page 6. Representative Coral Photos. (A) *Solenastrea bournoni* colonies (one paling, one apparently healthy) observed in the coral adjacent to the seawall on the north side of the causeway island; **(B)** a colony of *Siderastrea radians* (boring, macroalgal overgrowth) located on the concrete riprap at the base of the seawall along the causeway island; **(C)** colony of *Stephanocoenia intersepta* (boring, sponge/macroalgal overgrowth) observed in the southeast quadrant of the bridge; **(D)** colony of *Leptogorgia* sp. within a macroalgal bed off the south side of the causeway island; **(E)** partially bleached colony of *S. bournoni* observed in the coral habitat adjacent to the seawall on the north side of the causeway island; **(F)** tagged colonies of *S. bournoni* documented within transect T2 adjacent to the southeastern corner of the causeway island.

Town of Bay Harbor Islands
9665 Bay Harbor Terrace
Bay Harbor Islands, FL 33154
(305) 866-6241

APPENDIX F

OCTOBER 2023 FLORIDA BONNETED BAT SURVEY REPORT

Florida Bonneted Bat Survey Report

TOWN OF BAY HARBOR ISLANDS

BROAD CAUSEWAY BRIDGE REPLACEMENT
PROJECT DEVELOPMENT & ENVIRONMENT STUDY



Prepared for:

Town of Bay Harbor Islands, Florida

October **2023**

Financial Project Identification Number:	452428-1-21-01
Federal Project Number:	N/A
FDOT Efficient Transportation Decision Making (ETDM) Number:	14520
Town of Bay Harbor Islands Project Number:	BC-160

Florida Bonneted Bat Survey Report

October 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 Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. §327 and a Memorandum of Understanding dated May 26, 2022, and executed by Federal Highway Administration (FHWA) and FDOT.

Prepared for:
Town of Bay Harbor Islands

Prepared by:
Environmental Solutions & Innovations, Inc.
2250 Lucien Way, Suite 302
Maitland, FL 32751

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1

2.0 ECOLOGICAL SETTING 1
2.1 Description 1
2.2 Status 3
2.3 Species Distribution 3
2.4 Ecology 3
2.4.1 Roosting Ecology 4
2.4.2 Maternity Season 4
2.4.3 Food Habits and Foraging Ecology 4
2.5 Survivorship/Population Size 5
2.6 Causes of Past/Current Decline 5

3.0 METHODS 6
3.1 Level of Effort 6
3.2 Site Selection 6
3.3 Automated Data Analysis 6
3.4 Visual Data Analysis 7
3.5 Habitat Assessment 7
3.6 Potential Roost Search 8
3.6.1 Survey Methods for Natural Cavities 8
3.6.2 Survey Methods for Artificial Structures 8
3.7 Weather and Temperature 9

4.0 RESULTS 9
4.1 Automated Data Analysis 9
4.2 Maximum Likelihood Estimate 11
4.3 Visual Data Analysis 12
4.4 Habitat Assessment 12
4.5 Potential Roost Search 12
4.6 Potential Foraging Habitat 14
4.7 Weather and Temperature 14

5.0 DISCUSSION 14

6.0 LITERATURE CITED 15

LIST OF FIGURES

Figure Page

Figure 1. Location of the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida. 2

Figure 2. Acoustic detector locations on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida. 10

LIST OF TABLES

Table Page

Table 1. Acoustic detector locations on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida. 9

Table 2. Bat calls identified by Kaleidoscope Pro automated data analysis on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida. 11

Table 3. Kaleidoscope Pro maximum likelihood estimates for bat species on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida. 11

Table 4. Habitat characterization of detector sites on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida. 13

Appendices

Appendix A: Resume
Appendix B: Data Sheets
Appendix C: Photographs
Appendix D: Visual Vetting Table
Appendix E: Weather Data
Appendix F: Additional Tree Survey Data

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1.0 Introduction

The Town of Bay Harbor Islands is conducting a Project Development & Environment (PD&E) Study for the Broad Causeway Bridge Replacement Project (FM# 452428-1-21-01). The project's scope of work includes replacement of the aging Broad Causeway Bridge with a new structure that meets current design standards and is consistent with U.S. Coast Guard regulatory requirements.

Environmental Solutions & Innovations, Inc. (ESI) was retained by the Town of Bay Harbor Islands to conduct acoustic and visual surveys for the Florida bonneted bat (*Eumops floridanus*) on the proposed Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive) in Miami-Dade County, Florida (Project; Figure 1).

The entire Project area was evaluated for the Florida bonneted bat, but only the eastern Project limits within Bay Harbor Islands is within the U.S. Fish and Wildlife Service USFWS) Consultation Area for the species. As such, Project objectives include determining potential species presence or probable absence within the Project area.

2.0 Ecological Setting

2.1 Description

The Florida bonneted bat is the largest bat found in Florida. Individuals have short, glossy fur darker on the dorsal side and lighter on the ventral side, and hairs are bicolored as the bases are white (Timm and Genoways 2004). The fur may vary in color from black to brown to brownish gray or cinnamon brown (Timm and Genoways 2004). The forearm length ranges from 2.4 to 2.7 inches (60.0 to 69.1 mm) (Ober et al. 2017). The head and body length range from 5.1 to 6.5 inches (130 to 165 mm). Although Timm and Genoways (2004) describe the species without sexual dimorphism, further study indicates males are slightly larger than females and possess gular glands, which are absent in females (Ober et al. 2017).

Federal Register Documents

78 FR 71466 71501: 22 November 2022: Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Endangered Florida Bonneted Bat

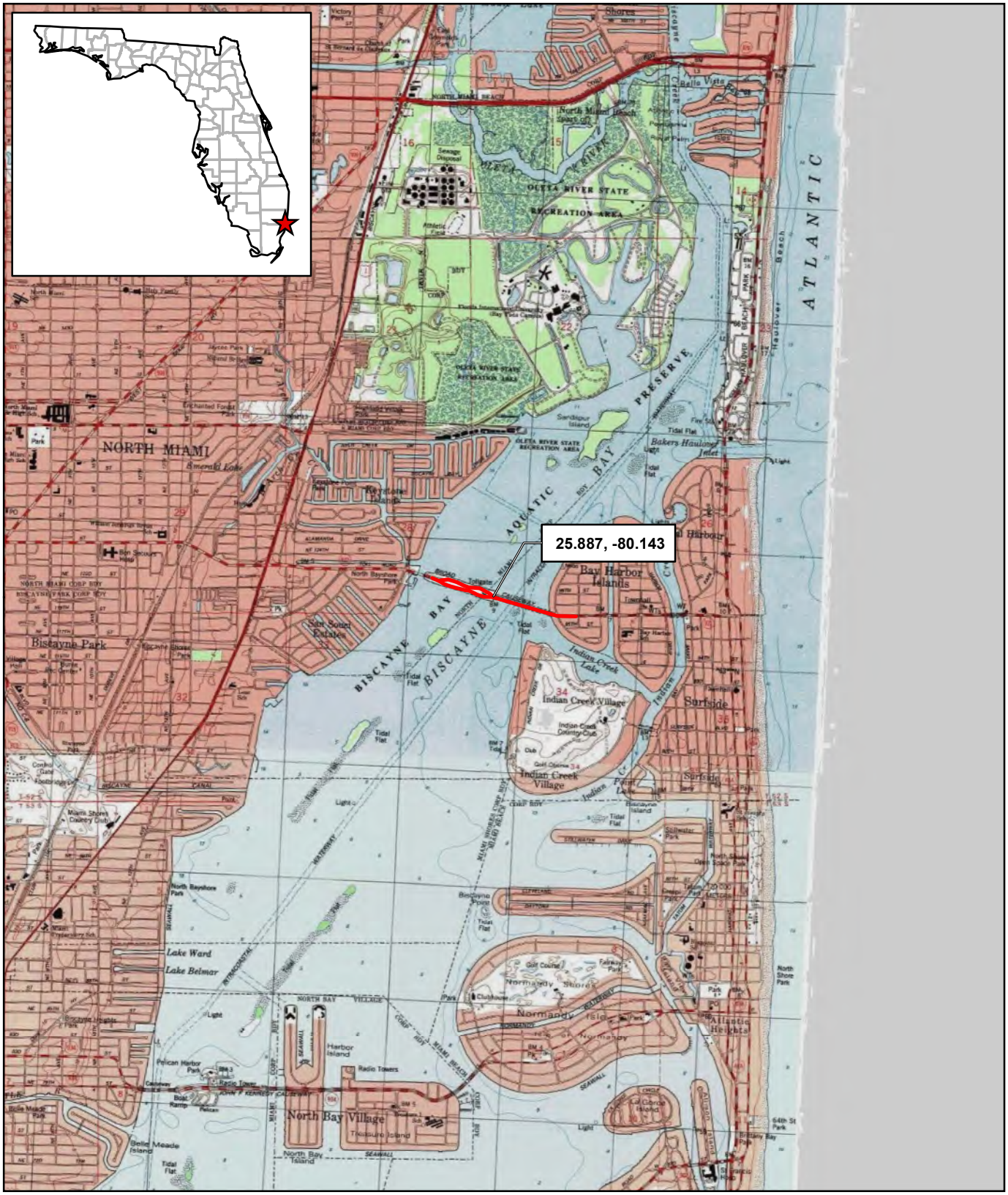
78 FR 61003 61043: 2 October 2013: Endangered Species Status for the Florida Bonneted Bat; Final Rule

77 FR 60749 60776; 4 October 2012: Proposed Endangered Species Status for the Florida Bonneted Bat: Proposed Rule; request for public comments

76 FR 66370 66439; 26 October 2011: Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions

75 FR 69222 69294; 10 November 2010: Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions; Proposed Rule

74 FR 57804 57878; 9 November 2009: Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions



N
W E
S

Figure 1. Location of the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Financial Project Identification Number: 452428-1-21-01.

0 0.5 1 Mile

Base Map: USGS Topographic Map

ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

G:\Current\2015_BayHarbor_FBB\Maps\Bat_Survey\Report_Figures\Figure1_2015_Location_Topo_20230531.mxd; creator: ckemmerer

2.2 Status

The USFWS listed the Florida bonneted bat as endangered on 2 October 2013 (USFWS 2013). The species was considered a sub-species of Wagner's mastiff bat (*Eumops glaucinus*) and was described as a separate species in 2004 (Timm and Genoways 2004). In the U.S., seven species of bats are within the family Molossidae, and the Florida bonneted bat is the only federally listed species. Factors affecting species' status include threats to roosting and foraging habitat, the inadequacy of existing regulatory protections prior to listing, and other natural or artificial factors, particularly small population size, restricted range, low fecundity, and few isolated colonies (USFWS 2013).

The International Union for Conservation of Nature (IUCN) Red List assessed the Florida bonneted bat in October 2015 and categorized it as vulnerable due to low population size and limited distribution. The species is thought to still be declining and population estimates range from 3,000-5,000 individuals (IUCN 2016).

In June 2020, USFWS introduced a proposal to designate approximately 1.5 million acres (607,028 ha) in 10 counties as critical habitats for the Florida bonneted bat under the Endangered Species Act (ESA) (USFWS 2020). However, an updated proposal in November 2022 revised the critical habitat total to approximately 1.2 million acres (475,105 ha) in 13 counties (USFWS 2022).

Additionally, the Florida Fish and Wildlife Conservation Commission (FWC) protects the species as a federally designated endangered species.

2.3 Species Distribution

The Florida bonneted bat has one of the most restricted distributions of any bat in North America, with records from only 12 counties in southern Florida: Charlotte, Collier, DeSoto, Glades, Hendry, Highlands, Lee, Miami-Dade, Monroe, Okeechobee, Osceola, and Polk (Timm and Genoways 2004, USFWS 2013).

Most known records of Florida bonneted bats are on federal-, state- or county-managed lands; however, a few exist on lands under private ownership. The USFWS defines the Florida bonneted bat's general distributable range, or Consultation Area, using confirmed presence data, key habitat features, reasonable flight distances, and home range sizes. Current Consultation Area requirements extend 15 miles (24 km) from a known roost representing the distance Florida bonneted bats likely travel on a given night. In 2019, USFWS expanded the Consultation Area to include all or parts of 17 counties. Justification for the extension was derived using home range sizes, key habitat features, and presence/absence data (USFWS 2019).

2.4 Ecology

Compared to other listed bat species in the U.S., relatively little is known about the

Florida bonneted bat. Recent studies are beginning to provide valuable information critical for the species' future.

2.4.1 Roosting Ecology

The Florida bonneted bat roosts in various artificial and natural roosts. It has been found under the Spanish tile of buildings, in low shrubbery, and in growths of tropical flowers and shrubs in residential Miami, Coconut Grove, and Coral Gables (Best et al. 1997). Individuals were also located roosting in bald cypress (*Taxodium distichum*), rock outcrops, chimneys, and beneath barrel roof tiles (Gore et al. 2015). Natural roosts include shafts of royal palms (*Roystonea regia*), cavities excavated by red-cockaded woodpeckers (*Picoides borealis*) and sometimes enlarged by pileated woodpeckers (*Dryocopus pileatus*), and in longleaf pines (*Pinus palustris*) (Best et al. 1997). In recent years, individuals were discovered occupying a cavity in a longleaf pine at Avon Park Air Force Range in Osceola County and a cavity in a slash pine (*Pinus elliottii*) in Florida Panther National Wildlife Refuge in Collier County (Braun de Torrez et al. 2016). The species may also use utility poles or highway structures (i.e., bridges).

Artificial bat boxes provide potential roosting habitat for the Florida bonneted bat. The species was observed roosting in bat boxes in the Fred C. Babcock/Cecil M. Webb Wildlife Management Area (BWWMA) (Ober et al. 2017). Boxes are primarily found in mesic and hydric pine flatwoods proximate other habitat types, such as basin wetlands (USFWS 2013).

The Florida bonneted bat roosts in small colonies, usually composed of a male and a harem of females. Roosting in tree cavities may allow a male to better defend the roost from other males (Belwood 1981).

2.4.2 Maternity Season

Evidence suggests Florida bonneted bats are polyestrous as pregnant bats were found in early summer and September in Florida (Belwood 1981, Timm and Genoways 2004). Pregnant females were documented in April and August, and males with descended testes in April, August, and December. The same study found non-volant pups eight months out of the year, but no individual female was pregnant more than once within the given year (Ober et al. 2016). Females give birth to one offspring each maternity season (USFWS 2013). Like other bats, females leave the young in the roost to forage during the lactation period. In the latter portion of the maternity season, the young forage with the females until the young can sufficiently forage alone (USFWS 2013).

2.4.3 Food Habits and Foraging Ecology

The species is insectivorous and known to primarily feed on flying insects such as beetles (Coleoptera), true bugs (Hemiptera), and true flies (Diptera) (Belwood 1981). Florida bonneted bats rely on open spaces for foraging and tend to avoid clutter as

they are fast fliers but not as agile as smaller bats (Best et al. 1997). Recent evidence potentially suggests males and females occupy separate foraging niches, as modest sexual dimorphism in wing morphology occurs (Ober et al. 2017). Florida bonneted bats rarely fly below 30 feet (9 m) (Timm and Genoways 2004). Important foraging areas include wetlands and open, fresh water such as ponds and streams, where they fly low to drink water (USFWS 2013).

2.5 Survivorship/Population Size

The population size of the Florida bonneted bat is unknown; however, it is thought to be less than that needed for optimum viability (Timm and Arroyo-Cabrales 2008). Additional studies will provide more insight; however, initial thoughts range from fewer than a few hundred individuals (Marks and Marks 2008) to a number in the hundreds or low thousands (FWC 2011).

2.6 Causes of Past/Current Decline

Habitat loss, modification, and other natural and manmade factors appear to influence the Florida bonneted bat. Management practices such as live or dead tree removal or prescribed burns potentially destroy roosts. The species' ability to adapt to roost in human structures puts it at risk of purposeful or accidental harm from humans. Activities such as utility pole removal or bridge maintenance can disturb maternity roosts or cause mortality in a situation where awareness of Florida bonneted bat's sensitivity is lacking (USFWS 2013)

Small population size, restricted range, isolated colonies, and low fecundity can allow stochastic or catastrophic events to be severely detrimental to the Florida bonneted bat. Factors also create a bottleneck effect making the species vulnerable to genetic drift. With such a restrictive range and likely small population size, the Florida bonneted bat becomes more vulnerable to demographic, stochastic, and environmental processes (USFWS 2013).

Competition for tree cavities as roosts is high. Florida bonneted bats must compete for roosts with various native and non-native wildlife. Competition increased due to habitat and potential roost tree (PRT) losses resulting from development (USFWS 2013).

Several factors potentially adversely affecting the Florida bonneted bat still need to be examined, including artificial light pollution, pesticides, disease, predation, and impacts from wind facilities (USFWS 2013).

3.0 Methods

ESI conducted acoustic (see 3.1 to 3.4) and roost (see 3.6) surveys following the October 2019 *Florida Bonneted Bat Consultation Guidelines* (USFWS 2019) (2019 Guidelines). Section 3.5 includes a habitat assessment of each detector location.

3.1 Level of Effort

The 2019 Guidelines recommend a minimum of 5 detector nights per 0.6 mile (1 km) of suitable habitat for Florida bonneted bat presence/probable absence surveys. The Project requires a minimum of three acoustic detectors for five calendar nights each totaling 15 detector nights.

3.2 Site Selection

Acoustic detectors (Song Meter SM4BAT Full Spectrum [FS] Ultrasonic Recorder [Wildlife Acoustics, Inc.]) equipped with omnidirectional microphones mounted approximately 10 to 20 feet (3 to 6 m) above ground are deployed. Detectors are preset to record 30 minutes before sunset to 30 minutes after sunrise.

Preferred acoustic detector deployment locations have limited acoustic clutter, which reduces the quality of the calls recorded (Britzke 2004, Broders et al. 2004), and regular bat traffic. Areas include, but are not limited to, forest canopy openings, forest edges, fencerows adjacent open habitats or connecting two larger blocks of suitable habitat, utility corridors, water sources (including vegetated wetlands, ponds, and open stretches of streams), and other open linear corridors (including logging and other woodland roads/trails). Areas exhibiting potential roosting habitat are prioritized for sampling.

3.3 Automated Data Analysis

All call files are collected in full spectrum, downloaded, and processed through Kaleidoscope Pro (Kpro) software (classifier v5.4.2 Wildlife Acoustics, Concord, Massachusetts). The software extracts parameters including the frequency, time, and slope components of each pulse. Each pulse is assigned a species-level identification, with the entire sequence assigned based on the species most frequently identified. In some cases, even very low confidence identifications are of value, including instances where biologists attempt to locate a rare species.

In other cases, such as academic research or studies aimed at regulatory compliance, a more complete level of identification is required. The software allows users the option of tightening or loosening the stringency of the rule governing species-level identifications and can also be adjusted to restrict the analysis to only those species expected present (to avoid misidentifications).

The software makes use of maximum likelihood estimators (MLE), a multivariate statistical technique used to test the strength of a proposed relationship based on known or assumed error rates. In this case, the proposed relationship is the presence of protected bats identified by analytical software. The MLE accounts for the number of call sequences identified as a species and compares it to the number of call sequences identified as belonging to a similar species based on assumed error rates. Assumed error rates are obtained by testing the software packages against libraries of known calls.

Eight species potentially present in the Project area are included in the analysis: Rafinesque' s big-eared (*Corynorhinus rafinesquii*), big brown (*Eptesicus fuscus*), Florida bonneted, eastern red (*Lasiurus borealis*), southeastern myotis (*Myotis austroriparius*), evening (*Nycticeius humeralis*), tricolored (*Perimyotis subflavus*), and Brazilian free-tailed (*Tadarida brasiliensis*) bats. The zero (balanced/neutral) sensitivity setting is used for analysis and classifier package, allowing calls to be classified to the species level based on the greatest percentage of the call classified as a single species. Acoustic data are provided electronically upon request and are stored for five years.

3.4 Visual Data Analysis

Recorded call files and noise files are visually examined by a bat acoustic identification specialist, as low-intensity calls are sometimes classified as noise by Kpro. Calls are vetted for the possibility of Florida bonneted bat presence, and all calls under 20 kHz are marked for analysis to determine if the call was potentially produced by the target species or an animal of other taxa. Call files potentially containing Florida bonneted bat-calls are flagged for vetting in full spectrum using both the Sonobat and Kpro viewers to visually assess the entirety of the call file, as zero-crossing often results in loss of call data or alters pulse structure.

Due to some repetition in noise or call structure in some cases, Kpro identifies low-end VHF frequencies from cars, insects, birds, or flying squirrels as Florida bonneted bats. Extensive experience in acoustic analyses is key to identifying such situations. In addition, Brazilian free-tailed and hoary bat (*Lasiurus cinereus*) calls can overlap Florida bonneted bats in frequency range. Kpro places great emphasis on call frequency as the major indicator, not on call structure or time between calls, to identify species. Low frequency Brazilian free-tailed bat calls are often misidentified as Florida bonneted bats due to characteristic frequencies below 20 kHz. Experienced acoustic analysts review all factors, thus ensuring proper identification. Calls are visually vetted by Mr. Patrick Moore (resume provided in Appendix A).

3.5 Habitat Assessment

Habitat at each detector location is described and assessed for use by Florida bonneted bats, and representative photographs are taken. The emphasis of this description is habitat form: size and relative abundance of large trees and snags that

potentially serve as roost trees, canopy closure, understory clutter/openness, water availability, and flight corridors.

ESI's habitat characterization does more than emphasize species of large trees. It identifies components of the canopy and subcanopy layers. All trees that reach into the canopy are canopy trees, regardless of diameter/size. Many smaller trees are often also found in the canopy; in some situations, the canopy can be entirely composed of smaller-diameter trees. ESI's habitat characterization identifies dominant and subdominant elements of the canopy.

The subcanopy, or understory, vegetation layer is well defined in classical ecological literature. It is that portion of the forest structure between the ground vegetation (to approximately 2 feet [0.6 m]) and the canopy layers, usually beginning at about 24.9 feet (7.6 m). Vegetation in the understory may come from lower branches of overstory trees, small trees that grow into the overstory, and all trees and shrubs confined to the understory.

3.6 Potential Roost Search

Roost surveys are conducted in all types and age classes of forest within the Project boundary. Habitat with high Florida bonneted bat roosting suitability includes areas with substantial presence of large or mature live trees with various deformities including, but not limited to: large cavities, hollows, and sloughing bark. PRTs are typically greater than 33 feet (10 m) in height and 8 inches (20 cm) in diameter at breast height (DBH) with cavities at least 16 feet (5 m) above ground. Artificial structures (e.g., bridges and culverts with a minimum 15-foot [4.6 m] clearance) are also inspected.

3.6.1 Survey Methods for Natural Cavities

Line transects are established through potential roosting habitat, and all trees and snags are inspected for evidence of cavities. Transects are oriented north to south and spaced according to habitat density. Locations of cavities observed are recorded using a GPS unit. Tree species, type of cavity structure, tree diameter and height, cavity height, and cavity orientation are also recorded. Photographs of trees were collected. PRT quality is estimated as high,moderate, or low. PRTs are designated low quality when potential roosting features,such as palm fronds, loose bark, or gouges, are too tight or shallow to search with a wireless cavity camera and are easily assessed using visual methods. Moderate-quality PRTs have up to two cavities and possibly loose bark but are less than 30 feet(9.14 m) in estimated height. High-quality PRTs present cavities, peeling bark or the base of palm fronds, are over 16 feet (4.9 m) above ground level, have sufficient solar exposure, and are generally mid- to upper canopy trees.

3.6.2 Survey Methods for Artificial Structures

Artificial structures (such as abandoned buildings, bridges/culverts, and wooden utility poles) are visually inspected for evidence of bats. Evidence potentially includes cavities, crevices, staining at the entrance to cavity or crevice, guano, and auditory

chirping sounds. Binoculars, spotting scopes, kayaks, and wireless cameras are used as needed to fully inspect the structures.

3.7 Weather and Temperature

To ensure compliance with USFWS guidelines, ESI monitors weather during the acoustic survey using the closest publicly available weather station (Miami International Airport [KMIA]), and a Kestrel 5000 Environmental Meter with a rotating vane (Kestrel). An additional level of effort may be required if the following conditions are encountered during the first five hours of the survey period:

- Temperatures <65°F;
- Precipitation (rain/fog) exceeding 30 minutes or continuing intermittently;
- Sustained wind speeds >9 miles per hour for >30 minutes.

4.0 Results

Acoustic results are described in Sections 4.1 to 4.3. Section 4.4 includes the results of the habitat assessment for each detector location and Section 4.5 includes the results of the potential roost search.

Detectors were deployed at three sites from 27 March through 8 April 2023 and collected call data for **15 complete and 24 partial detector nights**, exceeding the recommended effort in the 2019 Guidelines (Table 1; Figure 2). Wind speeds on 27, 29, 31 March and 4 through 7 April and rain on 30 March did not meet 2019 Guidelines thus call files from those nights were not analyzed. Detector deployment datasheets are provided in Appendix B, and photographs are provided in Appendix C.

Table 1. Acoustic detector locations on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Site	Date (2023)	Latitude (DD)	Longitude (DD)
D-01	27*, 28, 29*, 30*, 31* March, 1, 2, 3, 4*, 5*, 6*, 7*, 8 April	25.889292	-80.150018
D-02	27*, 28, 29*, 30*, 31* March, 1, 2, 3, 4*, 5*, 6*, 7*, 8 April	25.888146	-80.144235
D-03	27*, 28, 29*, 30*, 31* March, 1, 2, 3, 4*, 5*, 6*, 7*, 8 April	25.886381	-80.139121

* Weather conditions did not meet parameters per the 2019 Guidelines

4.1 Automated Data Analysis

Kpro identified and assigned a species classification to 185 call files (Table 2). Four of eight species used in the automated data analysis were identified. Potential calls from Florida bonneted bats (*n*=73) were recorded at all detector locations. Brazilian free-tailed bats (*n*=106) were most often detected. An additional 14 calls were recorded;



N
W E
S

Figure 2. Acoustic detector locations on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Financial Project Identification Number: 452428-1-21-01.

0 455 910 Feet

Base Map: Esri World Imagery

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however, a species classification was not assigned by Kpro.

4.2 Maximum Likelihood Estimate

Maximum likelihood analysis in Kpro indicated potential presence of two species used in the analysis (Florida bonneted and Brazilian free-tailed bats; Table 3). A “1” designation indicates Kpro did not identify pulses consistent with the species on thedata provided. A "0" designation means Kpro identified call pulses consistent with the call parameters of a specific species within the data indicating significance for presence. All other MLE classifications are either significant for likely species presence or non-significant and less likely present (p>0.05).

Table 2. Bat calls identified by Kaleidoscope Pro automated data analysis on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Site	Date (2023)	COTO	EPFU	EUFL	LABO	MYAU	NYHU	PESU	TABR	No ID	Noise
	28 March	0	0	4	0	0	0	0	2	1	2
	1 April	0	1	2	0	0	0	0	22	3	2
D-01	2 April	0	1	4	0	0	0	0	3	1	2
	3 April	0	0	1	0	0	0	0	1	0	3
	8 April	0	0	4	0	0	0	0	4	0	2
	28 March	0	0	6	0	0	0	0	8	0	5
	1 April	0	2	13	0	0	0	0	20	3	5
D-02	2 April	0	0	9	0	0	0	0	5	0	5
	3 April	0	0	6	0	0	0	0	4	0	93
	8 April	0	0	13	0	0	0	0	5	0	9
	28 March	0	0	1	0	0	0	0	2	0	0
	1 April	0	0	1	0	0	0	0	8	1	0
D-03	2 April	0	0	3	0	0	0	0	9	1	6
	3 April	0	0	1	0	0	1	0	4	4	2
	8 April	0	0	5	0	0	1	0	9	0	0
Total/Species		0	4	73	0	0	2	0	106	14	136

COTO=*Corynorhinus rafinesquii* (Rafinesque’s big-eared bat); **EPFU**=*Eptesicus fuscus* (big brown bat); **EUFL**=*Eumops floridanus* (Florida bonneted bat); **LABO**=*Lasiurus borealis* (eastern red bat); **MYAU**=*Myotis austroriparius* (southeastern bat); **NYHU**=*Nycticieus humeralis* (evening bat); **PESU**=*Perimyotis subflavus* (tricolored bat); **TABR**=*Tadarida brasiliensis* (Brazilian free-tailed bat).

Table 3. Kaleidoscope Pro maximum likelihood estimates for bat species on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Site	Date (2023)	COTO	EPFU	EUFL	LABO	MYAU	NYHU	PESU	TABR
	28 March	1	1	0	1	1	1	1	0.004
	1 April	1	1	0	1	1	1	1	0
D-01	2 April	1	0.618	0	1	1	1	1	0.002
	3 April	1	1	0	1	1	1	1	0.062
	8 April	1	1	0	1	1	1	1	0

Site	Date (2023)	COTO	EPFU	EUFL	LABO	MYAU	NYHU	PESU	TABR
D-02	28 March	1	1	0	1	1	1	1	0
	1 April	1	0.995	0	1	1	1	1	0
	2 April	1	1	0	1	1	1	1	0
	3 April	1	1	0	1	1	1	1	0
	8 April	1	1	0	1	1	1	1	0
D-03	28 March	1	1	0	1	1	1	1	0.004
	1 April	1	1	0	1	1	1	1	0
	2 April	1	1	0	1	1	1	1	0
	3 April	1	1	0	1	1	0.287	1	0
	8 April	1	1	0	1	1	0.288	1	0

COTO=*Corynorhinus rafinesquii* (Rafinesque's big-eared bat); **EPFU**=*Eptesicus fuscus* (big brown bat); **EUFL**=*Eumops floridanus* (Florida bonneted bat); **LABO**=*Lasiurus borealis* (eastern red bat); **MYAU**=*Myotis austroriparius* (southeastern bat); **NYHU**=*Nycticieus humeralis* (evening bat); **PESU**=*Perimyotis subflavus* (tricolored bat); **TABR**=*Tadarida brasiliensis* (Brazilian free-tailed bat).

4.3 Visual Data Analysis

Visual data analysis, including identification of species by focusing on morphological call characteristics such as frequency, slope, duration, and intensity, was conducted on acoustic calls to confirm Florida bonneted bat presence or probable absence. Kpro classified 73 call files as Florida bonneted bats. Automatic identification software often creates a suite of false positives within certain frequency ranges, such as low frequencies around Florida bonneted bats, spotted bats (*Euderma maculatum*), and mastiff bats (*Eumops perotis*) due to noise, or high frequencies, where *Myotis* typically echolocate due to overlap of multiple species. Programs identifying bat calls to species are best used to guide the focus of subsequent evaluations by an acoustic-identification specialist.

Calls were vetted with ESI-specific filters to ensure potential files of interest were not overlooked. **Qualitative vetting determined no calls automatically identified by Kpro were Florida bonneted bats.** Non-bat low-level noises were incorrectly classified as Florida bonneted bats (Appendix D).

4.4 Habitat Assessment

A habitat assessment was conducted on 27 March 2023. Habitat primarily consisted of open, developed/maintained land with scattered royal (*Roystonea regia*) and sabal (*Sabal palmetto*) palm trees. Herbaceous cover consisted of maintained grass. Each detector was deployed adjacent to water. Additional habitat data are included in Table 4 and data sheets are provided in Appendix B.

4.5 Potential Roost Search

A potential roost search was conducted within the Project boundary on 27 March 2023 and then on 31 August 2023. No large trees, snags, or trees exhibiting characteristics preferred by roosting Florida bonneted bats were present. Numerous palm trees were observed within the Project boundary; however, based on visual inspection, they

Table 4. Habitat characterization of detector sites on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Site	Water Source		Dominant Canopy	Subdominant Canopy	Canopy Closure	Clutter		Roost Tree		Habitat Type	Herbaceous Cover
	Type	Distance (m)				Rating	Composition	Roosting Potential	Composition		
D-01	Biscayne Bay	10	*Roystonea regia; Sabal palmetto*	*NA*	O	O	None	Low	None	Urban	S
D-02	Biscayne Bay	5	*Roystonea regia; Sabal palmetto*	*NA*	O	O	None	Low	None	Urban	S
D-03	Biscayne Bay	4	*Roystonea regia; Sabal palmetto*	*NA*	O	O	None	Low	None	Urban	S

Tree/Shrub Species: royal palm (*Roystonea regia*); sabal palm (*Sabal palmetto*).
Canopy Closure/Subcanopy Clutter: O=Open.
Herbaceous Cover: S=Sparse.

were not considered suitable roosting habitat for Florida bonneted bats (no cavities observed). Although the Broad Causeway bridge is not within the Florida bonneted bat consultation area (see Appendix F), the bridge was examined for evidence of bat activity. No signs of bat activity were found within the bridge.

No PRTs or other roosting structures were identified within the Project boundary and roosting potential was ranked low at all sites.

4.6 Potential Foraging Habitat

The Project area includes mowed and maintained Florida Department of Transportation (FDOT) right-of-way and drainage swales (with open fresh water), active roadways, and a commercial building. Open water within and adjacent the Project area may provide limited foraging opportunities; however, overall foraging suitability is deemed low given the maintained, urban nature of the Project area and high levels of disturbance.

4.7 Weather and Temperature

Weather data were monitored from 27 March through 9 April 2023 (Weather Underground: Miami International Airport Station [KMIA]). Weather conditions failed to meet 2019 Guidelines on 27, 29, and 31 March and 4 through 7 April due to excessive wind and on 30 March due to high wind and rain. All other nights were valid. Supplemental weather data are provided in Appendix E.

5.0 Discussion

Acoustic surveys completed between 27 March and 8 April 2023 yielded **15 complete and 24 partial detector nights**. Kpro's automated data analysis and MLE identified possible Florida bonneted bat calls at all three detector locations; however, visual vetting by a qualified ESI acoustic analyst determined **no diagnostic calls of Florida bonneted bats were recorded at any sites.**

During the habitat assessment and roost search conducted on 27 March 2023 and 31 August 2023, the Project area was found to contain numerous palm trees; however, no potential roosting cavities were observed. Additionally, the bridge was examined for evidence of bat activity but no signs were observed. **No PRTs or other roosting structures were identified**, and the Project area was ranked low suitability for roosting Florida bonneted bats.

Based on acoustic survey results, habitat assessment, and roost search, the probability of occurrence for the Florida bonneted bat is determined to be **Low.** No

adverse impacts to the Florida bonneted bat are anticipated as a result of the proposed Project. Based on visual analysis of acoustic call data, lack of PRTs, and poor roosting suitability within the Project area, the Town of Bay Harbor Islands, in consultation with FDOT, is proposing an effect determination of ***No Effect*** for the Florida bonneted bat. Because the Project is within the urban development boundary in Miami-Dade County as delineated in the October 2019 Florida Bonneted Bat Consultation Guidelines, the Consultation Key was not used and a technical assistance call with USFWS will be conducted to discuss results of this survey.

6.0 Literature Cited

Belwood, J. J. 1981. Wagner's mastiff bat. *Eumops glaucinus floridanus*, (Molossidae) in southwestern Florida. Journal of Mammalogy 62:411-413.

Best, T. L., W. M. Kiser, and J. C. Rainey. 1997. *Eumops glaucinus*. American Society of Mammalogists 551:1-6.

Braun de Torrez, E. C., H. K. Ober, and R. A. McCleery. 2016. Use of a multi-tactic approach to locate an endangered Florida bonneted bat roost. Southeastern Naturalist 15:235-242.

Britzke, E. R. 2004. Acoustic surveys of bats in the eastern United States. Pages 63-68 *in* Indiana Bat and Coal Mining, A Technical Interactive Forum (K. C. Vories and A. Harrington, eds.). 16-18 November 2004. Louisville, Kentucky. U.S. Department of the Interior, Office of Surface Mining, Alton, Illinois, and Coal Research Center, Southern Illinois University, Carbondale, Illinois. 229 pp.

Broders, H. G., C. S. Findlay, and L. Zheng. 2004. Effects of clutter on echolocation call structure of *Myotis septentrionalis* and *M. lucifugus*. Journal of Mammalogy 85:273–281.

FWC. 2011. Florida bonneted bat biological status review report. Florida Fish and Wildife Conservation Commission. Tallahassee, Florida. 11 pp.

Gore, J. A., M. S. Robson, R. Zambrano, and N. J. Douglass. 2015. Roosting sites of a Florida bonneted bat (*Eumops floridanus*). Florida Field Naturalist 43:179-184.

IUCN. 2016. *Eumops floridanus*, Florida bonneted bat. The IUCN Red List of Threatened Species. Assessment by S. Solari for the International Union for Conservation of Nature and Natural Resources.

Marks, G. E. and C. S. Marks. 2008. Status of the Florida bonneted bat (*Eumops floridanus*). Prepared by Florida Bat Conservancy, Bay Pines, Florida for U.S. Department of Interior, Fish and Wildlife Service Grant #401815G192.

Ober, H. K., E. C. Braun de Torrez, J. A. Gore, A. M. Bailey, J. K. Myers, K. N. Smith, and R. A. McCleery. 2016. Social organization of an endangered subtropical species, *Eumops floridanus*, the Florida bonneted bat. Mammalia 8:375-383.

Ober, H. K., E. C. Braun de Torrez, R. A. McCleery, A. M. Bailey, and J. A. Gore. 2017. Sexual dimorphism in the endangered Florida bonneted bat, *Eumops floridanus* (Chiroptera: Molossidae). Florida Scientist 80:38-48.

Timm, R. and J. Arroyo-Cabrales. 2008. *Eumops floridanus*, Florida bonneted bat. Available at http://www.iucnredlist.org/. International Union for Conservation of Nature (IUCN) Red List of Threatened Species.

Timm, R. M. and H. H. Genoways. 2004. The Florida bonneted bat, *Eumops floridanus* (Chiroptera: Molossidae): distribution, morphometrics, systematics, and ecology. Journal of Mammalogy 85:852-865.

USFWS. 2013. Endangered and threatened wildlife and plants; endangered species status for the Florida bonneted bat; final rule. Pages 61004-61043 *in* Federal Register Volume 78, No. 191. U. S. Department of the Interior, Fish and Wildlife Service.

USFWS. 2019. Consultation key for the Florida bonneted bat; 04EF2000-2014-I-0320-R001. U.S. Department of Interior, Fish and Wildlife Service, South Florida Ecological Services Office, Vero Beach, Florida. 34 pp.

USFWS. 2020. Proposed rule: Endangered and threatened wildlife and plants; designation of critical habitat for Florida bonneted bat. Pages 35510-35544 *in* Federal Register Volume 85, No. 112. U.S. Department of the Interior, Fish and Wildlife Service.

USFWS. 2022. Endangered and threatened wildlife and plants; Revised proposed rule designation of critical habitat for endangered Florida bonneted bat. Pages 71466-71501 *in* Federal Register Volume 87, No. 224 U.S. Department of the Interior, Fish and Wildlife Service.

APPENDIX A
RESUME

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Real Science, Real Solutions



EDUCATION

M.S., Biology - Master of Science, Biology Arkansas State University, 2016

B.S., Biology, Wildlife Ecology and Management. Arkansas State University, 2010

EXPERIENCE

13

CERTIFICATIONS

Certified Wildlife Biologist, 2018-Current

Certified Ecologist, 2019-Current

Section 10 Permit T&E Bats, 2014-Current

PROFESSIONAL AFFILIATIONS

The Wildlife Society

Ecological Society of America

Florida Bat Working Group

Florida Bonneted Bat Working Group

QUALIFICATIONS AND EXPERIENCE

Mr. Moore is a Certified Wildlife Biologist and Certified Ecologist specializing in large, complex projects across the United States. He is a recognized bat echolocation acoustic specialist. He is not only an expert in eastern bat call identification, but is extensively experienced with western bats, neotropical bats, and niche species such as the Florida bonneted bat. Mr. Moore manages and vets calls on acoustic projects from the east coast through the intermountain west, including experience on large-scale federal, national guard, and wind projects in Alabama, Arkansas, Illinois, Indiana, Missouri, Nevada, Montana, Oklahoma, Tennessee, Texas, West Virginia, Utah, and Virginia. Mr. Moore is approved to vet calls in high-threshold experience states such as Oklahoma. Mr. Moore conducts classes on acoustic analysis and assists in beta-testing new releases of Kaleidoscope Pro, and acoustic equipment from two companies. Mr. Moore is also one of few qualified individuals with experience eliminating false-positive calls from southeastern myotis, a species that often produces calls similar to calls consistent with federally listed species.

SELECT PROJECT EXPERIENCE

National Cooperative Highway Research Program, Handbook on Deterring and Excluding Bats from Transportation Structures

Florida *Senior Scientist*

Senior Scientist for Project 25-63, which is a multi-year project developing a handbook focusing on bats in transportation structures.

FDOT District Five, Ocklawaha River Bridge

Florida *Senior Scientist*

Conducted exclusion of bats from Ocklawaha River Bridge.

FDOT District One, SR 865 (San Carlos Boulevard) from Estero Boulevard to North of Hurricane Bay Bridge

Florida *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

FDOT District One, SR 82 from Hendry/Collier County Line to Gator Slough Lane

Florida *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Atkins, Ortiz Avenue Roundabout at the Hanson Road Extension

Florida *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Orsted/Placid Solar, Highlands North Solar Site
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Orsted/Placid Solar, Highlands South Solar Site
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Private Developer, Toledo Village
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Punta Gorda, Punta Gorda Airport
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Mosaic Phosphate, Hardee County Mine Site
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Duke Energy, Charlies Creek Solar Development
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Vulcan Materials Company, Fort Myers Mine 2 Pit F5
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Private Developer, Kindred Residential Development
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Private Developer, Kissimmee Village Center
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Private Client, El Maximo Ranch Public Private Partnership
Florida — *Senior Scientist*

Florida bonneted bat quantitative and qualitative acoustic analysis.

Duke Energy
North and South Carolina — *Principal Investigator*

NABat acoustic monitoring for species-presence composition over time. Includes yearly acoustic monitoring stations over a 40-year period.

U.S. Forest Service, Long Cane Ranger District
South Carolina — *Senior Scientist*

Quantitative and qualitative acoustic analyst for surveys across multiple habitat types within the Long Cane Ranger District of the Francis Marion and Sumter National Forest.

APPENDIX B
DATA SHEETS

2023

Property of: Environmental Solutions & Innovations, Inc.
2250 Lucien Way, Suite 302, Maitland, FL 32751

HABITAT ASSESSMENT

Project #: 2015 **Date:** 27 March 2023 **State:** FL **County:** Miami-Dade

Project Name: Broad Causeway **Site Name/#:** D-01

Permitted Biologist: Daniel Judy (full name) Other Field Staff: _____ (full name)

Detector ID(s)	Latitude	Longitude	Picture #	Waypoint #
D-01	25.889292	-80.15002	D-01	D-01

Distance to closest water source (meters): 10 Type of water source: Bay

Water source name: Biscayne Bay

ESTIMATED WATER SOURCE CHARACTERISTICS (IF ADJACENT TO DETECTOR):

Bank Height: 1 meters Channel Width: _____meters Stream Width: _____meters

Substratum: ___Bedrock ___Boulder ___Cobble ___Gravel ___Sand ___Silt/Clay

Still Water Present (Y/N): Y Average Water Depth: ____m or cm Clarity (H,M,L): H

VEGETATION: *Detectors not deployed immediately under or adjacent to trees.

Dominant Canopy Species (> 40 cm/16" dbh) Subdominant Canopy Species (< 40 cm/16" dbh)

_____ _____

_____ _____

_____ _____

Estimated dbh range: Lg: _____ Sm: _____ Estimated dbh range: Lg: _____ Sm: _____

Relative abundance of dominant vs. subdominant (ratio):_____

Estimated canopy closure: ___Closed ___Moderate X Open

Roost tree potential consists of: ___Hollow ___Large Trees ___Snags X Neither

E. floridanus roost tree potential is: ___High ___Moderate ___Low

Roost potential comments: Scattered palms but no cavities

Subcanopy clutter: ___High ___Moderate ___Low

Subcanopy consists largely of: __ Low Branches of Canopy Trees __ Saplings __ Shrubs

Common Subcanopy Species: _____ _____ _____

Check all that apply:

__Mature Upland Forest	__Recently Logged Forest	__Crop/Pasture Land	Other Urban/Bay
__Young Upland Forest	__Forest Edge	__Stream/River	_____
__Mature Lowland Forest	__Woodlot	__Vernal Pool	_____
__Young Lowland Forest	__Old Field	__Deepwater Lake/Pond	_____

Herbaceous Cover: X Sparse ___Moderate ___Dense

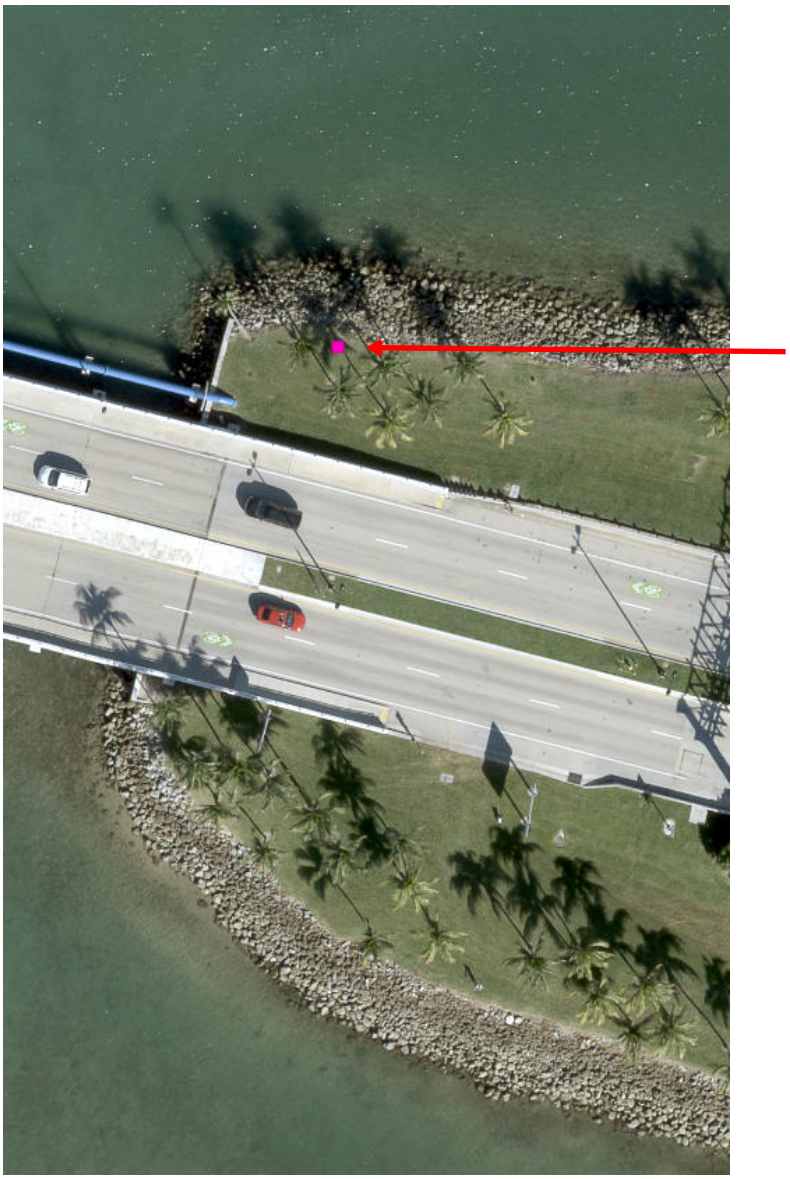
2023

Property of: Environmental Solutions & Innovations, Inc.
2250 Lucien Way, Suite 302, Maitland, FL 32751

HABITAT ASSESSMENT (continued)

Project #: 2015	**State/County:** FL/Miami-Dade	**Site Name/#:** D-01	**Initials:** DJ

N



LEGEND

Net:

Detector:

DETAILED HABITAT DESCRIPTION & COMMENTS

Detector deployed in maintained grassy area adjacent to bay, bridge, and road.

SURVEY YEAR 2023

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue. Cincinnati, OH 45232 (Phone: 513-451-1777)

DETECTOR DEPLOYMENT DATA SHEET

Project #: 2015 **Project Name:** Broad Causeway Drawbridge PDE **Date:** 27 March 2023

State: Florida **County:** Miami-Dade **Lead Biologist:** Daniel Judy **Other Staff:**

1. Location and Equipment

Site ID: D-01	**Latitude:** 25.889292	**Longitude:** -80.15002

Device ID or Serial #: S4U05157

Device Type (*check only one*)**:** ☐ **SM 3** ☑ **SM 4** ☐ **SM Mini** ☐ **Anabat Swift** ☐ **Anabat Chorus** ☐ **Other**

General description of placement and habitat:

Clutter type: Vegetation
Broad Habitat Type: Urban
*Detector deployed in maintained grassy area adjacent to bay, bridge, and road.

2. Detector Placement and Microphone Checklist

Detector Placement Checklist	Distance (feet)	Microphone checklist	
How far is the detector from vegetative clutter in all directions? **Compliance ≥ 10 ft**	12	Type of microphone: ☐ Hemispherical ☑ Omni Directional	
How far is the detector from another detector? **Compliance ≥ 656 ft**	1900	Calls recorded in: ☑ Full Spectrum ☐ Zero Crossing	
How far is the detector from any potential or known roost? **Compliance ≥ 50 ft**	over 500	Record angle of microphone (°) (SM should be horizontal)	Horizontal
Is the detector parallel to woodland? ☐ yes ☑ no - explain in Step 4 Setup Comments below		How high (ft) is the microphone above ground level? **Compliance = 10 ft**	10
Is the detector waterproofed? ☑ yes ☐ no			

3. Photo Documentation Checklist

☑ **North** ☑ **East** ☑ **South** ☑ **West** ☑ **Cone of Detection** **Camera ID:** DJ iPhone

4. Additional Setup Comments

Microphone Orientation: Horizontal
If using SM4 and SMMU2 Microphone, Microphone serial number: MU218730

*Only scattered trees present within Project boundary; therefore, detector is adjacent to water.

Project#: 2015 **Project Name:** Broad Causeway Drawbridge **Date:** 27 March 2023 **Site ID:** D-01

5. Daily Detector Deployment – *one entry for every date deployed*

Device ID	Date	Biologist(s)	Start Time	End Time	Detector Failure (Y/N)	Comments
S4U05157	27 March 2023	Daniel Judy	1906	0746	N	
S4U05157	28 March 2023	Daniel Judy	1906	0746	N	
S4U05157	29 March 2023	Daniel Judy	1906	0746	N	
S4U05157	30 March 2023	Daniel Judy	1906	0746	N	
S4U05157	31 March 2023	Daniel Judy	1906	0746	N	
S4U05157	1 April 2023	Daniel Judy	1906	0746	N	
S4U05157	2 April 2023	Daniel Judy	1906	0746	N	
S4U05157	3 April 2023	Daniel Judy	1906	0746	N	
S4U05157	4 April 2023	Daniel Judy	1906	0746	N	
S4U05157	5 April 2023	Daniel Judy	1906	0746	N	

6. Daily Weather Conditions – *one entry for every date deployed*

Date	Temp °F		Wind Speed (mph)		Precipitation Events	Weather Valid (Y/N)	Comments
	Low	High	Low	High			
27 March 2023	78	80	5	12	None	N	Excessive Wind
28 March 2023	74	78	0	8	None	Y	
29 March 2023	69	72	0	13	Thunderstorms	N	Excessive Rain
30 March 2023	73	76	7	15	Heavy Rain	N	Excessive Rain and Wind
31 March 2023	76	77	8	13	None	N	Excessive Wind
1 April 2023	74	75	3	8	None	Y	
2 April 2023	77	80	3	8	None	Y	
3 April 2023	77	80	5	9	None	Y	
4 April 2023	78	80	12	15	None	N	Excessive Wind
5 April 2023	78	80	13	17	None	N	Excessive Wind

Weather Data Source: Weather Underground - Miami International Airport Station (KMIA)

Record the nightly low and high temperatures EACH night detectors are deployed.
Record the nightly low and high wind speeds EACH night detectors are deployed.
Record precipitation events EACH night detectors are deployed.
Refer to compliance standards (at right) to determine if a weather out occurred and record accordingly.

Weather Compliance Standards (first 5 hours of survey):
Temperature ≥ 65°F
Wind speed ≤ 9 mph sustained
No precipitation exceeding 30 minutes (or continuing intermittently)

Project#: 2015 **Project Name:** Broad Causeway Drawbridge **Date:** 27 March 2023 **Site ID:** D-01

5. Daily Detector Deployment – *one entry for every date deployed*

Device ID	Date	Biologist(s)	Start Time	End Time	Detector Failure (Y/N)	Comments
S4U05157	6 April 2023	Daniel Judy	1906	0746	N	
S4U05157	7 April 2023	Daniel Judy	1906	0746	N	
S4U05157	8 April 2023	Daniel Judy	1906	0746	N	

6. Daily Weather Conditions – *one entry for every date deployed*

Date	Temp °F		Wind Speed (mph)		Precipitation Events	Weather Valid (Y/N)	Comments
	Low	High	Low	High			
6 April 2023	78	80	10	16	None	N	Excessive Wind
7 April 2023	77	78	8	14	None	N	Excessive Wind
8 April 2023	78	79	0	8	None	Y	

Weather Data Source: Weather Underground - Miami International Airport Station (KMIA)

Record the nightly low and high temperatures EACH night detectors are deployed.
Record the nightly low and high wind speeds EACH night detectors are deployed.
Record precipitation events EACH night detectors are deployed.
Refer to compliance standards (at right) to determine if a weather out occurred and record accordingly.

Weather Compliance Standards (first 5 hours of survey):
Temperature ≥ 65°F
Wind speed ≤ 9 mph sustained
No precipitation exceeding 30 minutes (or continuing intermittently)

2023

Property of: Environmental Solutions & Innovations, Inc.
2250 Lucien Way, Suite 302, Maitland, FL 32751

HABITAT ASSESSMENT

Project #: 2015 **Date:** 27 March 2023 **State:** FL **County:** Miami-Dade

Project Name: Broad Causeway **Site Name/#:** D-02

Permitted Biologist: Daniel Judy (full name) Other Field Staff: _____ (full name)

Detector ID(s)	Latitude	Longitude	Picture #	Waypoint #
D-02	25.888146	-80.14423	D-02	D-02

Distance to closest water source (meters): 4 Type of water source: Bay

Water source name: Biscayne Bay

ESTIMATED WATER SOURCE CHARACTERISTICS (IF ADJACENT TO DETECTOR):

Bank Height: 1 meters Channel Width: _____meters Stream Width: _____meters

Substratum: ___Bedrock ___Boulder ___Cobble ___Gravel ___Sand ___Silt/Clay

Still Water Present (Y/N): Y Average Water Depth: ____m or cm Clarity (H,M,L): H

VEGETATION: *Detectors not deployed immediately under or adjacent to trees.

Dominant Canopy Species (> 40 cm/16" dbh) Subdominant Canopy Species (< 40 cm/16" dbh)

_____ _____

_____ _____

_____ _____

Estimated dbh range: Lg: _____ Sm: _____ Estimated dbh range: Lg: _____ Sm: _____

Relative abundance of dominant vs. subdominant (ratio):_____

Estimated canopy closure: ___Closed ___Moderate X Open

Roost tree potential consists of: ___Hollow ___Large Trees ___Snags _X_Neither

E. floridanus roost tree potential is: ___High ___Moderate X Low

Roost potential comments: Scattered palms but no cavities

Subcanopy clutter: ___High ___Moderate ___Low

Subcanopy consists largely of: __ Low Branches of Canopy Trees __ Saplings __ Shrubs

Common Subcanopy Species: _____ _____ _____

Check all that apply:

__Mature Upland Forest __Recently Logged Forest __Crop/Pasture Land Other Urban/Bay

__Young Upland Forest __Forest Edge __Stream/River _____

__Mature Lowland Forest __Woodlot __Vernal Pool _____

__Young Lowland Forest __Old Field __Deepwater Lake/Pond _____

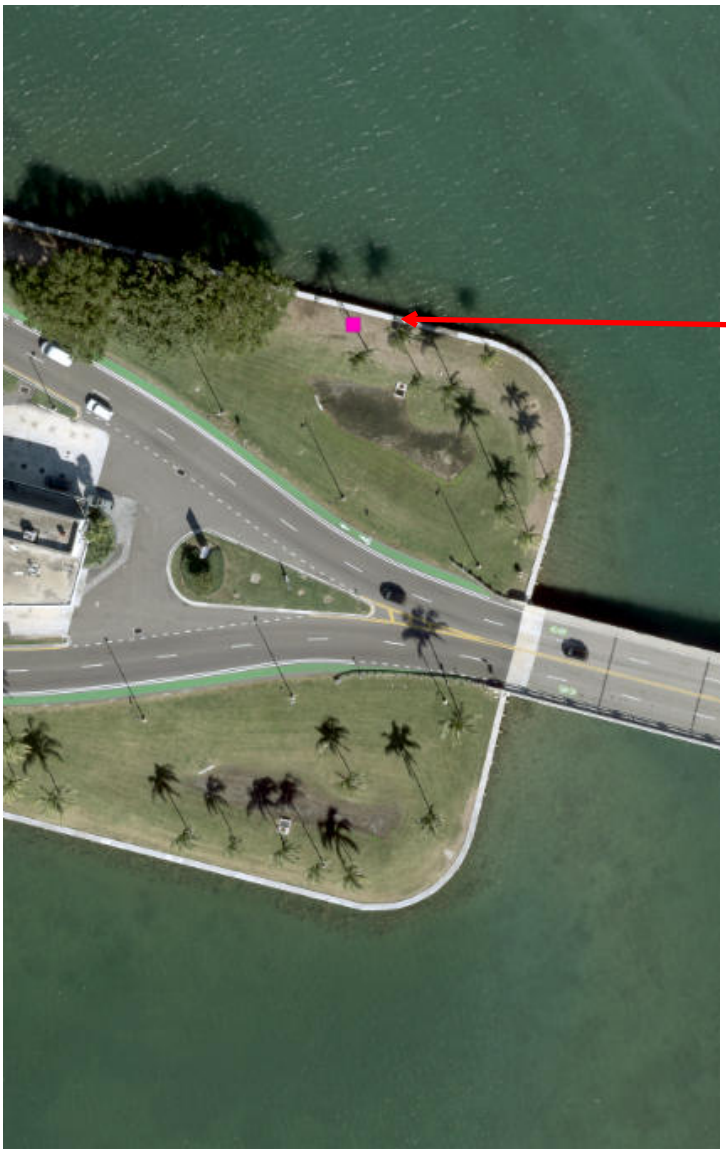
Herbaceous Cover: X Sparse ___Moderate ___Dense

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2250 Lucien Way, Suite 302, Maitland, FL 32751

HABITAT ASSESSMENT (continued)

Project #: 2015	State/County: FL/Miami-Dade	Site Name/#: D-02	Initials: DJ

N



LEGEND

Net:

Detector:

DETAILED HABITAT DESCRIPTION & COMMENTS

Detector deployed in maintained grassy area adjacent to bay, road, and bridge. Swale approximately 15' away, but dry on deployment day.

SURVEY YEAR 2023

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue. Cincinnati, OH 45232 (Phone: 513-451-1777)

DETECTOR DEPLOYMENT DATA SHEET

Project #: 2015 **Project Name:** Broad Causeway Drawbridge PDE **Date:** 27 March 2023

State: Florida **County:** Miami-Dade **Lead Biologist:** Daniel Judy **Other Staff:**

1. Location and Equipment

Site ID: D-02	**Latitude:** 25.888146	**Longitude:** -80.14423

Device ID or Serial #: S4U12923

Device Type (*check only one*)**:** ☐ **SM 3** ☑ **SM 4** ☐ **SM Mini** ☐ **Anabat Swift** ☐ **Anabat Chorus** ☐ **Other**

General description of placement and habitat:

Clutter type: Vegetation
Broad Habitat Type: Urban
*Detector deployed in maintained grassy area adjacent to bay, road, and bridge. Swale approximately 15' away, but dry on deployment day.

2. Detector Placement and Microphone Checklist

Detector Placement Checklist	**Distance (feet)**	**Microphone checklist**	
How far is the detector from vegetative clutter in all directions? **Compliance ≥ 10 ft**	30	Type of microphone: ☐ Hemispherical ☑ Omni Directional	
How far is the detector from another detector? **Compliance ≥ 656 ft**	1800	Calls recorded in: ☑ Full Spectrum ☐ Zero Crossing	
How far is the detector from any potential or known roost? **Compliance ≥ 50 ft**	over 500	Record angle of microphone (°) (SM should be horizontal)	Horizontal
Is the detector parallel to woodland? ☐ yes ☑ no - explain in Step 4 Setup Comments below		How high (ft) is the microphone above ground level? **Compliance = 10 ft**	10
Is the detector waterproofed? ☑ yes ☐ no			

3. Photo Documentation Checklist

☑ **North** ☑ **East** ☑ **South** ☑ **West** ☑ **Cone of Detection** **Camera ID:** DJ iPhone

4. Additional Setup Comments

Microphone Orientation: Horizontal
If using SM4 and SMMU2 Microphone, Microphone serial number: MU218672

*Only scattered trees present within Project boundary; therefore, detector is adjacent to water.

Project#: 2015 **Project Name:** Broad Causeway Drawbridge **Date:** 27 March 2023 **Site ID:** D-02

5. Daily Detector Deployment – *one entry for every date deployed*

Device ID	Date	Biologist(s)	Start Time	End Time	Detector Failure (Y/N)	Comments
S4U12923	27 March 2023	Daniel Judy	1906	0746	N	
S4U12923	28 March 2023	Daniel Judy	1906	0746	N	
S4U12923	29 March 2023	Daniel Judy	1906	0746	N	
S4U12923	30 March 2023	Daniel Judy	1906	0746	N	
S4U12923	31 March 2023	Daniel Judy	1906	0746	N	
S4U12923	1 April 2023	Daniel Judy	1906	0746	N	
S4U12923	2 April 2023	Daniel Judy	1906	0746	N	
S4U12923	3 April 2023	Daniel Judy	1906	0746	N	
S4U12923	4 April 2023	Daniel Judy	1906	0746	N	
S4U12923	5 April 2023	Daniel Judy	1906	0746	N	

6. Daily Weather Conditions – *one entry for every date deployed*

Date	Temp °F		Wind Speed (mph)		Precipitation Events	Weather Valid (Y/N)	Comments
	Low	High	Low	High			
27 March 2023	78	80	5	12	None	N	Excessive Wind
28 March 2023	74	78	0	8	None	Y	
29 March 2023	69	72	0	13	Thunderstorms	N	Excessive Rain
30 March 2023	73	76	7	15	Heavy Rain	N	Excessive Rain and Wind
31 March 2023	76	77	8	13	None	N	Excessive Wind
1 April 2023	74	75	3	8	None	Y	
2 April 2023	77	80	3	8	None	Y	
3 April 2023	77	80	5	9	None	Y	
4 April 2023	78	80	12	15	None	N	Excessive Wind
5 April 2023	78	80	13	17	None	N	Excessive Wind

Weather Data Source: Weather Underground - Miami International Airport Station (KMIA)

Record the nightly low and high temperatures EACH night detectors are deployed.
Record the nightly low and high wind speeds EACH night detectors are deployed.
Record precipitation events EACH night detectors are deployed.
Refer to compliance standards (at right) to determine if a weather out occurred and record accordingly.

Weather Compliance Standards (first 5 hours of survey):
Temperature ≥ 65°F
Wind speed ≤ 9 mph sustained
No precipitation exceeding 30 minutes (or continuing intermittently)

Project#: 2015 **Project Name:** Broad Causeway Drawbridge **Date:** 27 March 2023 **Site ID:** D-02

5. Daily Detector Deployment – *one entry for every date deployed*

Device ID	Date	Biologist(s)	Start Time	End Time	Detector Failure (Y/N)	Comments
S4U12923	6 April 2023	Daniel Judy	1906	0746	N	
S4U12923	7 April 2023	Daniel Judy	1906	0746	N	
S4U12923	8 April 2023	Daniel Judy	1906	0746	N	

6. Daily Weather Conditions – *one entry for every date deployed*

Date	Temp °F		Wind Speed (mph)		Precipitation Events	Weather Valid (Y/N)	Comments
	Low	High	Low	High			
6 April 2023	78	80	10	16	None	N	Excessive Wind
7 April 2023	77	78	8	14	None	N	Excessive Wind
8 April 2023	78	79	0	8	None	Y	

Weather Data Source: Weather Underground - Miami International Airport Station (KMIA)

Record the nightly low and high temperatures EACH night detectors are deployed.
Record the nightly low and high wind speeds EACH night detectors are deployed.
Record precipitation events EACH night detectors are deployed.
Refer to compliance standards (at right) to determine if a weather out occurred and record accordingly.

Weather Compliance Standards (first 5 hours of survey):
Temperature ≥ 65°F
Wind speed ≤ 9 mph sustained
No precipitation exceeding 30 minutes (or continuing intermittently)

2023

Property of: Environmental Solutions & Innovations, Inc.
2250 Lucien Way, Suite 302, Maitland, FL 32751

HABITAT ASSESSMENT

Project #: 2015 **Date:** 27 March 2023 **State:** FL **County:** Miami-Dade

Project Name: Broad Causeway **Site Name/#:** D-03

Permitted Biologist: Daniel Judy (full name) Other Field Staff: _____ (full name)

Detector ID(s)	Latitude	Longitude	Picture #	Waypoint #
D-03	25.886381	-80.13912	D-03	D-03

Distance to closest water source (meters): 5 Type of water source: Bay

Water source name: Biscayne Bay

ESTIMATED WATER SOURCE CHARACTERISTICS (IF ADJACENT TO DETECTOR):

Bank Height: 3 meters Channel Width: _____meters Stream Width: _____meters

Substratum: ___Bedrock ___Boulder ___Cobble ___Gravel ___Sand ___Silt/Clay

Still Water Present (Y/N): Y Average Water Depth: ____m or cm Clarity (H,M,L): H

VEGETATION: *Detectors not deployed immediately under or adjacent to trees.

Dominant Canopy Species (> 40 cm/16" dbh) Subdominant Canopy Species (< 40 cm/16" dbh)

_____ _____

_____ _____

_____ _____

Estimated dbh range: Lg: _____ Sm: _____ Estimated dbh range: Lg: _____ Sm: _____

Relative abundance of dominant vs. subdominant (ratio):_____

Estimated canopy closure: ___Closed ___Moderate X Open

Roost tree potential consists of: ___Hollow ___Large Trees ___Snags X Neither

E. floridanus roost tree potential is: ___High ___Moderate X Low

Roost potential comments: Scattered palms but no cavities

Subcanopy clutter: ___High ___Moderate ___Low

Subcanopy consists largely of: __ Low Branches of Canopy Trees __ Saplings __ Shrubs

Common Subcanopy Species: _____ _____ _____

Check all that apply:

__Mature Upland Forest	__Recently Logged Forest	__Crop/Pasture Land	Other Urban/Bay
__Young Upland Forest	__Forest Edge	__Stream/River	_____
__Mature Lowland Forest	__Woodlot	__Vernal Pool	_____
__Young Lowland Forest	__Old Field	__Deepwater Lake/Pond	_____

Herbaceous Cover: X Sparse ___Moderate ___Dense

Property of: Environmental Solutions & Innovations, Inc.
2250 Lucien Way, Suite 302, Maitland, FL 32751

HABITAT ASSESSMENT (continued)

Project #: 2015	State/County: FL/Miami-Dade	Site Name/#: D-03	Initials: DJ

N



LEGEND

Net:

Detector:

DETAILED HABITAT DESCRIPTION & COMMENTS

Detector deployed in maintained grassy area adjacent to roadside and bay/bridge. Grassy depression with standing water approximately 20' away to the southeast.

SURVEY YEAR 2023

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Avenue. Cincinnati, OH 45232 (Phone: 513-451-1777)

DETECTOR DEPLOYMENT DATA SHEET

Project #: 2015 **Project Name:** Broad Causeway Drawbridge PDE **Date:** 27 March 2023

State: Florida **County:** Miami-Dade **Lead Biologist:** Daniel Judy **Other Staff:**

1. Location and Equipment

Site ID: D-03	**Latitude:** 25.886381	**Longitude:** -80.13912

Device ID or Serial #: S4U00565

Device Type (*check only one*)**:** ☐ **SM 3** ☑ **SM 4** ☐ **SM Mini** ☐ **Anabat Swift** ☐ **Anabat Chorus** ☐ **Other**

General description of placement and habitat:

Clutter type: Vegetation
Broad Habitat Type: Urban
*Detector deployed in maintained grassy area adjacent to roadside and bay/bridge. Grassy depression with standing water approximately 20' away to the southeast.

2. Detector Placement and Microphone Checklist

Detector Placement Checklist	Distance (feet)	Microphone checklist	
How far is the detector from vegetative clutter in all directions? **Compliance ≥ 10 ft**	10	Type of microphone: ☐ Hemispherical ☑ Omni Directional	
How far is the detector from another detector? **Compliance ≥ 656 ft**	1800	Calls recorded in: ☑ Full Spectrum ☐ Zero Crossing	
How far is the detector from any potential or known roost? **Compliance ≥ 50 ft**	over 500	Record angle of microphone (°) (SM should be horizontal)	Horizontal
Is the detector parallel to woodland? ☐ yes ☑ no - explain in Step 4 Setup Comments below		How high (ft) is the microphone above ground level? **Compliance = 10 ft**	10
Is the detector waterproofed? ☑ yes ☐ no			

3. Photo Documentation Checklist

☑ **North** ☑ **East** ☑ **South** ☑ **West** ☑ **Cone of Detection** **Camera ID:** DJ iPhone

4. Additional Setup Comments

Microphone Orientation: Horizontal
If using SM4 and SMMU2 Microphone, Microphone serial number: MU218474

*Only scattered trees present within Project boundary; therefore, detector is adjacent to water.

Project#: 2015 **Project Name:** Broad Causeway Drawbridge **Date:** 27 March 2023 **Site ID:** D-03

5. Daily Detector Deployment – *one entry for every date deployed*

Device ID	Date	Biologist(s)	Start Time	End Time	Detector Failure (Y/N)	Comments
S4U00565	27 March 2023	Daniel Judy	1906	0746	N	
S4U00565	28 March 2023	Daniel Judy	1906	0746	N	
S4U00565	29 March 2023	Daniel Judy	1906	0746	N	
S4U00565	30 March 2023	Daniel Judy	1906	0746	N	
S4U00565	31 March 2023	Daniel Judy	1906	0746	N	
S4U00565	1 April 2023	Daniel Judy	1906	0746	N	
S4U00565	2 April 2023	Daniel Judy	1906	0746	N	
S4U00565	3 April 2023	Daniel Judy	1906	0746	N	
S4U00565	4 April 2023	Daniel Judy	1906	0746	N	
S4U00565	5 April 2023	Daniel Judy	1906	0746	N	

6. Daily Weather Conditions – *one entry for every date deployed*

Date	Temp °F		Wind Speed (mph)		Precipitation Events	Weather Valid (Y/N)	Comments
	Low	High	Low	High			
27 March 2023	78	80	5	12	None	N	Excessive Wind
28 March 2023	74	78	0	8	None	Y	
29 March 2023	69	72	0	13	Thunderstorms	N	Excessive Rain
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1 April 2023	74	75	3	8	None	Y	
2 April 2023	77	80	3	8	None	Y	
3 April 2023	77	80	5	9	None	Y	
4 April 2023	78	80	12	15	None	N	Excessive Wind
5 April 2023	78	80	13	17	None	N	Excessive Wind

Weather Data Source: Weather Underground - Miami International Airport Station (KMIA)

Record the nightly low and high temperatures EACH night detectors are deployed.
Record the nightly low and high wind speeds EACH night detectors are deployed.
Record precipitation events EACH night detectors are deployed.
Refer to compliance standards (at right) to determine if a weather out occurred and record accordingly.

Weather Compliance Standards (first 5 hours of survey):
Temperature ≥ 65°F
Wind speed ≤ 9 mph sustained
No precipitation exceeding 30 minutes (or continuing intermittently)

Project#: 2015 **Project Name:** Broad Causeway Drawbridge **Date:** 27 March 2023 **Site ID:** D-03

5. Daily Detector Deployment – *one entry for every date deployed*

Device ID	Date	Biologist(s)	Start Time	End Time	Detector Failure (Y/N)	Comments
S4U00565	6 April 2023	Daniel Judy	1906	0746	N	
S4U00565	7 April 2023	Daniel Judy	1906	0746	N	
S4U00565	8 April 2023	Daniel Judy	1906	0746	N	

6. Daily Weather Conditions – *one entry for every date deployed*

Date	Temp °F		Wind Speed (mph)		Precipitation Events	Weather Valid (Y/N)	Comments
	Low	High	Low	High			
6 April 2023	78	80	10	16	None	N	Excessive Wind
7 April 2023	77	78	8	14	None	N	Excessive Wind
8 April 2023	78	79	0	8	None	Y	

Weather Data Source: Weather Underground - Miami International Airport Station (KMIA)

Record the nightly low and high temperatures EACH night detectors are deployed.
Record the nightly low and high wind speeds EACH night detectors are deployed.
Record precipitation events EACH night detectors are deployed.
Refer to compliance standards (at right) to determine if a weather out occurred and record accordingly.

Weather Compliance Standards (first 5 hours of survey):
Temperature ≥ 65°F
Wind speed ≤ 9 mph sustained
No precipitation exceeding 30 minutes (or continuing intermittently)

APPENDIX C
PHOTOGRAPHS

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 1 **Date:** 27 Mar 23 **Direction Photo was taken:** East **Description:** D-01 Representative Photograph	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No. 2 **Date:** 27 Mar 23 **Direction Photo was taken:** North **Description:** D-02 Representative Photograph	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 3 **Date:** 27 Mar 23 **Direction Photo was taken:** West **Description:** D-03 Representative Photograph	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 4 **Date:** 27 Mar 23 **Direction Photo was taken:** East **Description:** Representative Habitat/Tree Photograph from D-01	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 5 **Date:** 27 Mar 23 **Direction Photo was taken:** South **Description:** Representative Habitat/Tree Photograph from D-01	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 6 **Date:** 27 Mar 23 **Direction Photo was taken:** Southeast **Description:** Representative Habitat/Tree Photograph from D-01	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 7 **Date:** 27 Mar 23 **Direction Photo was taken:** Southwest **Description:** Representative Habitat/Tree Photograph from D-02	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 8 **Date:** 27 Mar 23 **Direction Photo was taken:** West **Description:** Representative Habitat/Tree Photograph from D-02	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 9	
Date: 27 Mar 23	
Direction Photo was taken: Southeast	
Description: Representative Habitat/Tree Photograph from D-03	

Site Location: Broad Causeway Bridge Replacement Project (from Causeway Island to east of West Broadview Drive); FM# 452428-1-21-01	
Photo No.: 10	
Date: 27 Mar 23	
Direction Photo was taken: West	
Description: Representative Bridge Photograph from D-03	

APPENDIX D
VISUAL VETTING TABLE

Table D. Florida Bonneted Bat Visual Vetting Table for the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Site	File Name	Date (2023)	Time	Auto ID	Manual ID
D-01	D01_20230328_191211_000.00#	28 March	19:12:11	EUMFLO	Noise
D-01	D01_20230328_192256_000.00#	28 March	19:22:56	EUMFLO	Noise
D-01	D01_20230328_204340_000.00#	28 March	20:43:40	EUMFLO	Noise
D-01	D01_20230328_204346_000.00#	28 March	20:43:46	EUMFLO	Noise
D-01	D01_20230401_201042_000.00#	1 April	20:10:42	EUMFLO	Noise
D-01	D01_20230402_065103_000.00#	2 April	6:51:03	EUMFLO	Noise
D-01	D01_20230402_194536_000.00#	2 April	19:45:36	EUMFLO	Noise
D-01	D01_20230402_200836_000.00#	2 April	20:08:36	EUMFLO	Noise
D-01	D01_20230402_202532_000.00#	2 April	20:25:32	EUMFLO	Noise
D-01	D01_20230403_052938_000.00#	3 April	5:29:38	EUMFLO	Noise
D-01	D01_20230404_072942_000.00#	4 April	7:29:42	EUMFLO	Noise
D-01	D01_20230408_193049_000.00#	8 April	19:30:49	EUMFLO	Noise
D-01	D01_20230408_193142_000.00#	8 April	19:31:42	EUMFLO	Noise
D-01	D01_20230408_202107_000.00#	8 April	20:21:07	EUMFLO	Noise
D-01	D01_20230408_215639_000.00#	8 April	21:56:39	EUMFLO	Noise
D-02	D02_20230328_191221_000.00#	28 March	19:12:21	EUMFLO	Noise
D-02	D02_20230328_193201_000.00#	28 March	19:32:01	EUMFLO	Noise
D-02	D02_20230328_200048_000.00#	28 March	20:00:48	EUMFLO	Noise
D-02	D02_20230328_201351_000.00#	28 March	20:13:51	EUMFLO	Noise
D-02	D02_20230329_071253_000.00#	29 March	7:12:53	EUMFLO	Noise
D-02	D02_20230329_071848_000.00#	29 March	7:18:48	EUMFLO	Noise
D-02	D02_20230401_191139_000.00#	1 April	19:11:39	EUMFLO	Noise
D-02	D02_20230401_193152_000.00#	1 April	19:31:52	EUMFLO	Noise
D-02	D02_20230401_210524_000.00#	1 April	21:05:24	EUMFLO	Noise
D-02	D02_20230401_210938_000.00#	1 April	21:09:38	EUMFLO	Noise
D-02	D02_20230401_213847_000.00#	1 April	21:38:47	EUMFLO	Noise
D-02	D02_20230401_225409_000.00#	1 April	22:54:09	EUMFLO	Noise
D-02	D02_20230401_230330_000.00#	1 April	23:03:30	EUMFLO	Noise
D-02	D02_20230401_232441_000.00#	1 April	23:24:41	EUMFLO	Noise
D-02	D02_20230402_001843_000.00#	2 April	0:18:43	EUMFLO	Noise
D-02	D02_20230402_002730_000.00#	2 April	0:27:30	EUMFLO	Noise
D-02	D02_20230402_011535_000.00#	2 April	1:15:35	EUMFLO	Noise
D-02	D02_20230402_031020_000.00#	2 April	3:10:20	EUMFLO	Noise
D-02	D02_20230402_055050_000.00#	2 April	5:50:50	EUMFLO	Noise
D-02	D02_20230402_202005_000.00#	2 April	20:20:05	EUMFLO	Noise
D-02	D02_20230402_202231_000.00#	2 April	20:22:31	EUMFLO	Noise
D-02	D02_20230402_211328_000.00#	2 April	21:13:28	EUMFLO	Noise

Site	File Name	Date (2023)	Time	Auto ID	Manual ID
D-02	D02_20230402_215335_000.00#	2 April	21:53:35	EUMFLO	Noise
D-02	D02_20230402_215810_000.00#	2 April	21:58:10	EUMFLO	Noise
D-02	D02_20230402_224502_000.00#	2 April	22:45:02	EUMFLO	Noise
D-02	D02_20230402_224822_000.00#	2 April	22:48:22	EUMFLO	Noise
D-02	D02_20230403_065950_000.00#	3 April	6:59:50	EUMFLO	Noise
D-02	D02_20230403_070544_000.00#	3 April	7:05:44	EUMFLO	Noise
D-02	D02_20230403_192452_000.00#	3 April	19:24:52	EUMFLO	Noise
D-02	D02_20230403_200207_000.00#	3 April	20:02:07	EUMFLO	Noise
D-02	D02_20230403_200905_000.00#	3 April	20:09:05	EUMFLO	Noise
D-02	D02_20230403_235534_000.00#	3 April	23:55:34	EUMFLO	Noise
D-02	D02_20230404_064656_000.00#	4 April	6:46:56	EUMFLO	Noise
D-02	D02_20230404_072605_000.00#	4 April	7:26:05	EUMFLO	Noise
D-02	D02_20230408_192319_000.00#	8 April	19:23:19	EUMFLO	Noise
D-02	D02_20230408_194523_000.00#	8 April	19:45:23	EUMFLO	Noise
D-02	D02_20230408_194744_000.00#	8 April	19:47:44	EUMFLO	Noise
D-02	D02_20230408_200505_000.00#	8 April	20:05:05	EUMFLO	Noise
D-02	D02_20230408_201246_000.00#	8 April	20:12:46	EUMFLO	Noise
D-02	D02_20230408_202716_000.00#	8 April	20:27:16	EUMFLO	Noise
D-02	D02_20230408_203052_000.00#	8 April	20:30:52	EUMFLO	Noise
D-02	D02_20230408_204445_000.00#	8 April	20:44:45	EUMFLO	Noise
D-02	D02_20230408_224941_000.00#	8 April	22:49:41	EUMFLO	Noise
D-02	D02_20230408_230542_000.00#	8 April	23:05:42	EUMFLO	Noise
D-02	D02_20230408_230921_000.00#	8 April	23:09:21	EUMFLO	Noise
D-02	D02_20230408_235912_000.00#	8 April	23:59:12	EUMFLO	Noise
D-02	D02_20230409_034019_000.00#	9 April	3:40:19	EUMFLO	Noise
D-03	D03_20230328_202231_000.00#	28 March	20:22:31	EUMFLO	Noise
D-03	D03_20230401_200354_000.00#	1 April	20:03:54	EUMFLO	Noise
D-03	D03_20230402_194246_000.00#	2 April	19:42:46	EUMFLO	Noise
D-03	D03_20230402_201626_000.00#	2 April	20:16:26	EUMFLO	Noise
D-03	D03_20230402_202107_000.00#	2 April	20:21:07	EUMFLO	Noise
D-03	D03_20230404_071204_000.00#	4 April	7:12:04	EUMFLO	Noise
D-03	D03_20230408_194921_000.00#	8 April	19:49:21	EUMFLO	Noise
D-03	D03_20230408_194935_000.00#	8 April	19:49:35	EUMFLO	Noise
D-03	D03_20230408_201148_000.00#	8 April	20:11:48	EUMFLO	Noise
D-03	D03_20230408_213917_000.00#	8 April	21:39:17	EUMFLO	Noise
D-03	D03_20230408_230527_000.00#	8 April	23:05:27	EUMFLO	Noise
D-03	D03_20230408_230527_000.00#	8 April	23:05:27	EUMFLO	Noise

EUMFLO=*Eumops floridanus* (Florida bonneted bat).

APPENDIX E
WEATHER DATA

Appendix E. Weather conditions during acoustic surveys on the Broad Causeway Bridge Replacement Project in Miami-Dade County, Florida.

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	18:53	81	71	72	SE	12	0	30.04	0.0	Partly Cloudy
	19:53	80	72	76	SE	12	0	30.05	0.0	Partly Cloudy
	20:53	79	70	74	NNW	7	0	30.08	0.0	Cloudy
	21:53	80	69	69	SE	7	0	30.08	0.0	Cloudy
	22:53	79	72	79	S	6	0	30.09	0.0	Mostly Cloudy
	23:53	78	72	81	SE	6	0	30.09	0.0	Mostly Cloudy
27 March	0:53	78	72	81	ESE	5	0	30.08	0.0	Mostly Cloudy
	1:53	78	72	81	ESE	5	0	30.07	0.0	Cloudy
	2:53	77	72	84	SE	6	0	30.05	0.0	Mostly Cloudy
	3:53	77	72	84	SE	3	0	30.05	0.0	Cloudy
	4:53	77	72	84	S	5	0	30.04	0.0	Mostly Cloudy
	5:53	77	72	84	SSW	5	0	30.05	0.0	Cloudy
	6:53	77	71	82	Variable	3	0	30.06	0.0	Mostly Cloudy
	18:53	77	73	88	SE	8	0	30.01	0.2	Light Rain
	19:53	77	73	88	ESE	6	0	30.02	0.0	Cloudy
	20:53	78	73	84	Calm	0	0	30.04	0.0	Cloudy
	21:53	77	68	74	Calm	0	0	30.06	0.0	Cloudy
	22:53	75	69	82	SE	6	0	30.07	0.0	Cloudy
28 March	23:53	75	70	84	E	8	0	30.07	0.0	Cloudy
	0:53	74	70	87	Calm	0	0	30.06	0.0	Mostly Cloudy
	1:53	73	70	90	Calm	0	0	30.04	0.0	Fair
	2:53	73	70	90	Calm	0	0	30.02	0.0	Fair
	3:53	73	70	90	Calm	0	0	30.01	0.0	Fair

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	4:53	73	70	90	Calm	0	0	29.99	0.0	Fair
	5:53	73	70	90	SW	3	0	29.99	0.0	Fair
	6:53	73	70	90	W	3	0	30.01	0.0	Fair
	18:53	79	69	72	ESE	13	0	30.01	0.0	Cloudy
	19:53	74	70	87	N	8	0	30.05	0.1	Heavy T-Storm
	20:53	73	70	90	E	9	0	30.07	0.2	Cloudy
	21:53	74	71	91	Variable	7	0	30.08	0.0	Cloudy
	22:53	73	71	93	ESE	7	0	30.09	0.0	Mostly Cloudy
	23:53	73	70	90	ESE	8	0	30.10	0.0	Mostly Cloudy
29 March	0:53	73	70	90	Calm	0	0	30.09	0.0	Mostly Cloudy
	1:53	73	69	87	Calm	0	0	30.07	0.0	Mostly Cloudy
	2:53	73	69	87	Calm	0	0	30.05	0.0	Mostly Cloudy
	3:53	72	68	87	Calm	0	0	30.04	0.0	Mostly Cloudy
	4:53	73	69	87	Calm	0	0	30.04	0.0	Mostly Cloudy
	5:53	72	69	91	N	3	0	30.05	0.0	Partly Cloudy
	6:53	73	70	90	N	3	0	30.07	0.0	Partly Cloudy
	18:53	77	66	69	ENE	12	0	30.12	0.0	Mostly Cloudy
	19:53	76	66	71	ENE	12	0	30.12	0.0	Fair
	20:53	76	66	71	NE	9	0	30.15	0.0	Partly Cloudy
	21:53	73	68	84	ENE	9	0	30.18	0.0	Heavy Rain
30 March	22:53	73	70	90	E	7	0	30.18	0.2	Mostly Cloudy
	23:53	75	66	73	ENE	8	0	30.18	0.0	Fair
	0:53	75	66	73	E	15	0	30.18	0.0	Fair
	1:53	74	65	73	E	12	0	30.18	0.0	Mostly Cloudy

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	2:53	75	64	69	E	14	22	30.16	0.0	Mostly Cloudy
	3:53	75	64	69	E	15	0	30.16	0.0	Partly Cloudy
	4:53	74	63	68	E	12	0	30.16	0.0	Fair
	5:53	74	62	66	ENE	12	0	30.17	0.0	Fair
	6:53	73	62	68	E	12	0	30.18	0.0	Fair
	18:53	78	63	60	ESE	14	0	30.16	0.0	Mostly Cloudy
	19:53	77	63	62	E	13	0	30.16	0.0	Mostly Cloudy
	20:53	77	64	64	E	10	0	30.17	0.0	Partly Cloudy
	21:53	77	64	64	ESE	10	0	30.18	0.0	Mostly Cloudy
	22:53	77	63	62	ESE	12	0	30.18	0.0	Mostly Cloudy
	23:53	76	65	69	E	10	0	30.19	0.0	Mostly Cloudy
31 March	0:53	76	67	74	ESE	8	0	30.17	0.0	Mostly Cloudy
	1:53	76	67	74	ESE	9	0	30.16	0.0	Mostly Cloudy
	2:53	76	68	76	ESE	7	0	30.14	0.0	Mostly Cloudy
	3:53	75	69	82	ESE	7	0	30.13	0.0	Mostly Cloudy
	4:53	76	69	79	ESE	7	0	30.12	0.0	Partly Cloudy
	5:53	76	70	82	ESE	5	0	30.12	0.0	Mostly Cloudy
	6:53	77	70	79	SE	8	0	30.13	0.0	Mostly Cloudy
	18:53	76	72	87	SE	14	24	30.07	0.4	Heavy Rain
	19:53	74	71	91	SSE	8	0	30.07	0.1	Mostly Cloudy
	20:53	74	71	91	Variable	6	0	30.08	0.0	Partly Cloudy
1 April	21:53	74	72	93	Variable	3	0	30.10	0.0	Fair
	22:53	75	75	100	WSW	3	0	30.11	0.0	Fair
	23:53	74	72	93	W	3	0	30.11	0.0	Fair

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	0:53	75	72	90	W	3	0	30.11	0.0	Fair
	1:53	75	72	90	SW	3	0	30.07	0.0	Fair
	2:53	75	72	90	Calm	0	0	30.07	0.0	Fair
	3:53	73	72	96	Calm	0	0	30.05	0.0	Fair
	4:53	73	72	96	Calm	0	0	30.04	0.0	Partly Cloudy
	5:53	72	71	97	WSW	3	0	30.04	0.0	Fair
	6:53	72	71	97	Calm	0	0	30.06	0.0	Fair
	18:53	81	70	69	SSE	9	20	30.01	0.0	Fair
	19:53	80	69	69	SSE	8	0	30.02	0.0	Fair
	20:53	79	69	72	SSE	7	0	30.03	0.0	Fair
	21:53	79	70	74	S	7	0	30.05	0.0	Fair
	22:53	79	71	77	S	8	0	30.05	0.0	Fair
	23:53	78	70	76	SW	7	0	30.04	0.0	Fair
2 April	0:53	77	70	79	SSW	3	0	30.03	0.0	Fair
	1:53	76	70	82	S	5	0	30.01	0.0	Fair
	2:53	74	69	85	Calm	0	0	30.00	0.0	Fair
	3:53	74	70	87	Calm	0	0	29.98	0.0	Fair
	4:53	74	70	87	WNW	3	0	29.99	0.0	Fair
	5:53	74	70	87	Calm	0	0	29.98	0.0	Partly Cloudy
	6:53	73	69	87	Calm	0	0	30.01	0.0	Fair
	18:53	82	70	67	SE	9	0	30.00	0.0	Mostly Cloudy
3 April	19:53	80	71	74	SE	9	0	30.02	0.0	Partly Cloudy
	20:53	79	70	79	SE	6	0	30.03	0.0	Partly Cloudy
	21:53	79	71	77	ESE	7	0	30.04	0.0	Fair

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	22:53	78	71	79	SE	6	0	30.04	0.0	Fair
	23:53	77	70	79	SE	5	0	30.04	0.0	Fair
	0:53	78	71	79	ESE	5	0	30.04	0.0	Fair
	1:53	77	71	82	ESE	6	0	30.02	0.0	Fair
	2:53	77	71	82	E	6	0	30.00	0.0	Fair
	3:53	77	71	82	ESE	7	0	29.98	0.0	Fair
	4:53	77	71	82	ESE	6	0	29.98	0.0	Fair
	5:53	77	70	79	ESE	5	0	29.97	0.0	Fair
	6:53	76	71	85	ESE	6	0	29.99	0.0	Fair
4 April	18:53	82	68	62	ESE	12	0	30.02	0.0	Fair
	19:53	80	69	69	E	12	0	30.04	0.0	Fair
	20:53	80	69	69	E	12	0	30.05	0.0	Fair
	21:53	79	70	74	E	12	0	30.07	0.0	Partly Cloudy
	22:53	79	70	74	E	15	0	30.07	0.0	Fair
	23:53	79	69	72	E	14	0	30.07	0.0	Fair
	0:53	78	69	74	E	14	0	30.07	0.0	Fair
	1:53	78	68	71	E	14	0	30.06	0.0	Fair
	2:53	78	69	74	E	12	0	30.05	0.0	Fair
	3:53	78	69	74	E	10	0	30.04	0.0	Partly Cloudy
	4:53	77	67	71	ESE	8	0	30.04	0.0	Fair
	5:53	78	67	68	ESE	9	0	30.05	0.0	Fair
	6:53	77	66	69	E	9	0	30.07	0.0	Fair
5 April	18:53	82	69	65	E	20	0	30.07	0.0	Mostly Cloudy
	19:53	80	69	69	E	17	0	30.08	0.0	Mostly Cloudy

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	20:53	80	69	69	E	14	0	30.10	0.0	Mostly Cloudy
	21:53	80	70	71	E	14	23	30.12	0.0	Fair
	22:53	79	70	74	E	14	0	30.13	0.0	Fair
	23:53	79	69	72	E	14	0	30.12	0.0	Fair
	0:53	78	69	74	E	13	0	30.12	0.0	Fair
	1:53	78	69	74	E	13	0	30.11	0.0	Fair
	2:53	78	68	71	E	12	0	30.10	0.0	Fair
	3:53	78	69	74	E	9	0	30.09	0.0	Fair
	4:53	78	69	74	E	15	0	30.09	0.0	Partly Cloudy
	5:53	78	69	74	E	14	0	30.09	0.0	Partly Cloudy
	6:53	79	69	72	E	15	0	30.11	0.0	Mostly Cloudy
	18:53	82	66	58	E	14	0	30.11	0.0	Partly Cloudy
	19:53	80	67	64	E	16	0	30.12	0.0	Fair
	20:53	79	67	66	E	15	0	30.14	0.0	Fair
	21:53	79	68	69	E	13	0	30.15	0.0	Fair
	22:53	78	69	74	E	13	0	30.16	0.0	Fair
	23:53	78	69	74	E	12	0	30.15	0.0	Fair
6 April	0:53	78	69	74	ESE	10	0	30.14	0.0	Fair
	1:53	78	69	74	ESE	9	0	30.12	0.0	Fair
	2:53	78	69	74	ESE	13	0	30.11	0.0	Fair
	3:53	78	69	74	ESE	13	0	30.09	0.0	Fair
	4:53	77	68	74	ESE	10	0	30.08	0.0	Fair
	5:53	77	69	76	ESE	10	0	30.08	0.0	Partly Cloudy
	6:53	77	68	74	E	13	0	30.08	0.0	Mostly Cloudy

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	18:53	80	61	52	E	8	0	30.05	0.0	Fair
	19:53	78	62	58	ENE	8	0	30.06	0.0	Fair
	20:53	78	62	58	ENE	8	0	30.07	0.0	Fair
	21:53	77	65	66	ENE	9	0	30.08	0.0	Fair
	22:53	78	66	66	E	14	0	30.07	0.0	Fair
	23:53	77	65	66	E	13	0	30.07	0.0	Fair
7 April	0:53	77	65	66	E	9	0	30.07	0.0	Fair
	1:53	76	66	71	E	10	0	30.05	0.0	Fair
	2:53	77	67	71	E	9	0	30.03	0.0	Partly Cloudy
	3:53	77	68	74	E	12	0	30.01	0.0	Partly Cloudy
	4:53	77	66	69	E	9	0	30.02	0.0	Fair
	5:53	77	68	74	ESE	8	0	30.02	0.0	Fair
	6:53	77	68	74	E	8	0	30.03	0.0	Partly Cloudy
	18:53	80	66	62	SSE	10	16	29.97	0.0	Mostly Cloudy
	19:53	79	67	66	SE	8	0	29.98	0.0	Mostly Cloudy
	20:53	79	67	66	S	5	0	29.99	0.0	Mostly Cloudy
	21:53	78	67	68	Variable	5	0	30.01	0.0	Mostly Cloudy
	22:53	78	67	68	SE	6	0	30.02	0.0	Mostly Cloudy
8 April	23:53	78	67	68	SE	6	0	30.02	0.0	Mostly Cloudy
	0:53	78	67	68	Calm	0	0	30.01	0.0	Mostly Cloudy
	1:53	76	67	74	Calm	0	0	30.00	0.0	Fair
	2:53	75	70	84	NW	5	0	29.98	0.0	Partly Cloudy
	3:53	74	69	85	WNW	5	0	29.97	0.0	Mostly Cloudy
	4:53	74	68	82	W	3	0	29.95	0.0	Mostly Cloudy

Date	Time	Temperature (°F)	Dew Point (°F)	Humidity (%)	Wind Direction	Wind Speed (mph)	Wind Gust (mph)	Pressure (in)	Precipitation (in)	Condition
	5:53	73	68	84	WSW	3	0	29.95	0.0	Fair
	6:53	72	67	84	Calm	0	0	29.96	0.0	Partly Cloudy

APPENDIX F
ADDITIONAL TREE SURVEY DATA

All trees within the USFWS Florida Bonneted Bat (FBB) Consultation Area that may potentially be impacted by the proposed project were surveyed by AtkinsRéalis on 31 August 2023 using the USFWS 2019 FBB Consultation Guidelines. Only trees located within the USFWS FBB Consultation Area were surveyed as part of this effort. Within the USFWS FBB Consultation Area, there were a total of 18 royal palm trees (*Roystonea regia*) that met the diameter at breast height (DBH) and height criteria listed in the USFWS 2019 FBB Consultation Guidelines. The data on these 18 trees is provided in Table 1a below.

Visual examination of the trees found that there were no crevices in any of the trees surveyed and no evidence of bat use was observed. Figure 1a shows the FBB Consultation Area, the footprint of the two proposed build alternatives, and the location of each of the 18 trees surveyed. Representative photographs were collected for each tree and are provided below.

Table 1a: Site Features that met the criteria of the USFWS 2019 FBB Consultation Guidelines

Tree #	Height (ft)	DBH (in)	Scientific Name	Common Name
1	43.5	15	*Roystonea regia*	royal palm
2	37	15.75	*Roystonea regia*	royal palm
3	38.5	13	*Roystonea regia*	royal palm
4	43.5	17	*Roystonea regia*	royal palm
5	53.5	19.25	*Roystonea regia*	royal palm
6	43.5	19	*Roystonea regia*	royal palm
7	51	18.75	*Roystonea regia*	royal palm
8	41	14	*Roystonea regia*	royal palm
9	49.5	13.75	*Roystonea regia*	royal palm
10	44.5	22.25	*Roystonea regia*	royal palm
11	48.5	21.25	*Roystonea regia*	royal palm
12	49	21.75	*Roystonea regia*	royal palm
13	45	17	*Roystonea regia*	royal palm
14	50	21	*Roystonea regia*	royal palm
15	38.5	14.75	*Roystonea regia*	royal palm
16	42	13	*Roystonea regia*	royal palm
17	41.5	16	*Roystonea regia*	royal palm
18	42	16.5	*Roystonea regia*	royal palm



Survey Area
Florida Bonneted Bat Consultation Area
Surveyed Trees
Bridge Replacement Footprints - Two Build Alternatives

N
W
E
S

Figure 1a. Tree Survey within the Florida Bonneted Bat Consultation Area on the Broad Causeway Bridge Replacement Project in Miami-Dade County, FL

Project No.
FM# 452428-1-21-01

0 0.125 0.25 Miles

Base Map: Esri World Imagery

AtkinsRéalis

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AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 1

Date: 8/31/23

Description: This is a photo of Royal Palm (*Roystonea regia*) 1 (looking west) adjacent to the Bay Harbor Islands Tot Lot west of W Broadview Dr.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01
Photo No. 2		
Date: 8/31/23		
Description: This is a photo of Royal Palm 2 (looking west) adjacent to the Bay Harbor Islands Tot Lot west of W Broadview Dr.		

AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 3

Date: 8/31/23

Description: This is a photo of Royal Palms 3 and 4 (looking east) adjacent to the Bay Harbor Islands Tot Lot west of W Broadview Dr.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 4

Date: 8/31/23

Description: This is a photo of Royal Palm 5 (looking north) adjacent to the Bay Harbor Islands Tot Lot west of W Broadview Dr.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01
Photo No. 5		
Date: 8/31/23		
Description: This is a photo of Royal Palms 6, 7, 8, and 9 (looking south) adjacent to the Bay Harbor Islands Tot Lot west of W Broadview Dr.		

AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 6

Date: 8/31/23

Description: This is a photo of Royal Palms 10, 11, 12, 13, and 14 (looking northeast) south of NE 96th St and west of W Broadview Dr.



AtkinsRéalis

PHOTOGRAPHIC LOG

CLIENT: Town of Bay Harbor Islands	SITE LOCATION: Broad Causeway Bridge	Project No.: FM 452428-1-21-01

Photo No. 6

Date: 8/31/23

Description: This is a photo of Royal Palms 15, 16, 17, and 18 (looking west) south of NE 96th St and west of W Broadview Dr.



APPENDIX G

SPECIES PROTECTION MEASURES

Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives in the Waters of the State of Florida

Standard Manatee Conditions for In-water Work

Protected Species Construction Conditions, NOAA Fisheries Southeast Regional Office

Vessel Strike Avoidance Measures, NOAA Fisheries Southeast Regional Office

Standard Protection Measures for the Eastern Indigo Snake

Guidelines for the Protection of Marine Mammals and Sea Turtles During the Use of Explosives In the Waters of the State of Florida

May 2005

INTRODUCTION

The Endangered Species Act provides Federal protection for the West Indian manatee (*Trichechus manatus*) and six species of sea turtles (green, *Chelonia mydas*; hawksbill, *Eretmochelys imbricata*; Kemp's ridley, *Lepidochelys kempii*; leatherback, *Dermochelys coriacea*; loggerhead, *Caretta caretta*; olive ridley, *Lepidochelys olivacea*). The Marine Mammal Protection Act provides Federal protection for manatees, dolphins and whales. Under State of Florida statutes, the Florida Manatee Sanctuary Act provides protection for the manatee and the Marine Turtle Protection Act provides protection for sea turtles. These Federal and State statutes provide the regulatory authority for required compliance with these guidelines by the blasting proponent (e.g., the person(s) who is(are) proposing works or undertakings that involve the use of explosives) .

The detonation of explosives in the marine environment has in some instances caused injury and/or death to both marine mammals and sea turtles as reviewed by Ketten (1995), Lewis (1996), and Keevin and Hempen (1997). Individual scientific publications also document the potential for marine mammal (Fitch and Young 1948; Hanson 1954; Reiter 1981; Wright 1971; Wright 1982) and sea turtle (O'Keeffe and Young 1984; Duronslet et al. 1986; Klima et al. 1988; Gitschlag and Renaud 1989; Gitschlag 1990; Gitschlag and Herczeg 1994) injury and/or death. Based on the best available scientific information describing the potential for marine mammal and sea turtle injury/death, the Florida Fish and Wildlife Conservation Commission (FWC), in cooperation with the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS), has prepared these guidelines to provide information to project proponents on the conservation and protection of marine mammals and sea turtles from adverse impacts resulting from the use of confined or open-water explosives in Florida's waters. Within the context of these guidelines, an explosive is defined as a chemical compound which, when detonated, creates a compressional wave having an almost instantaneous rise time to a very high peak pressure followed by a decay to below ambient pressure by either rapid oxidation or the breaking of high-energy chemical bonds.

APPLICABLE FEDERAL AND STATE LEGISLATION

These guidelines for the protection of marine mammals and sea turtles, the application and review procedures and processes, and reporting requirements that are outlined in this document apply in the context of the State and Federal legislative authorities briefly summarized below.

The Endangered Species Act

Section 9 (16 U.S.C. 1538) - Prohibited Acts

(a) General
(1)…it is unlawful for any person subject to the jurisdiction of the United States to-

(B) take any such species within the United States or the territorial sea of the United States;

(C) take any such species upon the high seas;

Section 3 (16 U.S.C. 1532) - Definitions

(18) The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.

Section 11 (16 U.S.C. 1540) - Penalties and enforcement

(a) Civil Penalties
(1) Any person who knowingly violates…any provision of this Act…may be assessed a civil penalty…of not more than $25,000 for each violation.

(b) Criminal Violations
(1) Any person who knowing violates any provision of this chapter…upon conviction, be fined not more than $50,000 or imprisoned for not more than one year, or both. [The $50,000 maximum fine stated in the Act and repeated in this summary is modified by the Sentencing Reform Act of 1984, as amended by the Criminal Fine Improvements Act of 1987. The fines are generally higher.]

The Marine Mammal Protection Act

Section 102 (16 U.S.C. 1372) - Prohibitions
(a) …it is unlawful-

(1)(A) for any person or vessel or other conveyance to take any marine mammal in waters or on lands under the jurisdiction of the United States;

Section 3 (16 U.S.C. 1362) - Definitions
(13) The term "take" means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal.

(18)(A) The term "harassment" means any act of pursuit, torment, or annoyance which-

(i) has the potential to injure a marine mammal or marine mammal stock in the wild; or

(ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering.

Section 105 (16 U.S.C. 1375) - Penalties

(a)(1) Any person who violates any provision of this title or any permit or regulation issued thereunder, except as provided in section 118, may be assessed a civil penalty by the Secretary of not more than $10,000 for each such violation. No penalty shall be assessed unless such person is given notice and opportunity for a hearing with respect to such violation. Each unlawful taking or importation shall be a separate offense.

(a)(2)(b) Any person who knowingly violates any provision of this title or of any permit or regulation issued thereunder (except as provided in section 118) shall, upon conviction, be fined not more than $20,000 for each such violation, or imprisoned for not more than one year, or both. [The $20,000 maximum fine stated in the Act and repeated in this summary is modified by the Sentencing Reform Act of 1984, as amended by the Criminal Fine Improvements Act of 1987. The fines are generally higher.]

The Florida Manatee Sanctuary Act

Title XXVII, Section 370.12 – Marine animals; regulation

(2) Protection of Manatees or Sea Cows
(d) …it is unlawful for any person at any time, by any means, or in any manner intentionally or negligently to annoy, molest, harass, or disturb or attempt to molest, harass, or disturb any manatee; injure or harm or attempt to injure or harm any manatee; capture or collect or attempt to capture or collect any manatee; pursue, hunt, wound, or kill or attempt to pursue, hunt, wound, or kill any manatee, or possess, literally or constructively, any manatee or any part of any manatee.

(s) …any person violating the provisions of this subsection or any rule or ordinance adopted pursuant to this subsection shall be guilty of a misdemeanor.

The Marine Turtle Protection Act

Title XXVII, Section 370.12 – Marine animals; regulation

(1)Protection of Marine Turtles
(d)(5) Any person, firm, or corporation that illegally takes, disturbs, mutilates, destroys, causes to be destroyed, transfers, sells, offers to sell, molests, or harasses any marine turtle species, or the eggs or nest of any marine turtle species as described in this subsection, commits a third degree felony.

GUIDELINES

In seeking authorization to conduct underwater blasting in the State of Florida, the project proponent is responsible for providing a Blasting Plan. These guidelines are to be used to develop a site-specific Blasting Plan to be submitted to the appropriate State and Federal regulatory agencies (i.e., U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Coast Guard, and U.S. Army Corps of Engineers) as well as the FWC. This site-specific plan is to be submitted during the permitting process and approved before permit issuance. The permit will then reference the plan and the conservation measures within the plan will become permit conditions. Revision of the plan would require a permit modification.

THE BLASTING PLAN

The Blasting Plan must include the following components: (1) Blasting Design, (2) Impact Assessment, (3) Mitigation Plan, and (4) Endangered Species Watch Plan. Each of these components is described in detail below.

1. *Blasting Design*

The project proponent shall provide a "detailed" written description of the project blasting design, which must include a diagram(s) of the blasting design. At a minimum, the following information must be included:

a. Type of initiation system to be employed. [Is the system fully electric or completely non-electric? Are there parts of both? Is any detonation cord used?]

b. Timing and duration of underwater blasting, the limitation to daylight shooting, and any tidal and/or seasonal restrictions.

c. Expected type and weight of explosives to be used per shot for production shots and the maximum charge weight per interval of 9 milliseconds. Sequentially list every charges' total delay time in increasing time order. Any charge weights with less than 9-milliseconds interval are summed to find the maximum charge weight per delay.

d. Blast pattern and geometry of the individual shots for a small project or of a general blast production for a large blasting program. Test program to develop from small charges to the maximum charge weight per delay interval necessary for production. The expected production charge weight per delay, spacing and burden between borings, placement of explosives within borings, stemming type and minimum length of stemming placement within the structure (note 3.e. below), and the location of the initiator within the boring. [A small project (e.g., bridge demolition) will have a limited blasting plan, perhaps completely prepared. A large program (e.g., harbor rock removal) will have a general blasting program that varies through the project. A program may be needed to

scale the first charge weight per delay to the maximum charge weight per delay for the project.]

e. Description of millisecond-delays that will be used if multiple charges are required.

f. Detailed description of the material to be blasted (i.e., substrata characteristics, description of concrete and reinforcement, etc.) and surrounding geology (water depth, water width, sediment thickness, rock or structure being removed, etc.).

g. Detailed description of control measures that will be employed to assure that hole spacing, burden, hole depth, charge placement, delay interval, the stemming minimum, and recording of the shot have met the conditions of the permit and submitted plan.

2. *Impact Assessment*

The project proponent shall provide a "detailed" Environmental Impact Assessment of the proposed blasting project. At a minimum, the following information must be included:

a. The likelihood of sea turtles and marine mammals being in the blasting area. The proponent shall consult existing scientific literature and the FWC and/or other resource agencies. Pre-blast marine mammal/sea turtle surveys may be required, at the discretion of the FWC, USFWS, NMFS, or other reviewing/permitting agencies.

b. A description of the marine mammal/sea turtle "exclusion zone" that will be developed and used for underwater blasting programs to provide species' protection. The minimum exclusion zone radius or range from which to protect marine mammal/sea turtles is 300 linear feet beyond the perimeter of placed blasting agents for a shot. The maximum exclusion zone is a 2,000 foot radius beyond the blast perimeter for a submerged shot. When underwater blasting will be conducted in a very controlled manner for a protracted period of months and has acceptable project monitoring, the project proponent may apply to the FWC and other appropriate permitting agencies for a special review of exclusion zone criteria.

Underwater explosions can be broadly categorized as either "confined" or "open-water". Confined shots produce much less environmental damage for the same charge weight when compared to open-water shots (Nedwell and Thandavamoorthy 1992; Hempen et al. 2005). For confined shots, the pressure waves are dominantly radiated into a stiff medium (such as rock or a massive structure founded on rock) and remain in that medium. Confined shots have vertical heights of the stiff medium exposed to water (or loose sediment below water) of less than half the smaller areal (horizontal) dimension of removal. [For example, removal of a stiff medium (rock or concrete) exposed to 8 feet of the water and sand vertically for the smaller horizontal removal dimension of 20 linear feet would safely radiate most of its energy into the stiff medium. Alternatively, removal of a concrete column with 8 feet vertically surrounded by water and mud, and a

horizontal diameter of less than 16 feet, would be presumed to adversely transmit most of its energy to the water. The former example is a low-impact confined blast, while the latter is an open-water blast that may have high organism impact.] Blasting in the water column, not connected to a structure, has a high transmission of pressure waves through the water column. Blast removal of some stiff-medium structures below the water surface (e.g., columns, piers, or pilings) releases its energy directly to the surrounding water column or loose sediment, which has a high transmission of pressure waves through the water column. Underwater blasting with high transmission to the water column, and thus potentially high organism impact, shall be termed open-water blasting.

The "exclusion zone", EA, shall be calculated using the following equation, appropriate to the type of blasting.

The exclusion zone for open-water blasting shall be determined from the open-water shot's maximum charge weight per delay. For an open-water shot's maximum charge weight per delay of less than 0.19 pound, the exclusion-zone radius of 300 linear feet applies. The maximum charge weight per delay of a confined shot shall not exceed 57 pounds for the exclusion-zone criterion beneath the waters of the State of Florida, because the exclusion-zone radius would be greater than 2,000 linear feet. The equation for the open-water blasting exclusion-zone radius, EZ_{OW}, for maximum charge weights per delay between 0.19 to 57 pounds is:

$$EZ_{OW} \text{ (feet)} = 520\ w^{1/3},$$

where w is the maximum charge weight (in pounds) per delay of an individual open-water shot.

The exclusion zone for confined blasting shall be determined from the confined shot's maximum charge weight per delay. For a confined shot's maximum charge weight per delay of less than 1.5 pound, the "exclusion zone" radius of 300 linear feet applies. The maximum charge weight per delay of an open-water shot shall not exceed 450 pounds for the exclusion-zone criterion beneath the waters of the State of Florida, because the exclusion zone radius would be greater than 2,000 linear feet. The equation for the confined blasting exclusion zone radius, EZ_C, for maximum charge weights per delay between 1.5 to 450 pounds is:

$$EZ_C \text{ (feet)} = 260\ w^{1/3},$$

where w is the maximum charge weight (in pounds) per delay of an individual confined shot.

c. A record of the type of underwater blasting (open-water or confined), procedures to reduce impacts, calculations of blast parameters, actual placement of explosive agents, organism exclusion zone distance calculations, and plans for observation shall be filed on-site before every shot is fired. Records for each shot of the blasting program shall be retained by the project proponent for the duration of project and made available to the

FWC, USFWS, and NMFS immediately onsite or within two business days to the specified mailing address, as requested.

The following records shall be kept for each placement position or boring: (1) - the upper and lower bounds of cemented or consolidated material to be removed or blasted; (2) - the weight of blasting agents and explosives, and their upper and lower bounds; (3) - stemming material appropriate for the size of the borehole; and (4) - upper and lower bounds of the stemming placement within the cemented or consolidated material (usually rock or concrete). The record shall include the sequence of delays from the shortest to longest individual delay time with the total weight of blasting agent at that delay time. The record keeping shall provide enough detail to allow interpretation of the quality of shooting and level of compliance with the Blasting Plan.

d. A description of the monitoring program shall be implemented to record particle velocities when a blasting position is within 1,000 feet of a land-based location. Particle velocity monitoring independently confirms proper shot performance without the cost and difficulty of either pressure-wave recording or organism testing. Reports of particle velocity monitoring should be available to the FWC, USFWS, and NMFS, if requested, on the third business day following the shot.

e. Quantitative evaluation of potential marine mammal/sea turtle (i.e., manatee feeding areas, etc.) habitat that will be destroyed by the blasting project.

3. *Mitigation Plan*

The project proponent shall prepare a Mitigation Plan that shall include a detailed discussion of the measures employed to avoid or minimize the adverse impacts of blasting. Keevin (1998) provides a general description of mitigation techniques that may be useful to explosives engineers. The following measures shall be included in the Mitigation Plan:

a. Blasting shall be conducted during the time when manatees, other marine mammals, and sea turtles are least likely to be in the blasting area. Proponents should consult with the FWC, USFWS, and NMFS to determine the appropriate timing.

b. In tidal areas, the blasting proponent shall conduct blasting during the recommended tidal phase deemed appropriate for the area (i.e., slack or low-tide conditions).

c. The volume and length of all blasting agents, detonation cord, and explosives will be limited to the minimum necessary to conduct the work in a manner that is efficient, safe for workers, and protective of aquatic and marine organisms. Initiation of explosive charges should be conducted with the minimum length of detonation cord possible or should utilize alternative initiation systems. Detonation cord has its own impact radius (injury/kill zone) along the entire length of submerged detonation cord.

d. All shock-tubes and detonation cord or electric wires will be recovered and removed after each blast.

e. After loading a charge in a hole, the hole will be back-filled (stemmed) with angular stemming material. The stemming material shall be uniform, crushed, angular stone. The stemming material shall be within the range of 1/20 to 1/8 of the borehole diameter being confined. The stemming shall not be acceptable if it contains more than 10% fines (smaller than 1/20 of the hole diameter). Stemming material shall be placed a minimum vertical length of three borehole diameters above the placed charge within sound rock or concrete. A standard procedure of logging the hole and placing the explosives shall be established to resolve and verify the proper placement of stemming material.

f. If multiple charges are required, time-delays should be used to reduce the overall detonation pressures to a series of smaller explosions. Delays shall be used to effectively develop the removal while lowering the maximum charge weight per delay to as low as reasonably achievable. Delays of less than a 9-millisecond interval shall not be counted as delays. All charges within any 9-millisecond interval shall be summed to resolve the maximum charge weight per delay for a given shot.

g. In addition to these measures, the proponent should consider additional mitigation measures including, but not limited to the following:

Deployment of barriers in shallow water or bubble curtains in deep water to reduce the shock wave.

4. ***Endangered Species Watch Plan (WP)***

The project proponent shall prepare a WP using the guidance below to ensure that marine mammals and sea turtles are not in the exclusion zone during blasting events.

a. A formal WP Coordination Meeting shall be held at least one (1) week prior to the first blasting event to review the WP, to discuss the responsibilities of all parties, and to review and approve the schedule of events. Personnel invited to the WP Coordination Meeting shall be contacted at least two (2) weeks prior to the first detonation event. Contacted invitees shall include the Explosives Engineer, the observation team, FWC, USFWS, NMFS, U.S. Coast Guard, U.S. Army Corps of Engineers, and other interested parties. The agenda shall be coordinated with the FWC, USFWS and NMFS prior to the meeting. The meeting shall include the latest information concerning the possible presence of manatee, other marine mammals, and sea turtles during blasting, the logistics of the detonation schedule, details of the aerial survey, the communications plan, and the responsibilities of all parties involved.

b. The WP shall include time tables for the endangered species observation periods (e.g., start times for aerial surveys, boat surveys, and land-based surveys), observer positions, and a copy of the WP log sheet and map to record manatee and/or sea turtle sightings.

c. The WP shall include a list of names and qualifications of the observers. Approval of the observers is at the discretion of the FWC, USFWS, and NMFS and will be made prior to the blasting event.

d. The watch crew shall consist of a minimum of a WP Coordinator, four land or boat-based observers, and one aerial observer. All observers shall have had previous experiences in observing/spotting marine mammals and sea turtles, or be approved by the FWS, USFWS and NMFS. The aerial observer shall have a minimum of 60 aerial hours of experience observing sea turtles and marine mammals.

e. Observers shall follow the protocol established for the WP and shall conduct the watch in good faith and to the best of their ability.

f. Each observer shall be equipped with a two-way radio that will be dedicated exclusively to the watch. Observes will be equipped with a cell phone as a backup verbal communications system. Observers shall also be equipped with polarized sunglasses, binoculars, a red flag for backup visual communication, and a sighting log with a map to record sightings.

g. All blasting events shall be weather dependent. Climatic conditions must be suitable for optimal viewing. Slack water, low tide provides optimal viewing conditions. Blasting is prohibited if wind speeds are in excess of 10 knots, during periods of fog, and heavy rain. The WP Coordinator shall determine if optimal observation conditions occur prior to initiation of the survey for each blast event.

h. All blasting events shall occur during daylight hours to ensure that optimal observation conditions occur.

i. A continuous aerial survey shall be conducted by helicopter or airplane, beginning one hour prior to the start of blasting. The survey route shall be designed in conjunction with the FWC, USFWS, and NMFS. After detonation, the aerial survey crew will make a complete survey of the blast area. The aerial survey crew shall continue surveillance of the survey areas for 30 minutes post-blast in case there is a need of aerial tracking of an injured sea turtle or marine mammal.

j. The additional observers shall be located at predetermined positions around the blast site. These positions will be situated to provide maximum visibility of the exclusion zone and will be approved by the FWC, USFWS, and NMFS. The observers shall begin surveying the area one hour prior to the blast event and continue observing for one half hour after the blasting event.

k. The perimeter of the exclusion zone shall be marked with brightly colored buoys, and an added 300 foot radius perimeter around the exclusion zone shall be marked with white buoys for aerial reference.

l. All of the observers shall be in close communication with the blaster in order to halt the blast event, if the need arises. The event shall be halted (delayed), if a marine mammal or sea turtle is spotted within 300 feet of the perimeter of the exclusion zone. If a marine mammal or sea turtle is observed swimming in the direction of the blast zone and their arrival time is projected to coincide with the blast, the blasting event shall be halted. The blasting event shall be halted immediately upon the request of any observer. The blast shall not take place until the animal(s) move out of the area under its own volition. Animals shall not be herded away or harassed into leaving. If the animal(s) is not sighted a second time, the blasting shall not resume until 30 minutes after the initial sighting.

m. If an injured or dead marine mammal or sea turtle is sighted after the blasting event, the WP Coordinator shall contact the FWC through their Hotline at 1-888-404-FWCC and the USFWS at the Jacksonville Ecological Services Office at 904-232-2580.

n. If there are any problems encountered during blasting, the problems shall be evaluated by the observers and explosives engineer. Logistical solutions will be presented to the FWC, USFWS and NMFS. Corrections to the WP shall be made prior to the next blasting event.

o. Within two (2) weeks after completion of all the blasting events, the WP Coordinator will submit a summary report to the FWC, USFWS, and NMFS. The report shall include the observer logs, provide the names of the observers and their positions during the event, the number and location of manatee, other marine mammals, and sea turtles sighted and the actions that were taken when the animals were observed. The report shall reference the blasting event number.

REFERENCES

Duronslet, M. J., C. W. Caillouet, S. Manzella, K. W. Indelicato, C. T. Fontaine, D. B. Revera, T. Williams, and D. Boss. 1986. The effects of an underwater explosion on the sea turtles *Lepidochelys kempi* and *Caretta caretta* with observations of effects on other marine organisms. Unpublished report submitted to National Marine Fisheries Service Biological Laboratory, Galveston, Texas.

Fitch, J. E., and P. H. Young. 1948. Use and effect of explosives in California waters. California Fish and Game 34:53-70.

Gitschlag, G. R. 1990. Sea turtle monitoring at offshore oil and gas platforms. Pp. 223-246. *In*: Proceedings of the 10th Annual Workshop on Sea Turtle Biology and Conservation, T. H. Richardson, J. I. Richardson, and M. Donnelly (compiles). NOAA Technical Memorandum NMFS-SEFC-278.

Gitschlag, G. R., and B. A. Herczeg. 1994. Sea turtle observations at explosive removals of energy structures. Marine Fisheries Review 56:1-8.

Gitschlag, G. R., and M. Renaud. 1989. Sea turtles and the explosive removal of offshore oil and gas structures. Pp. 67-68 in Proceedings of the 9th Annual Workshop on Sea Turtle Conservation and Biology, S. A. Eckert, K.L. Eckert, and T. H. Richardson (compilers). NOAA Technical Memorandum NMFS-SEFC-232.

Hanson, H. F. 1954. Hair seal control program: Copper River and Bering Sea areas. 1954 Annual Report to Alaska Department of Fisheries (Mimeo). [Cited in Wright 1982]

Hempen, G. L., T. M. Keevin, and H. J. Ruben. 2005. Underwater blast pressures from confined rock removal shots: The Kill Van Kull Deepening Project. *In*: Proceedings of the Thirty-first Annual Conference on Explosives and Blasting Technique, Orlando, Florida. International Society of Explosive Engineers, Cleveland, OH. 11 pp.

Keevin, T. M. 1998. A review of natural resource agency recommendations for mitigating the impacts of underwater blasting. Reviews in Fisheries Science 6:281-313.

Keevin, T. M., and G. L. Hempen. 1997. The environmental effects of underwater explosions with methods to mitigate impacts. U.S. Department of Defense Legacy Report, U. S. Army Corps of Engineers, St. Louis District. 145 pp. http://www.denix.osd.mil/denix/Public/ES-Programs/Conservation/WaterX/water1.html

Ketten, D. R. 1995. Estimates of blast injury and acoustic trauma zones for marine mammals from underwater explosions. Pp. 391-407. *In*: Sensory Systems of Aquatic Mammals, R. A. Kastelein, J. A. Thomas, and P. E. Nachtigall (editors). De Spil Publishers, Woerden, The Netherlands.

Klima, E. F., G. R. Gitschlag, and M. L. Renaud. 1988. Impacts of the explosive removal of offshore petroleum platforms on sea turtles and dolphins. Marine Fisheries Review 50:33-42.

Lewis, J. A. 1996. Effects of underwater explosions on life in the sea. DSTO-GD-0080. Melbourne, Australia.

Nedwell, J. R., and T. S. Thandavamoorthy. 1992. The waterborne pressure wave from buried explosive charges: An experimental investigation. Applied Acoustics 37:1-14.

O'Keeffe, D. J., and G. A. Young. 1984. Handbook on the environmental effects of underwater explosions. NSWC TR 83-240. Naval Surface Weapons Center, Dahlgren, VA.

Reiter, G. A. 1981. Cold weather response F/V Ryuyo Maru No. 2 St. Paul, Pribiloff Islands, Alaska. Pp. 227-231. *In*: Proceeding of the 1981 Oil Spill Conference. American Petroleum Institute Publication 4334, Washington, D. C.

Wright, R. A. 1971. Effects of underwater overpressures on sea otters and other aquatic animals. Amchitka Bioenvironmental Program. U.S. Atomic Energy Commission Final Report Contract No. AT (26-1).

Wright, D. G. 1982. A discussion paper on the effects of explosives on fish and marine mammals in the waters of the Northwest Territories. Canadian Technical Report of Fisheries and Aquatic Science 1052:v + 16 pp.

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

2011

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or in Vero Beach (1-772-562-3909) for south Florida, and emailed to FWC at ImperiledSpecies@myFWC.com.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8½ " by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at http://www.myfwc.com/WILDLIFEHABITATS/manatee_sign_vendors.htm. Questions concerning these signs can be forwarded to the email address listed above.

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:



Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

PROTECTED SPECIES CONSTRUCTION CONDITIONS, NOAA FISHERIES SOUTHEAST REGIONAL OFFICE

The action agency and any permittee shall comply with the following construction conditions for protected species under the jurisdiction of NOAA Fisheries Southeast Regional Office (SERO) Protected Resources Division (PRD):[1]

Protected Species Sightings–The action agency and any permittee shall ensure that all personnel associated with the project are instructed about the potential presence of species protected under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). All on-site project personnel are responsible for observing water-related activities for the presence of protected species. All personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing listed species and all marine mammals. To determine which protected species and critical habitat may be found in the transit area, please review the relevant marine mammal and ESA-listed species at Find A Species (https://www.fisheries.noaa.gov/find-species) and the consultation documents that have been completed for the project.

1. **Equipment**–Turbidity curtains, if used, shall be made of material in which protected species cannot become entangled and be regularly monitored to avoid protected species entrapment. All turbidity curtains and other in-water equipment shall be properly secured with materials that reduce the risk of protected species entanglement and entrapment.

    a. In-water lines (rope, chain, and cable, including the lines to secure turbidity curtains) shall be stiff, taut, and non-looping. Examples of such lines are heavy metal chains or heavy cables that do not readily loop and tangle. Flexible in-water lines, such as nylon rope or any lines that could loop or tangle, shall be enclosed in a plastic or rubber sleeve/tube to add rigidity and prevent the line from looping and tangling. In all instances, no excess line shall be allowed in the water. All anchoring shall be in areas free from hardbottom and seagrass.

    b. Turbidity curtains and other in-water equipment shall be placed in a manner that does not entrap protected species within the project area and minimizes the extent and duration of their exclusion from the project area.

    c. Turbidity barriers shall be positioned in a way that minimizes the extent and duration of protected species exclusion from important habitat (e.g. critical habitat, hardbottom, seagrass) in the project area.

2. **Operations**–For construction work that is generally stationary (e.g., barge-mounted equipment dredging a berth or section of river, or shore-based equipment extending into the water):

    a. Operations of moving equipment shall cease if a protected species is observed within 150 feet of operations.

[1] Manatees are managed under the jurisdiction of the U.S. Fish and Wildlife Service.

b. Activities shall not resume until the protected species has departed the project area of its own volition (e.g., species was observed departing or 20 minutes have passed since the animal was last seen in the area).

3. **Vessels**–For projects requiring vessels, the action agency, and any permittee shall ensure conditions in the Vessel Strike Avoidance Measures are implemented as part of the project/permit issuance (https://www.fisheries.noaa.gov/southeast/consultations/regulations-policies-and-guidance).

4. **Consultation Reporting Requirements–**Any interaction with a protected species shall be reported immediately to NOAA Fisheries SERO PRD and the local authorized stranding/rescue organization.

   To report to NOAA Fisheries SERO PRD, send an email to takereport.nmfsser@noaa.gov. Please include the species involved, the circumstances of the interaction, the fate and disposition of the species involved, photos (if available), and contact information for the person who can provide additional details if requested. Please include the project's Environmental Consultation Organizer (ECO) number and project title in the subject line of email reports.

   To report the interaction to the local stranding/rescue organization, please see the following website for the most up to date information for reporting sick, injured, or dead protected species:

   Reporting Violations–To report an ESA or MMPA violation, call the NOAA Fisheries Enforcement Hotline. This hotline is available 24 hours a day, 7 days week for anyone in the United States.

   NOAA Fisheries Enforcement Hotline (800) 853-1964

5. **Additional Conditions–**Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the project consultation and must also be complied with.

For additional information, please contact NOAA Fisheries SERO PRD at:
NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701
Tel: (727) 824-5312
Visit us on the web at Protected Marine Life in the Southeast
(https://www.fisheries.noaa.gov/region/southeast#protected-marine-life)

Revised: May 2021

VESSEL STRIKE AVOIDANCE MEASURES, NOAA FISHERIES SOUTHEAST REGIONAL OFFICE

Background

Vessel strikes can injure or kill species protected under the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). NOAA Fisheries Southeast Regional Office (SERO) Protected Resources Division (PRD) recommends implementing the following identification and avoidance measures to reduce the risk of vessel strikes and disturbance from vessels to protected species under our jurisdiction.[1]

Protected Species Sightings

All vessel operators and crews should be informed about the potential presence of species protected under the ESA and the MMPA and any critical habitat in a vessel transit area. All vessels should have personnel onboard responsible for observing for the presence of protected species. All personnel should be advised that there are civil and criminal penalties for harming, harassing, or killing listed species and all marine mammals. To determine which protected species and critical habitat may be found in the transit area, please review the relevant marine mammal and ESA-listed species at Find A Species (https://www.fisheries.noaa.gov/find-species) and any ESA Section 7 consultation documents if applicable.

Vessel Strike Avoidance

The following measures should be taken when they are consistent with safe navigation to avoid causing injury or death of a protected species:

1. Operate at the minimum safe speed when transiting and maintain a vigilant watch for protected species to avoid striking them. Even with a vigilant watch, most marine protected species are extremely difficult to see from a boat or ship, and you cannot rely on detecting them visually and then taking evasive action. The most effective way to avoid vessel strikes is to travel at a slow, safe speed. Whenever possible, assign a designated individual to observe for protected species and limit vessel operation to only daylight hours.

2. Follow deep-water routes (e.g., marked channels) whenever possible.

3. Operate at "Idle/No Wake" speeds in the following circumstances:
    a. while in any project construction areas
    b. while in water depths where the draft of the vessel provides less than four feet of clearance from the bottom, or
    c. in all depths after a protected species has been observed in and has recently departed the area.

[1] Manatees are managed under the jurisdiction of the U.S. Fish and Wildlife Service.

4. When a protected species is sighted, attempt to maintain a distance of 150 feet or greater between the animal and the vessel. Reduce speed and avoid abrupt changes in direction until the animal(s) has left the area.

5. When dolphins are bow- or wake-riding, maintain course and speed as long as it is safe to do so or until the animal(s) leave the vicinity of the vessel.

6. If a whale is sighted in the vessel's path or within 300 feet from the vessel, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area. *Please see below for additional requirements for North Atlantic right whales.*

7. If a whale is sighted farther than 300 feet from the vessel, maintain a distance of 300 feet or greater between the whale and the vessel and reduce speed to 10 knots or less. *Please see below for additional requirements for North Atlantic right whales.*

Injured or Dead Protected Species Reporting
Vessel crews should report sightings of any injured or dead protected species immediately regardless of whether the injury or death is caused by your vessel. Please see How to Report a Stranded or Injured Marine Animal (https://www.fisheries.noaa.gov/report) for the most up to date information for reporting injured or dead protected species.

If the injury or death is caused by your vessel, also report the interaction to NOAA Fisheries SERO PRD at takereport.nmfsser@noaa.gov. Please include the species involved, the circumstances of the interaction, the fate and disposition of the animal involved, photos (if available), and contact information for the person who can provide additional details if requested. Please include the project's Environmental Consultation Organizer (ECO) number and project title in the subject line of email reports if a consultation has been completed.

Reporting Violations
To report any suspected ESA or MMPA violation, call the NOAA Fisheries Enforcement Hotline. This hotline is available 24 hours a day, 7 days week for anyone in the United States.

NOAA Fisheries Enforcement Hotline: (800) 853-1964

Additional Transit and Reporting Requirements for North Atlantic Right Whales

1. Federal regulation prohibits approaching or remaining within 500 yards of a North Atlantic right whale (50 CFR 224.103 (c)). All whales sighted within North Atlantic right whale critical habitat should be assumed to be right whales. Please be aware and follow restrictions for all Seasonal Management Areas along the U.S. east coast. These areas have vessel speed restrictions to reduce vessel strikes risks to migrating or feeding whales. More information can be found at Reducing Vessel Strikes to North Atlantic Right Whales (https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-north-atlantic-right-whales).

2. Ships greater than 300 gross tons entering the WHALESOUTH reporting area are required to report to a shore-based station. For more information on reporting procedures consult 33 CFR Part 169, the Coast Pilot, or at Reducing Vessel Strikes to North Atlantic

Right Whales (https://www.fisheries.noaa.gov/national/endangered-species-conservation/reducing-vessel-strikes-north-atlantic-right-whales).

3. From November through April, vessels approaching/departing Florida ports of Jacksonville and Fernandina Beach as well as Brunswick Harbor, Georgia are STRONGLY RECOMMENDED to use Two-Way Routes displayed on nautical charts. More information on Compliance with the Right Whale Ship Strike Reduction Rule can be found at (https://media.fisheries.noaa.gov/2021-06/compliance_guide_for_right_whale_ship_strike_reduction.pdf)

4. Mariners shall check with various communication media for general information regarding avoiding vessel strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard Broadcast to Mariners, Local Notice to Mariners, and NAVTEX. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NOAA Fisheries SERO, Protected Resources Division for more information regarding the CD).

5. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16 and the NOAA Fisheries Southeast Marine Mammal Stranding Hotline at (877) WHALE HELP (877-942-5343).

For additional information, please contact NOAA Fisheries SERO PRD at:
NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701
Visit us on the web at Protected Marine Life in the Southeast
(https://www.fisheries.noaa.gov/region/southeast#protected-marine-life)

Revised: May 2021

STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

The eastern indigo snake protection/education plan (Plan) below has been developed by the U.S. Fish and Wildlife Service (USFWS) in Florida for use by applicants and their construction personnel. At least **30 days prior** to any clearing/land alteration activities, the applicant shall notify the appropriate USFWS Field Office via e-mail that the Plan will be implemented as described below (North Florida Field Office: jaxregs@fws.gov; South Florida Field Office: verobeach@fws.gov; Panama City Field Office: panamacity@fws.gov). As long as the signatory of the e-mail certifies compliance with the below Plan (including use of the attached poster and brochure), no further written confirmation or "approval" from the USFWS is needed and the applicant may move forward with the project.

If the applicant decides to use an eastern indigo snake protection/education plan other than the approved Plan below, written confirmation or "approval" from the USFWS that the plan is adequate must be obtained. At least 30 days prior to any clearing/land alteration activities, the applicant shall submit their unique plan for review and approval. The USFWS will respond via e-mail, typically within 30 days of receiving the plan, either concurring that the plan is adequate or requesting additional information. A concurrence e-mail from the appropriate USFWS Field Office will fulfill approval requirements.

The Plan materials should consist of: 1) a combination of posters and pamphlets (see **Poster Information** section below); and 2) verbal educational instructions to construction personnel by supervisory or management personnel before any clearing/land alteration activities are initiated (see **Pre-Construction Activities** and **During Construction Activities** sections below).

POSTER INFORMATION

Posters with the following information shall be placed at strategic locations on the construction site and along any proposed access roads (a final poster for Plan compliance, to be printed on 11" x 17" or larger paper and laminated, is attached):

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands

and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION UNDER FEDERAL AND STATE LAW: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

IF YOU SEE A <u>LIVE</u> EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the live eastern indigo snake sufficient time to move away from the site without interference;
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A <u>DEAD</u> EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

Telephone numbers of USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida Field Office – (904) 731-3336
Panama City Field Office – (850) 769-0552
South Florida Field Office – (772) 562-3909

PRE-CONSTRUCTION ACTIVITIES

1. The applicant or designated agent will post educational posters in the construction office and throughout the construction site, including any access roads. The posters must be clearly visible to all construction staff. A sample poster is attached.

2. Prior to the onset of construction activities, the applicant/designated agent will conduct a meeting with all construction staff (annually for multi-year projects) to discuss identification of the snake, its protected status, what to do if a snake is observed within the project area, and applicable penalties that may be imposed if state and/or federal regulations are violated. An educational brochure including color photographs of the snake will be given to each staff member in attendance and additional copies will be provided to the construction superintendent to make available in the onsite construction office (a final brochure for Plan compliance, to be printed double-sided on 8.5" x 11" paper and then properly folded, is attached). Photos of eastern indigo snakes may be accessed on USFWS and/or FWC websites.

3. Construction staff will be informed that in the event that an eastern indigo snake (live or dead) is observed on the project site during construction activities, all such activities are to cease until the established procedures are implemented according to the Plan, which includes notification of the appropriate USFWS Field Office. The contact information for the USFWS is provided on the referenced posters and brochures.

DURING CONSTRUCTION ACTIVITIES

1. During initial site clearing activities, an onsite observer may be utilized to determine whether habitat conditions suggest a reasonable probability of an eastern indigo snake sighting (example: discovery of snake sheds, tracks, lots of refugia and cavities present in the area of clearing activities, and presence of gopher tortoises and burrows).

2. If an eastern indigo snake is discovered during gopher tortoise relocation activities (i.e. burrow excavation), the USFWS shall be contacted within one business day to obtain further guidance which may result in further project consultation.

3. Periodically during construction activities, the applicant's designated agent should visit the project area to observe the condition of the posters and Plan materials, and replace them as needed. Construction personnel should be reminded of the instructions (above) as to what is expected if any eastern indigo snakes are seen.

POST CONSTRUCTION ACTIVITIES

Whether or not eastern indigo snakes are observed during construction activities, a monitoring report should be submitted to the appropriate USFWS Field Office within 60 days of project completion. The report can be sent electronically to the appropriate USFWS e-mail address listed on page one of this Plan.

APPENDIX H

SEAGRASS FUNCTIONAL ASSESESSMENT FORMS (UMAM)

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetland SF

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Permanent Direct Impact	0.09 ac

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes one seagrass bed (Wetland SF) located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgal species, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary submerged aquatic vegetation (SAV) cover. Seagrass species within Wetland SF during the 2023 benthic survey (July/August 2023) consisted primarily of *Thalassia testudinum* (turtle grass) with very sparse *Halophila decipiens* (paddle grass). *T. testudinium,* the dominant seagrass species, was observed to have an average density of 20.9% (permanent direct impact area = 0.012 ac). The average seagrass density for the entire permanent direct impact area (bridge pier installation and/or bridge shading - total permanent direct impact area of 0.172 ac) is 5.91%.

Significant nearby features

The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).

Uniqueness (considering the relative rarity in relation to the regional landscape).
Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).

Functions

Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.

Mitigation for previous permit/other historic use

N/A

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)

Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.

Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)

Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E).

The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetland SF
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Permanent Direct Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		w/o pres or current	with
.500(6)(a) Location and Landscape Support	The assessment area (AA) is located within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use (transportation, commercial, and residential) and water dependent uses (boating, fishing) present within the AA which may have adverse effects to seagrass, fish, and wildlife. Anthropogenic impacts to water quality are evident (e.g., epiphytic growth on seagrass and drainage canal releases).	6	6
.500(6)(b)Water Environment (n/a for uplands)	Water levels and flow are appropriate within the AA, with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023. On a regional scale, water quality within Biscayne Bay is a major concern, with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay. The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the primary initiative to improving the health and resilience of Biscayne Bay.	6	6
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	Seagrass species within the AA in July/August 2023 consisted of *Thalassia testudinum* (turtle grass) and *Halophila decipiens* (paddle grass). The average seagrass density for *T. testudinum*, the dominant seagrass species within the mapped seagrass bed, was ~21%. Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the AA, rather than seagrass. On a regional scale, seagrass decline has been reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.	6	1

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.60	0.43

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 0.0020

Delta = [with-current]
0.166666667

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

Form 62-345.900(2), F.A.C. [effective date 02-04-2004]

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetlands SG, SO, SL, and SK

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Permanent Direct Impact	0.38 acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes the four seagrass beds located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgal species, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary submerged aquatic vegetation (SAV) cover. Seagrass species observed within Wetland SG consisted primarily of *H. decipiens* with very sparse *T. testudinum* with an average total seagrass density of 1.00% (permanent direct impact area = 0.001 ac). The only seagrass species observed within Weltands SO, SL, and SK was *H. decipiens*. The average seagrass densities observed were: Wetland SO - 2.50% (permanent direct impact area = 0.002 ac), Wetland SL - 4.14% (permanent direct impact area = 0.059 ac), and Wetland SK - 2.60% (permanent direct impact area = 0.098 ac). The average seagrass density for the entire permanent direct impact area (bridge pier installation and/or bridge shading - total permanent direct impact area of 0.172 ac) is 5.91%.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape).
The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).	Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).
Functions Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.	Mitigation for previous permit/other historic use N/A
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found) Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area) Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E). The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetlands SG, SO, SL, and SK
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Permanent Direct Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		w/o pres or current	with
.500(6)(a) Location and Landscape Support	The assessment area (AA) is located within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use (transportation, commercial, and residential) and water dependent uses (boating, fishing) present within the AA which may have adverse effects to seagrass, fish, and wildlife. Anthropogenic impacts to water quality are evident (e.g., epiphytic growth on seagrass and drainage canal releases).	6	6
.500(6)(b)Water Environment (n/a for uplands)	Water levels and flow are appropriate within the AA, with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023. On a regional scale, water quality within Biscayne Bay is a major concern, with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay. The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the primary initiative to improving the health and resilience of Biscayne Bay.	6	6
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	Seagrass species within the AA in July/August 2023 consisted of *Thalassia testudinum* (turtle grass) and *Halophila decipiens* (paddle grass). The average total seagrass density within the mapped seagrass beds was ~2.7%. Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the AA, rather than seagrass. On a regional scale, seagrass decline has been reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.	4	1

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.53	0.43

Delta = [with-current]
0.1

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

If mitigation
Time lag (t-factor) =
Risk factor =

For impact assessment areas
FL = delta x acres = 0.016

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetland SF

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Temporary Direct Impact	0.09 ac

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes one seagrass bed (Wetland SF) located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgal species, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary SAV cover. Seagrass species within Wetland SF during the 2023 benthic survey (July/August 2023) consisted primarily of *Thalassia testudinum* (turtle grass) with very sparse *Halophila decipiens* (paddle grass). *T. testudinium,* the dominant seagrass species, was observed to have an average density of 20.9% (temporary direct impact area = 0.030 ac). The average seagrass density for the entire temporary direct impact area (25-foot construction impact buffer - total temporary direct impact area of 0.107 ac) is 5.75%.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape).
The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).	Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).
Functions	Mitigation for previous permit/other historic use
Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.	N/A
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.	Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E). The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetland SF
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Temporary Direct Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support w/o pres or current: 6 with: 6	The assessment area (AA) is within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. There are no hydrologic impediments or flow restrictions. The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use and water dependent uses present within the AA which may cause some adverse effects to seagrass, fish, and wildlife. Recreational fishing and boating occurs within the area and anthropogenic impacts are evident (e.g., epiphytic growth on seagrass, drainage canal releases).
.500(6)(b)Water Environment (n/a for uplands) w/o pres or current: 6 with: 6	Water levels and flow are appropriate within the assessment area with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023; however, on a larger scale, water quality within Biscayne Bay is a concern with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay (including the AA). The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the number 1 initiative to improving the health and resiliency of Biscayne Bay.
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current: 6 with: 5	Seagrass species within the AA in July/August 2023 consisted of *Thalassia testudinum* (turtle grass) and *Halophila decipiens* (paddle grass). The average seagrass density for *Thalassia testudinum*, the dominant seagrass species within the mapped seagrass bed, was ~21%. Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the AA, rather than seagrass. On a regional scale, seagrass decline has been reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.

Score = sum of above scores/30 (if uplands, divide by 20)	If preservation as mitigation,	For impact assessment areas
current or w/o pres: 0.60 with: 0.57	Preservation adjustment factor = Adjusted mitigation delta =	FL = delta x acres = 0.0010

Delta = [with-current]	If mitigation	For mitigation assessment areas
0.033333333	Time lag (t-factor) = Risk factor =	RFG = delta/(t-factor x risk) =

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetlands SG, SO, SL, and SK

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Temporary Direct Impact	0.38 ac

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes the four seagrass beds located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgal species, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary submerged aquatic vegetation (SAV) cover. Seagrass species observed within Wetland SG consisted primarily of *H. decipiens* with very sparse *T. testudinum* with an average total seagrass density of 1.00% (permanent direct impact area = 0.022 ac). The only seagrass species observed within Weltands SO, SL, and SK was *H. decipiens*. The average seagrass densities observed were: Wetland SO - 2.50% (permanent direct impact area = 0.009 ac), Wetland SL - 4.14% (permanent direct impact area = 0.001 ac), and Wetland SK - 2.60% (permanent direct impact area = 0.046 ac). The average seagrass density for the entire temporary direct impact area (25-foot construction impact buffer - total temporary direct impact area of 0.107 ac) is 5.75%.

Significant nearby features

The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).

Uniqueness (considering the relative rarity in relation to the regional landscape).
Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).

Functions

Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.

Mitigation for previous permit/other historic use

N/A

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)

Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.

Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)

Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E).

The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		High-Level Fixed Bridge Wetlands SG, SO, SL, and SK
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Temporary Direct Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support w/o pres or current: 6 — with: 6	The assessment area (AA) is within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. There are no hydrologic impediments or flow restrictions. The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use and water dependent uses present within the AA which may cause some adverse effects to seagrass, fish, and wildlife. Recreational fishing and boating occurs within the area and anthropogenic impacts are evident (e.g., epiphytic growth on seagrass, drainage canal releases).
.500(6)(b)Water Environment (n/a for uplands) w/o pres or current: 6 — with: 6	Water levels and flow are appropriate within the assessment area with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023; however, on a larger scale, water quality within Biscayne Bay is a concern with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay (including the AA). The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the number 1 initiative to improving the health and resiliency of Biscayne Bay.
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current: 4 — with: 3	Seagrass species within the AA in July/August 2023 consisted of *Thalassia testudinum* (turtle grass) and *Halophila decipiens* (paddle grass). The average total seagrass density within the mapped seagrass beds was ~2.7%. Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the AA, rather than seagrass. On a regional scale, seagrass decline has been reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.

Score = sum of above scores/30 (if uplands, divide by 20)		
current or w/o pres: 0.53	with: 0.50	

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 0.0025

Delta = [with-current]
0.033333333

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetland SF

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Permanent Direct Impact	0.09 ac

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes one seagrass bed (Wetland SF) located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgal species, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary SAV cover. Seagrass species within Wetland SF during the 2023 benthic survey (July/August 2023) consisted primarily of *Thalassia testudinum* (turtle grass) with very sparse *Halophila decipiens* (paddle grass). *T. testudinium,* the dominant seagrass species, was observed to have an average density of 20.9% (permanent direct impact area = 0.074 ac). The average, total seagrass density for the entire permanent direct impact area (bridge pier installation and/or bridge shading - total permanent direct impact area of 0.332 ac) is 5.33%.

Significant nearby features

The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).

Uniqueness (considering the relative rarity in relation to the regional landscape).

Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).

Functions

Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.

Mitigation for previous permit/other historic use

N/A

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)

Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.

Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)

Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E).

The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetland SF
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Permanent Direct Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

	w/o pres or current	with	
.500(6)(a) Location and Landscape Support	6	6	The assessment area (AA) is within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. There are no hydrologic impediments or flow restrictions. The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use and water dependent uses present within the AA which may cause some adverse effects to seagrass, fish, and wildlife. Recreational fishing and boating occurs within the area and anthropogenic impacts are evident (e.g., epiphytic growth on seagrass, drainage canal releases).
.500(6)(b)Water Environment (n/a for uplands)	6	6	Water levels and flow are appropriate within the assessment area with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023; however, on a larger scale, water quality within Biscayne Bay is a concern with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay (including the AA). The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the number 1 initiative to improving the health and resiliency of Biscayne Bay.
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	6	1	Seagrass species within the AA in July/August 2023 consisted of *Thalassia testudinum* (turtle grass) and *Halophila decipiens* (paddle grass). The average seagrass density for *T. testudinum*, the dominant seagrass species within the mapped seagrass bed, was ~21%. Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the AA, rather than seagrass. On a regional scale, seagrass decline has been reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.60	0.43

Delta = [with-current]
0.166666667

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

If mitigation
Time lag (t-factor) =
Risk factor =

For impact assessment areas
FL = delta x acres = 0.0124

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetlands SG,SI,SO,SN,SM,SL, and SK

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Permanent Direct Impact	0.61 acres

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes the seven seagrass beds located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgal species, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary SAV cover. Seagrass species observed within Wetland SG consisted primarily of *H. decipiens* with very sparse *T. testudinum* with an average total seagrass density of 1.00% (permanent direct impact area = 0.040 ac). The only seagrass species observed within Wetlands SI, SO, SN, SL, and SK was *H. decipiens*. The average seagrass densities observed were: Wetland SI - 4.5% (permanent direct impact area = 0.003 ac), Wetland SO - 2.50% (permanent direct impact area = 0.033 ac), Wetland SN - 0% (very sparse seagrass densities) (permanent direct impact area = 0.008 ac), Wetland SL - 4.14% (permanent direct impact area = 0.052 ac), and Wetland SK - 2.60% (permanent direct impact area = 0.120 ac). The only seagrass species observed within Wetland SM was *T. testudinum* with an average seagrass density of 0% (very sparse seagrass densities observed outside of quadrats; permanent direct impact area = 0.002 ac). The average, total seagrass density for the entire permanent direct impact area (bridge pier installation and/or bridge shading - total permanent direct impact area of 0.332 ac) is 5.33%.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape).
The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).	Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).
Functions	**Mitigation for previous permit/other historic use**
Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.	N/A
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	**Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)**
Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.	Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E). The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetlands SG,SI,SO,SN,SM,SL, and SK
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Permanent Direct Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		w/o pres or current	with
.500(6)(a) Location and Landscape Support	The assessment area (AA) is within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. There are no hydrologic impediments or flow restrictions. The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use and water dependent uses present within the AA which may cause some adverse effects to seagrass, fish, and wildlife. Recreational fishing and boating occurs within the area and anthropogenic impacts are evident (e.g., epiphytic growth on seagrass, drainage canal releases).	6	6
.500(6)(b)Water Environment (n/a for uplands)	Water levels and flow are appropriate within the assessment area with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023; however, on a larger scale, water quality within Biscayne Bay is a concern with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay (including the AA). The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the number 1 initiative to improving the health and resiliency of Biscayne Bay.	6	6
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	Seagrass species within the assessment area in July/August 2023 consisted of *Halophila decipiens* (paddle grass) and *Thalassia testudinum* (turtle grass). However, seagrass density was low (~3.2%). Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the assessment area. On a larger scale, regional seagrass decline is being reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.	4	1

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.53	0.43

Delta = [with-current]
0.1

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

If mitigation
Time lag (t-factor) =
Risk factor =

For impact assessment areas
FL = delta x acres = 0.0258

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetlands SF and SH

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Temporary Direct Impact	0.38 ac

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes two seagrass beds (Wetlands SF and SH) located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgae, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary SAV cover. Seagrass species within Wetland SF during the 2023 benthic survey (July/August 2023) consisted primarily of *Thalassia testudinum* (turtle grass) with very sparse *Halophila decipiens* (paddle grass). *T. testudinium,* the dominant seagrass species, was observed to have an average density of 20.9% (temporary direct impact area = 0.011 ac). Seagrass species observed within Wetland SH consisted primarily of *H. decipiens* with very sparse *T. testudinum* with an average total seagrass density of 18.14%. The temporary direct impact area for Wetland SH is extremely small (0.000051 ac or approximately 2 square feet). The average seagrass density for the entire temporary direct impact area (25-foot construction impact buffer - total temporary direct impact area of 0.085 ac) is 9.26% which is higher than the average seagrass density observed for the permanent direct impact area due to the higher seagrass density within Wetland SH.

Significant nearby features

The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).

Uniqueness (considering the relative rarity in relation to the regional landscape).
Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).

Functions

Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.

Mitigation for previous permit/other historic use

N/A

Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)

Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.

Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)

Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E).

The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetlands SF and SH
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		w/o pres or current	with
.500(6)(a) Location and Landscape Support	The assessment area (AA) is within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. There are no hydrologic impediments or flow restrictions. The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use and water dependent uses present within the AA which may cause some adverse effects to seagrass, fish, and wildlife. Recreational fishing and boating occurs within the area and anthropogenic impacts are evident (e.g., epiphytic growth on seagrass, drainage canal releases).	6	6
.500(6)(b)Water Environment (n/a for uplands)	Water levels and flow are appropriate within the assessment area with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023; however, on a larger scale, water quality within Biscayne Bay is a concern with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay (including the AA). The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the number 1 initiative to improving the health and resiliency of Biscayne Bay.	6	6
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	Seagrass species within Wetland SF during the 2023 benthic survey (July/August 2023) consisted primarily of *Thalassia testudinum* (turtle grass) with very sparse *Halophila decipiens* (paddle grass). *T. testudinium*, the dominant seagrass species, was observed to have an average density of ~21%. Seagrass species observed within Wetland SH consisted primarily of *H. decipiens* with very sparse *T. testudinum* with an average total seagrass density of ~18%. Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the assessment area. On a larger scale, regional seagrass decline is being reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.	6	5

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.60	0.57

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 0.00037

Delta = [with-current]
0.033333333

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART I – Qualitative Description
(See Section 62-345.400, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetlands SG,SI,SO, SL, and SK

FLUCCs code	Further classification (optional)	Impact or Mitigation Site?	Assessment Area Size
9111 - Seagrass, sparse-medium		Temporary Direct Impact	0.67 ac

Basin/Watershed Name/Number	Affected Waterbody (Class)	Special Classification (i.e.OFW, AP, other local/state/federal designation of importance)
Biscayne Bay	Class III	Biscayne Bay Aquatic Preserve (Oustanding Florida Waters)

Geographic relationship to and hydrologic connection with wetlands, other surface water, uplands

This assessment area (AA) is located within Biscayne Bay along the Intracoastal Waterway (ICW) and has a direct hydrologic connection to the Atlantic Ocean via Haulover Cut to the north. The tidal exchange is high with measurable currents during incoming and outgoing tide. Flow is restricted due to manmade islands (Broad Causeway island to the west and Bay Harbor Islands to the east). The adjacent uplands have a modified shoreline (seawall and areas of rock riprap).

Assessment area description

The AA includes five seagrass beds located within the Broad Causeway Bridge Replacement project area. Substrate within the greater AA includes sparse seagrass beds. Macroalgae, predominately consisting of *Caulerpa* sp. and *Halimeda* sp., were observed throughout the greater AA and constituted the primary SAV cover. Seagrass species observed within Wetland SG consisted primarily of *H. decipiens* with very sparse *T. testudinum* with an average total seagrass density of 1.00% (temporary direct impact area = 0.004 ac). The only seagrass species observed within Weltands SI, SO, SL, and SK was *H. decipiens*. The average seagrass densities observed were: Wetland SI - 4.50% (temporary direct impact area = 0.010 ac), Wetland SO - 2.50% (temporary direct impact area = 0.003 ac), Wetland SL - 4.14% (temporary direct impact area = 0.008 ac), and Wetland SK - 2.60% (temporary direct impact area = 0.049 ac). The average seagrass density for the entire temporary direct impact area (25-foot construction impact buffer - total temporary direct impact area of 0.085 ac) is 9.26% which is higher than the average seagrass density observed for the permanent direct impact area due to the higher seagrass density within Wetland SH.

Significant nearby features	Uniqueness (considering the relative rarity in relation to the regional landscape).
The AA is within the Biscayne Bay Aquatic Preserve (Outstanding Florida Waters).	Biscayne Bay is unique in that it's the largest estuary in Florida and the only large, subtropical, protected bay within the continental United States. It provides habitat for many birds and other wildlife and provides critical habitat for the federally threatened West Indian manatee (*Trichechus manatus*).
Functions	Mitigation for previous permit/other historic use
Primary production, nutrient transport and cycling, sediment stabilization. Provides foraging, spawning, nursery habitat, and support of multiple life stages for fish and invertebrates.	N/A
Anticipated Wildlife Utilization Based on Literature Review (List of species that are representative of the assessment area and reasonably expected to be found)	Anticipated Utilization by Listed Species (List species, their legal classification (E, T, SSC), type of use, and intensity of use of the assessment area)
Seagrass provides foraging habitat for sea turtles, seabirds, dolphins, and manatees. Seagrass habitat also serves as nursery grounds for several important species of fish and invertebrates. Corresponding fish fauna include bonefish (*Albula vulpes*), ladyfish (*Bodianus rufus*), pompano (*Trachinotus carolinus*), permit (*Trachinotus falcatus*), spotted sea trout (*Cynoscion nebulosus*), silver perch (*Bairdiella chrysoura*), hogfish (*Lachnolaimus maximus*), Nassau grouper (*Epinephelus striatus*), red grouper (*Epinephelus morio*), black grouper (*Mycteroperca bonaci*), gag grouper (*Mycteroperca microlepis*), yellowfin mojarra (*Mycteroperca microlepis*), and crevalle jack (*Caranx hippos*) (Alleman et al., 1995). Scientists reported that at least 512 fish species occur in the bay as documented by de Sylva (1976). Benthic surveys tallied over 800 species of invertebrates, 36 that make Biscayne Bay their home, including over 150 species of shrimp, crabs, and lobsters.	Per the FNAI Biodiversity Matrix, potential listed species include the West Indian manatee (E), hawksbill sea turtle (E), osprey (SSC), and smalltooth sawfish (E). The AA includes Essential Fish Habitat and juvenile life stage support for penaeid shrimp, snapper-grouper complex, coastal migratory pelagics, spiny lobster, and coral.

Observed Evidence of Wildlife Utilization (List species directly observed, or other signs such as tracks, droppings, casings, nests, etc.):

Tarpon, great barracuda, mutton snapper, gray snapper, hogfish, porkfish, gray angelfish, gray triggerfish, checkered puffer, bandtail puffer, scrawled cowfish, fringed filefish, striped parrotfish, yellow stingray, sergeant major, French grunt, bluestriped grunt, tomtate, slippery dick, spotted drum, green moray, red lionfish, Caribbean spiny lobster, stone crab, and long-spined sea urchin.

Additional relevant factors:

Assessment conducted by:	Assessment date(s):
Stephen Trbovich, AtkinsRéalis	11/3/2023

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Broad Causeway Bridge Replacement		Mid-Level Moveable Bridge Wetlands SG,SI,SO, SL, and SK
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Impact	Stephen Trbovich, AtkinsRéalis	11/3/2023

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support w/o pres or current: 6 with: 6	The assessment area (AA) is within Biscayne Bay and directly connected to the Atlantic Ocean via Haulover Inlet. There are no hydrologic impediments or flow restrictions. The habitat in this area provides for the entire life history of various recreational and commercially important fish and inverebrate species and there is open access to and from the AA with no barriers to wildlife and their movement. However, the use of the AA by wildlife is less than expected. There is upland land use and water dependent uses present within the AA which may cause some adverse effects to seagrass, fish, and wildlife. Recreational fishing and boating occurs within the area and anthropogenic impacts are evident (e.g., epiphytic growth on seagrass, drainage canal releases).	
.500(6)(b)Water Environment (n/a for uplands) w/o pres or current: 6 with: 6	Water levels and flow are appropriate within the assessment area with tidal flushing due to the nearby direct connection to the Atlantic Ocean via Haulover Inlet. At a project level, some turbidity (lower water clarity and visibility than anticipated) was observed during benthic surveys in August 2022 and July/August 2023; however, on a larger scale, water quality within Biscayne Bay is a concern with eutrophication being an underlying factor in recent seagrass disappearance throughout the Bay (including the AA). The C-8 Biscayne Canal and Oleta River account for a large portion of the freshwater input (and nutrients) into the AA. The Biscayne Bay Task Force has listed water quality improvement as the number 1 initiative to improving the health and resiliency of Biscayne Bay.	
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current: 4 with: 3	Seagrass species within the assessment area in July/August 2023 consisted mostly of *Halophila decipiens*. However, seagrass density was low (approximately ~3.2%% cover). Epiphytes were observed on the seagrass blades (indicative of nutrient loading), and macroalgae (*Caulerpa* sp. and *Halimeda* sp.) were the primary SAV component in the assessment area. On a larger scale, regional seagrass decline is being reported within Biscayne Bay (beginning in 2016) with basins in the vicinity of the AA reporting seagrass losses of 63%-78%.	

Score = sum of above scores/30 (if uplands, divide by 20)		
current or w/o pres: 0.53	with: 0.50	

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 0.0024

Delta = [with-current]
0.033333333

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

APPENDIX I

SEAGRASS MITIGATION INQUIRY EMAIL

Zimmer, Beth

From: Zimmer, Beth
Sent: Monday, November 20, 2023 12:14 PM
To: alex.reed@FloridaDEP.gov; Edward.C.Smith@FloridaDEP.gov; Kevin.Coyne@dep.state.fl.us; Griffin.N.Alexander@FloridaDEP.gov; Charles.E.Smith@floridadep.gov; lindsay.furr@floridaDEP.gov; chris.stahl@dep.state.fl.us; Jennifer.Mcgee@MyFWC.com; Christina.Frederick@MyFWC.com; john.ricisak@miamidade.gov; wilbur.mayorga@miamidade.gov; Sweeney, Pamela (RER); josh.mahoney@miamidade.gov; resilience@miamigov.com; amyknowles@miamibeach.gov; samanthatiffany@miamibeachfl.gov; pviala@northmiamifl.gov; Bourque, Amanda; anita_barnett@nps.gov; cweterf@sfwmd.gov; Wrublik, John; Veronica.C.Beech@usace.army.mil; somerville.amanetta@epa.gov; Kurtis Gregg - NOAA Federal
Cc: McMullen, Robert; James, Craig (steven.james@dot.state.fl.us); Konz, David W; Lasher, Wendy G; Rodney Carrero Sanrtana
Subject: Town of Bay Harbor Islands Broad Causeway Bridge Replacement - Potential Seagrass Mitigation Projects

The Broad Causeway Bridge connects the Town of Bay Harbor Islands with the City of North Miami, within Miami-Dade County, Florida. The Town of Bay Harbor Islands is currently conducting a Project Development & Environment (PD&E) Study to evaluate the replacement of the existing drawbridge over the Intracoastal Waterway and Biscayne Bay. The Broad Causeway Bridge replacement project will likely result in unavoidable impacts to Biscayne Bay seagrass communities within the project area. The project is located within the Biscayne Canal/Arch Creek Basin. **The PD&E team (Team) is currently seeking stakeholder input regarding any available traditional or non-traditional seagrass restoration projects that can be evaluated as potential compensatory mitigation for seagrass impacts associated with the Broad Causeway Bridge project.**

Traditionally, seagrass impacts are mitigated via seagrass restoration projects, such as derelict vessel removal or restoration of dredge-holes, spoil islands, or prop scars to the correct elevation and sediment characteristics. This restoration is then followed by either natural recruitment or planting of seagrass and subsequent monitoring to verify long-term repopulation. These types of restoration projects rely upon adequate light penetration and appropriate sediment for the re-establishment, reproduction, and recruitment of seagrasses into the restored areas.

Substantial seagrass losses have been documented within Biscayne Bay in recent years and according to a report released by the Biscayne Bay Task Force in 2020, the health of Biscayne Bay is in a state of emergency and the problems facing the Bay are serious and complex, most of which will require financial investments and a unified and collaborative approach to restoration and recovery. Currently, within northern Biscayne Bay, it is the Team's understanding that traditional seagrass restoration projects are not readily available or are not advisable due to poor water quality conditions (primarily high phosphorous or nitrogen concentrations) that stimulate algae, thereby restricting light penetration and oxygen levels in the water. Seagrass planting projects, even with appropriate sediment conditions and elevations, have a high risk of failure due to these poor water quality conditions. As a result, government agencies and non-profit organizations are promoting water quality improvement as a basis for restoring seagrass beds in Biscayne Bay. A similar approach has been utilized elsewhere as mitigation for seagrass impacts, including for transportation projects in Tampa Bay (Courtney Campbell Causeway/Old Tampa Bay Regional Water Quality Improvement) and the Florida Keys (US-1 Lake Surprise Causeway Removal Project).

Agencies and non-profit organizations have identified multiple projects that would improve water quality and promote the conditions necessary for seagrass recovery and restoration in Biscayne Bay. As a potential compensatory seagrass mitigation option, the Team is proposing an evaluation of these water quality improvement projects to determine potential effects/benefits on seagrass recovery, the value as mitigation to offset the anticipated impacts from the Broad Causeway Bridge replacement project (via application of the statewide Uniform Mitigation Assessment Method (UMAM)), and acceptability to stakeholders such as the Biscayne Bay Commission and regulatory agencies, including the US Army Corps of Engineers (USACE), US Coast Guard (USCG), National Marine Fisheries Service (NMFS), Florida Department of Environmental Protection (FDEP), South Florida Water Management District (SFWMD), and Miami-Dade Department of Environmental Resource Management (DERM).

Based on a preliminary review of proposed water quality improvement projects, the Team has identified the following projects as having the greatest potential to offset (mitigate) all, or part, of the seagrass impacts associated with the Broad Causeway Bridge replacement project:

1) Projects identified by the Biscayne Bay Commission:
    - Contribute funding towards construction of the Coral Gables Waterway / Biscayne Bay Water Quality Improvements (construct baffles and replace existing solid pipes with exfiltration trenches to treat and redirect stormwater runoff into an underground porous limestone layer).
    - Contribute funding towards King's Bay Septic-to-Sewer Conversion (removal of approximately 150 septic tanks).
    - Contribute funding towards Biscayne Bay Aquatic Preserve Sponge Propagation Project.
    - Contribute funding towards Key Biscayne Stormwater Sustainability Pilot Project.
    - Contribute in-kind assistance (e.g., online, GIS-integrated database) or funding towards Miami-Dade County's mandatory septic system registration and inspection program.
    - Contribute in-kind assistance (e.g., scientific and engineering analysis) or funding towards Miami-Dade County's identification of pollution hotspots, construction solutions leading to reduced nutrient inputs to surface waters of Biscayne Bay Aquatic Preserves, and biological restoration in support of protecting Florida's coral reefs.
    - Contribute in-kind assistance (e.g., scientific and engineering analysis) or funding towards the SFWMD Biscayne Bay and Southeastern Everglades Ecosystem Restoration (BBSEER) project.

2) Projects identified by the Florida Blue-Green Algae Task Force:
    - Analyze and/or directly fund one or more public works projects to address improperly functioning septic systems, thereby reducing nutrient pollution.
    - Analyze and/or directly fund one or more improvements in municipal separate stormwater systems (MS4's) to maximize water quality protection, including advanced stormwater treatment technologies such as stormwater catch basins, stormwater filtering systems and smart stormwater system technology.
    - Fund one or more public-private partnerships and/or projects to retain more stormwater at the property-level via increased stormwater management in retention and infiltration, and to eliminate discharge of untreated stormwater into canals, creeks, rivers, and lakes, including from the streets.
    - Fund one or more projects identified within the BBSEER project (also known as the BBCW / C-111).

The Team is interested in meeting with you to discuss these potential seagrass mitigation options, and any others you may be able to offer/suggest, in order to mitigate potential seagrass impacts associated with the Broad Causeway Bridge replacement project. Please provide your availability for a discussion of potential seagrass mitigation.

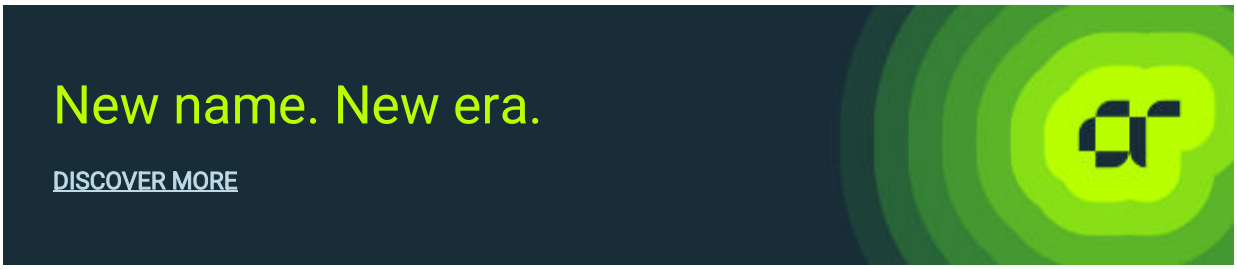
Feel free to forward this email to any additional stakeholders or agency contacts that may be able to provide input.

Thank you for your assistance.

Beth Zimmer

Senior Scientist
Planning & Sciences
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