DRAFT
PRELIMINARY ENGINEERING REPORT

Town of Bay Harbor Islands
In cooperation with the Florida Department of Transportation District 6
and US Coast Guard

Broad Causeway Bridge Replacement Project Development and Environment (PD&E) Study
Broad Causeway Bridge from Broad Causeway Island to East of West Broadview Drive
Miami-Dade County, Florida

Financial Management Number: 452428-1-21-01
Federal-Aid Project Number: N/A
FDOT Efficient Transportation Decision Making Number: 14520
Town of Bay Harbor Islands Project Number: BC-160

May 23, 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 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.

PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with AtkinsRéalis, and that I have supervised the preparation of, and approved the evaluation, findings, opinions, conclusions, and technical advice reported in:

REPORT:	Draft Preliminary Engineering Report
PROJECT:	Broad Causeway Bridge Replacement PD&E Study
LOCATION:	Miami-Dade County, Florida
FINANCIAL MANAGEMENT NO.:	452428-1-21-01
TBHI PROJECT NO.:	BC-160
FEDERAL–AID PROJECT NO.:	N/A
FDOT ETDM NO.:	14520

This Preliminary Engineering Report (PER) contains engineering information that fulfills the purpose and need for the Broad Causeway Bridge Replacement PD&E Study from Broad Causeway Island to East of West Broadview Drive in Miami-Dade County, Florida. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgment and experience.

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

This item has been digitally signed and sealed by *Eric Wooley* on the date adjacent to the seal. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

DRAFT PRELIMINARY ENGINEERING REPORT

TOWN OF BAY HARBOR ISLANDS

BROAD CAUSEWAY BRIDGE REPLACEMENT
PROJECT DEVELOPMENT & ENVIRONMENT STUDY

Prepared for:

Town of Bay Harbor Islands, Florida

May 23, 2024

BAY HARBOR ISLANDS

Financial Management Number:	452428-1-21-01
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Preliminary Engineering Report

May 23, 2024

Prepared for:
Town of Bay Harbor Islands

Prepared by:
AtkinsRéalis

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ACRONYMS AND ABBREVIATIONS

A	**AADT**	Average Annual Daily Traffic
	AASHTO	American Association of State Highway and Transportation Officials
	ACM	Asbestos Containing Materials
	ADA	Americans with Disabilities Act
	AET	All-Electric Tolling
	ALPR	Automated License Plate Reader
	APE	Area of Potential Effect
B	**BBAP**	Biscayne Bay Aquatic Preserve
	BEBR	Bureau of Economic and Business Research
	BMPs	Best Management Practices
C	**CCTV**	Closed-Circuit Television
	CEQ	Council on Environmental Quality
	CH	Critical habitat
	CFR	Code of Federal Regulations
	CIDR	Comprehensive Inventory Data Report
	CIP	Capital Improvements Program
	CO	Carbon monoxide
D	**3D**	Three Dimensional
	D	Directional
	DDHV	Directional Design Hour Volume
	DERM	Division of Environmental Resource Management
	DHT	Design Hour Truck
	DMS	Dynamic Message Sign
	DTPW	Department of Transportation and Public Works
	DRER	Department of Regulatory Environmental Resources
E	**EAA**	Expedited Administrative Authorization
	EFH	Essential Fish Habitat
	EL	Elevation
	EOR	Engineer of Record
	ERP	Environmental Resource Permit
	EST	Environmental Screening Tool
	ETAT	Environmental Technical Advisory Team
	ETDM	Efficient Transportation Decision Making
F	**F.A.C.**	Florida Administrative Code
	FEMA	Federal Emergency Management Agency
	FDACS	Florida Department of Agriculture and Consumer Services
	FDEM	Florida Department of Emergency Management
	FDEO	Florida Department of Economic Opportunity
	FDEP	Florida Department of Environmental Protection
	FDM	FDOT Design Manual
	FDOT	Florida Department of Transportation
	FHWA	Federal Highway Administration
	FIRM(s)	Flood Insurance Rate Map(s)
	FLHSMV	Florida Department of Highway Safety and Motor Vehicle

	FONSI	Finding of No Significant Impact
	FS	Florida Statutes
	FTO	Florida Traffic Online
	FWC	Florida Fish and Wildlife Conservation Commission
	FY	Fiscal Year
G	**GIS**	Geographic Information System
H	**HAPC**	Habitat Area of Particular Concern
	HCM	Highway Capacity Manual
	HSM	Highway Safety Manual
I	**ICWW**	Intracoastal Waterway
	ID	Identification
	IPR	Independent Peer Review
	ITS	Intelligent Transportation Systems
J		
K	**K**	Standard peak hour
L	**LCCA**	Life-Cycle Cost Comparison Analysis
	LED(s)	Light-Emitting Diode(s)
	LEP	Limited English Proficiency
	LiDAR	Light Detection and Ranging
	LRTP	Long Range Transportation Plan
	LRFD	Load & Resistance Factor Design
	LTS	Level of Traffic Stress
M	**MBC**	Metal Based Coatings
	MDT	Miami-Dade Transit
	MHW	Mean High Water
	MLW	Mean Low Water
	MOT	Maintenance of Traffic
	MOU	Memorandum of Understanding
	MP	Milepost
	Mph	Miles per hour
	MSAT	Mobile Source Air Toxics
	MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
	MSL	Mean Sea Level
	MVMT	Million Vehicle Miles Traveled
N	**NAVD**	North American Vertical Datum of 1988
	NBI	National Bridge Inventory
	NEPA	National Environmental Policy Act
	NGVD	National Geodetic Vertical Datum of 1929
	NIS	Navigation Impact Study
	NMFS	National Marine Fisheries Service
	No(s).	Number(s)
	NOAA	National Oceanic and Atmospheric Administration
	NPDES	National Pollutant Discharge Elimination System
	NPS	National Park Service
	NRCS	National Resources Conservation Service
	NRE	Natural Resources Evaluation

	NRHP	National Register of Historic Places
	NTUs	Nephelometric Turbidity Units
O	**OEM**	Office of Environmental Management
	OFW	Outstanding Florida Waters
	OSW	Other Surface Waters
P	**P2P**	Point-to-Point
	PCB	Polychlorinated Biphenyls
	PD&E	Project Development and Environment
	PER	Preliminary Engineering Report
	PI	Public Information
	PIP	Public Involvement Plan
	PTAR	Project Traffic Analysis Report
Q	**Q&A**	Question and Answer
R	**RCP**	Reinforced Concrete Pipe
	ROW	Right-of-Way
	RSU	Roadside Unit
	RWIS	Roadway Weather Information Systems
S	**SAFMC**	South Atlantic Fisheries Management Council
	SAV	Submerged Aquatic Vegetation
	SERPM	Southeast Florida Regional Planning Model
	SFWMD	South Florida Water Management District
	SHGWT	Seasonal High Groundwater Table
	SHPO	State Historic Preservation Office(r)
	SIS	Strategic Intermodal System
	SLD	Straight Line Diagram
	SMF(s)	Stormwater Management Facility(ies)
	SPF	Safety Performance Function
	SR	State Road
	SRCC	Stormwater Runoff Control Concept
	Sta.	Station
	SUP	Shared-use Path
T	**TBHI**	Town of Bay Harbor Islands
	TBP	Toll-By-Plate
	TDP	Transit Development Plan
	TIP	Transportation Improvement Program
	TMC	Turning Movement Counts
	TMP	Transportation Management Plan
	TNM	Traffic Noise Model
	TO	Transportation Operations
	TSM&O	Transportation Systems Management and Operations
	TTCP	Temporary Traffic Control Plan
	TPO	Transportation Planning Organization
U	**USACE**	United States Army Corps of Engineers
	USCG	United States Coast Guard
	USDOT	United States Department of Transportation
	USEPA	United States Environmental Protection Agency

	USFWS	United States Fish and Wildlife Service
V	**V/C**	Volume to Capacity
W		
X		
Y		
Z		

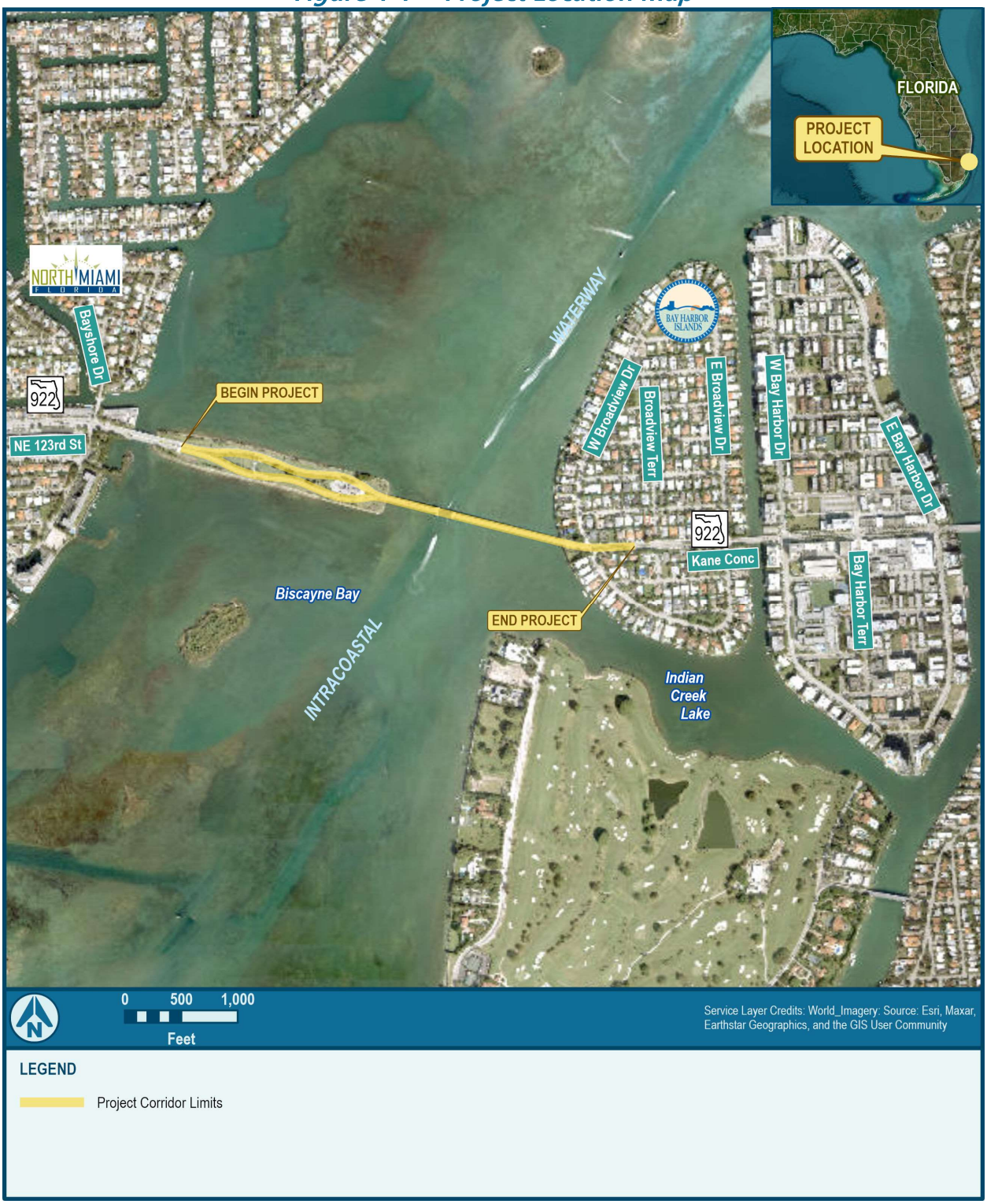
1.0 PROJECT SUMMARY

1.1 Project Description

The project involves the potential replacement of the Broad Causeway Bridge connecting the Town of Bay Harbor Islands (Town) with the City of North Miami, within Miami-Dade County. The bridge is part of the Broad Causeway, a roadway classified as "Urban Minor Arterial". This arterial also begins in Bal Harbour/Surfside and connects those commuters to the mainland. The limits of the project extend from the Broad Causeway Island (25°53'19.41"N, 80° 8'54.52"W) on the west side (25°53'11.30"N, 80° 8'18.93"W) to east of West Broadview Drive. The improvements include the bridge approaches and Broad Causeway Island circulation. The Florida Department of Transportation (FDOT) Bridge Identification (ID) Number (No.) is 875101. A graphic depicting the location of the bridge is provided as **Figure 1-1**. The project is approximately 0.77 miles in length.

The existing bascule bridge consists of four lanes, undivided (two in each direction), the four travel lanes are 10 ft. wide, without a raised median. The outside travel lanes also include shared-use markings to accommodate bicycles. In addition, pedestrians are accommodated with a raised maintenance area on each side of the bridge, with a width that varies from 22 to 36 inches (in.). There are no guardrails separating the raised maintenance area from the travel lane. Crossing over the Intracoastal Waterway (ICWW), the bridge channel has a horizontal clearance of 79.7 ft., a maximum vertical clearance of 18.0 ft. at Mean Low Water (MLW) and a minimum vertical clearance of 15.7 ft. at Mean High Water (MHW) at the Bascule crossing. The ICWW 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 twice per hour on the quarter and three-quarter hour but only opens if vessels are waiting.

Figure 1-1 Project Location Map



Existing right-of-way (ROW), owned by the Town, is anticipated to accommodate the replacement bridge and approaches. Included in the Town Charter by the 1953 Senate Bill No. 865, the State of Florida surrendered and granted to the Town 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 ft. wide from Kane Concourse (SR 922), westwardly across Biscayne Bay to approximately 123rd Street in the City of North Miami. This 300-ft. wide strip is shown in **Figure 1-2** as a bright yellow highlight. Therefore, the replacement bridge will be built within the 300 ft. strip over Biscayne Bay under claim or control by the Town.

Figure 1-2 Depiction of 300-ft. wide strip from Kane Concourse to 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 73-year-old bridge 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. 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, shoulder widths, or serve current or future traffic demand. The bridge received a Sufficiency Rating of 11.1 (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 ranking/conditions for the components examined in the reports are as follows:

Bridge ID Number 875101 (FDOT Inspection Date – January 19, 2024)

- 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: 4 (Poor)
- Superstructure: 5 (Fair)
- Substructure: 3 (Serious)
- Performance Rating: Poor
- Channel: 7 (Minor Damage)
- Deck Geometry Appraisal: 2 (Intolerable; Replace)
- Approach Alignment Appraisal: 4 (Minimum Tolerable)
- Scour Critical: 5 (Stable within footing)

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 $3.0 million. As a result of the 2024 inspection, temporary emergency repairs will be completed. One lane of the bridge is closed until repairs are complete. As the structure continues to age, frequent, costly repairs will be needed to prevent closure or severe damage.

1.2.2 Transportation Demand

The Broad Causeway and Kane Concourse (SR 922) 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 slightly increase based on the suggested annual growth rate of 1.0% detailed in the *Project Traffic Analysis Report (PTAR) (March 2024)*. Since the ICWW at the bridge crossing is deemed a navigable waterway by the USCG, the bridge bascule is required by the USCG to open twice per hour on the quarter and three-quarter hour but only opens if vessels are waiting. Having the bridge open potentially 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 (19% of total 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 bicyclists to get off the bicycle and walk. According to the FDOT's *Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Greenbook 2018)*, the minimum width of a shared traffic/bicycle lane is 14 ft. The existing lane width on Broad Causeway Bridge is only 10 ft. Therefore, the bicycles are sharing 30 mph travel lanes with vehicles on lane widths that do not meet current standards. As a result, there have been nine vehicle crashes involving bicycles. All nine crashes resulted in injury and occurred on the undivided bridge and approach sections. Vehicle to bicycle interactions account for 19% of the total crashes occurring within the project limits. 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, pedestrians use a raised maintenance area with a width that varies from 22 to 36 in. on each side of the bridge. There are no guardrails separating the raised maintenance area from the travel lane. The west side of the bridge has a 6-inch curb to enter the maintenance area that does not provide ADA access. 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 has only one undersized emergency generator. 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, a direct emergency evacuation route 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 9.40 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.

1.2.4 Project Status

The project is a priority for the Town of Bay Harbor Islands and is included in their current Capital Improvements Program (CIP) with the following allocations to date for the PD&E phase:

- Fiscal Year (FY) 2021-2022 - $500,000
- FY 2022-2023 - $2,300,000
- FY 2023-2024 - $2,800,000

The project was approved by the Miami-Dade Transportation Planning Organization (TPO) on November 3, 2022 (TPO's Resolution #46-2022), to be added to the 2045 Long Range Transportation Plan (LRTP) and FY 2024 Transportation Improvement Program (TIP) Amendments. Future project phases are currently not funded. Ongoing coordination with the TPO has occurred to keep them apprised of funding. The TIP FY 2025- 2026 update will include Design phase funds for FY 2025- FY 2027. Currently the Town is providing the Design funds from toll revenues, but is actively seeking Federal, state, and local funds and applying for all applicable grants to offset Design phase funding and fund the Construction phase.

1.3 Commitments

1.3.1 Implementation Measures

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

1. Best Management Practices (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.
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 Nephelometric Turbidity Units (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 National Marine Fisheries Service (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.

1.3.2 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 US Fish and Wildlife Service (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 Florida Fish and Wildlife Conservation Commission (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, National Oceanic and Atmospheric Administration (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, US Army Corps of Engineers

(USACE), South Florida Water Management District (SFWMD), and Division of Environmental Resource Management (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.

During construction, the Town will comply with all provisions in the most recent version of the FDOT *Standards Specifications for Road and Bridge Construction*. In addition, the Town is committed to the following:

1. During the design phase, the Town will coordinate bridge features such as aesthetics, landscaping and lighting with the community.

2. The Town will coordinate with Florida Department of Environmental Protection (FDEP) Office of Greenways and Trails during design regarding the temporary detour of the Florida Circumnavigational Saltwater Paddling Trail during construction of the new Broad Causeway Bridge.

3. As the Official with Jurisdiction, the Town commits to keeping the Tot Lot open during construction.

4. The Town will adhere to the stipulations included in the Memorandum of Agreement (MOA) between the Town and the SHPO.

5. The Town commits to providing uninterrupted access to the causeway island service station, during operating hours, during construction via the existing entry or an alternate entry point. If an alternate entry point is needed, detour signage and directions will be provided to the public to maintain access to the Section 4(f) protected property.

6. During the design phase, Medium and High rated sites will be further evaluated to determine if Level II testing is warranted based on the Project's future design.

1.4 Alternatives Analysis Summary

1.4.1 Alternatives Analysis Process

The alternatives analysis involved developing, evaluating, and eliminating potential project alternatives based on the purpose and need, engineering and environmental analyses, public input, cost, and safety for the project. The alternatives development involved several steps including:

Step 1 – Determine Bridge Heights

Step 2 – Identify Constraints and Considerations

Step 3 – Determine Bridge Typical Sections

Step 4 – Develop Horizontal and Vertical Alignment

Step 5 – Identify Viable Alternatives

Each of the steps in the alternatives analysis process are described in detail in **Section 5.3**. When identifying a variety of constraints and considerations the Town followed local, state, and federal laws and regulations regarding the physical and natural environment in the vicinity of the bridge. Before rigorously exploring reasonable alternatives, reviewing these constraints and considerations helped guide the parameters of the bridge alternatives and the causeway island circulation options. Note that for the purposes of National Environmental Policy Act (NEPA), *reasonable* means those alternatives which may be feasibly carried out based on technical, economic, and environmental factors.

The first constraint identified resources that are protected under Section 4(f) of the United States Department of Transportation (USDOT) Act. These resources include public parks and recreation lands, wildlife and waterfowl refuges, and historic sites. Transportation alternatives that involve these resources should include all possible planning to avoid these resources. If there are no feasible and prudent avoidance alternatives to the use of land, then the project would include all possible planning to minimize harm to the resource resulting from the proposed use. Section 4(f) resources identified in the study area include the Bay Harbor Islands Tot Lot, the Florida Circumnavigation Saltwater Padding Trail, the existing bridge, Bay Harbor Islands Historic District, and the service station on the causeway island. These resources are shown in **Figure 1-3**.

The USCG has jurisdiction over the ICWW in Biscayne Bay. Consultation between the Town and the USCG indicated the navigation constraints for this bridge replacement project. Specifically, within Biscayne Bay, the USCG requires 90 ft. horizontal clearance between bridge fenders within a navigational channel and 21 ft. (closed) vertical clearances for new bascule bridges and for new fixed bridges they require 90 ft. horizontal and a 65 ft. vertical clearance. Another USCG constraint specified that the bridge spans would not be allowed to move the navigational channel from its existing location.

The Town prefers project alternatives avoid acquisition of ROW and relocations to both minimize costs and safeguard personal property.

Alternatives must be technically and economically feasible and satisfy the purpose and need for the project. In addition to construction costs, maintenance, and inspection costs, along with bridge tender costs for movable bridge options must also be considered when developing alternatives.

Figure 1-3 Section 4(f) Resources Within the Project Limits

A review of potential adverse and beneficial impacts to the natural, social, and built environments in the project area was conducted. Seagrasses have been documented to be near the bridge, therefore, alternatives that avoid, and/or minimize impacts to these natural resources were developed. Corals have also been observed in the bridge area.

The physical location, profile (height), and appearance of the bridge is important to the Town and to residents in the vicinity of the bridge. Bridge Alternatives developed considered aesthetics and viewsheds to understand potential impacts from the bridge and from vantage points looking towards the bridge, such as the views to and from Miami.

Guided by the above constraints and considerations, a No Build Alternative, Transportation Systems Management and Operations (TSM&O) Alternative, Multimodal Alternative, Rehabilitation Alternative and numerous Build Alternatives and six causeway island circulation options were developed. **Section 5.0** of this PER describes each alternative and how the alternative was developed and evaluated. If an alternative was eliminated from advancing further into detailed analysis, the justification is presented in **Section 5.0**.

Section 5.0 focuses on each of the three alternatives evaluated in detail and presents a comparative alternative evaluation with a matrix that summarizes significant differences. Below is a description of the three alternatives (including the No Build Alternative) studied in detail along with the estimated costs.

Bridge Alternatives Studied in Detail

- No Build (Repair) Alternative
    - The No Build alternative assumes the Town would keep the existing bridge and not construct a new bridge. The existing conditions would be maintained within the projects limits and there would not be any direct impacts to the physical, natural, cultural, and social 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.
- Build Alternative 1 (High-Level Fixed Bridge)
    - The High-Level Fixed Bridge Alternative would replace the existing movable bridge with a fixed structure featuring a vertical navigational clearance of 65 ft. to allow the waterway user safe passage under the bridge. The new fixed bridge includes widened lane widths and shoulders, and a shared-use path for pedestrians and bicyclists that meet current standards. Alternative 1 has steeper roadway and shared-use path slopes than the existing conditions, and more visual impacts to businesses and residents.
- Build Alternative 2 (Mid-Level Movable Bridge)
    - The Mid-Level Movable Bridge Alternative would replace the existing bridge with a mid-level movable bridge with a vertical navigational clearance of 40 ft. Using the 2022 bridge tender logs which did not record vessel heights but did provide boat type, the PD&E team was able to quantify the types of boats that are generally taller than 40 ft. and create an assumption of height/vessel based on the tender logs. While higher than the minimum USCG clearance, by using this method of estimation, the 40 ft. mid-level movable alternative bridge would allow approximately 70 to 80 percent of the waterway users that currently require the existing bridge to open, passage without the need to open the bridge. The new movable bridge includes widened lane widths and shoulders, and a shared-use path for pedestrians and bicyclists that meet current standards. Alternative 2 has a higher impact on essential fish habitat, 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.

1.4.2 Summary of Public Involvement Feedback

The Town conducted a Public Kick-off Meeting to introduce the project and the study process on February 9, 2023. A total of approximately 49 citizens and two elected officials signed in at the public meeting.

The Town held a Hybrid Alternatives Public Workshop, both virtually and in-person on separate days, to provide interested persons an opportunity to express their views concerning the proposed improvements and vote on which alternative they preferred.

The in-person Alternatives Public Workshop was held on September 26, 2023, and approximately 20 citizens and two elected officials attended. This workshop provided the public with information about the proposed build alternatives, the project schedule, and next steps. The PD&E team hosted an open Question & Answer (Q&A) session where the citizens asked questions about the project, provided comments, and voted for their preferred alternative. A total of twelve (12) citizens spoke during the Q&A session. Some of the issues brought up at the in-person meeting were:

- Project cost
- Traffic coming from the mainland
- Crosswalks with pedestrian features
- Preventative maintenance
- Lighting
- Project timeframe
- Cost of tolls

The Town held a Virtual Alternatives Public Workshop on September 28, 2023, via a Zoom Webinar. The workshop was an opportunity for the citizens that were not able to attend in-person to be introduced to the proposed build alternatives for the project.

The workshop opened with the same presentation shown at the in-house workshop followed by a Q&A session. A total of approximately 42 citizens and two (2) elected officials signed in at the Virtual Alternatives Public Workshop. A total of eleven (11) comments were received from the public in the Q&A portion of the meeting.

See below summary of votes received both in-person and virtually, along with comments received via mail, e-mail and on the website during the 10-day public comment period after the Hybrid Alternatives Public Workshops.

Alternatives Votes:

1. No Build Alternative – **8 votes**
2. Build Alternatives – **21 votes**
    - Alternative 1 High-Level Fixed Bridge – **13 votes**
    - Alternative 2 Mid-Level Movable Bridge – **8 votes**

1.4.3 Summary of Cost Estimates

Table 1-1 shown below is a summary of the detailed costs provided in the Life Cycle Cost Analysis included in **Appendix A.** Additionally, estimated design costs for each alternative are provided below.

Table 1-1 Estimated Costs of Alternatives Evaluated in Detail

	No Build (Repair) Alternative*	High-Level Fixed Bridge Alternative*	Mid-Level Movable Bridge Alternative*
Design	N/A	$15.9	$31.8
Mitigation	N/A	TBD	TBD
Construction	N/A	$226.7	$356.1
Bridge Tender	$30.7	$0	$30.7
Inspection and Maintenance	$41.7	$4.8	$22.3
TOTAL	**$72.4**	**$247.4**	**$440.9**

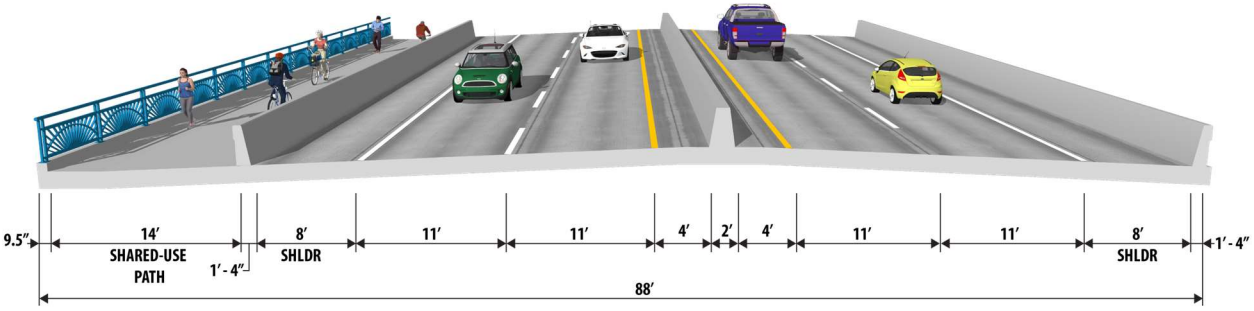
Estimated Project Costs (2023 Dollars, in millions)

1.5 Description of Preferred Alternative

After comparing and weighting the benefits and impacts of the No Build Alternative and two feasible Build alternatives, along with the public input received during the Hybrid Alternatives Public Workshop described in the *Type 2 Categorical Exclusion (May 2024)*, the Town identified the 65-ft. High-Level Fixed Bridge as the Preferred Alternative, subject to public review of the *Type 2 Categorical Exclusion* and completion of the public comment period after the Public Hearing. 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 consists of a new 65 ft. High-Level Fixed Bridge on a southern alignment that replaces the existing Broad Causeway Bridge and bridge approaches. The new bridge includes a 4-lane divided roadway with two, 11 ft. lanes in each direction separated by 4 ft. inside shoulders and a 2 ft. concrete barrier wall. The outside shoulders are 8 ft. wide, adjacent to concrete barrier walls. A 14 ft. shared-use path along the north side of the new bridge accommodates pedestrians and bicycles with a 1.5 ft. barrier wall to safely separate travel lanes and the path. See **Figure 1-4** for an image of the proposed bridge typical section. The design and posted speed would be 30 mph, as it is today.

Figure 1-4 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 Preferred Alternative includes adding a shared-use path to provide a safe travel experience for pedestrians and bicyclists on the new bridge and causeway island. The proposed shared-use paths within the project limits will be developed to meet current safety standards and ADA compliance. Sidewalks outside of the project limits will remain as is and tie directly to the upgraded pedestrian and bicycle facilities.

The existing median opening east of the bridge on Kane Concourse (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 overall bridge length is 2,918 ft. 9 in. A detailed description of the Preferred Alternative is located in **Section 7.0** of this PER.

Alternative 1, the High-Level Fixed Bridge Alternative was selected as the Preferred Alternative for the following reasons:

- The 65 ft. high-level fixed bridge allows all anticipated waterway users to safely navigate through the proposed structure and pass under the new bridge without any delay to roadway traffic, compared to the movable bridge in Alternative 2. Without the need to stop automobiles, bicyclists, or pedestrians for bridge opening cycles, the traffic would be presented with free flow conditions to accommodate projected high traffic volumes that connect beach communities and Bay Harbor Islands to the mainland. Bicyclists and pedestrians would have continuous safe access without bridge opening delays.
- In emergency situations and during evacuation events, a high-level fixed bridge would play a critical role in facilitating the evacuation of approximately 40,000 residents from the municipalities of Bay Harbor Islands, Bal Harbour, Surfside, Miami Beach, and Sunny Isles Beach.
- A high-level fixed bridge does not have any mechanical moving parts or an electrical system that could malfunction and close the bridge. Without the chance of human error operating a drawbridge, the high-level fixed bridge would maintain operational reliability.
- The high-level fixed bridge alternative includes adequate lane widths and shoulders, and a shared-use path. These features improve safety for both motorized and non-motorized roadway users by correcting existing roadway deficiencies.
- The high-level fixed bridge is proposed within the existing right-of way, owned by the Town, making it a feasible option for the Town to address bridge deficiencies.

Details on the evaluation and selection of the Preferred Alternative are included in **Section 5.0.** The proposed High-Level Fixed-Bridge Alternative typical section is shown in **Figure 1-4**. The Preferred Alternative Concept Plans and Profile are included in **Appendix B**.

1.6 List of Technical Documents

The technical documents that have been and will be prepared for the study include:

Public Involvement:

- Public Involvement Plan (February 2023)
- Comments and Coordination Report (May 2024)

Engineering:

- Bridge Development Report (April 2024)
- Bridge Hydraulics Report (March 2024)
- Existing Signing Inventory Report (November 2023)
- Preliminary Geotechnical Report (February 2024)
- Lighting Design Analysis Report (April 2024)
- Location Hydraulics Report (December 2023)
- Preliminary Engineering Report (May 2024)
- Project Traffic Analysis Report (March 2024)
- Pond Siting Report (February 2024)
- Utilities Assessment Package (May 2024)

Environment:

- Air Quality Technical Memorandum (December 2023)
- Cultural Resource Assessment Survey (April 2024)
- Contamination Screening Evaluation Report (February 2024)
- Natural Resource Evaluation (April 2024)
- Noise Study Report (April 2024)
- Research Design and Survey Methodology (May 2023)
- Section 106 Case Study Report (April 2024)
- Sociocultural Effects Evaluation Technical Memorandum (May 2024)
- Type 2 Categorical Exclusion (May 2024)
- Water Quality Impact Evaluation (September 2023)

The Final PER will list the dates of the final documents.

2.0 EXISTING CONDITIONS

2.1 Previous Planning Studies

There are no previous planning studies completed for this project.

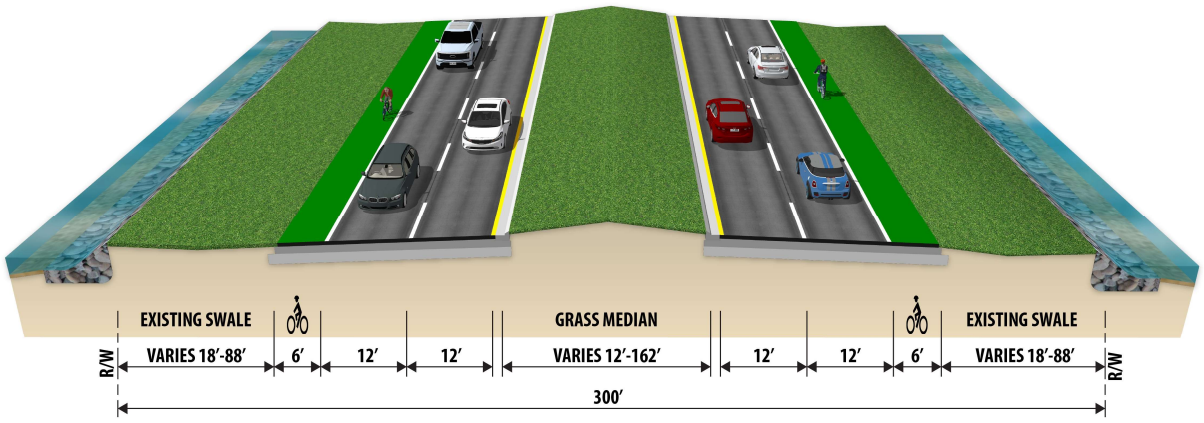
2.2 Existing Roadway Conditions

The Broad Causeway Bridge crosses Biscayne Bay as well as the ICWW and connects the City of North Miami Beach to the Town of Bay Harbor Islands within Miami-Dade County. The bridge is owned and managed by the Town of Bay Harbor Islands and majority of project limits fall within Town owned ROW. There is a portion of the project that will tie into SR 922 which is FDOT owned from Milepost (MP) 4.546 to MP 5.548 east of the bridge. The bridge runs from east to west and touches down on a man-made island at the western project limits. Currently there are no pedestrian facilities. The service station on the causeway island was constructed in 1951 and has been determined to be eligible for listing on the National Register of Historic Places (NRHP).

2.2.1 Typical Sections

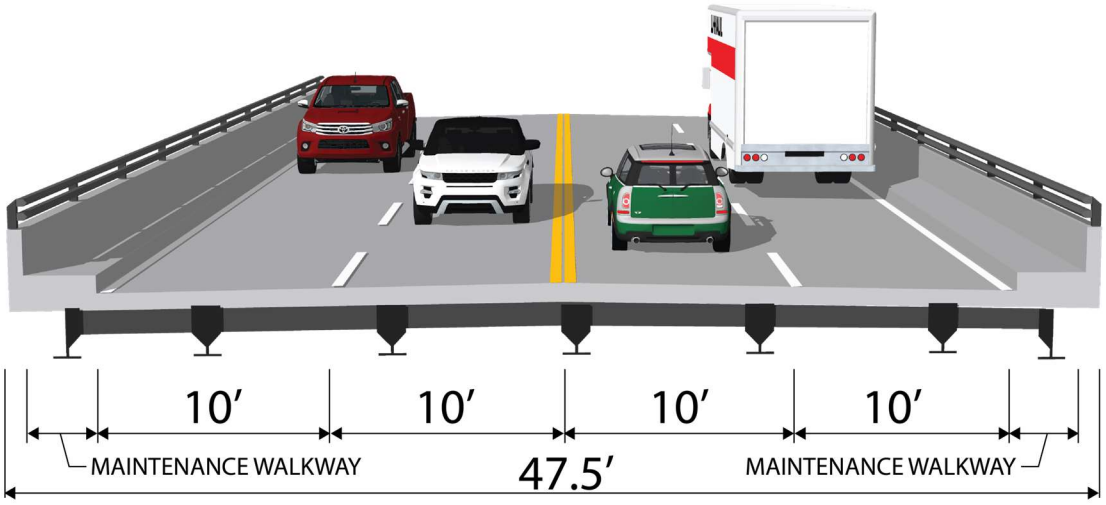
There are three existing typical sections within the project limits. The first typical is the existing roadway on the man-made causeway island from Sta. 105+21.37 to Sta. 123+85.28. The typical includes four, 12 ft. travel lanes and 6 ft. shoulders/bike lanes in both directions and no sidewalks. There is a grassed median that varies in width and inside curbs of 2 ft. On the outside of the shoulder there are grassed swales that vary in width and tie to an existing seawall/rubble. The entire typical fits within the existing ROW owned by the Town (**Figure 2-1**).

Figure 2-1 Existing Roadway Typical Section – Causeway Island



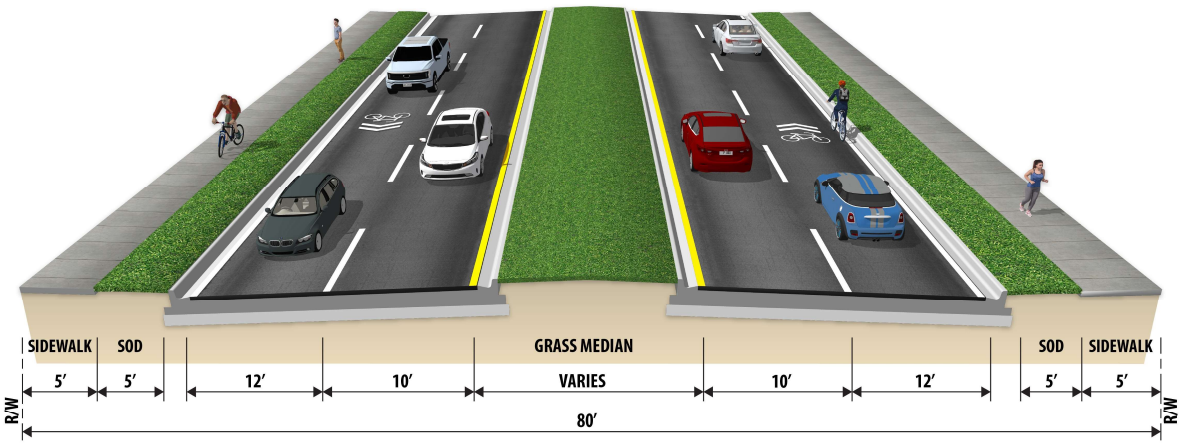
The second typical section is the existing bridge with four 10 ft. travel lanes, no shoulders, and a raised maintenance section that is 22 to 36 in. wide with outside bridge railings This maintenance section is used as a path for pedestrians and includes a bridge railing. The outside lanes of the existing bridge typical are striped as sharrows for bicycle use (**Figure 2-2**).

Figure 2-2 Existing Bridge Typical Section



The third typical is the approach roadway on the eastern end of the existing bridge on Kane Concourse (SR 922) from Sta. 141+41.25 to Sta. 146+25.69 and consists of four travel lanes with widths of 10 ft. (inside) and 12 ft. (outside). The typical also includes a landscaped median varying in width and two 2 ft. curbs on both its sides. On the outside are 2 ft. curbs with 5 ft. sidewalks and 5 ft. of existing sod on each side. The outside lanes are striped as sharrows for bicycle use (**Figure 2-3**).

Figure 2-3 Existing Roadway Typical Section – Kane Concourse (SR 922)



2.2.2 Roadway Functional and Context Classifications

Utilizing FDOT's Straight Line Diagram (SLD) No. 87066000 for SR 922 the Broad Causeway Bridge is currently classified as an "Urban Minor Arterial." Note that the portion of SR 922, considered to be the Broad Causeway Bridge from MP 3.741 to MP 4.546, is managed and owned by the Town and ties into the FDOT managed SR 922 on the eastern and western ends of the above MPs. Both the Broad Causeway Bridge and SR 922 are not part of the National Highway System or the Strategic

Intermodal System (SIS): however, the bridge does cross the Atlantic ICWW, which is on the SIS. The project context classification is not specified since most of the project falls outside FDOT limits. To the west of the project the roadway is classified as C4 Urban General and to the east C5 Urban Center.

In addition, both Broad Causeway Bridge and SR 922 are designated evacuation routes by the FDEM, State Emergency Evacuation team.

2.2.3 Access Management Classification

The project limits are classified as Access Class 7. Access Class 7 facilities are typically found in urbanized areas where existing land use and roadway sections are built out to the maximum feasible intensity and where significant land use changes or roadway widening will be limited.

2.2.4 Right-of-Way

The existing total ROW width varies from 80 ft. along Kane Concourse (SR 922) to 300 ft. on the causeway island as shown in **Table 2-1**.

Table 2-1 Existing ROW Widths

From Station	To Station	Width (ft)
Sta. 105+21.37	Sta. 123+85.28	300
Sta. 141+41.25	Sta. 146+25.69	80

Included in the Town Charter by the 1953 Senate Bill No. 865, the State of Florida surrendered and granted to the Town 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 ft. wide from Kane Concourse (SR 922), westwardly across Biscayne Bay to approximately 123rd Street in the City of North Miami. Therefore, the replacement bridge will be built within the 300 ft. area over Biscayne Bay under claim or control by the Town.

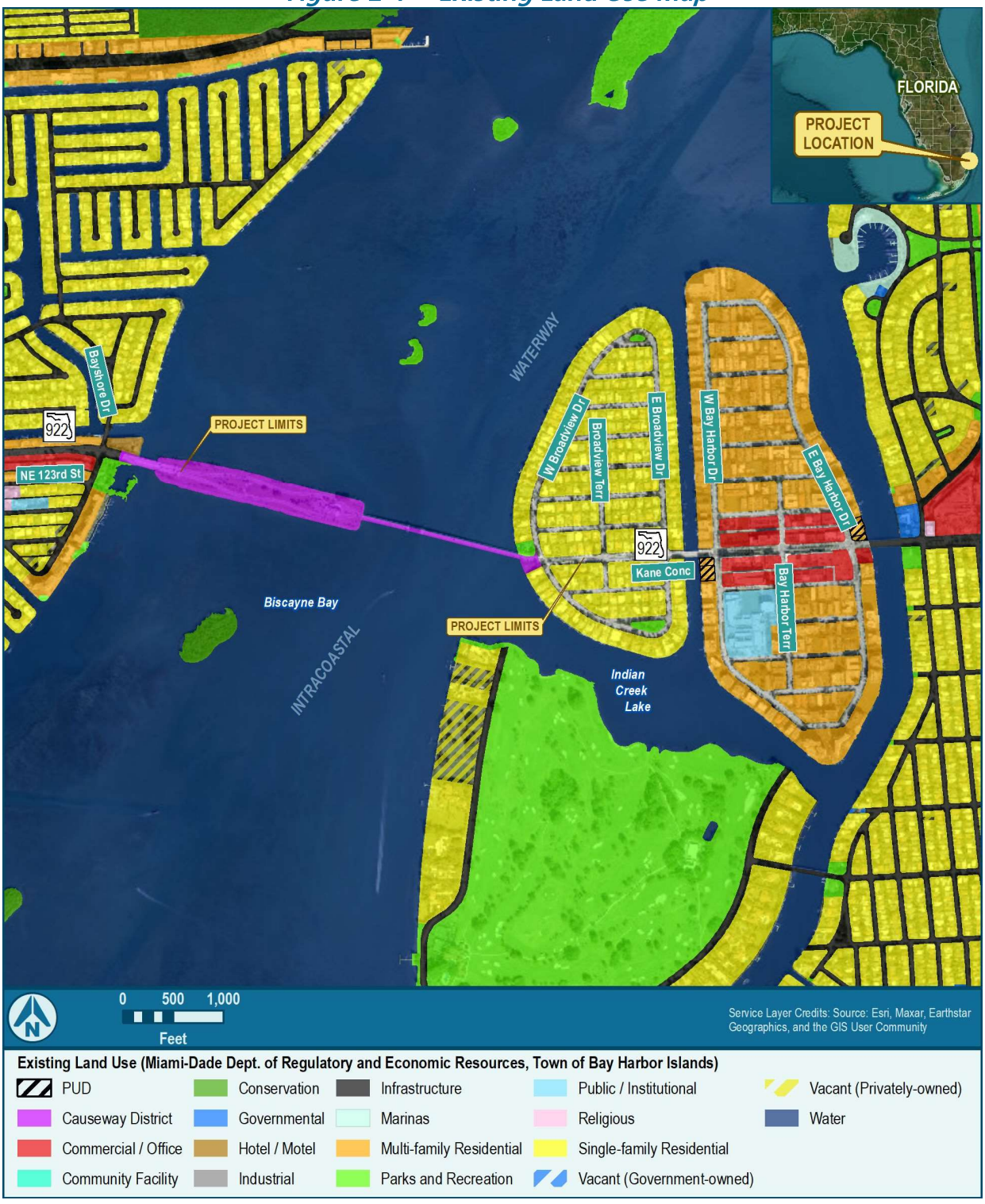
Within the existing Town owned Tot Lot at the eastern side of the existing bridge there is a 20 ft. utility easement for a 30 in. Miami Dade Water and Sewer water main approximately 20 ft. north of the existing roadway.

There are no formal drainage easements within the project limits.

2.2.5 Adjacent Land Use

Existing land uses in the project area primarily consist of infrastructure (transportation use) and commercial (service station) on the causeway island - identified as the Causeway District on the Town's zoning map. The Town of Bay Harbor Islands gets its name because the Town is divided between two different islands, a West Island and East Island. On the West Island are single family residential and parks and recreation land uses. The East Island contains a commercial/office district and multi-family residential housing with some public/institutional uses (**Figure 2-4**). The Broad Causeway bridge connects the causeway island to the West Island. The East Island is not within the project limits. The project location and surrounding towns/cities are described in **Section 1.1**.

Figure 2-4 Existing Land Use Map



2.2.6 Pavement Type and Condition

The causeway island and existing bridge are owned by the Town and no existing Pavement Condition Survey exists. The roadway within the causeway island and SR 922 portion east of the existing bridge was constructed using flexible asphalt pavement. Most of the roadway pavement is in good condition, based on field inspection performed by the PD&E team. The total project is less than a mile long and therefore will not require a full pavement type selection report as stated in the *FDOT Pavement Type Selection Manual* (2019). The causeway island and existing bridge are owned by the Town and no existing Pavement Condition Survey exists.

2.2.7 Existing Design and Posted Speed

The following are the existing design and posted speeds based on field observations and the latest As-Built plans. The existing design speed from the existing bridge constructed in 1951 is not shown in existing As-Built plans.

SR 922/NE 123rd Street Western Approach
Design Speed: 40 mph
Posted Speed: 35 mph west of western relief bridge
30 mph east of western relief bridge

Broad Causeway Bridge and Drawbridge
Design Speed: Unknown
Posted Speed: 30 mph

Kane Concourse (SR 922) Eastern Approach
Design Speed: 30 mph
Posted Speed: 30 mph

2.2.8 Horizontal Alignment

The existing horizontal alignment derived from the centerline of the existing roadway and bridge survey is shown in **Table 2-2**.

Table 2-2 Existing Horizontal Alignment

PI* Station	Degree of Curvature	Curve radius (ft.)	Curve Length (ft.)	Deflection Angle	Bearing Ahead
Sta. 14+14.06	-	-	-	-	S75°59'34"E
Sta. 15+94.46	-	-	-	0°01'36"	S76°01'02"E
Sta. 59+37.35	5°43'46.48"	1000 ft.	298.34 ft.	10°53'48"	S86°54'50"E
Sta. 60+85.65	-	-	-	-	S86°54'50"E

*PI - Point of Intersection

2.2.9 Vertical Alignment

Existing roadway and bridge vertical alignment was derived from the original *As-Built Plans* (July 1950). Stationing does not follow standard West to East stationing because the roadway was previously part of a longer route with a cardinal direction of South to North from the Town of Bay Harbor Islands (beach) to the mainland.

Starting at Station (Sta.) 41+61.90 on the causeway island, the existing profile starts at elevation (EL.) 7.50 ft. and continues east with a 0.00% grade. This grade continues until Sta. 19+55.40 at which point there is a 100 ft. vertical sag curve with an existing grade of 3.444%. At Sta. 15+05.39, the profile has a 100 ft. crest vertical curve and a 0.00% exit grade at EL. 23.00 ft. The profile continues over the ICWW at 0.00% grade until Sta. 12+28.04. At this point a 100 ft. vertical crest curve deflects down with an existing grade of 1.549% until Sta. 1+60.00 when it goes into a 100 ft. vertical sag curve with a 1.015% existing grade. The profile ends at Sta. 0+00 (intersection with SR 922 and West Broadview Drive) at EL. 5.33 ft.

Elevations do not include the vertical adjustment of -1.55 ft. for the datum conversion from 1929 to 1988.

2.2.10 Multi-modal Facilities

The existing bridge consists of four lanes (two in each direction) that are 10 ft. wide, without a raised median. The outside travel lanes also include sharrow markings to accommodate bicycles which is a safety concern due to substandard lane widths. According to the FDOT's *Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Greenbook 2018)*, the minimum width of a shared lane should be 14 ft. The existing lane width on Broad Causeway Bridge is only 10 ft. Therefore, bicycles are sharing 30 mph travel lanes with vehicles on lane widths that do not meet the current standards.

In addition, a raised maintenance area that is used by pedestrians is present on each side of the bridge, with a width that varies from 22 to 36 in. The typical width of the maintenance area and existing barrier wall is 3.75 ft. There are no guardrails separating the maintenance area from the travel lane creating a safety concern for pedestrians using the maintenance area to cross the bridge. The west side of the bridge has a 6 in. curb to enter the maintenance area that does not provide ADA access. Also, the maintenance area is not ADA compliant since it does not provide the 36 in. minimum required or 32 in. minimum at the point of an obstruction such as a light fixture/pole. There are currently no sidewalks on the causeway island west of the bridge. The bridge approaches are generally consistent with the typical section of the bridge, except for west of the bridge where there are no sidewalks.

The Miami-Dade Transit Route 107 (G) traverses the proposed project area with a bus stop located at Broadview Terrace and Kane Concourse (SR 922). Route 107 (G) starts at the Miami-Dade College North Campus and heads east over the Broad Causeway Bridge ending at Harding Avenue and 94th Street in the Town of Surfside. According to the Miami-Dade Transit, the *Miami-Dade Transit Development Plan (*TDP) Annual Progress Report, for FY 2022 – 2031, this municipal transit service is expected to continue to operate at current service levels.

The project is located within a transportation disadvantaged service provider area [Miami-Dade Transit Transportation Disadvantaged Program]. The Miami-Dade Transit Transportation Disadvantaged Program is a state-funded program that provides free transportation passes to qualifying Non-Profit Agencies/Programs for use by their Miami-Dade County resident clients who qualify as "Transportation Disadvantaged". The complimentary Bay Harbor Islands Shuttle also operates within the project area starting in North Miami and heads east over the Broad Causeway Bridge to Surfside.

The *TDP* contains no transit needs or planned improvements for the project corridor, but the Transit Division of Miami-Dade County's Department of Transportation and Public Works (DTPW) noted in their Advance Notification review that this is a key connection to Miami Beach and the Town of Bay Harbor Islands and future transit needs may be different than currently planned. According to the *Miami-Dade 2040 Bicycle/Pedestrian Plan*, Broad Causeway is not listed as a bike/ped priority. The FDOT's *Bike Network Plan* (October 2022) defines the project area as a "County Connector."

2.2.11 Intersections

There are no existing signalized intersections within the project limits of the Broad Causeway Bridge. The proposed bridge design includes two side street access points at the east end that will remain open. For westbound traffic, there is an entrance-only one-way access to West Broadview Drive, while eastbound traffic has an exit-only stop-controlled one-way egress from West Broadview Drive.

2.2.12 Physical or Operational Restrictions

Within the middle of the causeway island is an existing service station that is considered to be a Physical Restriction. The service station includes parking, mechanic area, pump stations and a small store front and can be accessed both eastbound and westbound. The service station is eligible for NRHP listing and shall remain for all proposed alternatives. The service station is also ranked as High for potential contamination sites.

The existing lanes along the bridge and at the eastern project limits of SR 922 include bicycle sharrows for bicycle usage. As noted previously the sharrows do not meet the minimum width per *Florida Greenbook*. No barriers fall within the clear zone within the project corridor.

2.2.13 Traffic Data

Seven-day, 24-hour machine counts were collected at Broad Causeway for the eastbound and westbound approaches between February 11 and 17, 2023. The data observed is listed in **Table 2-3**. The counts were evaluated for applicable seasonal adjustments, with the season factor for the corresponding count week being 0.96. A season factor below 1.00 indicates that the data was gathered during the peak season, thus negating the need for applying the season factor.

Table 2-3 Traffic Data – Existing

Weekday AADT	K	D	DDHV	Truck %
25,100	9.0	56.5	1,280	6.6

AADT = Average Annual Daily Traffic; *K = Standard Peak Hour; D = Directional; DDHV = Directional Design Hour Volume*

Bicyclists travel across the causeway island using the existing green bike lanes and sharrows on the Broad Causeway Bridge and Kane Concourse (SR 922). The maximum pedestrian and bicyclist counts from the two count locations on two separate days are listed below in **Table 2-4** and provided in the *Project Traffic Analysis Report (March 2024).*

Table 2-4 Multimodal Traffic Counts

Date	Time	Type	Eastbound	Westbound
Saturday, February 11, 2023	7:00 AM – 7:00 PM	Pedestrians	119	122
		Bicyclists	216	176
Tuesday, February 14, 2023	7:00 AM – 7:00 PM	Pedestrians	103	95
		Bicyclists	105	91

2.2.14 Roadway Operational Conditions

A 2023 existing traffic segment analysis was performed using collected traffic data. The Broad Causeway peak hour segment volumes were obtained from the turning movement counts and daily volumes on the segment were obtained from the 7-day, 24-hour machine counts. Analysis tools included the SimTraffic Arterial Level of Service Reports for peak hours counts and 2023 FDOT Generalized Service Volume Tables for the daily volumes. Performance measures for evaluation were selected based on the FDOT policy of target level of service (LOS) for State Highway System arterials in urban areas. The target LOS for intersections and corridors is LOS D.

Table 2-5 and **Table 2-6** summarize the level of service and volume to capacity for daily volumes using 2023 FDOT Generalized Service Volume Tables and peak hour travel speed LOS using results of a calibrated Syncrho-Simatraffic simulation of arterial travel speeds.

The existing segment analysis results were as follows. The daily analysis, which is based on volume comparison to the 2023 FDOT Generalized Service Volume Table, results in a volume to capacity (V/C) ratio of 0.70 and an LOS When using the peak hour arterial travel speed the results indicate a LOS of A. Both methods for analysis are within the FDOT statewide target LOS D.

Since the segment analysis is intended to evaluate typical peak hour operations the existing drawbridge interruption to traffic is not included in the segment analysis or models. This is due to the drawbridge operations not occurring on a recuring consistent basis like a traffic signal or stop-controlled intersection would have.

Table 2-5 Existing Segment Volume Analysis Summary (Daily)

Roadway	Extents	Scenario	Volume	Service Volume Capacity	V/C	LOS	Targeted LOS
Broad Causeway	Bayshore Drive to West Broadview Drive	2023 Existing	25,100	36,100	0.70	D	D

Source: FDOT 2023 Quality/Level of Service Handbook Generalized Tables (C4)

Table 2-6 Existing Segment Volume Analysis Summary (Peak Hour)

Roadway	Extents	Peak Period	Travel Speed (mph)		Level of Service (LOS)		Target LOS
			EB	WB	EB	WB	
Broad Causeway	Bayshore Dr to West Broadview Dr	AM	28	27	A	A	D
		MID	28	28	A	A	D
		PM	28	26	A	A	D

Source: Calibrated SimTraffic Analysis Results, as detailed in Project Traffic Analysis Report

2.2.15 Toll Collection Facilities

Tolls are collected at a toll facility that is present just outside the western limits of the project, at the west end of the causeway island. The toll facility consists of an overhead span gantry structure extending over the four existing travel lanes, and there are no barrier-channelized toll lanes in the road to affect free-flow traffic. The toll collection is accomplished via all-electronic tolling (AET) using SunPass™ and Toll-By-Plate (TBP). Tolls are collected in both eastbound and westbound directions based on the number of axles for each vehicle.

2.2.16 Crash Data

A historical safety review was conducted within the study limits using five years of available crash records occurring between January 1, 2018, and December 31, 2022. Crash data and crash reports were obtained from the Signal Four Analytics (Signal4) database and reviewed in accordance with FDOT Safety Crash Data Guidance. The Signal4 database uses crash records obtained from the Florida Department of Highway Safety and Motor Vehicle (FLHSMV) crash records and is maintained by the GeoPlan Center at the University of Florida.

Detailed crash data, including crash type, crash severity, lighting conditions, roadway surface conditions, etc., was reviewed and summarized in text, tabular, and graphical forms to convey critical trends experienced in the historical cash data. For safety analysis purposes, the study area includes crashes occurring within 250 ft. of intersections in the project limits.

Within the study limits a total of 47 crashes were reported over the five-year period. A summary of the crash analysis is provided in this section.

Crash data was reviewed to record the severity of crashes and contributing factors. Of the 47 crashes, two resulted in serious injury, 18 resulted in injury, and 27 resulted in property damage only as shown in **Table 2-7**.

In the five-year crash history, there were 13 sideswipe crashes, which accounted for 28% of the total crashes. The next most common crashes were rear-end crashes (12) and bicycle crashes (9).

Table 2-7 Crash Type by Level of Severity

Crash Type	Severity				
	No Injury	Possible Injury	Non-Incapacitating Injury	Incapacitating Injury	Total
Sideswipe	13				13
Rear End	6	4	2		12
Off Road	6	2			8
Bicycle			8	1	9
Head On	2	1	1	1	5
Total	**27**	**7**	**11**	**2**	**47**

Source: Signal4 – Jan 1,2018 - Dec 31, 2022

Temporal Crash Trends:

Crash data and reports were assessed to determine temporal trends in the statistics. This review included crash year, month, day of the week, and time-of-day.

The five-year historical crash trends peaked in 2020 and remained consistent throughout 2022 with 11 or 12 crashes each year.

Friday was the most common day for crash occurrences with 11 crashes. Tuesday had the second highest crash occurrence with 10 crashes. The average per weekday count was 8 crashes. There is a decrease in crashes over the weekend which aligns with a typical school and work week.

For time-of-day analysis, the crash frequency was highest during the 2 PM hour with 6 crashes. There is a secondary peak at the 11 AM and the 5 PM hour with 5 crashes. Overall, the hourly crash trends correlate with typical fluctuations in traffic volumes observed throughout the day.

Crash Condition Trends:

Crash data records the prevailing weather conditions at the time of crash occurrence. The majority of the crashes within the study area occurred during clear weather conditions (90%). The remaining crashes occurred in cloudy (8%) or rain (2%) weather conditions.

Crash data includes the prevailing lighting condition estimated at the time of the crash. The majority of crashes occurred during daylight conditions (80%). The remaining crashes (20%) occurred during dark-lighted conditions.

Approximately 90% of the total crashes occurred during dry road surface conditions**.** The remaining 10% of the crashes occurred during wet surface conditions.

Crash Rates:

Crash rates for the study corridor were calculated for the entire project limits. The segment was analyzed from 250 ft. east of North Bayshore Drive to 500 ft. west of East Broadview Drive.

The classification of Broad Causeway Bridge and Kane Concourse (SR 922) as an urban, four-lane, roadway, was utilized to compare the study locations to the statewide average crash rate for similar facilities in each year. The roadway segment was broken up into 3 segments based on the roadway being divided or undivided. A map displaying the roadway segment classifications can be found in

Figure 2-5. Crash rates per million vehicle miles traveled (MVMT) were calculated for each year from 2018 through 2022 for the study area.

The number of crashes along the segment (including bicycle crashes), the associated crash rate based on crashes per million vehicle miles traveled, and the statewide average for similar facilities for years 2018 through 2022 are summarized in **Table 2-8** below. At the time of this report, 2020 through 2022 statewide average crash rates for segment analysis were not available. The 5-year average crash rate (2018-2022) for the divided and undivided roadway segments were below the 2016-2019 statewide average crash rates. The traffic and safety analysis are further detailed in the *Project Traffic Analysis Report (March 2024)*.

Figure 2-5 Segment Classification for Safety Analysis

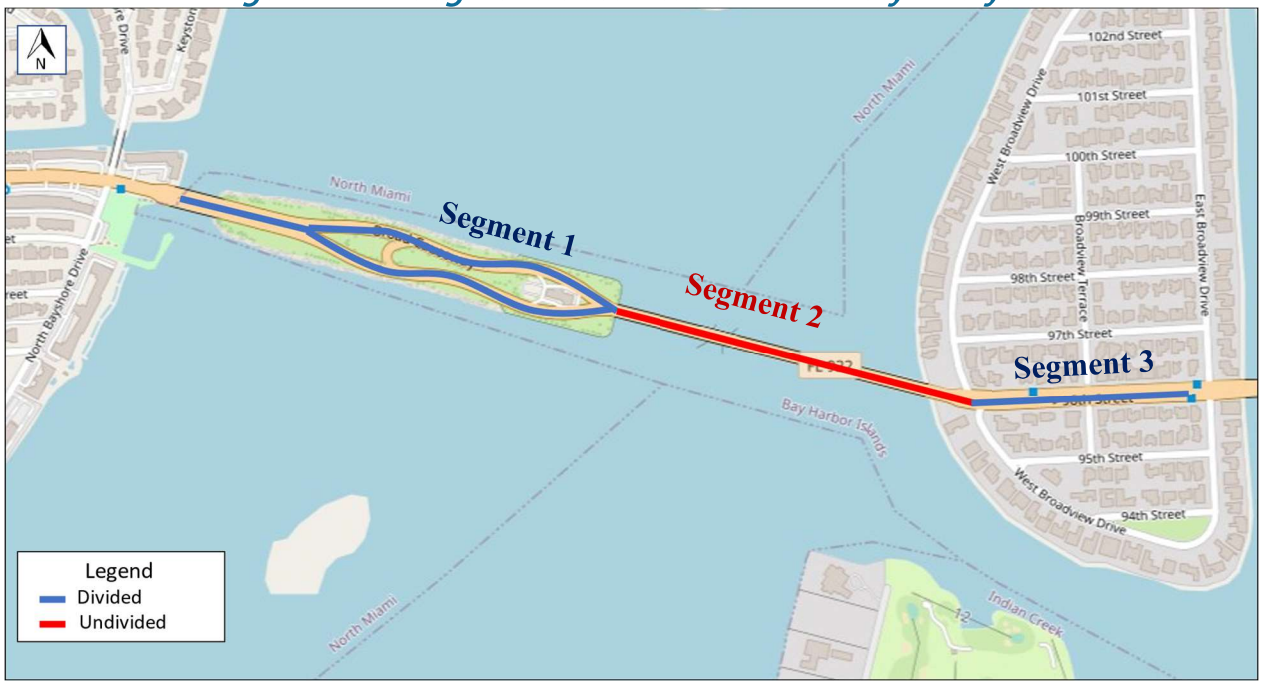


Table 2-8 Historical Crash Rates

Median Type	Limits	Mile Post		Metric	Year					Average
		Begin	End		2018	2019	2020	2021	2022	
				AADT	21,000	21,000	22,000	21,000	22,000	
Divided	.05 mi East of North Bayshore Dr. to east of service station access	3.764	4.216	Crashes	2	2	2	3	3	
				Crash Rate	0.58	0.58	.055	0.87	0.83	0.68
				Statewide avg. Crash Rate	3.92	3.89				3.88
Undivided	East of service station access to east shore of bridge	4.216	4.566	Crashes	3	4	6	8	5	
				Crash Rate	1.12	1.49	2.14	2.98	1.78	1.90
				Statewide avg. Crash Rate	7.31	7.34				7.30
Divided	East shore of bridge to 0.1 mi west of East Broadview Dr.	4.566	4.736	Crashes	1	0	3	1	4	
				Crash Rate	0.77	0	2.20	0.77	2.93	1.36
				Statewide avg. Crash Rate	3.92	3.89				3.88

Roadway ID: 87066000. Note: Crash Rates are shown in crashes per 100 million vehicles miles of travel. AADT from FTO site 878608.

2.2.17 Railroad Crossings

No railroads or railroad crossings are present within the study area.

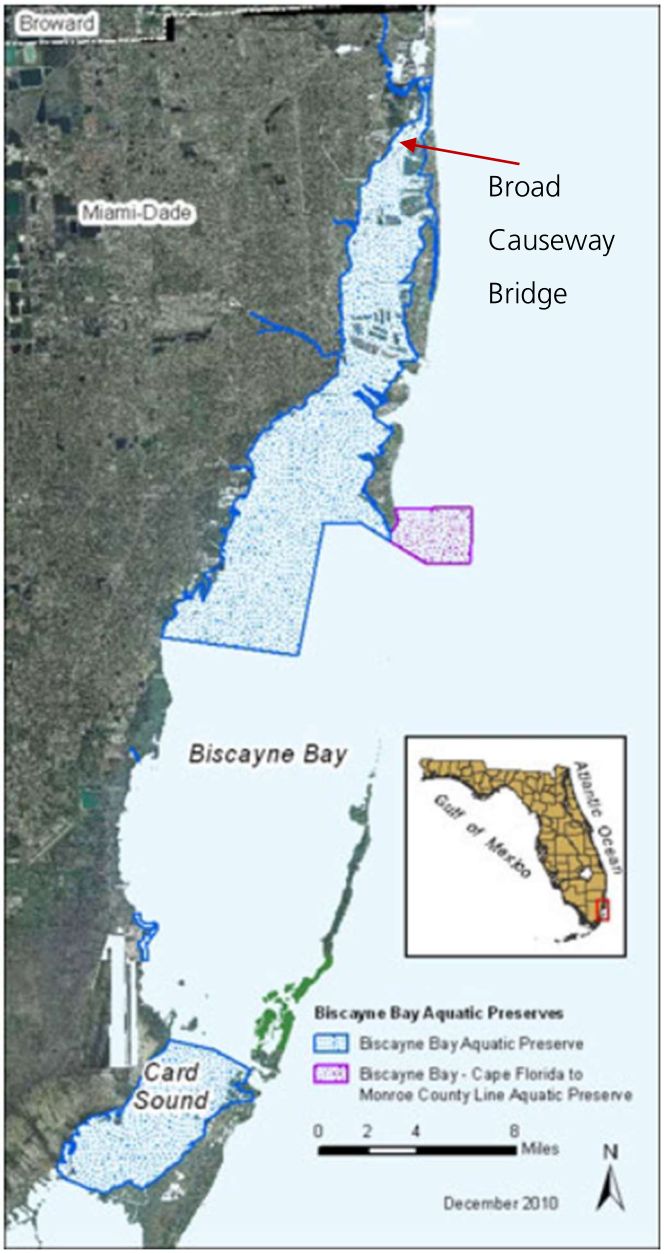
2.3 Drainage

A preliminary drainage assessment was performed for the project corridor based on information gathered from the Town and available online.

2.3.1.1 Drainage Basins

The project discharges to the Biscayne Bay Aquatic Preserve (shown in **Figure 2-6**), which is a NOAA Marine Protected Area within the Southern Everglades boundary and is designated as an Outstanding Florida Waters (OFW). The Biscayne Sole Source Aquifer is located to the west of the project limits; because the aquifer is not within the project limits no involvement regarding this specially designated resource is anticipated.

Figure 2-6 Biscayne Bay Aquatic Preserve, designated and OFW (figure courtesy of FDEP)



The Biscayne Bay Aquatic Preserve is within the South Florida Water Management District (SFWMD) jurisdiction, the regional water management district. The project is also within Miami-Dade County's Department of Regulatory Economic Resources' (DRER) DERM jurisdiction, the local water management district.

2.3.1.2 Flow Patterns

On the causeway island within Biscayne Bay, stormwater runoff flows are collected in small ponds and is conveyed via overflow structures to the bay. 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 Biscayne Bay via a 24" reinforced concrete pipe (RCP) outfall. Runoff from the bridge goes directly into Biscayne Bay through the grate of the bascule span or through 4" scuppers on the bridge.

2.3.1.3 Stormwater Management

There are no formal stormwater management facilities that were permitted by SFWMD within the boundaries of the proposed project. Stormwater collection systems either discharge directly to Biscayne Bay or overflow from ponds on the causeway island, realizing only informal water quality improvements. Stormwater collected on the existing bridge structure is also not treated before discharging into the bay through scuppers.

2.3.1.4 Floodplains

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), the project area has no FEMA Floodways but the entire project, other than the elevated Broad Causeway Bridge over Biscayne Bay, is in the 100-year floodplain (**Figure 2-7**). The different flood zones for the project limits are listed in **Table 2-9**. The average elevation on the causeway island is elevation 5 to 6 ft., NAVD, and the average elevation east of the ICWW bridge is about 3.5 ft., NAVD, varying between 3 to 4 ft., NAVD.

Figure 2-7 Flood Insurance Rate Maps (FIRMs) within the Project Area

Table 2-9 Flood Insurance Rate Map (FIRM) Summary

Panel Name and Number	Flood Zone	Elevation ft-NGVD 29	Elevation ft-NAVD 88
City of North Miami 120655	VE	10	8.45
Miami-Dade Unincorporated Areas 120635	AE	10	8.45
Town of Bay Harbor Island 120637	AE	8	6.45

NGVD 29 Elevations – 1.55-ft. = NAVD 88 Elevations

2.3.1.5 Cross Drains

There are no regional cross drains or box culverts within the project limits.

2.3.1.6 Historical Flooding Problems

In an interview with Jason Atkinson, former Director of Public Works, Town of Bay Harbor Islands, on December 14, 2023, Mr. Atkinson stated that (1) flooding from king tides is not highly significant at the project site but gets worse further north of the Broad Causeway Bridge east touch down, and (2) the Town is not having problems in the project area though problems occur further northward on the West Island. However, the drainage systems on the causeway island are occasionally inundated by backflow from Biscayne Bay. Future sea level rise is expected to increase these flooding problems.

2.3.2 Lighting

Currently, the bridge lacks light poles. Instead, step lights are integrated into the bridge maintenance area, while navigation lights are positioned beneath the bridge. Additionally, the tender house is illuminated. On the causeway island, the existing lighting comprises a decorative luminaire attached to a single arm measuring 12 to 15 in., along with a tapered aluminum light pole. These poles are mounted on concrete pedestals above the ground. The wiring connecting the poles is located underground. The Town of Bay Harbor Islands is responsible for the maintenance of the lighting system. Certain poles are equipped with CCTV cameras and an above ground metal pull box.

2.3.3 Utilities

Existing utilities within the project study area were identified through Sunshine State One-Call of Florida, Base maps were sent to utility providers listed on the Sunshine 811 ticket with a request to provide information on existing and planned utilities. Correspondence and sketches of the existing utilities are included in the Utility Assessment Report. **Table 2-10** summarizes the utility owner, location and type of the utilities present within the project corridor. **Table 2-11** summarizes locations of boreholes in correspondence with **Section 2.3.4** Soils and Geotechnical Data.

Table 2-10 Existing Utilities in the Study Area

Owner	Type	Contact Name and Phone Number	Location and Type
Atlantic Broadband / Breezeline	Cable	Javares Hall 305-213-9908	• Overhead coax cable approximately 30 ft. west of centerline of W Broadview Drive along the north and south of its intersection with Kane Concourse (SR 922). • Overhead coax cable approximately 160 ft. north of centerline of Kane Concourse (SR 922) SIZES UNKNOWN
Comcast Cable	CATV / Fiber	Thornton Szynkarski 954-562-5309	• Overhead facilities approximately 30 ft. west of centerline of W Broadview Drive along the north and south of its intersection with Kane Concourse) (SR 922), east of Broad Causeway Bridge. TYPE/SIZE UNKNOWN
FP&L Dade / Subaqueous	Electric	Gabriel Rodriguez 305-281-9847	• 13kV buried cable approximately 40 ft. north of centerline of western relief bridge on the west end of the causeway island, 50 ft. south of centerline of the causeway island on the west end, and 20 ft. north of centerline of Broad Causeway Bridge. • 13kV overhead cable approximately 25 ft. west of centerline of W Broadview Drive along the north and south of its intersection with Kane Concourse (SR 922).
Miami-Dade Water & Sewer	Water / Sewer	Manuel Diaz 786-552-4424	• 30" water main runs along the north side of the causeway island and approximately 150 ft. north of the existing Broad Causeway Bridge. The 30" water main enters a 20 ft. easement at the Tot Lot and is 50 ft. North of the existing Broad Causeway Bridge centerline. • 8" water main approximately 10 ft. west of centerline of Kane Concourse (SR 922) along the north and south of its intersection with W Broadview Drive.
Teco Peoples Gas South Florida	Gas	David Rivera 954-453-0794	• 2" steel gas main approximately 15 ft. west of centerline of Kane Concourse (SR 922) along the north and south of its intersection with W Broadview Drive. • 2" polyethylene (PE) gas main approximately 35 ft. south of centerline of W Broadview Drive.
AT&T / Distribution	Telephone	Steve Low 305-341-0968	• 4" PVC COND115 cable approximately 55 ft. south of centerline of Broad Causeway west and 40 ft. north of centerline of Broad Causeway west. • Copper Cable AFTW-50 approximately 35 ft. south of centerline of Broad Causeway west and 40 ft. north of centerline of Broad Causeway west. • These cables connect to an AT&T manhole / pull box approximately 50 south of centerline of Broad Causeway west.

Table 2-11 Borehole Locations

Test Hole #	B/L and/or C/L			Existing Ground Elevation	Top Elevation	(X) Easting	(Y) Northing	Comments
	Station	Offset	LT/RT					
BB-01	28+57.18	45.94'	RT	4.87'	4.87'	936403.298	566037.191	Electrical Street Light located 1.38' north of boring
BB-02	35+81.32	129.11'	RT	3.77'	3.77'	937085.884	565781.508	Clear
P-01	25+65.28	22.81'	RT	5.56'	5.56'	936125.637	566130.164	Clear
P-02	35+41.36	65.30'	RT	4.66'	4.66'	937062.529	565853.089	Electrical Street Light located 4.90' north of boring
P-03	57+58.37	41.88'	RT	4.57'	4.57'	939219.499	565340.113	Clear
RB-01	23+55.79	55.26'	RT	2.63'	2.63'	935914.510	566149.296	Clear
RB-02	24+12.63	69.74'	LT	2.52'	2.52'	935999.873	566256.860	Water located 3.77' south of boring
RB-05	26+84.11	46.64'	RT	4.96'	4.96'	936235.192	566078.330	Clear
RB-09	32+63.48	107.18'	LT	0.94'	0.94'	936834.551	566087.595	Clear
RB-11	39+45.84	89.87'	LT	1.88'	1.88'	937492.520	565905.924	Storm located 4.79' NW of boring
WB-01	25+70.02	85.58'	RT	4.01'	4.01'	936115.066	566068.108	BE located .064' SW of boring, storm located 4.14' north of boring
WB-02	30+31.49	103.00'	RT	4.28'	4.28'	936558.654	565939.702	Clear
WB-03	32+73.71	25.24'	RT	5.22'	5.22'	936812.487	565956.627	Clear

2.3.4 Soils and Geotechnical Data

The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) soil survey for the area is shown in **Figure 2-8**. This survey indicates that the soils along the project alignment consist of Udorthents-Water-Urban land complex, 0 to 60 percent slopes (9), Urban land, 0 to 2 percent slopes (15), and Water (99).

Figure 2-8 USDA Soil Survey Map

The proposed project is located on the southern flank of the Florida Plateau, a stable, carbonate platform on which deposits of Jurassic, Cretaceous, tertiary limestone, dolomites, and evaporative have accumulated. In the study area, the upper 200 ft. of this platform is composed predominantly of limestone and quartz sand. These sediments were deposited during several glacial and interglacial stages during the Pleistocene Epoch (10,000 to 2 million years ago). Near the surface, we can find poorly cemented, oolitic Miami Limestone, which is underlain by a wide variety of loose to dense quartz sands and coarse to fine-grained limestones (Fort Thompson Formation). However, in several parts of Miami-Dade, surface sand deposits of the Pamlico Formation along with man-made fill materials are encountered. The Pamlico Formation is composed of unfossiliferous, unconsolidated quartz fine sand.

In general, the Pamlico formation overlies the Miami Limestone Formation. The limestone found in the Miami area are much softer than the hard rock formations found elsewhere in the U.S. Although the limestone in Miami can be very porous and have a sponge-like open interconnected network of vugs and small voids, large cavities prone to sinkhole activity are not generally found in the Miami area because the rock formations of South Florida are relatively young, as compared to those encountered in other parts of Florida.

The non-bridge portion of the causeway island was created with materials which came from the dredging of the bay for the construction of the existing bridge and consists of a heterogeneous soil composition including a combination of coarse to fine sands, calcareous silts and/or organic sands and silts that overlie the Miami Limestone Formation. The Miami Limestone formation is a soft or weakly cemented porous limestone. The Miami Limestone is a soft to medium, light tan to tan, porous sometimes sandy, fossiliferous, oolitic limestone. It obtains a maximum thickness of about 45 ft. along the Atlantic Coastal Ridge and thins abruptly near the Atlantic coastline. West of the ridge it is about 10 to 15 ft. in thickness.

Underlying the Miami Limestone, the Fort Thompson Formation includes sand, sandstone, and limestone unit. In the Miami area, the Fort Thompson Formation has a thickness of approximately 60 ft. The lithology of the Fort Thompson Formation is highly variable. Lithologies include fine quartz sand, molluscan quartz sandstone, fossiliferous quartz sandy limestone, fine grain freshwater limestone, and coralline limestone. These lithologies alternate abruptly in thickness and lateral extent.

As part of the PD&E Study of this project, a preliminary geotechnical study was conducted that consisted of both field exploration and laboratory testing as well as geotechnical engineering and analyses for the proposed bridge replacement, retaining walls, roadway and drainage improvements. Based on the geotechnical borings performed, the subsurface conditions along the project alignment generally consist of fill material consisting of select material followed by dredged fill materials down to depths ranging from 14 to 22 ft. below ground surface (approximately elevations ranging from -6 to -16 ft., NAVD), encountering hydrocarbon odor at one location nearby the gas station. This layer is underlain by the natural limestone intermittently with the natural sand material. Notably, the thickness of the sand layer varies across the project area, increasing in thickness as you move eastward. This information is documented in the *Preliminary Geotechnical Report (February 2024)*.

Furthermore, the Fort Thompson Limestone Formation, considered to be the bearing layer for deep foundations in South Florida, was encountered at variable depths ranging from about 45 to 75 ft. below existing ground surface (approximate elevations ranging from -42 to -72 ft.). Rock coring was

performed for this project revealing that the rock quality within this layer varies significantly at the project site. Notably, lower rock recovery was observed on the eastern side of the project area.

A very soft to loose organic SAND/SILT and SILT layer was encountered underlying the existing select fill soils within approximately the upper 15 to 20 ft. below existing ground surface. The presence of the unsuitable organic materials would require soil improvement (i.e., demucking, surcharging and/or preloading) or foundations to be pile supported in this area.

During construction near the existing bridge, and/or existing buildings, it is crucial to implement precautions for safeguarding the integrity of the current structures. In order to minimize any adverse effects and potential damage caused by vibrations, it is recommended to protect the existing structures in accordance with Section 108 of the FDOT Standard Specifications and perform vibration monitoring in accordance with FDOT FDM Chapter 117.

The *Preliminary Geotechnical Report (February 2024)* can be referenced for additional detailed information regarding unsuitable soils and for information regarding the US Department of Agriculture (USDA)/Natural Resource Conservation Service (NRCS) soil map.

2.3.5 Aesthetics Features

Landscaping is the main aesthetic feature. Mature Coconut Palms and manicured shrubs scatter the causeway island portion of the corridor while mature Royal Palms with manicured shrubs line the median of SR 922 along the eastern end of the project.

Some key architectural features include "Bay Harbor Islands" gateway signs along the eastern bridge approaches. The gateway signs are used for town decorations during the holidays and the landscaping that surrounds them is also well maintained by the Town of Bay Harbor Islands Public Works (**Figure 2-9** and **Figure 2-10**). Other architectural features include four plaques which commemorate Shepard Broad the founder and first mayor of the Town of Bay Harbor Islands as well as the original developers and particularly Benjamin N. Kane (**Figure 2-11** and **Figure 2-12**).

Figure 2-9 Bay Harbor Islands Gateway Sign

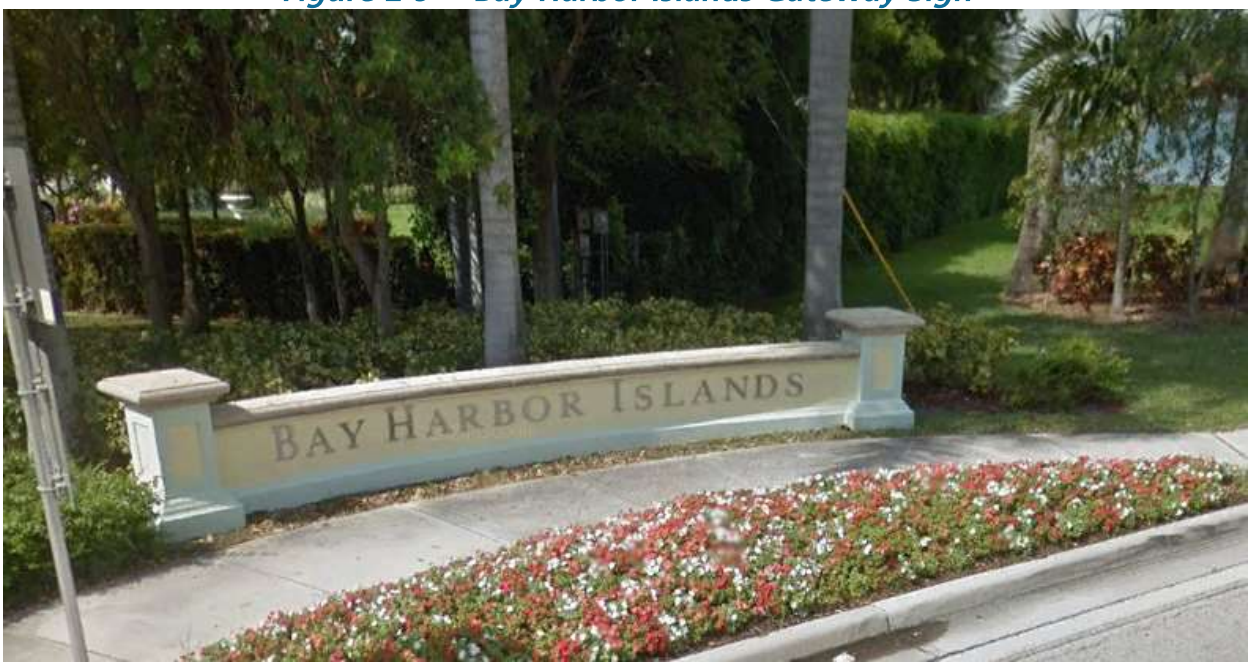


Figure 2-10 Bay Harbor Islands Decorated Gateway Sign

Figure 2-11 Bay Harbor Island Bridge Plaque 1

Figure 2-12 Bay Harbor Island Bridge Plaque 2

2.3.6 Traffic Signs

There are more than eighty (80) existing traffic control and regulatory sign assemblies within the limits of the project (**Figure 2-13**), including signs located within the causeway island, on the bridge structure, and along Kane Concourse (SR 922) upstream and downstream of the bridge between North Bayshore Drive and Broadview Terrace. The existing signs cover a wide variety of purposes – including regulatory traffic control (e.g., Speed Limit [R2-1], Bicycle Lane [R3-17]), warning (e.g., Merge [W4-1]), service (e.g., Gas [D9-7]), tolling, and non-traffic control ("NO FISHING") signs. In addition to standard static signs, there are two (2) electronic speed feedback signs and two (2) flashing beacon sign assemblies – one set installed for each direction of travel across the causeway island. The electronic speed feedback signs aid in the management of speed along the roadway providing real-time information on passing vehicle speed to encourage compliance with posted speed limits. Flashing beacons are installed above "DRAW BRIDGE AHEAD" (W3-6) sign panels and are actuated to begin the flashing sequence when the gates for the movable bridge begin to lower promoting advance awareness of the situation ahead.

Within the project limits, all signs are ground-mounted and supported by multiple different types of structures – including steel U-channel post with direct concrete embedment; four in. nominal diameter aluminum poles with direct concrete embedment, transformer bases, and slip-base breakaway systems; decorative poles; and multi-column sign structures with W-flange steel beams on slip-base breakaway systems.

Figure 2-13 Example Sign Assemblies Located in Project Limits

The existing sign assemblies are for the most part in good to fair condition with only a handful of sign panels showing physical damage (e.g., bent, peeling legend). Along the seawall of the causeway, multiple "NO FISHING" regulatory signs (non-traffic control) are faded due to continued elemental exposure to sun, rain, and salt spray. Additionally, some of the non-galvanized steel U-channel posts show a significant amount of rust damage.

Refer to the *Existing Signing Inventory Report (November 2023)* for more information on the existing signage within the project limits.

2.3.7 Noise Walls and Perimeter Walls

No noise walls or perimeter walls are present within the study limits.

2.3.8 Intelligent Transportation Systems (ITS) Features

Along the Kane Concourse (SR 922) arterial corridor, there is no integrated Intelligent Transportation System (ITS) for the monitoring, management, and operations of the roadway; however, there are several isolated systems performing specific functions within the project limits.

Electronic Speed Feedback Signs – Integrated systems which employs K-band forward-facing doppler radar to capture and display vehicle speed and warning messages to motorists in real-time to reduce the travel speed of violators. These are isolated systems capable of functioning without connection to a central network; however, providing network communications enable users to monitor health status and record historical data. Electronic speed feedback signs (**Figure 2-14**) are capable of operating via solar-power arrays and hardline power connections.

Figure 2-14 Examples of Electronic Speed Feedback Signs in Project Limits

- Quantity – two (2)
- Owner / Maintaining Agency – Town of Bay Harbor Islands
- Communications – isolated (does not require network connection)
- Power Options – solar, hardline
- Manufacturer(s) – Carmanah Technologies, RU2 Systems

Automated License Plate Readers (ALPR) – Technology leveraging high-speed cameras to capture images with license plate, timestamp, and location information utilized by law enforcement and municipalities to create vehicle-specific location data by cataloging license plate matches. Systems commonly utilize infrared lighting to ensure quality image captures occur in all lighting conditions – day or night. **Figure 2-15** shows examples of ALPR technology within the project limits. Captured images are transmitted to a central repository for storage and processing using network communications – either through point-to-point (P2P) wireless or cellular means. Systems are capable of operation using either solar-power arrays or direct, hardline connections. These standalone systems are not part of the causeway's tolling system but are used for data collection and security surveillance of incoming and outgoing vehicles to and from the islands.

Figure 2-15 Examples of Automated License Plate Readers in Project Limits

- Quantity – five (5)
- Owner / Maintaining Agency – Town of Bay Harbor Islands Police Department
- Communications – wireless point-to-point, cellular
- Power Options – solar, hardline
- Manufacturer(s) – Flock Safety, Cintel

Closed-Circuit Television (CCTV) Cameras – Camera technology providing live video streams for users to remotely monitor real-time traffic and roadway conditions. Fixed cameras provide dedicated fields of view for points of interest – including the bridge, roadway, and causeway. Examples of CCTV within the project limits are seen in **Figure 2-16**. Each camera requires connection back to a centralized network to stream video images in real-time or to a dedicated server responsible for recording and storing video. Power-over Ethernet is the most common form of powering camera systems and provides both power and communications.

Figure 2-16 Examples of CCTV Cameras in Project Limits

- Quantity – fifteen (15)
- Owner / Maintaining Agency – Town of Bay Harbor Island owns and maintains and Town of Bay Harbor Islands Police Department Police Department monitors.
- Communications – wireless point-to-point, cellular
- Power Options – power-over Ethernet
- Manufacturer(s) – Uniarch, etc.

Movable Bridge Warning System – An integrated system used to monitor the status of the movable bridge and provide advanced warning to motorists using flashing beacons, signal heads, and gates. A closed-contact relay connection is made when the movable bridge span begins to open triggering the appropriate response (e.g., beginning flash pattern, changing signal status, lowering gates). The system leverages other systems installed along the bridge, namely CCTV cameras, to monitor for potentially dangerous situations – such as pedestrians located in the movable bridge span portion. While this system is a closed-loop system, communications may be provided to a network to enable monitoring of status remotely. **Figure 2-17** depicts the moveable bridge warning system within the project limits.

Figure 2-17 Movable Bridge Warning System in Project Limits

- Quantity – one (1)
- Owner / Maintaining Agency –Town of Bay Harbor Island
- Communications – direct closed-contact relay
- Power Options – hardline
- Manufacturer(s) – Unknown

2.4 Existing Bridges and Structures

The existing low-level bridge (ID Number 875101) is approximately 1,630 ft. long and consists of 30 spans. The bridge typical section width is 47 ft. 6 in. out-to-out which consists of four 10 ft. lanes, two in each direction, flanked by two 2 ft. 10 ¾ in. raised maintenance areas with 10 ¼" railings. There is no median separation and no shoulders between each travel lane and the curbed maintenance section that is used as a path for pedestrians.

2.4.1 Type of Structure

The existing bridge consists of both fixed and movable structure types. The main span over the navigable channel is a double leaf bascule span of approximately 150 ft. in length as shown in **Figure 2-18**. A pair of concrete bascule piers, one on each side of the navigation channel, support both the steel bascule span and flanking steel i-girder spans. Each bascule pier consists of a large concrete structure that houses the counterweight and operating equipment. The tender house is located on the south side of the west bascule pier, while a multi-use house is located on the north side of the west bascule pier.

Figure 2-18 Bascule Span (Looking North)

There are nine spans approaching from the west side of the bascule span, which consists of eight 50 ft. steel i-girders with steel diaphragms as shown in **Figure 2-19**. There are 20 spans approaching from the east side of the bascule span which consists of eight 50 ft. steel i-girders with steel diaphragms. The steel approach spans are supported by intermediate concrete bents supported by 18" prestressed concrete pile.

Figure 2-19 Approach Spans

2.4.2 Condition and Year of Construction

The description of the overall existing bridge condition is based on FDOT's Bridge Management System *Bridge Inspection Report* and the *Comprehensive Inventory Data Report (CIDR).* The last biennial routine inspection was performed on January 26, 2023.

The bridge was constructed in 1951 and currently has a *Structure Inventory and Appraisal* Sufficiency Rating of 46.3 out of 100 with a Health Index of 88.16 out of 100. The sufficiency rating is a method of evaluating highway bridge data by calculating factors to obtain a numeric value, which is indicative of bridge sufficiency to remain in service. The sufficiency rating includes the following applicable primary factors:

1. Structural Adequacy and Safety including:
    a. Superstructure Condition
    b. Substructure Condition
    c. Load Carrying Capacity
2. Serviceability and Functional Obsolescence including:
    a. Deck Condition
    b. Overall Structural Condition
    c. Roadway Geometry
    d. Traffic Volume
3. Essentiality for Public Use including:
    a. Traffic Volume
    b. Detour Length
    c. Probability of Bridge Closure

The health index is an assessment of a bridge's condition based on the bridge's economic worth, determined from an element level inspection. The health index makes it possible to ascertain the structural quality of the bridge. A lower health index means that more work would be required to improve the bridge to an ideal condition. A health index below 85 generally indicates that some repairs are needed, although it doesn't mean the bridge is unsafe. A low health index may also indicate that it would be more economical to replace the bridge than to repair it.

The bridge has been in service for nearly 72 years. At the time of construction, it was customary to design a bridge with an anticipated service life of 50 years. According to the *2023 FDOT Bridge Management System Inspection Report*, the bridge is located in an extremely aggressive coastal environment and carries a high volume of heavily loaded truck traffic (Average Daily Traffic = 25,100, 6.6% trucks). The bridge opens a maximum of two times every hour to allow boat traffic. The overall condition of the bridge is consistent with the age, environmental conditions, traffic use, and frequency of openings.

The current typical section does not meet current standards due to insufficient shoulder widths, insufficient maintenance section used by pedestrian with widths that do not meet ADA criteria, and outdated traffic railing barriers as shown in **Figure 2-20**. Therefore, the bridge is classified as Functionally Obsolete as well as Structurally Deficient. The National Bridge Inventory (NBI) ratings from the most recent Bridge Inspection Report indicate the overall condition rating of the deck is *Poor* due to depressions in the deck top and spall/delamination areas with exposed rebars throughout the concrete deck underside comprising more than 5% of the deck area. Superstructure

is considered *Fair* due to corrosion with section loss on the steel beams, bearings, and main girders. The overall condition rating of the Substructure is *Serious* due to large spalled areas at pier caps 6, 9, and 22, with compromised/loss of bearing areas beneath the bearings.

Figure 2-20 Traffic Railings

Load Capacity: The bridge load carrying capacity has not been recently re-evaluated. According to the 1996 load rating, the structure does not require posting for load restrictions. The structure is not posting signage.

Scour: According to the *2023 FDOT Bridge Management System Inspection Report* a Phase II Scour Evaluation was previously performed, and the bridge was determined not to be scour critical (i.e., there are no current conditions or anticipated future scour that would cause a condition in which the stability of the bridge would be in question).

Safety Features: The post and beam concrete bridge railings are substandard, as they do not meet current standards for roadside safety in both terms of geometry and impact resistance. Railings for new bridges are required to meet specific crash testing and geometric requirements outlined in *NCHRP Report 350, Recommended Procedure for the Safety Performance Evaluation of Highway Features* which has been adopted by the American Association of State Highway and Transportation Officials (AASHTO) and FDOT.

2.4.3 Span Arrangement

The existing low-level bridge (ID Number 875101) is approximately 1,630 ft. long and consists of 30 spans. The main span over the navigable channel is a double leaf bascule span of approximately 150 ft. in length. There are nine spans approaching from the west side of the bascule span, which consists of eight, 50 ft., steel i-girders with steel diaphragms. There are 20 spans approaching from the east side of the bascule span which consists of eight, 50 ft., steel i-girders with steel diaphragms.

2.4.4 Previous Repair Projects

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 in the upcoming year amount to $3.0 million. As the structure continues to age, frequent costly repairs will be needed to prevent closure or severe damages.

2.4.5 Channel Data

The Broad Causeway Bridge carries Broad Causeway over the ICWW, which is the main federal navigation channel running from Massachusetts southward along the Atlantic Seaboard and around the southern tip of Florida, then following the Gulf Coast to Brownsville, Texas at the Mexico border. A prestressed concrete pile-supported timber fender system along both sides of the channel protects the bridge from vessel impact. The channel data presented below is based on the *2023 FDOT Bridge Management System Inspection Report* (**Table 2-12**).

Table 2-12 Channel Data

Structure Number	Navigable Horizontal Clearance	Navigable Vertical Clearance	Maximum Waterway Depth	Condition State	NBI Rating
875101	84 ft.	16 ft.*	11.9 ft.	2	7 – Minor Damage

*This number is rounded in the inspection Report, the exact vertical clearance of Structure Number 875101 is 15.7 ft.

2.4.6 Bridge Openings

Since the ICWW at the bridge crossing is deemed a navigable waterway by the USCG, Broad Causeway Bridge personnel must be available 24 hours per day, seven days a week, 365 days a year to open and close the bridge at the appointed times every hour. The Town is under Part B of the Federal Regulations which means the bridge can be kept closed except during designated times and not opening at regular intervals, only opening if vessels are waiting at the designated time each hour. For Broad Causeway, the bridge is allowed to stay closed between 6 PM and 8 AM and has scheduled openings between 8 AM to 6 PM twice per hour on the quarter and three-quarter hour but only opens if vessels are waiting. The bridge may be opened on demand to allow passage of public vessels of the United States, tugboats with tows, or in case of emergencies.

The bascule bridge tender logs were analyzed for the time period between January 2022 and December 2022. During this period the bridge opened 7,370 times. This averages 20 openings per day. The peak boat traffic months were from March through May. **Table 2-13** shows the details of the bridge openings by month during that time period. These statistics were considered when developing the various alternatives.

Table 2-13 Bridge Openings between January 2022 and December 2022

Month – Year	No. of Openings
January 2022	603
February 2022	642
March 2022	737
April 2022	711
May 2022	712
June 2022	488
July 2022	678
August 2022	572
September 2022	464
October 2022	618
November 2022	556
December 2022	589
TOTAL	**7,370**

2.4.7 Vessel Height Data

The Town met with the USCG and FDOT on January 20, 2023, to discuss the required clearance for a new bridge. Based on coordination with the USCG, they did not require a "Navigation Impact Study" if providing a 65 ft. vertical clearance fixed bridge or a movable bridge 21 ft. vertical clearance or over. Vessel types were analyzed in the bascule bridge tender's log between January 2022 and December 2022. These bridge tender's logs did not include vessel (mast) heights. The analysis indicated that the majority of vessels passing through the bridge were yachts, sport fisherman, sailboats, catamarans, and trawlers. A summary of vessel types is shown in **Table 2-14** below. USCG coordination documents are located in **Appendix E**.

The average boat clearances (or heights) for a select type of vessel is as follows:

- Center Consoles (CC): 9 ft.-6 in. (with canopy)
- Barges: 14 ft. (with no cargo)
- Small Yacht: 20 ft.
- Emergency Fire: 25 ft.
- Catamaran: 39 ft.
- Charter: 40 ft.

- Average Size Yacht: 40 ft.
- Sport Fishing: 40 ft. (with fixed canopy and/or antenna)
- Sailboat: 50 ft.

According to the tender log data in **Table 2-14**, a total of 15,265 vessels have passed through the bridge under 7,370 openings (see **Table 2-13**) with the existing vertical clearance of 15.7 ft. Assuming the average boat clearances above, a low-level movable bridge with the minimum 21 ft. clearance would likely result in the same number of openings as the current 15.7 ft clearance. Thus, there is no benefit to improving flow of vehicular traffic by replacing the bridge with a low-level movable bridge. Therefore, a mid-level movable bridge alternative with a 40 ft. clearance was considered due to its ability to accommodate the majority of boat traffic and thus reducing the number of bridge openings. The data above supports this assumption because it appears that approximately 70 to 80 percent of the waterway users that currently require the existing bridge to open, would now be able to pass through without opening.

Table 2-14 Vessel Types January 2022 and December 2022

Month	Barge	Center Console	Cata-maran	Cat-Sail	Charter	Other (Cruiser, Stroaker, Houseboat or Trimaran)	Emergency Vehicle / Fire Boat	Not Specified / Illegible / Other	Power-Cat	Sail	Sport Fish	Towboat	Trawler	Tug	USCG	Yacht	Total Vessels
January	20	13	39	5	11	1	1	0	2	90	173	5	62	10	4	773	1209
February	17	12	68	3	22	1	2	0	6	102	143	9	73	8	1	1,067	1,534
March	24	4	79	9	31	3	20	3	10	104	171	14	111	3	6	1,117	1,709
April	39	5	49	4	32	0	20	0	15	85	159	12	65	11	1	1,083	1,580
May	20	15	58	6	33	0	15	5	8	44	142	11	40	6	9	1,064	1,476
June	17	4	20	4	24	0	2	0	4	48	99	11	18	8	1	620	880
July	15	0	42	0	26	0	3	0	3	40	151	8	13	2	6	1,153	1,462
August	20	3	36	2	8	0	2	0	0	21	122	11	10	2	3	765	1005
September	13	4	28	2	14	0	0	0	3	17	85	8	5	1	3	637	820
October	30	16	36	4	17	0	0	0	3	18	94	8	21	5	4	840	1096
November	15	20	46	2	23	0	0	0	3	43	115	3	34	4	2	821	1131
December	15	18	50	13	20	0	2	0	0	91	101	7	51	2	2	991	1363
Total	**245**	**114**	**551**	**54**	**261**	**5**	**67**	**8**	**57**	**703**	**1555**	**107**	**503**	**62**	**42**	**10,931**	**15,265**

2.5 Existing Environmental Features

2.5.1 Social and Economic

The project bridge carries Broad Causeway over Biscayne Bay and the ICWW 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 the East Island. The existing land use for the project is described in **Section 2.2.5**. 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. Specific community features reported within the 500 ft. project buffer include the Bay Harbor Islands Tot Lot, Florida Circumnavigational Saltwater Paddling Trail, and cultural resources.

The Sociocultural Effects Evaluation (SCE) process is used to identify and address the effects of a transportation improvement project on a community and its quality of life. To ensure no important factors were overlooked, a quarter-mile buffer of the project study area was used to capture all aspects of the affected community. Additional detail is located in the *Sociocultural Effects Evaluation Technical Memorandum (May 2024)*.

Demographics Analysis

This project is located entirely within the Town of Bay Harbor Islands, but this study area for sociocultural effects also covers a small portion of North Miami, west of the project terminus.

A demographic profile of the study area was prepared and compared against Miami-Dade County. The demographic profile utilizes data from the Environmental Screening Tool (EST) Sociocultural Data Report (SDR). The SDR uses the 2018 to 2022 American Community Survey (ACS) data and reflects the approximation of the population based on the area of a quarter-mile buffer intersecting the Census block groups along the project corridor. The most current ACS data is used to characterize the population with potential to be directly affected by the project.

Race and Ethnicity

In summary, the data indicates that residents within a quarter-mile buffer of the project are at 57.78% minority, which is much lower than Miami-Dade County's minority population percentage of 86.97%. The minority population within a quarter-mile buffer is primarily "Claim Two or More Races" (23.41%) with about 48% of the population being Hispanic or Latino ethnicity (of any race).

Age and Persons with Disabilities

The analysis indicates that roughly 18% of the population in the study area are age 65 and older, with the median age of 40 years, which is comparable to the median age in Miami-Dade County of 40.6 years. It should be noted that within the study area 26.12% of the populations is 18 years or younger. Approximately 4.14% of the population aged 20 to 64 years has a disability.

Income/Poverty Status

The median income has more than doubled for households within the study area between 2000 and 2020 to roughly $113,258 which is $59,283 higher than Miami-Dade County's median household

income of $53,975 in 2020. The percent of households within a quarter mile of the project living below the poverty level has decreased from 6.56% to 3.10% since 2010, which is 13.11% lower than Miami-Dade County's average of 16.21%.

Education Attainment

The study area population has a high degree of educational attainment, with roughly 94% high school graduates, while 56% have received a Bachelor's degree or higher education.

Occupied Housing with No Vehicle

About 3.4% of the households within a quarter mile buffer of the project do not have access to a vehicle, compared to 9.74% of households county-wide.

English Language Proficiency

Approximately 15.8% of the population within a quarter mile of the project has limited English proficiency (LEP), or "Speaks English Less than Very Well", compared to 33.95% in Miami-Dade County. Based on the demographics of the project area and surrounding communities, including North Maimi, the Town decided to provide Limited English Proficiency (LEP) services and sent newsletters to the public in English and Spanish. Translation services were available upon request for all public meetings in Spanish, Portuguese, French, and Creole.

As one of seven crossings of Biscayne Bay and the ICWW between the mainland and the barrier islands, Broad Causeway Bridge provides access from I-95 and US 1 to the Town of Bay Harbor Islands, Village of Bal Harbour, and Town of Surfside. The bridge on Broad Causeway is essential to maintaining the movement of people and goods along the corridor as well as providing access to local businesses in the Town of Bay Harbor Islands, Village of Bal Harbour, Town of Surfside, and the City of North Miami. The project is located within two U.S. Census Designated Places [Bay Harbor Islands and North Miami] and is in an area of high tourist activity connecting North Miami to the beach communities such as Surfside and Bal Harbour. According to Miami-Dade Beacon Council, the labor force on Bay Harbor Islands is 3,139 people and the largest job counts are for office and administrative support, sales, managers, healthcare support, and financial operations with 25% being blue collar workers (perform manual labor) and 74% being white collar workers (office jobs). Based on online information from Zippia, major businesses in the North Miami area include Jackson North Medical Center, Grand Realty of America, City of North Miami Beach, ECE Consulting Group, and Klika Tech. Overall, in the long term, the proposed project is expected to improve both the economic conditions of the area and mobility by maintaining an important regional connection to jobs, essential services, and tourist destinations.

Existing mobility resources are outlined in **Section 2.2.10** and aesthetics in **Section 2.3.5**.

2.5.2 Cultural Resources

The Town-owned Tot Lot is located on the northeast side of the bridge at 9600 W Broadview Drive. It is a gated park with shaded playground equipment which includes ADA accessible components and a picnic pavilion.

The Florida Circumnavigational Saltwater Paddling Trail begins at Big Lagoon State Park near Pensacola, extending around the Florida peninsula and Keys, and ending at Fort Clinch State Park

near the Georgia state line in Fernandina Beach, the Florida Circumnavigational Saltwater Paddling Trail is a 1,515-mile sea kayaking paradise. It is the country's longest designated national recreation trail. Within the project area the trail follows the ICWW. The Florida Circumnavigational Saltwater Paddling Trail follows the ICWW under the existing Broad Causeway Bridge.

Broad Causeway Bridge, Citgo Service Station, and Bay Harbor Islands Historic District are located within the project corridor and are NRHP-eligible resources that were evaluated for potential Section 4(f) impacts. The Town is currently coordinating with the FDOT and the State Historic Preservation Officer (SHPO) to prepare a Memorandum of Agreement for adverse effects to these resources.

The CRAS determined that thirteen (13) historic resources are eligible for listing in the NRHP either individually or as part of a historic district with the APE (or have insufficient information to fully determine eligibility). These identified resources include one (1) linear resource (Broad Causeway [8DA10123, FDOT Bridge No. 875101]), eight (8) historic structures (9700 W Broadview Drive [8DA10435], Citgo [8DA10436], 2395 Bayview Lane [8DA21593], Whitehouse Inn on the Bay [8DA21598], and Majorca Towers [8DA21599], 9600 Broadview Terrace [8DA21630], 1371 96th Street [8DA21606], and 1330 96th Street [8DA21607]), and four (4) resource groups (Bay Harbor Islands Historic District [9DA10515], Keystone Islands [8DA11549], Broad Causeway Island [8DA21594], and Indian Creek Country Club Golf Course [8DA21608]).

No archaeological sites were identified that are eligible for listing in the NRHP within the archaeological APE.

2.5.3 Natural Resources

Biscayne Bay is the most predominant natural feature in the project study area. Biscayne Bay is a major focal point for environmental analysis with regards to protected species. The project study area falls within Biscayne Bay Aquatic Preserve (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 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 (F.S. 18-18.001).

There are 18 jurisdictional wetland systems (seagrass beds) located within the Biscayne Bay portion of the project study area, representing 1.34 ac. The 18 seagrass beds range in size from 0.00002 ac to 0.29 ac.

The project study area occurs within the USFWS's designated Consultation Areas for the West Indian manatee (*Trichechus manatus),* piping plover (*Charadrius melodus*), American crocodile (*Crocodylus acutus*), and Florida bonneted bat (*Eumpos floridanus*). In addition, the project study area is located within USFWS designated critical habitat (CH) for the West Indian manatee and the proposed CH for the green sea turtle (*Chelonia mydas*).

The project study area occurs within BBAP and will involve in-water work; therefore, the project has the potential to directly and indirectly impact benthic resources and habitats that have been designated as Essential Fish Habitat (EFH) and Habitat Areas of Particular Concern (HAPCs) by the South Atlantic Fisheries Management Council (SAFMC).

There are 26 wildlife species that are federally listed or proposed for listing (3 mammals, 2 birds, 1 insect, 6 reptiles, 3 fish, and 7 corals) and four state listed birds with potential to occur in the project study area. Several federally and state listed plants have been documented to occur in Miami-Dade County; however, these plant species 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.

Section 7 Endangered Species Act Consultation will be completed during the PD&E Study with the USFWS, FWC, and NMFS. The USFWS provided concurrence with these effect determinations on May 2, 2024. The USFWS concurrence sticker is included in **Appendix F**. The FWC provided concurrence on May 13, 2024. The FWC concurrence letter is included in **Appendix F**.

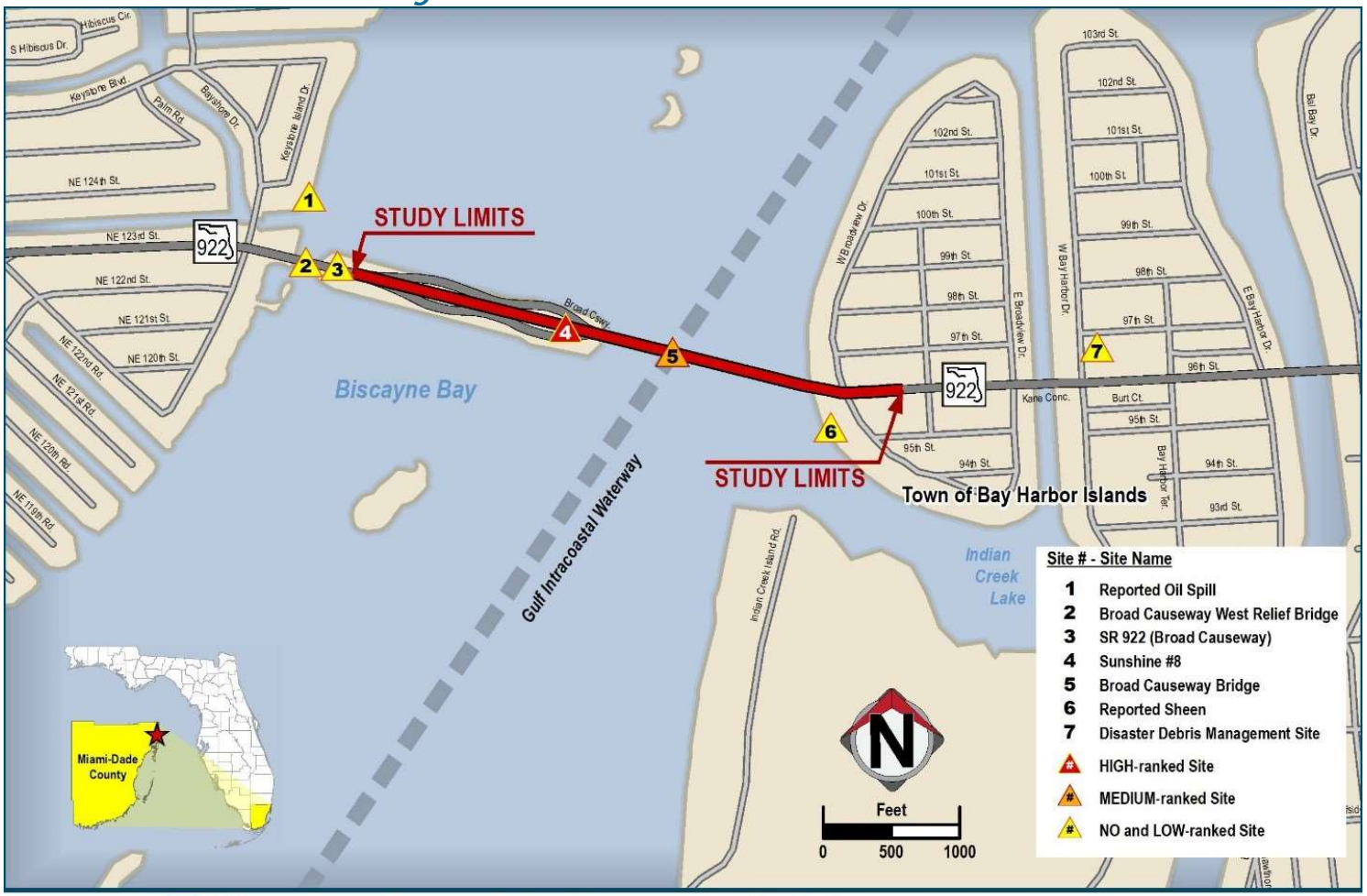
2.5.4 Physical

For the purpose of maintaining traffic during construction, the Broad Causeway Bridge is anticipated to be replaced on new alignment with changes to the width and height to bring the bridge to current design standards and USCG requirements. Although capacity is not increasing, the vertical alignment and height of the bridge is changing; therefore, it could influence highway traffic noise. The FHWA's Traffic Noise Model (TNM) was used to predict existing noise levels for receptors located near roadways and where traffic noise is dominant. An evaluation of substantial increases was performed for this PD&E Study phase analysis. Each noise sensitive site was assigned an existing noise level based on TNM predicted existing noise levels. No eye clinics, laser facilities, or senior care facilities [other features that have a higher propensity to be impacted by noise and vibration effects] are reported within the project vicinity.

The project is not located within a United States Environmental Protection Agency (USEPA)-designated Air Quality Maintenance Area or Non-Attainment Area for any of the six pollutants [ozone, carbon monoxide (CO), sulfur dioxide, nitrogen dioxide, lead, and small particulate matter] specified by the USEPA in National Ambient Air Quality Standards; therefore, the Clean Air Act conformity requirements do not currently apply to this project.

Potential sources of contamination have been identified. All sites along or in proximity to the corridor were evaluated through review of historical resources such as aerial photographs, regulatory sources at the Federal, State, and local levels, and site reviews. The environmental screening evaluation has resulted in a "High" ranking for one site (Sunshine #8), a "Medium" ranking for one site/structure (Broad Causeway Bridge), a "Low" ranking for two sites (reported oil spill at 12405 Keystone Island Drive in North Miami and reported sheen at 9510 West Broadview Drive), and a "No" ranking for three sites (Broad Causeway, Broad Causeway West Relief Bridge, and disaster debris management site) as shown in **Figure 2-21**.

Figure 2-21 Potential Contamination Sites



Broad Causeway Bridge Replacement PD&E Study
Town of Bay Harbor Islands
Miami - Dade County, Florida
FPID: 452428-1-21-01

3.0 FUTURE CONDITIONS

3.1 Future Conditions Considerations

3.1.1 Traffic Forecasting

In the *Project Traffic Analysis Report* (March 2024), future demand volumes and design hour volumes were estimated after reviewing multiple sources of historical and projected data. This included historical traffic counts with regression analysis applied, the Southeast Florida Regional Planning Model (SERPM), existing year turning movement counts and 24-hour machine counts, and population projections from the Bureau of Economic and Business Research (BEBR).

The steps used in developing the growth rate are listed below. To determine an average growth rate, each step of the traffic forecasting methodology was considered.

1. Growth rates were obtained from the SERPM.
2. Historical Average Annual Daily Traffic (AADT) volumes were obtained to review historical traffic trends.
3. Population projections from FDOT were obtained to understand the population growth in the study area.
4. Population projections from BEBR were obtained as an additional resource to understand the future growth in the study area.
5. Based on all the above information, a growth rate was determined and recommended for use in future traffic projections.
6. The Opening (2030) and Design (2050) Year segment and intersection volumes were generated by applying the selected annual average growth rate to Existing Year 2023 traffic volumes.

Travel Demand Forecasting analysis was incorporated into the Project Traffic Analysis Report to develop future-year design traffic volumes. The SERPM Version 8.524 was utilized in the development of future travel demand. The SERPM has a base year of 2015 and a horizon year of 2045 and projects traffic by assumed growth rates and adding constructed and committed roadway improvements. After completion of the travel demand forecast, a 0.29% growth rate was obtained.

Historical counts with regression analysis resulted in an annual growth rate that ranged between a -0.57 annual reduction to a 0.90 annual increase. BEBR population annual projection rates ranged between -0.2 to 1.15% per year.

After reviewing the study area's historical growth trends and population projections, it is determined that all growth rate estimates fell between an annual range of -0.57% and 1.15%.

Taking into consideration each data estimate, the recommended annual growth rate for use in developing future volumes is 1.00% per year.

3.1.2 Design Hour Volumes

Design Hour Volumes were estimated based on guidance from the FDOT *Project Traffic Handbook (2019)*. Design hour volumes were estimated based on data collected from FDOT's Florida Traffic Online (FTO) web application was utilized to supplement collected traffic data. Two portable traffic

monitoring sites from FTO count information includes historical AADT, directional hourly volumes, vehicle classification, and truck factors. Standard peak hour (K) factors (9.0% for urban areas) were used for the peak hour conditions. Directional (D) factors were obtained from Florida Traffic Online. D factors and confirming from the 24-hour approach count and eight-hour turning movement count (TMC) data. Truck factors were based on classification counts collected in February 2023 that resulted in 6.60% daily truck and a design hour truck (DHT) factor of 3.30%.

3.1.3 Future Context Classification

According to the FDOT Context Classification Guide the context classification of a bridge or tunnel should be based on the context classification of the segments on either end of the bridge. Meaning that the context classification of the bridge is dependent on changes that may occur on adjacent segments. The project limits are not listed on the FDOT Context Classification Geographic Information System (GIS)because the segment is off system. The adjacent segments of SR 922 east and west of the project limits are C4 (east) and C5 (west). The proposed and existing bridge tie directly to the C5 section which is considered the design Context Classification. Barring any changes however, the context classification for the bridge is to remain C5.

3.1.4 Future Land Use and Developments

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. The causeway island is classified as "Infrastructure" with "Commercial/Office" where the existing service station is located. East of the causeway, the West Island is classified as "Single-Family residential" with "Parks and Recreation" and East Island is a mix of "Multi-family Residential" with "Commercial/Office" and "Public/Institutional."

3.1.5 Future No-Build Traffic Analysis

For future year segment analysis for both the no-build and build alternatives are analyzed using peak hour and daily segment volumes. The segment volumes were obtained by growing existing counts by an 1.0% annual growth factor. **Table 3-1** summarizes level of service and volume to capacity for daily volumes using 2023 FDOT Generalized Service Volume Tables. HCM methods will be used to show peak hour analysis in the Future Build Alternatives traffic performance analysis.

The future no-build segment analysis, results in a 2050 volume to service volume capacity of 0.88 and a LOS of D, which is within the statewide urban segment target of LOS D threshold.

Table 3-1 Future Segment Volume Analysis Summary (Daily)

Roadway	Extents	Scenario	Volume	Service Volume Capacity	v/c	LOS	Targeted LOS
Broad Causeway	Bayshore Dr. to West Broadview Dr.	2030 No-Build	26,900	36,100	0.74	D	D
		2050 No-Build	31,900	36,100	0.88	D	D

Sources: FDOT 2023 Quality/Level of Service Handbook Generalized Tables (C4)

4.0 DESIGN CONTROLS AND CRITERIA

In order for the proposed roadway improvements to fulfill the objective of accommodating motorized vehicles, pedestrians, and bicyclists in a safe and efficient manner, the proposed typical sections and design features must adhere to specific design standards. The *FDOT Design Manual (FDM)* was utilized where design conditions could be met but the *Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (Florida Greenbook 2018 Edition)* will govern as the project is not on an FDOT Roadway.

4.1 Design Controls

Table 4-1 presents the parameters or physical characteristics that affect the selection of criteria and standards for the design of the project alternatives.

Table 4-1 Design Controls

Roadway Context Classification	*C5 Urban Center*
Functional Classification	*Urban Minor Arterial*
SIS Designation	*Not a SIS roadway but does cross the ICWW which is a SIS.*
Design and Target Speed	*Design Speed: 30 mph* *Target Speed: 30 mph*
Capacity and LOS Target	*AADT: 36,600* *Peak Hour Directional: 1,800* *LOS Target: LOS D*
Design Vehicle	*WB-50*
Pedestrian and Bicycle Requirements	*Separate use facility for pedestrians and bicyclists*
Physical Constraints	*Existing historic service station, 300 ft. Town controlled tidewaters and lands, residential relocations, submerged gas line, Section 4(f) resources, existing bridge*
Environmental Constraints	*High risk contamination site (service station), essential fish habitat including seagrasses and corals, juvenile mangroves*
Type of Stormwater Management Facilities	*Retention*
Navigational Requirements	*USCG Movable Bridge Height: 21 ft.* *USCG Fixed Bridge Height: 65 ft.* *USCG Horizontal Clearance: 90 ft.*
Mean High Water	*Current MHHW Elevation = 0.258 ft NAVD88* *Total sea level rise over service life = 1.242 ft* *Future MHHW Elevation = 1.5 ft NAVD88*
Design Wave Heights	*The preliminary design wave height is 3.12 ft. This corresponds to the 100-yr significant wave height at the bridge.*

4.2 Design Criteria

Table 4-2 presents the pertinent minimum design criteria used for this effort and their respective values or designations.

Table 4-2 Roadway Design Standards

Design Criteria to meet FDOT FDM when possible and Florida Greenbook 2018 when restricted since project is not on the State Highway System (SHS).		
DESIGN CRITERIA	**DESIGN STANDARD**	**SOURCE**
FUNCTIONAL CLASSIFICATION	Urban Minor Arterial	SLD/Functional class definition FDM 200.2
CONTEXT CLASSIFICATION	C4 Urban General and C5-Urban Center	FDOT GIS
POSTED SPEED	30 mph	Google Earth/Field Review
TARGET SPEED	30 mph	30 mph
DESIGN SPEED (V)	30 mph	FDM 201.5.1
Design Vehicle	WB-50	Meets overall dimensions of gas delivery trucks
HORIZONTAL ALIGNMENT		
Max. Curvature	D Max = 20 Degrees	FDM Table 210.9.2
Border Width	12 ft. (10 ft. with bicycle lane)	FDM Table 210.7.1
Minimum Lateral Clearance	Locate in accordance with FDOT Standard Plans	FDM Table 215.2.2
	1.5ft. from face of curb – Light Poles	FDM Table 215.2.2
	1.5 ft. from face of curb – Above Ground Fixed Utilities	FDM Table 215.2.2
	1.5 ft. from face of curb – Signal Poles and Controller Cabinet	FDM Table 215.2.2
	1.5ft. from face of curb- Trees	FDM Table 215.2.2
	1.5 ft. from face of curb – Other Roadside Obstacles	FDM Table 215.2.2
	1.5 ft. from face of curb – ITS Poles	FDM Table 215.2.2
	Bridge Pier/Abutment (use greater of the following)	FDM Table 215.2.2
	16 ft. from Edge of Travel Lane	
	4 ft. from Face of Curb to outside Aux. Lane	
	6 ft. from inside Aux Lane	
Max. Superelevation	0.05	FDM Table 210.9.2
Superelevation Transition Slope Rate	1:100 (50 ft. minimum length of transition)	FDM Table 210.9.3
Max. Deflection w/o Curve	2° 00′ 00″	FDM 210.8.1
Max. Deflection Through Intersection	8° 00′ 00″	FDM Table 212.7.1

Min. Horizontal Curve Length	450 ft.* (when desirable horizontal curve length cannot be attained, provide the greatest attainable length possible, but not less than 400 ft.)	FDM Table 210.8.1
Max. Curvature Using Normal Cross Slopes	7° 00' 00"	FDM Table 210.9.2
VERTICAL ALIGNMENT		
K Value for Vertical Curve (Crest)	31	FDM Table 210.10.3
Minimum Length (Crest)	90 ft.	FDM Table 210.10.4
K Value for Vertical Curve (Sag)	37	FDM Table 210.10.3
Minimum Length (Sag)	90 ft.	FDM Table 210.10.4
Grades	Grades may mirror the roadway profile. When sidewalk is not adjacent to a traveled way, sidewalk grades are not to exceed 5%	FDM 222.2.1.3
	8% Maximum	FDM Table 210.10.1
	0.3% Minimum	FDM 210.10.1.1
Min. Distance Between VPI's	250 ft.	FDM 210.10.1.1
Max. Change in Grade w/o Vertical Curve	1.00%	FDM Table 210.10.2
Roadway Base Clearance	1 ft. min	FDM 210.10.3
Vertical Clearance Over Water	1 ft. above 100-yr wave crest elevation	FDM 260.8.1
Vertical Clearance Over Navigation Channel	65 ft. (fixed bridge) 21 ft. (movable bridge)	US Coast Guard
SIGHT DISTANCE		
Minimum Stopping Sight Distance for Grades 5%	211 ft. (downgrade), 186 ft. (upgrade)	FDM Table 210.11.1
Minimum Stopping Sight Distance for Grades 6%	215 ft. (downgrade), 184 ft. (upgrade)	FDM Table 210.11.1
Minimum Stopping Sight Distance for Grades 7%	218 ft. (downgrade), 182 ft. (upgrade)	FDM Table 210.11.1
Minimum Stopping Sight Distance for Grades 8%	222 ft. (downgrade), 180 ft. (upgrade)	FDM Table 210.11.1

Minimum Stopping Sight Distance for Grades ≤ 2%	200 ft.	FDM Table 210.11.1
Minimum Passing Sight Distance	1090 ft.	FDM Table 210.11.2
ROADWAY ELEMENTS – Main Line		
Through Lane Width	11 ft. (10 ft min.)	FDM Table 210.2.1
Turn Lane Width	11 ft. (10 ft min.)	FDM Table 210.2.1
Bicycle Lane Width	Not Applicable	FDM Figure 223.2.3
Shoulder Width on Bridge	Outside shoulders 8 ft. min. Inside shoulders 4 ft. min.	FDM 260.1.4 Florida Greenbook 2018 Table 3-21
Shoulder Width on Approach Roadway	Outside shoulders 8 ft. min. Inside shoulders 4 ft. min.	Florida Greenbook 2018 Table 3-21
Sidewalk Width	10 ft. (adjacent to curb, not to be less than 6 ft.)	FDM Table 222.2.1
	6 ft on bridge	FDM 260.2.2
Shared-Use Path	Width: 10 ft to 14 ft Max. Slope: 5% (8.33% on ramps) Shoulder Width: 2 ft. w/max. grade of 1:6 Horizontal Clearance: 4 ft. Vertical Clearance: 10 ft. Design Speed: 18 mph Mininum Radius: 86 ft. Minimum Stopping Sight Distance: 383 Separation from Roadway: 5 ft.	FDM 224.4 FDM 224.6 FDM 224.7 FDM 224.7 FDM 224.8 FDM 224.9 FDM 224.10.1 FDM 224.10.2 FDM 224.12
Side Slopes	Front Slope: 1:2 or to suit property owner, not flatter than 1:6	FDM Table 215.2.3
	Back Slope: 1:2 or to suit property owner, not flatter than 1:6	FDM Table 215.2.3
Recoverable Transverse Slopes	1:4	FDM Table 215.2.3
Travel Lane Cross Slope (ft/ft)	0.02	FDM Figure 210.2.1
ROADWAY ELEMENTS – Ramps/Auxiliary Lanes		
Number of Through Lanes	Provide access to service station in all directions	Town of Bay Harbor
Lane Width	15 ft. Ramp	FDM 211.2
	12 ft Auxiliary Lane	FDM 211.2.1
Ramp Widths	Total Pavement Width: 21 ft. Total Shoulder Width: 6 ft.	Fl. Greenbk. 2018 Tb. 3-35 (Case II) FDM Table 211.4.1
Canal Hazard	40 ft. min (curbed), 50 ft.(Flush)	Florida Greenbook 2018 Chapter 4.B.2.c
Maximum Grade	8% Maximum	FDM Table 210.10.1

Minimum K Value for Vertical Curve (Sag)	37	FDM Table 211.9.2
Minimum K Value for Vertical Curve (Crest)	31	FDM Table 211.9.2
Minimum Curve Length	90 ft.	FDM 211.9.3
Travel Lane Cross Slope (ft/ft)	0.02	FDM Figure 211.2.1
Length of Horizontal Curve	450 ft. (400 ft. min)	FDM Table 211.7.1

4.3 Structural Design Specifications

The structural design of the proposed Broad Causeway Bridge replacement alternatives will be in accordance with the FDOT standard practices and procedures. The design will be in compliance with the following:

- AASHTO Load & Resistance Factor Design (LRFD) Bridge Design Specifications (9th Edition)
- AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (1st Edition, with 2020 Interim Revisions)
- AASHTO Manual for Bridge Evaluation (3rd Edition, with 2020 Interim Revisions)
- FDOT Structures Manual (January 2024)
- FDOT Bridge Load Rating Manual (2023)
- FDOT Standard Plans for Bridge Construction (FY 2023-24)

4.3.1 United States Coast Guard Guide Clearances

The USCG guide clearances have been established for a new bridge crossing the ICWW at this location. They are 21 ft. vertical clearance at MHW for new movable bridges in the closed position and 65 ft. vertical clearance at MHW for new fixed-span bridges. The horizontal guide clearance for all bridge replacement alternatives is 90 ft. perpendicular between fenders.

4.3.2 Splash Zone

One reason for the deterioration of the existing structure is its location in vertical proximity to the saltwater. According to the FDOT *Structures Design Guidelines* (January 2024), the splash zone applies to marine structures and is defined as the vertical distance from 4 ft. below MLW to 12 ft. above MHW and/or areas subject to wetting by personal watercraft (e.g., jet skis) or other activities and features. Providing for this area in new bridge designs will significantly protect the structure from the effects of corrosion since the bridge superstructure will be less susceptible to saltwater spray which can be absorbed into the concrete and cause corrosion of the reinforcing steel. All new structure concepts considered for this project would be constructed above the splash zone.

4.3.3 Wave Crest Elevation

Wave conditions at the bridge site result from winds blowing along varying fetches within Biscayne Bay. The *Structures Design Guidelines* requires that new bridges be designed such that the low member is one foot above the wave crest elevation. Bridge replacement alternatives will be designed to clear the wave crest elevation by one foot or be designed to resist wave forces.

4.3.4 Hydrology, Hydraulics, and Bridge Scour

Compliance with hydrology, hydraulics, and bridge scour criteria allow the highway to continue to function safely during rainfall and runoff. These criteria and policies are in the manuals listed below:

- FDOT January 2023 Drainage Manual
- FDOT Drainage Design Guide (January 2023)
- FDOT Design Manual (January 2024)
- Town of Bay Harbors Islands Municode Chapter 23 / Article I / Section 23.12(10)(c) (Minimum seawall Elevation

5.0 ALTERNATIVE ANALYSIS

The alternatives analysis involved developing, evaluating, and eliminating potential project alternatives based on the purpose and need, engineering and environmental analyses, public input, cost, and safety. Refer to **Section 1.4.1** for a description of the alternative analysis process.

5.1 No Build (Repair) Alternative

The No Build (Repair) Alternative consists of keeping the existing movable bridge in place and not constructing a new bridge. The bridge 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. The Town would continue normal maintenance and make minor repairs of the existing bridge in its current configuration while keeping the bridge operating in a safe condition and maintaining the existing typical sections as shown previously in **Figure 2-1** through **Figure 2-3**. Repairs would include repairing the concrete (sealing cracks, patching spalls, etc.) in the piles, pile caps, deck, beams, and traffic railing; repairing the fender system; and repairing the drawbridge operational machinery in order to extend the service life 15 to 25 years. The estimated repair costs are shown in **Section 5.4.5** for the concrete fixed spans and the steel movable span, respectively.

The No Build (Repair) Alternative requires closure of the bridge for an undetermined amount of time based on repairs needed. At the end of the service life period, an extensive rehabilitation, decommissioning, or replacement of the bridge would be required. An 11.12-mile detour to the south and a 9.4-mile detour to the north would have to be utilized if the bridge is decommissioned or closed for extensive repairs. The No Build (Repair) Alternative does not require stormwater management facilities (SMFs) since it does not alter the existing roadway or add additional capacity; therefore, no treatment of the runoff would occur. The existing bridge would remain in its current configuration and no additional travel lanes are proposed.

Although No Build (Repair) 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 as required by NEPA.

5.2 Alternatives Considered But Eliminated

5.2.1 Transportation Systems Management and Operations Alternative

The Transportation Systems Management and Operations (TSM&O) activities generally provide short-term improvements that extend the service life of the facility. The TSM&O activities include strategies designed to optimize the performance and utilization of the existing infrastructure through implementation of systems, services, and projects to preserve the capacity and improve the security, safety, and reliability of the transportation system. TSM&O improvements include, but are not limited to, upgrades or additions to the existing facility, such as arterial traffic management systems, traffic incident management, work zone traffic management, road weather management, traveler information services, commercial vehicle operations, transit priority signals systems, freight management, improved traffic signals and intersection geometries, sidewalks, bicycle facilities, signal timing, and improved access features. While these activities may provide system improvements, the

purpose of this project is to address the structural and functional deficiencies of the existing Broad Causeway Bridge, therefore, the TSM&O Alternative does not meet the purpose and need of the project. This alternative was not considered to be a viable alternative; however, TSM&O strategies will be incorporated into the preferred alternative as appropriate and implemented to enhance traffic safety and mobility. For these reasons, and considering the other advantages and disadvantages above, the TSM&O Alternative was eliminated from further consideration.

5.2.2 Multimodal Alternative

The design plans for the bridge reconstruction removes the bike lane along the shoulder and develops a shared-use path horizontally separated from the roadway.

According to the 2045 Miami-Dade County Bicycle and Pedestrian Master Plan, the vision of the plan is to enhance the accessibility, safety, public health, social equity, environment, and overall quality of life within Miami-Dade County. A non-motorized transportation alternative for this project could include widening the bridge to add safe sidewalks and shoulders - consistent with the Master Plan, however, a separate bikeway or pedestrian bridge, by itself, would not meet the purpose and need for this project to address the structural deficiencies of the existing bridge.

The Miami-Dade Transit Route 107 (G) and the complimentary Bay Harbor Islands Shuttle services the project area. These transit routes will remain active and uninterrupted, but specific transit lanes and or bus access facilities were not considered viable since the project ROW constraints and environmental impacts prohibit the widening of the bridge to accommodate additional lanes.

While these improvements will provide safety to bicycle and pedestrian users, the Multimodal Alternative does not meet the purpose and need of the project. This alternative was not considered to be a viable alternative, however multimodal improvements will be incorporated into the preferred alternative as appropriate and implemented to enhance pedestrian safety and mobility. For these reasons, and considering the other advantages and disadvantages above, the Multimodal Alternative was eliminated from further consideration.

5.2.3 Rehabilitation Alternative

The Rehabilitation Alternative would extend the useful life of the existing bridge. Currently the bridge does not meet current FDOT Design Standards because of the following:

1) Pedestrians are using a raised maintenance area that resembles a sidewalk on both sides of the bridge that is not ADA compliant,
2) Does not meet the clear zone, and
3) There are no existing shoulders.

Rehabilitating the bridge would eliminate substandard issues. To provide wider sidewalks, lanes and shoulders, the bridge would be widened to one or both sides. Widening to the north impacts the Section 4(f) Tot Lot and existing 40 in. water main and widening to the south effects the existing bridge tender house and electrical room. Rehabilitation also calls for deck replacement, mechanical and electrical upgrades and major repairs such as providing pile jackets to the existing piles, and full zinc metalizing to slow down corrosion. Rehabilitation of the existing bridge will include extensive maintenance of traffic including lane closures and detours to all the existing bridge users.

The rehabilitation costs are significant and lead to a 40-year estimated service life. Also, the rehabilitation does not meet purpose and need since it does not improve the vehicular flow of traffic since the bascule would remain. Therefore, it was not considered to be a viable alternative. For these reasons, and considering the other advantages and disadvantages above, the Rehabilitation Alternative was eliminated from further consideration.

5.2.4 Temporary Movable or Fixed Bridge Alternative

For this alternative a Temporary Movable or Fixed Bridge would be built to the south of the existing bridge to construct a new bridge in the location of the existing movable bridge. The temporary bridge could be a fixed or movable structure. Although this a viable solution, it would be costly and would involve building two new bridges and demolishing two bridges including the temporary and the existing bridges. Building a temporary bridge does not provide an advantage of reduced construction efforts because temporary bridges still require full design and would need permanent substructure and pilings for construction. Another drawback of the temporary option is the inability to rent materials such as the temporary movable bridge, thus it would have to be purchased and thrown away. Once completed the new bridge would be in the same alignment as the existing bridge without any impacts to the Tot Lot, water line, or existing service station.

This alternative does meet the purpose and need of the project. However, this alternative is not reasonable or cost feasible due to high construction costs associated with building and demolishing multiple bridges and the additional environmental impacts to EFH habitat and protected species. Therefore, it was not considered to be a viable alternative. For these reasons, and considering the other advantages and disadvantages above, the Temporary Movable or Fixed Bridge Alternative was eliminated from further consideration.

5.2.5 Tunnel Alternative

A Tunnel Alternative would use a southern alignment to avoid the Tot Lot and would parallel the existing bridge during construction. To start and end tunnels, large holes need to be opened to place custom boring machines at one or both ends. On the eastern end of the project an entry hole would require some or all the existing thru lanes to be closed or restricted which would impose a 9.4-mile detour to the north or an 11.12-mile detour to the south. On the western end of the project there are significant environmental concerns for tunneling under or in the vicinity of the existing service station due to known contamination. The tunnel would restrict access to existing residents who use West Broadview Drive and many of the homes along Broad Causeway east of the existing bridge would lose access to their driveways. For a tunnel to be constructed the entire portion of SR 922 before the existing bridge would need to be dug up to essentially create a drop off. This would eliminate access to the properties along SR 922 and the entrance and exit roads of West Broadview drive would need to be closed because of the drop off into a proposed tunnel. The tunnel would provide unobstructed access for boaters along the ICWW by eliminating the need for a bridge. The tunnel would avoid impacts to existing corals and seagrass located alongside the existing bridge since its construction would be done under the seabed with tunneling machines.

This alternative does not meet the purpose and need of the project since it would not maintain emergency evacuation due to the entry hole that would require some or all the existing thru lanes to be closed or restricted resulting in use of a detour route. Since the alternatives does not meet purpose and need, would have significant impacts to residents, would close the bridge, would cause

additional safety concerns, and is not reasonable or cost feasible due to high construction cost, it was not considered to be a viable alternative**.** For these reasons, and considering the other advantages and disadvantages above, the Tunnel Alternative was eliminated from further consideration.

5.2.6 Low-level Movable Bridge (21 ft.) Alternative

A low-level movable bridge with a 21 ft. clearance over the ICWW was explored and provides a bridge that would be similar to the existing bridge. The amount of bridge openings would be comparable to the existing bridge and would not provide free flow of vehicular traffic or infrequent bridge openings that will help relieve congestion and facilitate emergency evacuation. Thus, there is no benefit to improving flow of vehicular traffic by replacing the bridge with a low-level movable bridge. Therefore, this alternative does not meet purpose and need for this project. For these reasons, the Low-Level Fixed Bridge Alternative was eliminated from further consideration.

5.2.7 Mid-level Fixed Bridge (55 ft.) Alternative

A Mid-Level Fixed Bridge with a 55 ft. clearance over the ICWW was explored and provides an opportunity to reduce the grades of the bridge to less than 5% and meets the purpose and need of the project. The PD&E team met with the USCG on January 20, 2023, and it was determined from this meeting that the minimum fixed bridge clearance required would be 65 ft. The 55 ft. alternative does not meet all the governing design standards and regulations. For these reasons, the Mid-Level Fixed Bridge Alternative was eliminated from further consideration.

5.3 Build Alternatives

5.3.1 Development of Build Alternatives

5.3.1.1 Step 1 – Determine Bridge Heights

The USCG has jurisdiction over the ICWW in Biscayne Bay. The Town met with the USCG and FDOT on January 20, 2023, to discuss the required clearance for a new bridge. Consultation between the Town and the USCG indicated the navigation constraints for this bridge replacement project. Specifically, within Biscayne Bay, the USCG requires 90 ft. horizontal and 21 ft. (closed) vertical clearances (profile) for new bascule bridges and for new fixed bridges they require 90 ft. horizontal and a 65 ft. vertical clearance (profile). Another USCG constraint specified that the bridge spans would not be allowed to move the navigational channel from its existing location. A preliminary profile was set to determine if the Broad Causeway Bridge would be able to touchdown to meet the existing grade on the causeway island on west side and SR /Kane Concourse (SR 922) on the east side. It was determined that the profile can meet the existing grade on both sides within the project limits. USCG coordination documentation is in **Appendix E**.

5.3.1.2 Step 2 – Identify Constraints and Considerations

Because the project area is built with limited available right-of-way and has numerous environmental features, including Biscayne Bay, the Town identified a variety of constraints and considerations that follow local, state, and federal laws and regulations regarding the physical and natural environment in the vicinity of the bridge. Before rigorously exploring reasonable alternatives, a reminder of these constraints and considerations helped determine the parameters of the bridge alternatives and the causeway island circulation options. Under National Environmental Policy Act (NEPA), *reasonable* is

generally understood to mean those technically and economically feasible project alternatives that would satisfy the primary objectives of the project defined in the Purpose and Need (P&N) statement.

The first constraint noted the location of resources that are protected under Section 4(f) of the United States Department of Transportation (USDOT) Act. Section 4(f) resources identified include the Bay Harbor Islands Tot Lot, the Florida Circumnavigation Saltwater Padding Trail, the existing bridge, and the service station on the causeway island.

Consultation between the Town and the USCG, detailed above, indicated the navigation constraints for this bridge replacement project.

This bridge replacement project would include adding a shared-use path to provide a safe travel experience for pedestrians and bicyclists on the new bridge and causeway island that meet current safety standards and ADA compliance.

The Town prefers project alternatives avoid acquisition of ROW and relocations to both minimize costs and safeguard personal property.

As with most transportation infrastructure projects, alternatives must be technically and economically feasible and satisfy the purpose and need for the project. Operations and maintenance costs must also be considered when developing alternatives.

There were other engineering and environmental considerations that were important for developing alternatives. A review of potential adverse and beneficial impacts to the natural, social, and physical environments in the project area was conducted. Seagrasses have been documented to be near the bridge, therefore, alternatives that avoid, and/or minimize impacts to these natural resources were developed. Corals have also been observed in the bridge area.

The physical setting of the bridge is important to the Town and to residents in the vicinity of the bridge. Bridge alternatives developed considered aesthetics and viewsheds to understand potential impacts from the bridge and from vantage points looking towards the bridge, such as the views to and from Miami.

5.3.1.3 Step 3 – Determine Bridge Typical Sections

Once the bridge profile was determined and constraints and considerations were identified, a typical section analysis was performed to determine recommended typical section(s) for the causeway island, Broad Causeway Bridge, and SR 922 within the project limits. The following typical section design components played a role in determining the recommended typical section.

- Number of lanes
- Lane widths
- Inside and outside shoulder widths
- Pedestrian and bicycle accommodations
- Structure configuration

These components were evaluated with regards to functionality, safety, constructability, and public preference. The recommended typical section was revisited during the Alternatives Public Workshop

comment period based on comments received from the Miami-Dade TPO. The Town met with the Miami Dade TPO on October 30 and November 3, 2023, to discuss typical section components concerning pedestrian and bicycle accommodations. As a result of the typical section evaluation, including coordination with the TPO, two bridge typical sections were recommended for further consideration during the PD&E Study. These recommended typical sections utilize the design elements listed below and are detailed in the Draft Typical Section Package (**Appendix D**). The Broad Causeway Bridge typical section for the movable and fixed bridges are shown in **Figure 5-1** and **Figure 5-2** below.

The proposed four-lane divided bridge typical section includes four, 11 ft. travel lanes, 2 ft. concrete median with 4 ft. inside shoulders and two, 8 ft. outside shoulders which can accommodate disabled vehicles. In addition, a 14 ft. shared-use path would be included on the north side of the bridge, separated from the shoulder by a concrete barrier wall. A 42 in. high pedestrian/bicycle railing will be provided on the outside of the 14 ft. shared-use path. The typical section for the movable bridge option would vary slightly at the bascule leaves to accommodate a 14.5 ft. maintenance area within the median and a 4.5 ft. maintenance area along the south edge of bascule leaves. Maintenance areas are only required for moveable bridge options. The design speed for all proposed typical sections is 30 mph, maintaining the existing posted speed of 30 mph.

5.3.1.4 Step 4 – Develop Horizontal Alignment

The evaluation of both build alternatives includes the evaluation of a center alignment, a north alignment, and a south alignment. The project length is not significantly different for the center, north or south alignments; however, costs, environmental impacts, maintenance of traffic (MOT) for vehicles and vessels along with permitting aspects may differ.

5.3.1.4.1 Existing/Center Alignment

The existing alignment is centered within the 300 ft. Town controlled tidewaters and lands as stated in 1953 Senate Bill No. 865 over the ICWW and between the Town Bay Harbor Islands and the City of North Miami. Utilizing the existing alignment and proposing a bridge within the existing bridge footprint would require additional phases of construction and a bridge closure. To construct this option the existing bridge would need to be demolished prior to construction of the new bridge. Currently the Broad Causeway Bridge is the main artery for residents coming and going to the Town of Bay Harbor Islands. Demolition of the existing bridge prior to construction would require a 9.40-mile detour to the north or an 11.12-mile detour to the south. Not only would the alternative cause delays to residents it would also impact emergency vehicle's access and response times. Should there be a hurricane warning event, the need to evacuate would present unacceptable delays as the Broad Causeway Bridge is a hurricane evacuation route. Therefore, a temporary bridge could be built to eliminate long periods of bridge closure but would incur a large project cost and environmental impacts for a temporary solution. The additional phases of construction would add time and cost to the project that can be avoided by shifting the alignment to the north or south of the existing alignment. Therefore, the existing/center alignment alternative was determined to be impractical and was not considered for further evaluation.

5.3.1.4.2 North Alignment

Alternatives on the northern alignment would provide room for construction and demolition activities and would fall within the existing ROW, owned by the Town and the 300 ft. Town controlled tidewaters and lands as stated in 1953 Senate Bill No. 865. The northern alignment would run parallel to the existing alignment and would not disrupt traffic on the existing bridge during construction. The major impact of the northern alignment is the existing Tot Lot, a Section 4(f) property. The northern alignment would require the Tot Lot to be removed or relocated to another town owned property. The Tot Lot is the only public park for children in the Town and is frequently used by residents. Tying the northern alignment down to the causeway island would avoid the existing service station. The traffic movements to and from the service station would be adjusted to meet the proposed northern alignment. An existing 30 in. water main owned by Miami Dade Water and Sewer would need to be relocated as it is approximately 93 ft. north of the existing bridge. Based on the impacts, the northern alignment was determined to be impractical and was not considered for further evaluation.

5.3.1.4.3 South Alignment

The south alignment would utilize the Town-owned empty lot located on the southeast corner of the existing bridge and run parallel to the existing bridge. The proposed separation between proposed and existing alignments would provide room for construction and demolition activities and would fall within the existing ROW and the 300 ft. Town controlled tidewaters and lands as stated in 1953 Senate Bill No. 865. The southern alignment would not disrupt traffic on the existing bridge during construction. Tying the southern alignment down to the causeway island would avoid the existing service station but would span over the service station awning. The traffic movements to and from the service station would be adjusted to meet the proposed southern alignment. Utilities are not a significant issue for the south alignment.

5.3.1.4.4 Alignment Conclusion

The southern alignment was selected for further evaluation with both bridge alternatives based on the following points:

- Does not impact Section 4(f) Resource (Tot Lot)
- Allows for construction of proposed bridge and demolition of existing bridge to occur while minimizing traffic disruptions.
- No significant utility impacts.
- Falls within, or utilizes the area to the maximum extent possible, the existing 300 ft. Town controlled tidewaters and lands as stated in 1953 Senate Bill No. 865.
- Utilizes existing Town-owned lot for eastern bridge tie down.
- Avoids phased construction.
- Avoids relocation existing 30" water main owned by Miami Dade Water and Sewer as it is approximately 93 ft. north of the existing bridge.

5.3.1.5 Step 5 – Identify Viable Build Alternatives

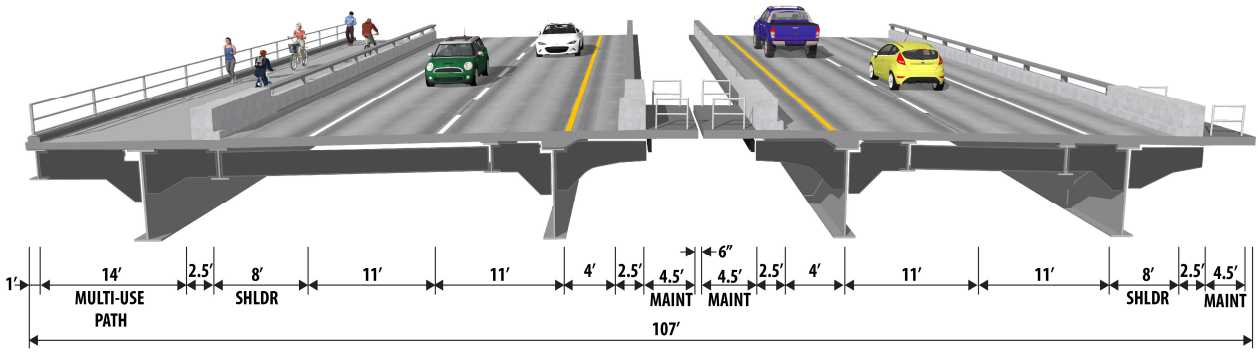
Based on the vertical clearance (profile), horizontal alignment, typical sections, and constraints and considerations numerous alternatives were developed. On May 15, 2023, the Town met to discuss all of the alternatives evaluated and determine the viable build alternatives that would be presented to the public at the upcoming Alternatives Public Workshop. Several alternatives were eliminated as described in **Section 5.2**. The remaining two build alternatives that were advanced for further detailed analysis and public comment were the 40 ft. Mid-Level Movable and the 65 ft. High-level Fixed Bridges and approach spans described in the following sections.

5.3.2 Mid-Level Movable Bridge (40 ft. Vertical Clearance from MHW) Alternative

The Mid-Level Movable Bridge Alternative would replace the existing bridge and approach spans on the southern alignment and meet all governing design standards and regulations. The new bridge would include adequate lane widths and shoulders, and a shared-use path. This alternative would replace the existing bridge with a movable 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. See **Figure 5-1** for the Mid-Level Movable Bridge Alternative.

The Mid-Level Movable Bridge Alternative meets the purpose and need of the project, but compared to the High-Level Fixed Bridge, it 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 estimated construction cost of $440.9 million. The Mid-Level Movable Bridge Alternative advanced for further detailed analysis and public comment.

Figure 5-1 40 ft. Mid-Level Movable Bridge Alternative



5.3.3 High-Level Bridge (65 ft. Vertical Clearance from MHW) Alternative

The High-Level Fixed Bridge Alternative would replace the existing bridge and approach spans and meet all governing design standards and regulations. The new bridge would include adequate lane widths and shoulders, and a shared-use path. A fixed structure with a vertical navigational clearance of 65 ft. meets the USCG permit requirements for new high-level fixed bridges along the Atlantic Intracoastal Waterway (ICW) from Virginia through Florida which can be found in the Clearance Guide at the following USCG website: https://www.dco.uscg.mil/Our-Organization/Assistant-Commandant-for-Prevention-Policy-CG-5P/Marine-Transportation-Systems-CG-5PW/Office-of-Bridge-Programs/Bridge-Guide-Clearances/.

Also, along the ICW, access through the Broad Causeway bridge is constrained by the following adjacent fixed bridges:

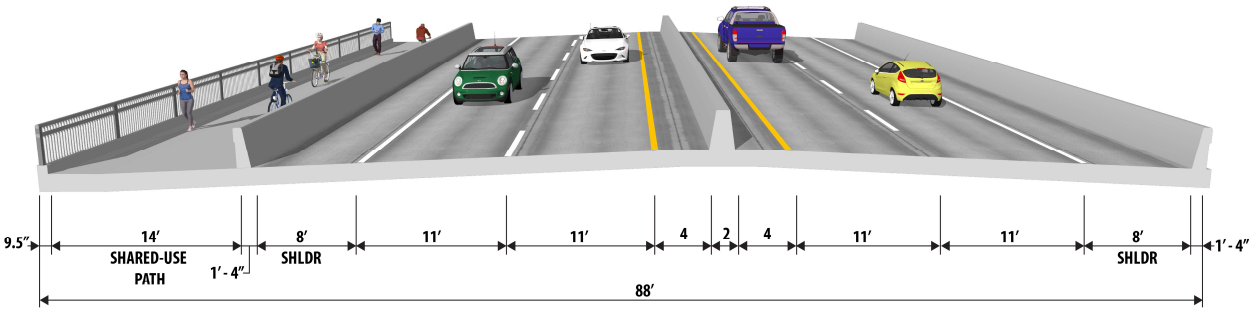
1. To the north along the ICW is the William Layman Causeway Fixed Bridge – 65 ft.
2. To access the Atlantic Ocean is the Bakers Haulover Inlet Bridge – 32 ft.
3. To the south along the ICW is the Julia Tuttle Causeway Fixed Bridge – 56 ft.

Therefore, with a vertical clearance of 65 ft., the Broad Causeway Bridge will not restrict marine vessel access through the area.

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 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 hours a day, 7 days a week access to pass through the corridor for emergencies. Should a hurricane warning be issued; the corridor would be used as a Hurricane Evacuation Route during construction as it is today. See **Figure 5-2** for the High-Level Fixed Bridge Alternative.

The High-Level Fixed Bridge Alternative meets the purpose and need of the project but would have a steeper roadway and shared-use path slopes and there would be more visual impact to businesses and residents. The estimated construction cost is $247.4 million. The High-Level Fixed Bridge Alternative advanced for further detailed analysis and public comment.

Figure 5-2 65 ft. High-Level Fixed Bridge Alternative



5.4 Comparative Alternatives Evaluation

In order to evaluate the study alternatives and intersection options, an evaluation matrix was prepared using criteria from the following categories:

- Ability to Meet Purpose and Need
- Bridge Features
- Traffic Operations
- Social and Cultural Resources
- Natural and Physical Resources
- Right-of-Way
- Project Costs

Once the project advances to design, the Florida Design Manual (FDM) requires that an Independent Peer Review (IPR) be completed in accordance with FDM 121.12.

5.4.1 Ability to Meet Purpose and Need

Both build alternatives meet the purpose and need for the project. The No Build (Repair) Alternative does not meet the purpose and need because of the following:

- Does not address the bridge deficiencies.
- Does not improve safety.
- Does not provide free flow of vehicular traffic or infrequent bridge openings that will help relieve congestion.
- Does not maintain emergency evacuation if there are bridge closures for repairs.

At the end of the service life period projected to be between 15 to 25 years for the No Build (Repair) Alternative, an extensive rehabilitation, decommissioning, or replacement of the bridge would be required. An 11.12-mile detour to the south and a 9.4-mile detour to the north would have to be utilized if the bridge is decommissioned or closed for extensive repairs.

5.4.2 Bridge and Traffic Operations

The No Build (Repair) Alternative consists of keeping the existing movable bridge in place and not constructing a new bridge. The High-Level Fixed Bridge has a steeper profile (5% west of the ICWW and 5.8% east of the ICWW). Vehicular traffic will be free flowing. The Mid-Level Movable Bridge with a mild profile (2.6% west of the ICWW and 4.2% east of the ICWW). There will be bascule bridge openings that impede traffic. Both build alternatives will improve vehicle and marine traffic flow. The existing bridge will remain open during construction so there will be no temporary bridge, closures nor detours during construction.

5.4.3 Social, Cultural, Natural and Physical Resources

The No Build (Repair) Alternative will not impact social, cultural, natural, or physical resources since the existing bridge would remain. The High-Level Fixed Bridge will have more visual impacts since it has a steeper profile. The Mid-Level Movable Bridge will have higher impacts to essential fish habitat, seagrasses, and sovereign submerged lands. Both build alternatives will have a temporary impact to

the Florida Circumnavigational Saltwater Paddling Trail, a Section 4(f) resource. Both build alternatives would demolish the existing NRHP-eligible Broad Causeway Bridge and have potential impacts to the viewshed and access of the NRHP-eligible service station. Comparable noise and contamination impacts will occur with both build alternatives.

5.4.4 Right-of-Way

Both build alternatives will avoid property relocation and right-of-way acquisitions; although, project impacts could include temporary driveway access closures and/or permanent driveway access modifications.

5.4.5 Project Costs

When evaluating different alternatives, it can be misleading to just compare construction costs when different alternatives have different services lives and maintenance costs. The Life-Cycle Cost Comparison Analysis (LCCA) is an effective evaluation technique for making a realistic comparison between alternatives in terms of cost. This is done by considering schedule, construction costs, periodic costs, inflation, & the time value of money. The main steps of the LCCA are:

1. Establish Design Alternatives
2. Determine Activity Timing
3. Estimate Costs (agency and user)
4. Compute Life-Cycle Costs
5. Analyze Results

The alternatives that were evaluated in the LCCA are the High-Level Fixed Bridge, Mid-Level Movable Bridge, and the No Build (Repair) alternatives with results summarized below as well as detailed in **Appendix A**. The base year of this analysis is 2023 as this is when historical cost data was gathered to determine unit pricing of the cost estimate. The "expenditure year" is the year which each alternative was taken to in terms of cost. It is estimated that the existing bridge has a remaining service life of up to 25 years, thus the expenditure year is taken as 2048. A critical factor in evaluating alternatives is making sure they are being measured in equal units. There are two items that must be considered to ensure this is accomplished: Inflation and Discounting. Because expenditures occur at various points in time, they must be measured in different value units because of the changes in price. An inflation rate of 3% was used based on the average inflation rate over the last forty years. Discounting is also known as the opportunity value of time, which is the economic return that could be earned on funds, such as earning interest. Based on FHWA recommendations and prior FDOT analyses, a range of discount rates of 1% to 5% were used in this analysis.

<u>No Build (Repair)</u>

- Life Cycle Cost = $72 million
    - No base cost for bridge replacement construction
    - $530k annual maintenance, $600k bridge operation cost, $20 million repair project between year 0 and year 25. These are base year costs that do not consider inflation and discount rate.

- Life cycle cost for this option does not include the cost of the new bridge that will be required at the end of existing bridge's service life. Cost of the new bridge is estimated to be $316 million in year 2048 vs the estimated $218 million in year 2029.

High-Level Fixed Bridge

- Life Cycle Cost = $232 million
  - Base cost of $202 million at year 0
  - Actual cost of $227 million at year 6 (expected year of construction) based on 3% inflation and 1% discount rate.
  - $116k annual maintenance, $600k repair project between year 0 and year 25

Mid-Level Movable Bridge

- Life Cycle Cost = $409 million
  - Base cost of $317 million at year 0
  - Actual cost of $356 million at year 6 (expected year of construction) based on 3% inflation & 1% discount rate.
  - $530k annual maintenance, $600k bridge operation cost, $3 million repair project between year 0 and year 25. These are base year costs that do not consider inflation and discount rate.

The total LCCA for each alternative is equal to the construction cost of a new bridge (equals no cost for the No Build Alternative), bridge operations, and routine maintenance and annual inspection. These LCCA totals results were added to the design phase costs and entered into the alternatives evaluation matrix as the alternative costs as shown in **Table 5-1**.

Table 5-1 Alternative Costs

No Build Alternative	Alternative 1 High-Level Fixed Bridge	Alternative 2 Mid-Level Movable Bridge
$72.4 Million	*$247.4 Million*	*$440.9 Million*

*No Build Alternative does not include the construction cost of a new bridge.

5.4.6 Alternative Evaluation Matrix

Table 5-2 is an alternatives evaluation matrix that compares each alternative evaluated in detail including the No Build (Repair), the High-Level Fixed Bridge, and the Mid-Level Movable Bridge. This matrix was presented at the Alternatives Public Workshops on September 26, 2023, and September 28, 2023.

Table 5-2 Alternative Evaluation Matrix*

Criteria/Category		No Build Alternative	Preferred Alternative - High-Level Fixed Bridge	Alternative 2 Mid-Level Movable Bridge
ABILITY TO MEET PURPOSE AND NEED	Address Bridge Deficiencies	☒	✓	✓
	Improve Safety			
	Improve Flow of Traffic			
	Maintain Emergency Evacuation			
BRIDGE FEATURES	Vertical Navigational Clearance Above Mean High Water	15.7 ft.	65 ft.	40 ft.
	Horizontal Clearance (between fenders)	79.7 ft.	90 ft.	90 ft.
	Bridge Profile Grade (West side / East side)	3.44% / 1.55%	5.00% / 5.85%[1]	2.60% / 4.15%
	Improved Waiting Time for Marine Traffic	No	Yes	Yes
	Temporary Bridge Required During Construction	N/A	No	No
	Bridge Closure or Detour During Construction	N/A	No	No
TRAFFIC OPERATIONS	Bridge Opening	Yes	No	Yes
	Benefit to Vehicular Traffic	No	Yes	Yes
	Evacuation / Emergency Response (Improved)	No	Yes	Yes
SOCIAL & CULTURAL RESOURCES	Potential Impacts to Archaeological Resources	N/A	None	Low
	Potential Impacts to Historic Resources	N/A	High	High
	Potential Impacts to Parks/Recreation Areas (#)	0	1	1
	Town of Bay Harbor Islands Tot Lot	No	Yes[2]	Yes[2]
	Florida Circumnavigational Saltwater Paddling Trail	No	Yes[2]	Yes[2]
	Aesthetic/Visual Changes	No	Yes	Yes
	Pedestrian and Bicycle Facility Improvements	No	Yes	Yes
NATURAL & PHYSICAL RESOURCES	Potential Total Impacts to Wetlands (acres)	0	0.279	0.417
	Potential Total Impacts to Essential Fish Habitat (acres)	0	4.18	5.18
	Threatened/Endangered Species Potential	N/A	Medium[3]	Medium[3]
	Potential Impacts to Sovereign Submerged Lands	No	No	Yes
	Potential Impacted Noise Sensitive Sites (#)	0	31	233
	Potential Contamination Sites (#High / #Medium)	0	1 / 1	1 / 1
RIGHT-OF-WAY	Relocations (#)	0	0	0
	Right-of-Way to be acquired (acres)	0	0	0
ESTIMATED PROJECT COSTS[4] (2023 Dollars, in millions)	Lifespan of Alternative (Estimated Years) ★	25	75	75
	Design	N/A	$15.9	$31.8
	Mitigation	N/A	TBD	TBD
	Construction	N/A	$226.7	$356.1
	Bridge Tender	$30.7	$0	$30.7
	Inspection & Maintenance	$41.7	$4.8	$22.3
	TOTAL	**$72.4**	**$247.4**	**$440.9**

★ Toll bridge to be closed with "No Build Alternative".

[1] The bridge sidewalks will comply with ADA requirements.

[2] Temporary impacts during construction only.

[3] Medium assigned based on mitigation and minimization measures that will be implemented based on regulatory agency coordination.

[4] This is not a representation of impacts

[5] Preliminary estimates are for planning purposes only. Costs shown are 2023 dollars through 2048 with 3% inflation. Utility relocation costs are not included on the cost estimate.

5.5 Causeway Island Circulation Options

During the PD&E Study alternative analysis, various circulation options within the causeway island were considered and presented to the Town on August 30, 2023. The circulation options presented would apply to both the 40 ft. Mid-Level Movable Bridge Alternative and the 65 ft. High-Level Fixed Bridge Alternative. The options explored increasing greenspace, elimination of movements to the existing service station and consideration of different ramp and pedestrian access points. See **Appendix C** for concept drawings, comparative analysis and meeting minutes of all options presented. The circulation options presented included the following:

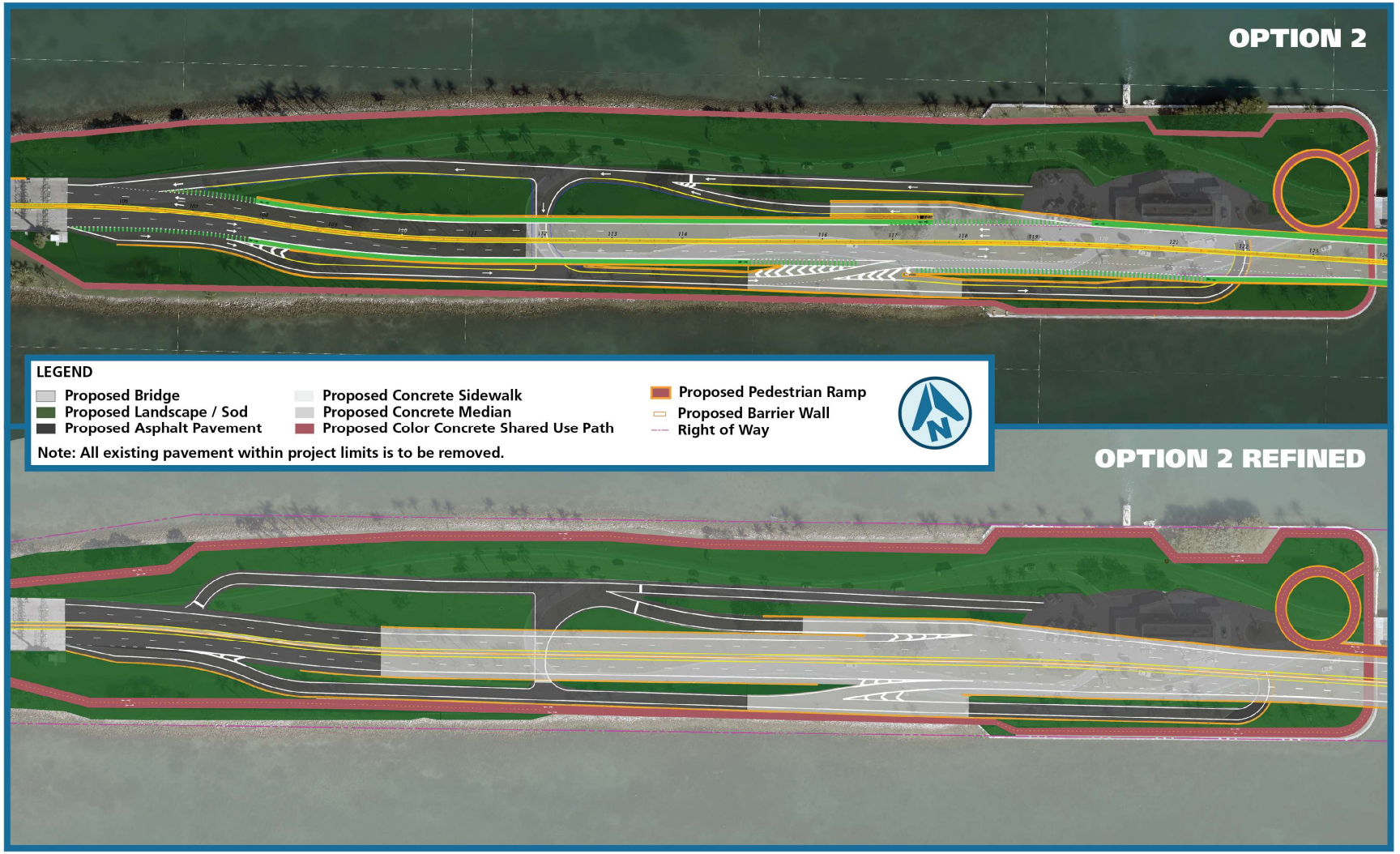
- Option 1- Eastbound-Westbound Access (Initial Design)
- Option 2- Eastbound-Westbound Access (Modified Westbound Exit)
- Option 3- Westbound Only Access
- Option 4- Westbound Access with Split Offramp (No Helix)
- Option 5- Westbound Access Left-Handed, Westbound Exit
- Option 6- Eastbound Only Access

The comparative analysis after the meeting determined that the best fit circulation option for the Town's planned and/or desired uses on the causeway island was Option 2- Eastbound-Westbound Access (Modified Westbound Exit). Option 2 circulation (**Figure 5-3**) provided two-way ingress/egress to the existing service station, more greenspace than what was presented in the Initial Design (Option 1), provided safer pedestrian facilities (no pedestrian crossings on causeway island), and circulation within the causeway island proposed under the mainline (providing even more greenspace). Option 2 can be used for either build alternative.

The Town conducted additional coordination with Miami-Dade County, detailed in **Section 5.3.1.3** which resulted in the following refinements to Option 2 depicted in **Figure 5-3**.

- Updates to Westbound Access connection to BCB Mainline.
- Removal of bike lane pavement markings.
- Changes the sidewalk around the island perimeter to a shared-use path varying between 8 ft. and 14 ft. in width with the helix showing 14 ft.
- Modification or Westbound ramp transition.

Figure 5-3 Causeway Island Circulation Option 2



5.6 Selection of the Preferred Alternative

Key differentiators between the alternatives were considered when selecting the Preferred Alternative.

Advantages of the No Build Alternative is that it maintains the existing facility as-is with no new improvements. While the No Build Alternative would have no environmental impacts, maintain roadway slope and has a lower cost, it would not address the substandard roadway, deteriorating bridge or safety needs and will be decommissioned at end of estimated 25-year lifespan. Other disadvantages include the potential for bridge closures that would require a detour and may affect emergency evacuation. The bridge would also continue to open at the same frequency as it does now.

Advantages of Alternative 1, High-Level Fixed Bridge is that it would provide a new bridge with an estimated lifespan of 75 years. There would no longer be drawbridge openings and it has the lowest cost between the two build alternatives. Disadvantages would include potential environmental impacts, steeper roadway and shared-use path slopes, visual impacts since it is a higher bridge and cost to design and construct the new bridge.

Alternative 2, the Mid-Level Movable Bridge is not as high as Alternative 1 and therefore would have average slopes and less visual impacts, but it would still have bridge openings for large vessels and in emergency evacuation circumstances and slightly higher impacts to Essential Fish Habitat. Since the alignment is outside of the 300-foot area the Town controls there will be impacts to Sovereign Submerged lands. This alternative has the highest cost between the two build alternatives.

Both build alternatives would provide a new bridge with an estimated lifespan of 75 years, provide improvements to pedestrian and bicycle accommodations, safety, resiliency, and seawalls.

Based on the analysis of the viable alternatives presented in the Alternatives Evaluation Matrix along with the public input received during the Hybrid Alternatives Public Workshop described in **Section 6.2.3**, Alternative 1 – 65 ft. High-Level Fixed Bridge was recommended as the Preferred Alternative. As described in **Section 6.2.4**, the Town of Bay Harbor Islands Town Council unanimously approved this recommendation.

6.0 PUBLIC INVOLVEMENT / PROJECT COORDINATION

The Town developed and carried out a *Public Involvement Program (PIP) (February 2023)*, prepared under separate cover, as an integral part of this project. This program was implemented in compliance with Section 339.155, F.S.; Executive Orders 11990, Protection of Wetlands and 11988, Floodplain Management; Council on Environmental Quality (CEQ) Regulations for implementing the procedural provisions of the NEPA; and 23 CFR 771 to describe the public involvement approach for the study.

The purpose of this program was to establish and maintain communication with the public at large and individuals and agencies interested in the project and its potential impacts. To ensure open communication and agency and public input, the Town provided an early notification package to state and federal agencies and other interested parties defining the project and, in cursory terms, describing anticipated issues and impacts. Comments received through agency coordination assisted with the development and analysis of alternatives and identification of permits and mitigation measures.

6.1 Agency Coordination

The purpose of this program was to establish and maintain communication with the public at large and individuals and agencies interested in the project and its potential impacts. To ensure open communication and agency and public input, the Town provided an early notification package to state and federal agencies and other interested parties defining the project and, in cursory terms, describing anticipated issues and impacts. Comments received through agency coordination assisted with the development and analysis of alternatives and identification of permits and mitigation measures.

In addition, in an effort to resolve all issues identified, the Town with the support of the FDOT has conducted an extensive interagency coordination and consultation effort and public participation process. The *Comments and Coordination Report (May 2024),* prepared under separate cover*,* details the program to fully identify, address, and resolve all project-related issues identified within the PIP. A summary of the outreach efforts and meetings conducted to date are provided in the following sections.

6.1.1 Additional Local Government and Agency Coordination

The FDOT and Town met with the USCG on January 20, 2023, to discuss the required clearance for a new bridge. Consultation between the Town and the USCG indicated the navigation constraints for this bridge replacement project. Specifically, within Biscayne Bay, the USCG requires 90 ft. horizontal and 21 ft. (closed) vertical clearances (profile) for new bascule bridges and for new fixed bridges they require 90 ft. horizontal and a 65 ft. vertical clearance (profile). Another USCG constraint specified that the bridge spans will not be allowed to move the navigational channel from its existing location.

A meeting was held with the Miami-Dade TPO to address comments received on October 19, 2023, on the proposed typical section of the Broad Causeway Bridge. The typical section that was reviewed by the Miami-Dade TPO was presented during the Public Alternatives Workshop on September 26 and September 28, 2023 (virtual). The Town met with the Miami-Dade TPO on October 30 and November 3, 2023, to discuss pedestrian and bicyclist safety and accommodations, and revising the

typical section to fully address these accommodations. The project was presented to the TPO Bicycle Pedestrian Advisory Committee (BPAC) on February 13, 2024, and the Transportation Planning and Technical Advisory Committee (TPTAC) and Citizens' Transportation Advisory Committee (CTAC) on May 1, 2024.

Additionally, numerous agencies were coordinated with throughout the PD&E Study. **Table 6-1** lists the agency coordination to date.

Table 6-1 Agency Coordination Table

Agency	Meeting Date	Topic
USCG	*January 20, 2023*	*Guide Clearance Requirements*
State Historic Preservation Officer (SHPO)*	*June 19, 2023*	*Cultural Resource Identification and Methodology*
*NMFS***	*July 12, 2023*	*Benthic Survey Methodology*
Miami-Dade TPO	*October 30, 2023 November 3, 2023*	*Pedestrian and Bicyclist Accommodations*
NMFS	*December 21, 2023*	*Technical Assistance Call – 2023 Benthic Survey Results, Determinations of Effect, and EFH Coordination*
US Fish and Wildlife Service (USFWS)	*January 12, 2024*	*Technical Assistance Call*
Miami-Dade TPO BPAC	*February 13, 2024*	*Pedestrian and Bicyclist Accommodations*
NMFS	*February 21, 2024*	*Technical Assistance Call*
SHPO	*April 18, 2024*	*Cultural Resource Assessment Survey*
Miami-Dade TPO TPTAC	*May 1, 2024*	*Project Overview and Announcement of Public Hearing*
Miami-Dade TPO CTAC	*May 1, 2024*	*Project Overview and Announcement of Public Hearing*

* SHPO coordination is documented in the CRAS (April 2024) and Section 106 Case Study Report (April 2024).
** USFWS and NMFS coordination is documented in the NRE (April 2024).

USCG coordination documents are located in **Appendix E**. Resource agency coordination is included in **Appendix F**.

6.2 Public Involvement Activities

6.2.1 Project Website

A project website is available at https://www.bayharborislands-fl.gov/444/Broad-Causeway-Bridge-Replacement-PDE-St. The website featured information about the study; documents and publications; public notices and public meeting documents; and the project schedule. A comment form link is provided for residents to leave feedback on the project.

6.2.2 Public Kick-off Meeting

A Project Kick-off notification for the Broad Causeway Bridge Replacement was emailed to elected officials on January 20, 2023, from Mayor Joshua D. Fuller. The Town held a Public Kick-off Meeting on February 9, 2023, at 6 PM, at the Town Hall Council Chambers on Bay Harbor Islands. The meeting started in an open house format where the public could view a looping video of the project area and project display boards. Project team representatives were present to address one-on-one questions. A formal presentation was given at 6:30 PM. The meeting introduced the project and the PD&E Study process to the public with the intent to inform the community on proposed improvements to Broad Causeway Bridge from causeway island to East of West Broadview Drive.

A total of approximately 49 citizens and two (2) elected officials signed in at the public meeting. Eleven (11) comments were received at the meeting, online, or via email to the Public Involvement Specialist during the 10-day review period following the in-person meeting. The majority of comments received were focused on pedestrian and bicyclist traffic, wildlife species, safety, water intrusion, toll revenues, and project funding. A full summary of this meeting, including meeting materials and comments received, can be found in the *Comments and Coordination Report (May 2024)* that was prepared as part of this study.

Public comments received were considered when developing the project alternatives and conducting the alternatives analysis.

6.2.3 Hybrid Alternatives Public Workshop

The Town held a Hybrid Alternatives Public Workshop both virtually and in-person to provide interested persons an opportunity to express their views concerning the proposed improvements and vote on which alternative they preferred. Property owners and interested parties were notified of the workshops via either a project handout or the Town's monthly NewsWaves publication via USPS mail. The project was also announced through a Town website, press release, advertisements in the *Miami Herald* and *El Nuevo,* and the Florida Administrative Register. Environmental Technical Advisory Team (ETAT) members were notified via an Environmental Screening Tool (EST) generated email notification. Additionally, an Alternatives Public Workshop invite for Broad Causeway Bridge Replacement was emailed to elected officials on August 25, 2023, from Mayor Elizabeth Tricoche. Citizens were strongly encouraged to attend either of these meetings to learn more about the project and the alternatives being considered.

The Hybrid Alternatives Public Workshop was held in accordance with *Title VI of the 1964 Civil Rights Act* and related statutes, as referenced in FDOT's *Non-Discrimination Policy, Topic Number 001-275-006* and implementing procedure *Topic Number 275-010-010.* Elected and appointed officials were notified first via email.

The In-house Alternatives Public Workshop was held on September 26, 2023, at 7 PM, at Morris N. Broad Community Center. The meeting began with an informal open house from 7:00 to 7:15 PM, followed by a formal presentation and a public Question and Answer (Q&A) session. This meeting was recorded and was made available at the project website. A total of approximately 20 citizens and two elected officials signed in at the in-person Alternatives Public Workshop. This workshop was to provide the public with information about the proposed build alternatives, schedule and next steps. The PD&E team had an open Q&A session where the citizens asked questions about the project,

provide comments, as well as voted for their preferred alternative. A total of twelve (12) citizens spoke during the Q&A session. Some of the issues brought up at the in-person meeting were:

- Project cost
- Traffic coming from the mainland
- Crosswalks with pedestrian features
- Preventative maintenance
- Lighting
- Process
- Cost of tolls

A virtual reality station was set up for the public to see three dimensional (3D) renderings of each proposed alternative while driving over the bridge to the causeway island. Attendees were provided with project information materials.

The Town held a Virtual Alternatives Public Workshop on September 28, 2023, at 6 PM, via a Zoom Webinar. The meeting was an opportunity for the citizens that were not able to attend in-person to be introduced to the proposed build alternatives for the project.

The meeting opened with a presentation followed by a Q&A session. The same presentation used at the in-house meeting was shown. A total of approximately 42 citizens and two (2) elected officials signed in at the Virtual Alternatives Public Workshop. This meeting was to provide the public with information about the proposed build alternatives, schedule, and next steps.

At the Q&A session the citizens asked questions about the project. A total of eleven (11) comments were received from the public in the virtual portion of the meeting.

Both meetings were recorded and made available on the project website. The sign-in sheets, meeting handout in English and Spanish, display boards, photos from the meeting, comment forms and speaker cards from the in-house meeting, the attendees report and Q&A reports from the virtual meeting, transcripts from both meetings, as well as comments received in the 10 days following the virtual meeting, can be found in the *Comments and Coordination Report*.

The public was provided with an opportunity to communicate their preferences by participating in the Hybrid Public Alternatives Workshop. Additionally, a comment form was made available on the project website, and it remained accessible for ten days following the workshop sessions. To gather further input, a survey was designed for residents to complete on the project website or by scanning a QR code available on public involvement materials and notifications, allowing them to share their comments, questions, and indicate their preferred bridge option. The team also received comments and votes via email, further expanding the channels through which the public could participate in the decision-making process. See the summary of votes received below. Further details about these votes are in the *Comments and Coordination Report*.

Alternatives Votes:

3. No Build Alternative – **8 votes**
4. Build Alternatives – **21 votes**
    - Alt. 1 High-Level Fixed Bridge – **13 votes**
    - Alt. 2 Mid-Level Movable Bridge – **8 votes**

6.2.4 Presentation of Preferred Alternative to Town of Bay Harbor Islands Town Council

The recommendation for the Preferred Alternative was presented by the PD&E team to the Town of Bay Harbor Islands Town Council at their regular meeting on November 8, 2023, at 7 PM. After a presentation was made, Town Council questions were answered, and comments were received by the public in attendance, the Town Council unanimously approved the Preferred Alternative as Alternative 1 – 65 ft. High-Level Fixed Bridge. TBHI Resolution No. 2346, adopted on November 8, 2023, states "The Town council finds it is in the best interest of the safety and mobility of the residents of the Town, the travelling public, and users of the Intracoastal waterway to select Alternative 1 – 65-ft. High Level Fixed Bridge as the Preferred Alternative".

6.2.5 Hybrid Public Hearing

A Hybrid Public Hearing is anticipated to be held in Summer 2024.

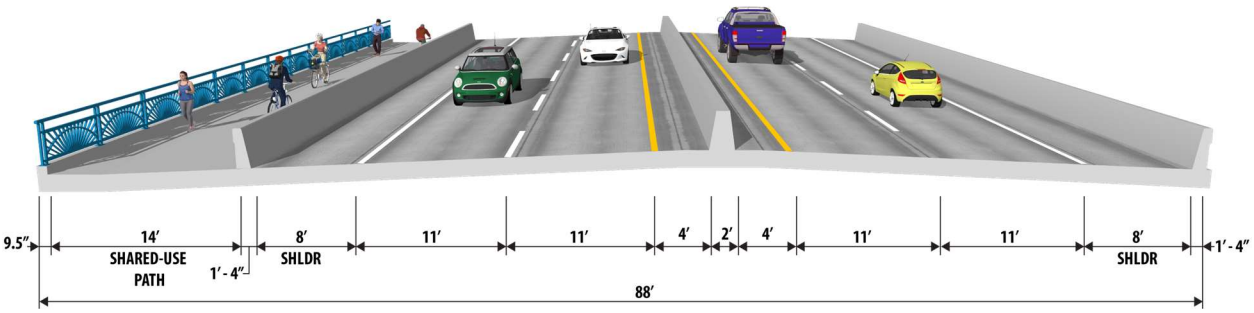
7.0 PREFERRED ALTERNATIVE

As described earlier, the 65 ft. High-Level Fixed-Bridge Alternative was selected as the Preferred Alternative.

7.1 Typical Sections

A four-lane divided roadway typical section was developed for the project. This typical section consists of two 11 ft. lanes in each direction separated by 4 ft., inside shoulders and a 2 ft., concrete barrier wall. The outside shoulders are 8 ft. and are adjacent to concrete barrier walls, and a 14 ft. shared-use path is proposed along the north side of the bridge with a 48 in. high pedestrian/bicycle railing. The proposed bridge typical section is shown in **Figure 7-1**. The Design speed for all proposed typical sections is 30 mph, maintaining the existing posted speed of 30 mph.

Figure 7-1 65 ft. High-Level Fixed Bridge Typical



The proposed roadway approach typical sections transition from the existing roadway configuration east of the ICWW to the proposed bridge and are shown in **Figure 2-1** to **Figure 2-3**. Also proposed on the causeway island are new access ramps to and from the existing service station. All ramps and perimeter roads to access the existing service station are shown in the draft Typical Section Package and provided in **Appendix D**.

7.2 Access Management

The existing access management is described in **Section 2.2.3**. There are no proposed changes to the overall classification of the corridor. There is an existing median opening located along SR 922 at Broadview Terrace that provides for vehicle U-turns along SR 922 only that will remain open in the preferred alternative. The median opening currently serves as a relief U-turn to expedite access to single family homes. The U-turn movement was added after the intersection of Broadview Terrace and SR 922 was closed for left and right turns.

7.3 Right-of-Way

No ROW acquisition is anticipated for the Preferred Alternative; however, temporary construction easements are required for the harmonization of SR 922 east of the bridge with the adjacent properties and driveway connections.

7.4 Horizontal and Vertical Geometry

The preferred alternative alignment is proposed adjacent to the existing bridge and is offset from the existing alignment to the south by approximately 85 ft. at the ICWW. The horizontal geometry will utilize the Town's empty lot on the east end of the project and stay on the south side of the causeway island to provide ample greenspace for optional recreational space. The key component of the vertical geometry is clearing the ICWW by the USCG required 65 ft. and staying above the existing service station. To achieve this the proposed design will utilize roadway slopes of 5.78% east of the ICWW and 4.95% west of the ICWW. As noted in Section 4, FDM and Florida Greenbook criteria are used to develop proposed horizontal and vertical geometry. Except for horizontal curve lengths (for which a design variation memo will be required) horizontal and vertical curve geometry of mainline roadway (EB and WB Broad Causeway Blvd and ramps) adhere to these criteria. As service station access roads serve only a very low volume (< 400 vpd) at a very low speed, they function effectively as extended driveways and do not necessarily adhere to the design criteria of the mainline. (Proposed horizontal and vertical geometry is shown in detail on the concept plans (**Appendix B**).

7.5 Design Variations and Design Exceptions

A design variation for horizontal curve length will be necessary. (See **Appendix H** for Curve Length Design Variation). All deflections meet Greenbook and/or FDM design criteria.

7.6 Multimodal Accommodations

The complete streets approach was utilized in the Preferred Alternative to incorporate missing and substandard safe modes of transportation previously discussed in the Existing Multi-Modal Facilities (**Section 2.2.10**). The proposed design will provide improved forms of bicycle access throughout the corridor and the needed pedestrian access that is completely missing today will be added to the project.

The Preferred Alternative will create improved facilities for bicyclists and pedestrians. Pedestrians and bicycles are accommodated throughout the project corridor with a shared-use path around the causeway island perimeter (8 ft. to 14 ft.) and a 14 ft. shared-use path along the northern side of the preferred alternative high level fixed bridge. Connecting the pedestrians from the bridge section to the causeway island section is a 14 ft. shared-use path spiral ramp which is described in **Section 7.21**. All proposed pedestrian features will tie to existing sidewalks at both eastern and western project limits. To provide complete connectivity for pedestrians a midblock crossing is proposed just east of West Broadview Dr. at Sta. 144+80. The midblock crossing will connect pedestrians to the south sidewalk east of the project and will include warning signs and other special emphasis features to alert drivers of the upcoming crossing. 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.

Transit routes already functioning within the corridor will remain active and uninterrupted. No additional transit lanes or bus access facilities are anticipated with the Preferred Alternative.

7.7 Design Traffic Volume

The Southeast Florida Regional Planning Model (SEFRPM), turning movement counts, and 24-hour machine counts collected in the field were used to forecast future year volumes for this study.

Future traffic was developed using the growth rate derived from travel demand forecasting, historical growth rates and population projections to forecast a future year (2050) design volume based on the existing volume estimates.

7.7.1 Future Traffic Projections

After reviewing the study area's historical growth trends and population projections, it is determined that all growth rate estimates fell between an annual range of -0.57% and 1.01%.

Taking into consideration each data estimate, the recommended annual growth rate for use in developing future volumes is 1.00%.

7.7.2 K, D, T and DHT Factors

The Design Traffic Factors used for future volume development are as follows (**Table 7-1**). The T factor was obtained from 2022 FDOT Annual Counts was higher than 2023 counts so it was used for conservative purposes.

Table 7-1 Traffic Data – Design Hour Traffic

K	D	T Factor	Design Hour Truck %
9.0	56.5	7.8	3.9

7.7.3 Future AADT Volumes

The estimated 2030 opening and 2050 design volumes for the weekday and weekend AADT (**Table 7-2**). These forecasted volumes are based on the selected 1% annual growth rate.

Table 7-2 Estimated Future Daily Traffic Counts

Count Location	Scenario	Weekday AADT	Weekend AADT
Broad Causeway, West of Service Station	2030 Opening	26,900	18,800
	2050 Design	31,900	22,300

7.7.4 Future Corridor Operational Analyses

For future year segment analysis for both the No Build and Build scenarios are analyzed using peak hour and daily segment volumes. The segment volumes were obtained by growing existing counts by an 1.0% annual growth factor. **Table 7-3** and **Table 7-4** summarizes level of service and volume to capacity for daily using 2023 FDOT Generalized Service Volume Tables and peak hour volumes using methods of the Highway Capacity Manual (HCM) and arterial travel times analysis.

The future segment daily analysis, which is based on volume comparison to the 2023 FDOT Generalized Service Volume Tables, results in a daily volume to capacity (V/C) ratio below 0.88. Peak hour arterial travel speed LOS A.

All future conditions are within the target of LOS D.

Table 7-3 Future Segment Volume Analysis Summary (Daily)

Roadway	Extents	Scenario	Volume	Service Volume Capacity	v/c	LOS	Target LOS
Broad Causeway	Bayshore Dr. to West Broadview Dr.	2030 Build	26,900	36,100	0.74	D	D
		2050 Build	31,900	36,100	0.88	D	D

Sources: FDOT 2023 Quality/Level of Service Handbook Generalized Tables (C4)

Table 7-4 Future Segment Volume Analysis (Peak Hour)

Roadway	Extents	Scenario	Peak Period	Travel Speed (mph)		Level of Service (LOS)		Target LOS
				EB	WB	EB	WB	
Broad Causeway	Bayshore Dr. to West Broadview Dr.	2030 No-Build	AM	28	27	A	A	D
			MID	28	28	A	A	D
			PM	28	26	A	A	D
		2050 No-Build	AM	27	27	A	A	D
			MID	28	27	A	A	D
			PM	28	26	A	A	D
		2030 Build	AM	28	28	A	A	D
			MID	28	28	A	A	D
			PM	28	26	A	A	D
		2050 Build	AM	28	27	A	A	D
			MID	28	28	A	A	D
			PM	28	26	A	A	D

Source: Calibrated SimTraffic Analysis Results, as detailed in Project Traffic Analysis Report

7.7.5 Future Intersection Operational Analysis

From an intersection perspective, the build alternative changes how vehicles enter and exit the service station. The new vehicle interactions include locations where traffic merge and diverge with the proposed frontage road ramps and stopped controlled intersections from the gas station driveways and frontage roads. Intersection capacity analysis for the future year No Build scenario utilized the *Highway Capacity Manual* (HCM) methodology and was completed using Synchro software. All movements result in a LOS of C or better except for the 2050 No Build PM stop at the northern driveway between the service station and frontage road access along the westbound direction, which resulted in an LOS D.

For the Build scenarios merging and diverging points between the service station access and causeway island mainline are created. Freeway Merge and Diverge Level of Service (LOS) was completed using HCS7 software.

Based on the results, each build scenario intersection results in a LOS of A or better and each merge and diverge report results in a LOS of C or better.

The unique features of Broad Causeway generated a final speed adjustment in the analysis. In HCM the freeway merge procedure, the minimum free-flow speed is 45 mph. The posted speed limit along Broad Causeway is 30 mph. To replicate field conditions, a 0.9 final speed factor was applied to the freeway free-flow speed.

7.7.6 Predictive Crash Analysis

The future year design alternative safety analysis was preformed using the predicted average crash frequency process outlined in the *Highway Safety Manual* (HSM). This HSM provides a predictive method for estimating expected average crash frequencies at individual sites and corridors. This method relies on safety performance functions (SPF) that estimate predicted average crash frequency as a function of traffic volume and roadway characteristics (e.g., number of lanes, median type, shoulder width, etc.). The goals of this process are to evaluate the safety effects of roadway improvements and to compare relative safety performance of design alternatives.

Although there are design recommendations throughout the project study area, the segment with the most significant changes to the typical section is the segment of the Broad Causeway from east of the service station to the eastern edge of the bridge, or essentially the undivided portion of the corridor. Therefore, the predictive method is only performed for this segment. For HSM analysis purposes this corridor was assumed to be an urban arterial (HSM Chapter 12).

The safety performance functions (SPF) for estimating predicted average crash frequency as a function of traffic volume. Existing and design year volumes developed in Section 4 of this report are used for analysis. It is noted that the intent of the predictive analysis is to show impacts of the design decisions for the wider shoulders and separated medians. Therefore, FDOT HSM calibration factors were not used in this analysis given this bridge segment is not similar to the typical state roads where these calibration factors were developed from. The results show that with the design changes proposed in this study the previously undivided segment of the Broad Causeway Bridge is predicted to go from 3.4 crashes per year to 2.3 crashes per year by the design year 2050 (**Table 7-5**).

Table 7-5 HSM Predictive Crash Analysis Results

Crash Severity Level	*Design Year No Build (Predicted crashes/year)*	*Design Year Build (Predicted crashes/year)*
Property Damage Only	*2.4*	*1.6*
Fatal and Injury	*1.0*	*0.7*
Total Crashes	***3.4***	***2.3***

The following examples further examine the logical benefits to safety that are not well reflected in the HSM process. The crash values used include 5-years of crash history for the undivided segment of the study area.

- Separated Bicycle Facility: In the existing condition there were 4 bicycle crashes (all resulting in injury) and in the proposed condition there is a physically separated shared-use path crossing the bridge, thus eliminating vehicle and bicycle interactions.
- Separated Median: In the existing condition there were 2 head-on crashes (both resulting in an injury), and in the proposed condition there is expected to be zero head on crashes with the physical separation between opposing travel lanes. As for the other crash types, installing a median barrier has a documented Crash Modification Factor of 0.14 or 86% reduction for all crash types and severities (Source: mfclearninghouse.org CMF ID# 974).

7.7.7 Multimodal Analysis

The multimodal operations were assessed by using the Level of Traffic Stress (LTS) metric. LTS is an approach developed by the Mineta Transportation Institute that focuses on classifying the comfort of pedestrians and bicyclists when using a roadway. The practice has been adopted by FDOT to quantify the impacts of a facilities features have on multimodal users' comfort levels. Determining LTS for a facility is based on a variety of factors and conditions, such as the presence and configuration of dedicated or mixed traffic facilities. Roadways were assigned a stress level of one to four, with LTS 1 signifying very low stress and LTS 4 signifying high stress. The design plans for the bridge reconstruction retains the shoulder that bicycles are permitted to use and develops a shared-use path physically separated from the roadway.

In the existing conditions the level of traffic stress for a pedestrian and bicyclist crossing the bridge was LTS 4 (which is defined as a route that is impassible by a wheeled mobility device or a level tolerated only by those with limited route choice and/or a cycling enthusiast. After reviewing each characteristic in future build conditions, the level of traffic stress for pedestrians and bicyclist is expected to be LTS 1, which is a level that can be tolerated by all users. The installation of a shared-use path separated from Broad Causeway is expected to providing a safe and comfortable facility for all users willing to use the shared path which improved the LTS score. Additionally, if bicyclists would prefer to use the roadway, they are permitted to ride within the newly installed 8-foot shoulder. The width of the shoulder concludes cyclist utilizing the shoulder along the roadway is expected to be LTS 3 (which is a level tolerated by confident cyclists who still prefer having their own dedicated space for riding).

7.7.8 Summary of Traffic Analysis

Based on the traffic performance analysis, it is determined that Preferred Alternative's reconfiguration of the Broadway Causeway Bridge and adjacent improvements to the service station results in a beneficial impact. The improvements to the bridge cross section, such as increased shoulder width and separated multimodal shared-use path results in providing a pedestrian/bicycle option that results in a Level of Traffic Stress of 1, which is a level that can be tolerated by all users.

Access improvements at the service station results in a LOS C or better. The reconfigurations occur from new locations where traffic merge and diverge as well as a stopped controlled intersection between entering and exiting vehicles. The design merge and diverge areas resulted in LOS of B and design stopped controlled intersection resulted in LOS A.

Based on the multimodal analysis, it is determined that the Preferred Alternative improves the level of traffic stress for pedestrians and bicyclists. The shared-use path separated from Broad Causeway is expected to improve the safety and comfort for multimodal movement.

7.8 Intersection Concepts and Signal Analysis

The Preferred 65 ft. Fixed-Bridge Alignment does not impact existing intersections along the project corridor. The existing signals that operate the existing drawbridge will be removed along with the existing bridge once traffic is ultimately moved to the Preferred Alternative.

7.9 Tolled Projects

The tolling structure will remain as is and will not be impacted by any of the proposed or preferred alternatives. Electric power and data communications utility services are expected to be maintained during the project with minimal expected interruptions if relocation is required.

7.10 Intelligent Transportation System and TSM&O Strategies

In compliance with the FHWA Rule 940, a comprehensive Systems Engineering analysis is currently underway as part of the project to identify the existing conditions and user needs, establish stakeholder roles and responsibilities, detail the proposed technologies and available alternatives, and define the operational scenarios of the proposed system(s).

In addition to the existing systems deployed currently, the following identifies the systems considered for implementation within the Broad Causeway Bridge Replacement project.

Closed-Circuit Television (CCTV) Cameras – pan-tilt-zoom cameras will be installed to provide full coverage of the bridge, approaches, and causeway to remote operations personnel enabling the ability to monitor roadway (e.g., severe weather) and traffic (e.g., crashes, congestion) conditions in real-time.

Vehicle Detection Systems – roadside sensors used to collect real-time traffic data – including volume, lane occupancy, and travel speed. Available in a variety of technologies, these systems can be used to determine current traffic conditions and identify anomalies (e.g., congestion, crashes) automatically by comparing against historical values. This system can be applied to a multitude of applications – including queue detection enabling real-time warnings provided to motorists ahead of the slowed traffic, travel time information dissemination, and more.

Dynamic Message Signs (DMS) – full-color, full matrix displays comprised of light-emitting diodes (LEDs) used to provide motorists with information on active roadway and traffic conditions to increase contextual awareness. Installed upstream of the causeway in both directions of travel, these overhead displays provide the ability to disseminate automated or user-generated messages to drivers in either textual and/or pictorial formats. Common information provided to motorists include the following:

- Travel times (e.g., *"SR A1A 3 MILES – 7 MINS"*)
- Incidents (e.g., *"CRASH AHEAD – RIGHT LANE BLOCKED"*)
- Traffic patterns (e.g., *"CAUTION - SLOW TRAFFIC AHEAD"*)
- Weather events (e.g., " *HIGH WIND ADVISORY"*)
- Detours (e.g., *"DIXIE HWY CLOSED – DETOUR US 1 AHEAD"*)
- Special events (e.g., *"HURRICANE EVACUATION IN PROGRESS"*)

Refer to the Concept Plans for specific locations of the proposed DMS on the project.

Roadway Weather Information Systems (RWIS) – integrated system of environmental sensors used to collect real-time data for the state of ambient weather. Each system contains a central controller responsible for processing inputs from various sensors and providing actionable information and alerts, such as push notifications to operations personnel. Sensors are customizable to the specific needs of the location and include technology able to determine ambient temperature, humidity, precipitation type, precipitation levels, visibility, wind speed and direction, pavement surface temperature, water level on pavement surface, rising water levels, and more.

Bridge Monitoring Systems – collection of technologies utilized to monitor the present state of the bridge structure to identify changes to the structural integrity and potential failures. These systems may leverage a wide array of technologies for multiple purposes – including CCTV cameras and LiDAR sensors to monitor bridge scour or physical impacts to piers from vessels; strain gauges and vibration sensors to determine changes in structural integrity. When an anomaly is identified, the system will provide a real-time warning or notification to the appropriate maintenance or operations personnel.

Bicycle Collision Avoidance System – series of detection sensors calibrated to detect and classify bicyclists at potential conflict points with motorists to actuate warning systems (e.g., flashing beacons). Strategically installed at transition points of bicycle lanes where drivers will have a lower likelihood of identifying the approaching bicyclists ("blind spot"), this system will enhance the contextual awareness of motorists to reduce bicycle-vehicle incidents.

Connected Vehicle Technology – roadside technology that enables real-time data collection and dissemination of information directly to motorists utilizing in-vehicle systems ("onboard units"). Deploying roadside units (RSU)—wireless communications radios—throughout the corridor provides an intelligent environment to deploy safety and mobility-based applications specific to each vehicle rather than regionally, as appropriate.

While many of these technologies may function as isolated or closed-loop systems, the implementation of one centralized system providing all subsystems and devices the ability to exchange information seamlessly will maximize the operational benefits for users. This requires a robust communications network established between all field equipment and a centralized control and command center (e.g., Traffic Management Center) to enable operations personnel to monitor and manage the overall system remotely. Additional coordination with project stakeholders will be completed prior to construction as part of the design phase to determine the roles and responsibilities related to operations and maintenance of the Intelligent Transportation Systems.

Refer to the *Broad Causeway Bridge Replacement – Concept of Operations Report* for more information regarding the proposed Intelligent Transportation Systems deployment. The *Concept of Operations* will be reviewed at a future date in conjunction with project stakeholders – namely the Town and Department – to better define the selected technologies, data interfaces, and operational scenarios for the Intelligent Transportation Systems deployment on the project.

Following evaluation of the existing conditions and needs of the project, it was determined that reliance upon TSM&O strategies alone will not provide the operational benefits sought by the Town. Implementation of traditional strategies (e.g., lighting, transit signal priority, active arterial

management) will not alleviate existing congestion concerns or improve the mobility across the causeway because the issues of the movable bridge are not addressed. Multiple TSM&O strategies were considered including technology-based solutions to identify when the movable bridge is up or if queues are building on the causeway to provide real-time information to motorists upstream to encourage alternative routes. However, each of these strategies failed to provide the necessary operational improvements due to the limited available bridge crossings of Biscayne Bay (Intercoastal Waterway) making alternative routes impractical in most cases.

7.11 Landscape

The proposed bridge provides the opportunity for improved aesthetics and opportunity for the Town to create a park or community facilities within the causeway island which today does not include any pedestrian space. During the design process, it will be necessary to gather input from community representatives and officials to identify specific details related to proposed landscapes and hardscapes.

7.12 Lighting

The project is located away from the wildlife Sensitive turtle nesting area and not near the shore, therefore, Wildlife Sensitive amber LED luminaires are not required.

The existing causeway island lighting will be replaced with new decorative LED luminaires mounted on new aluminum poles. The decorative LED luminaire to use will be coordinated with the Town. A USCG compliant navigation lighting system will be provided over the Intracoastal Waterway. The existing underground conduit and conductors on the causeway island will be replaced with new conduit installed underground and new copper conductors. The lighting poles on the proposed bridge will be mounted on pilasters. Lighting calculations will include the shared-use path and the outside shoulders.

Color changing LED luminaires will be provided to illuminate the bridge beams and piers. Up to seven color themes will be proposed.

A USCG compliant navigation lighting system will be provided over the Intracoastal Waterway.

7.13 Permits

The following permits are anticipated for this project:

- USCG Bridge Permit
- USACE Nationwide 15 Permit (including Section 408 review)
- FDEP National Pollutant Discharge Elimination System (NPDES) Permit
- FDEP Contamination Stormwater Permit
- SFWMD Environmental Resource Permit (ERP)
- SFWMD Consumptive Water Use Permit
- Miami-Dade County Class I Coastal Construction Permit
- Miami-Dade County Class II Permit
- Miami-Dade Class VI 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 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 ft. wide from Kane Concourse (SR 922), 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 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 be not 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 Miami-Dade County's Department of Regulatory and Economic Resources - Division of Environmental Resource Management 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 Stormwater Runoff Control Concept (SRCC) and proper coordination for NPDES requirements. Additionally, a Class II will be required from DERM for construction of drainage system with overflow in, on, or upon any waterbody.

If dewatering occurs within 500 ft. 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.

7.14 Drainage and Stormwater Management Facilities

The proposed stormwater management system will be developed to meet the design and performance criteria established in the SFWMD ERP Applicant's Handbook Volumes I and II for the treatment and attenuation of discharges to impaired waters and OFWs; the design will provide 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. A SRCC will also be implemented to control the effects of stormwater runoff during construction. All outfalls on the project will discharge to Biscayne Bay.

Stormwater runoff will be collected within ponds on the causeway island; if percolation is sufficient, dry retention will be explored to attain greater water quality treatment. A new seawall will be constructed along the landward perimeter of the causeway island and tying into the existing wall under the western bridge. Rubble, sufficient to remain stable during the 100-year event, will be placed at the base of the seawall, tying into the existing rubble. The size of the existing rubble around the island's perimeter was analyzed and found to be stable, in its current placement, during the 100-year storm (See **Appendix G** for an analysis of the existing revetment). The elevated perimeter walkway will allow stormwater to be stored to a higher elevation than currently feasible on the island.

No scuppers discharging to Biscayne Bay will be used on the proposed bridge. Runoff will be conveyed on the proposed bridge deck shoulders and be collected by roadway inlets immediately beyond the bridge ends, except for the sag in the bridge profile from sta 112+27 to 115+66. At this location, 4" scuppers, spaced 10 ft. apart, will be used along the WB and EB Broad Causeway Bridge barrier walls, and will drain into the pond underneath the bridge.

The roadway east of the bridge, east of the existing W. Broadview Drive intersection, is too low to store runoff in this retention pond or in French drains and will therefore be directly discharged in the proposed condition, even as occurs currently. However, runoff east of the crest of the proposed Broad Causeway Bridge, down to the W. Broadview Drive intersection, will be stored in a retention pond on the southeastern end of the bridge. A *Water Quality Impact Evaluation (WQIE) (September 2023)* has been drafted to document water quality. Ponds and outfalls will be identified, and OFW treatment requirements calculated, in the *Pond Siting Report* (February 2024). Additional compensatory water quality will be developed within the ponds on the island to compensate for the minimal water quality realized through the pond east of the bridge.

The required FDEP SLIP study notification and 30-day publication period were completed on April 26, 2023. As required in Section 161.551, Florida Statutes, the SLIP study will be maintained on the FDEP's website for a minimum of 10 years. The report has been uploaded to the SLIP study website and to OCULUS. The 10-year period started Wednesday, April 26, 2023.

7.14.1 Resiliency and Nature-based Solutions

The MHW and Seasonal High Groundwater Table (SHGWT) elevations water levels within the proposed drainage design consider future sea level rise per the FDOT Drainage Manual, Section 3.4.1. Additionally, to account for future sea level rise, the minimum seawall cap elevation is 6 ft above Mean Sea Level (MSL), which is 6.33 ft NAVD, per Town of Bay Harbors Islands Municode Chapter 23 / Article I / Section 23.12(10)(c).

The Town proposes to integrate nature-based environmental treatment into the shallow dry detention ponds on the Causeway Island. Bio-swales, rain gardens, and bio-retention, will be employed, both under bridges and interspersed in open areas, with appropriate vegetation for the expected level of shading. These nature-based solutions will increase pollutant uptake within the detention ponds and provide a pleasant environment for recreation on the island.

7.15 Floodplain Analysis

The entire corridor lies within the 100-year floodplain. The project's being in a tidally dominated basin rather than a regulated basin, cup-by-cup floodplain compensation is not required.

7.16 Bridge and Structure Analysis

A detailed analysis of the proposed Broad Causeway Bridge can be found in the *Bridge Development Report (April 2024)*. The following sections provide general attributes for the proposed bridge in accordance with the *FDM*, Section 121.8.

7.16.1 Environmental and Site Conditions

The environmental classifications for the superstructure and substructure can be found in the *Preliminary Geotechnical Report (February 2024)*. A summary of the findings and corrosion test results can be found in **Table 7-6**.

Table 7-6 Corrosion Test Results

Element	Classification	pH	Chlorides	Sulfates	Resistivity
Substructure	*Extremely Aggressive*	*7.9*	*49950*	*330*	*26*
Superstructure	*Extremely Aggressive*	*7.9*	*49950*	*330*	*26*

7.16.2 Bridge Typical Sections

As indicated in **Section 7.1**, the bridge typical section consists of a four-lane divided roadway. This typical section consists of two (2), 11 ft. lanes in each direction separated by 4 ft. inside shoulders and a 2 ft. concrete barrier wall. The outside shoulders are 8 ft. and are adjacent to 1 ft. 4 in. concrete barrier walls, and a 14 ft. shared-use path is proposed along the north side of the bridge with a 48 in. high pedestrian/bicycle railing.

7.16.3 Vertical and Horizontal Clearances

The USCG has jurisdiction over the ICWW in Biscayne Bay. Consultation between the Town and the USCG indicated the navigation constraints for this bridge replacement project. USCG requires 90 ft. horizontal clearance and 65 ft. vertical clearances for new fixed bridges, which is accommodated with the preferred alternative.

7.16.4 Bridge Superstructure

The superstructure consists of precast prestressed concrete FIB girders of varying size throughout the length of the bridge as shown in **Figure 7-2**. The channel span and the two flanking spans are approximately 144 ft. long and will have FIB-63 girders to help meet the minimum vertical clearance requirements. The remaining spans range from 163 ft. down to 95 ft. and will be comprised of various FIB sizes ranging from FIB-78 to FIB-36 depending on the geometric constraints at given locations.

Figure 7-2 FIB Superstructure

7.16.5 Bridge Substructure

The typical water pier will consist of dual arched caps with two columns with aesthetic rustication detailing on the column and cap as shown in

These piers will utilize waterline footings that meet the wave crest elevation requirements specified in the *FDOT Structures Manual*. Land piers will be similar to the water piers in cap shape and number of columns where the bridge width is similar to that of the waterway. At locations where the bridge width increases, a similar multi-column arched cap pier will be implemented with a modified cap shape and number of columns. The land piers will have buried footings 3 ft. below existing ground line.

7.16.6 Bridge Foundations

Various options for foundations were considered in the development of the *Bridge Development Report (April 2024)*. Some types that will be evaluated are: 24 in. PSC pile, 30 in. PSC pile, 48 in. drilled shafts, and 60 in. drilled shafts. A final recommendation on foundation type will be made based on constructability, feasibility, and recommendations from the geotechnical engineer.

7.17 Navigation

The USCG indicated at the initial project coordination meeting on January 20, 2023, that replacement of the Broad Causeway Bridge will require a USCG bridge permit; therefore, the Preferred Alternative will require a USCG permit.

The USCG guide clearance established for the Gulf Intracoastal Waterway at this location is 65 ft. vertical clearance above MHW for new fixed bridges. The next existing fixed bridge directly downstream along the Intracoastal Waterway, Julia Tuttle Causeway Bridge, has a 55.8 ft. vertical clearance and upstream the Bakers Haulover Inlet Bridge has a 31.8 ft. vertical clearance. Based on this ICW bridges information and data provided by the bridge tender at the Broad Causeway Bridge the Preferred Alternative, a 65 ft. High-Level Fixed-Bridge with a guide clearance of 90 ft. perpendicular distance between fenders, would allow most boats that currently require the existing bridge to open to safely navigate under the proposed structure. Navigational lighting mounted on the existing bridge and fenders will be replaced with the Preferred Alternative, in accordance with the USCG bridge permit requirements.

Minor impacts on navigation are expected as temporary closures of the waterway under the bridge may occur during the project construction phase. No permanent adverse impacts to navigation are expected to result from this project.

7.18 Transportation Management Plan

It can be anticipated that this project will cause sustained work zone impacts; therefore, the project will require a detailed Transportation Management Plan (TMP). A TMP includes three components: a Temporary Traffic Control Plan (TTCP), a Transportation Operations (TO) component, and a Public Information (PI) component. The TO and PI components should be thoroughly developed during the Design Phase of the project, so that existing conditions at that time can be accurately and fully considered and addressed. The PD&E team has evaluated the TTCP component of the Preferred Alternative, which is detailed in **Section 7.19.1**.

7.19 Constructability

Phased construction will be completed within three major phases and will not affect the general traffic flow of two lanes in each direction. No restrictions are anticipated for residents and business owners adjacent to the project limits. Emergency evacuation will be maintained.

Bridge spans over water will require construction of a temporary trestle or floating barges to support a crane and allow delivery of materials for the bridge construction. Typically, temporary trestles are only used if the water is not deep enough to allow a barge to travel and support construction equipment. Temporary trestle requirements will be investigated further in the *Bridge Development Report (April 2024)* and as more detailed survey is gathered.

7.19.1 Temporary Traffic Control Plan

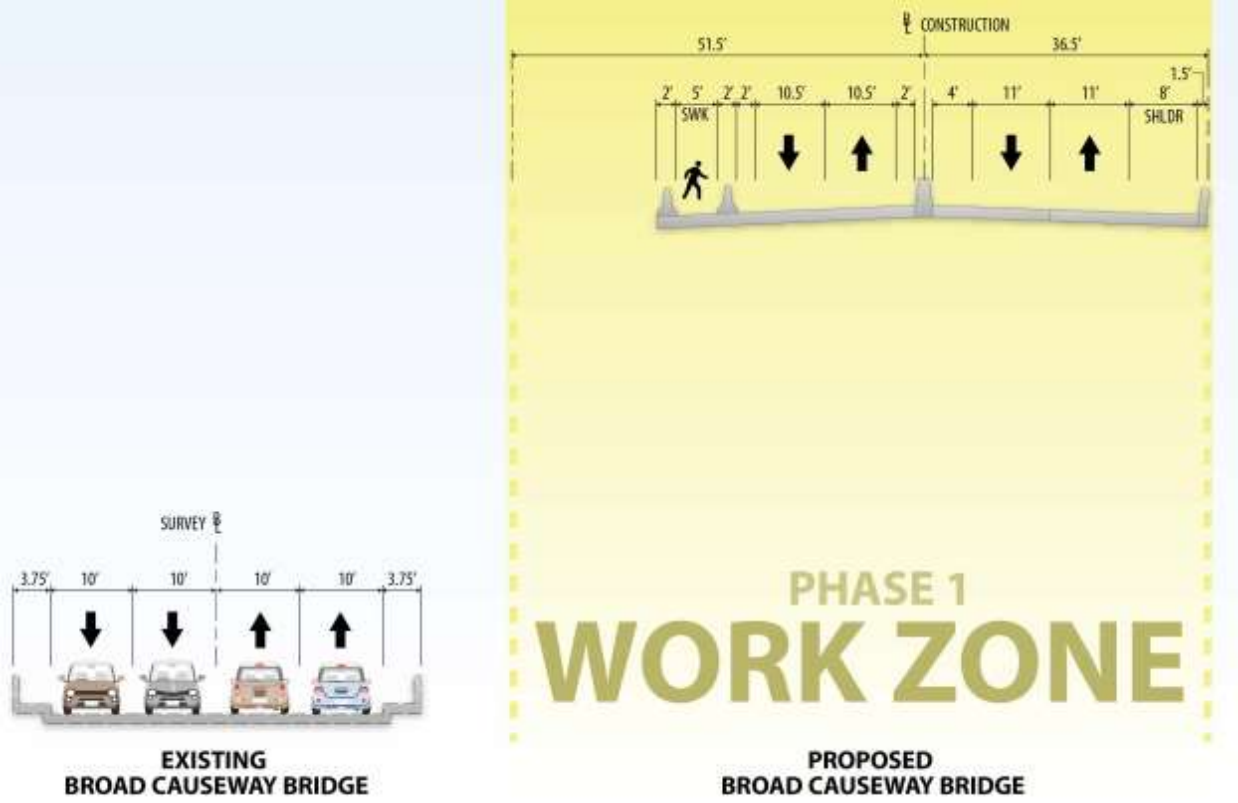
The Broad Causeway Bridge connects the City of North Miami to the Town of Bay Harbor Island and is one of only three vehicular connections within a 5-mile radius, thus a vital connection that must remain functional throughout the duration of the construction activities. Because the bridge is a critical regional coastal route, detour routes are limited, and the public expressed an overall common concern regarding maintenance of traffic and potential bridge closure during construction. The project team developed a preferred build alternative that maintains traffic across the existing bridge during construction. The proposed Broad Causeway Bridge is anticipated to be replaced on a new alignment with changes to the width and height to bring the bridge to current design standards and USCG requirements. Both vehicular and vessel TTCP plans will be required during construction and broken into three major phases and two minor phases.

Phase 1

The proposed alignment of the Preferred Alternative will lie approximately 85 ft. south of the existing bridge alignment. Traffic will remain unchanged in the four lanes of the existing bridge and in the eastern approach from SR 922. See **Figure 7-3**: Construct full-width bridge (Spans 1 - 8 and spans 10 – 17). Construct partial path width for shared-use path on Span 9, 18 and 19. At the existing service station and western approach of the existing bridge, a minor construction phase will construct temporary asphalt along the north side of the causeway along the existing westbound traffic lanes to construct two temporary eastbound traffic lanes. The temporary traffic lanes will be used to divert the eastbound traffic onto the north side of the causeway island to provide space for the construction of the proposed bridge and access ramps to the service station. Access to the existing service station

will be provided from the north side of the causeway island in this phase. Access points to West Broadview Drive will remain open during all phases of construction. The mainline travel lanes, and portions of the shoulders will all be completed in Phase 1.

Figure 7-3 Temporary Traffic Control Plan Typical Section – Phase 1



Phase 2A

Shift eastbound (EB) vehicular traffic to new bridge. Maintain westbound (WB) traffic on existing bridge along with all pedestrian traffic (pedestrian traffic maintained only on north side of existing bridge). Construct a partial new approach at the east end of the bridge using nighttime WB lane closures.

Phase 2B

Shift all WB traffic to the new bridge. Maintain pedestrians on the existing bridge.

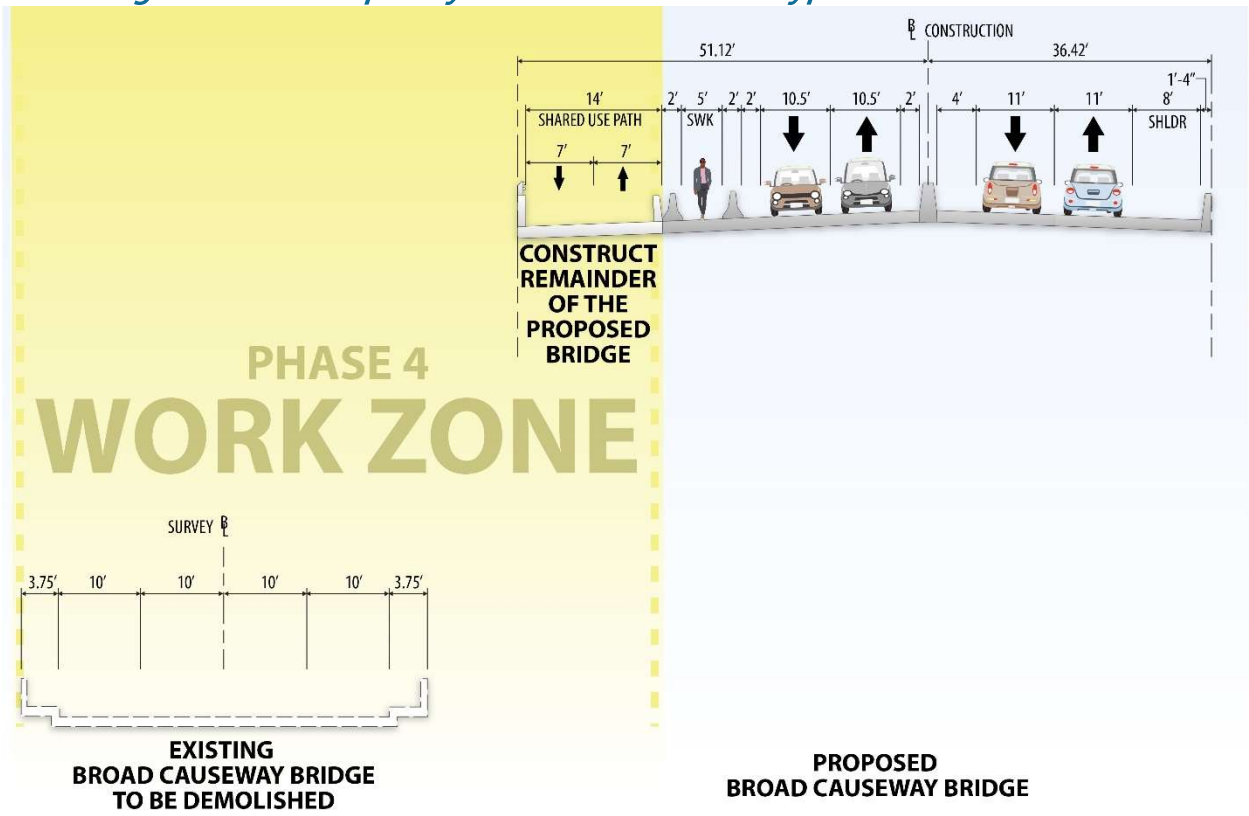
Phase 3

Maintain all traffic on new bridge. Maintain pedestrian traffic on north side of existing bridge. Partially demolish eastbound direction of existing bridge.

Phase 4

Maintain traffic on the new bridge with pedestrians on the existing bridge. Construct remainder of the proposed bridge (Spans 9, 18 and 19). Construct circular pedestrian ramp on causeway island. Shift pedestrian traffic to new bridge and ramps. Demolish remainder of existing bridge. See **Figure 7-4** for TTCP Phase 4 Typical.

Figure 7-4 Temporary Traffic Control Plan Typical Section – Phase 4



7.20 Construction Impacts

Construction activities for the Preferred 65 ft. Fixed Bridge Alternative will not impact the existing traffic flow or navigational flow. Proposed construction phasing described in **Section 7.19.1** clarifies that the four existing lanes will stay in operation throughout construction. Pedestrian and bicycle traffic will be temporarily impacted due to safety concerns as the existing facilities do not meet current standards. In addition, there will be short term air, noise and water quality impacts for residents and travelers within the project study area.

Maintenance of traffic and sequence of construction will be planned and scheduled to minimize traffic delays throughout the project. Signs will be used to provide notice of access to local business and other pertinent information to the traveling public. The latest edition of the FDOT's Standard Specifications for Road and Bridge Construction will be followed.

Once the traffic is redirected to the new bridge, the current bridge will undergo demolition. All materials will be cleared from the location, unless they are considered sufficiently clean for reuse or repurposing. The potential of relocating and submerging certain sections of the old bridge to form an artificial reef is an option that can be considered during the design phase and coordinated with the Town's leadership.

The air quality effect of construction activities will be short-term and will mainly be in the form of dust from earth work and unpaved roads. These impacts will be minimized by adherence to all applicable State and Local regulations and to the FDOT's Standard Specifications for Road and Bridge Construction.

Bridges are built with heavy construction equipment and there is potential for noise and vibration impacts. Early identification of potential noise and vibration sensitive sites along the project is important in minimizing these impacts. Construction noise and vibration impacts to these sites will be minimized by adherence to the controls listed in the latest edition of the FDOT's Standard Specifications for Road and Bridge Construction.

Water quality effects resulting from erosion and sedimentation will be controlled in accordance with the latest edition of the FDOT's Standard Specifications for Road and Bridge Construction.

The project is in Biscayne Bay, an OFW and designated Aquatic Preserve. The proposed Preferred Alternative cannot completely avoid impacts to existing natural resources within the project area; however, avoidance and minimization measures will be incorporated during the construction of the project to minimize impacts to natural resources. BMPs are to be implemented to prevent impacts to threatened and endangered species; wetlands and surface water features; EFH; and benthic resources. Additional details regarding the measures to be implemented prior to and during construction are discussed in the *Natural Resource Evaluation (NRE) (April 2024)*.

7.21 Special Features

Due to the increased vertical profile the 65 ft. Fixed-Bridge Alternative will provide a completely different view shed for its users, the increased height will be highlighted on the 14 ft. shared-use path where overlooks will be located on the east and west edges of the ICWW. The overlooks will give the users a place to rest if using the shared-use path as an exercise destination or a place to take pictures and take in the 360-degree panoramic views of the Town of Bay Harbor Islands and Downtown Miami.

Another special feature of the shared-use path is the spiral ramp that brings the users down to the causeway island from the 65 ft. Fixed Bridge. To enhance safety measures on the spiral ramp, specific signage for pedestrians and bicyclists will be installed to indicate the direction of flow. Additionally, speed feedback signs can be implemented to alert users of their speed and promote caution while using the ramp. The spiral ramp will meet ADA requirements and have less of a design and construction footprint then a standard horizontal ramp on the causeway island. A smaller footprint

will provide more greenspace for the Town to expand the causeway island to include park features for their residents in the future.

During the design phase bridge features such as aesthetics, landscaping and lighting will be coordinated with the community.

7.22 Utilities

The Preferred Alternative will require the relocation of some existing utilities and coordination with utility providers will continue as appropriate for relocations, as necessary. See **Table 7-7** for information on the potentially impacted existing utilities. Utility contact information is provided in **Table 7-8**.

A 30 in. Miami Dade water main runs along the north side of the causeway island and approximately 123 ft. north of the existing Broad Causeway Bridge. This water main enters a 20 ft. utility easement at the existing Town-owned Tot Lot at the eastern side of the existing bridge approximately 50 ft. north of the existing roadway. There is an active electric line that runs across the north side of the bridge. This line powers the tender house and machinery.

Table 7-7 Potential Utility Impacts

Owner	Type	Potential Impact	Station	Side
Breezeline/Comcast	*Cable*	*Overhead cables may have to be raised to accommodate proposed elevated roadway profile*	*142+27.42*	*LT/RT*
Miami-Dade WASD	*Water*	*Fire hydrants may have to be relocated to accommodate proposed road work*	*104+30.49*	*RT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*107+30.59*	*LT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*110+09.41*	*LT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*112+82.78*	*RT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*115+55.56*	*LT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*118+15.00*	*RT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*120+35.69*	*LT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*122+23.89*	*LT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*122+36.62*	*LT*
Miami-Dade WASD	*Water*	*Fire hydrants to be relocated to accommodate preferred fixed-bridge alternative*	*141+73.58*	*LT*
FPL	*Electrical*	*13kV line to be relocated to preferred fixed-bridge alternative*	*123+82.57 to 140+45.89*	*LT*

Table 7-8 Utility Owner Contact Information

Service Area	Utility Type(s)	Contact
Atlantic Broadband / Breezeline	Cable	Javares Hall (305) 213-9908 JHall@breezeline.com
Town of Bay Harbor Islands Water & Sewer Dept.	Sewer, Water	Rodney Carrero (305) 866-6241 rcarrerosantana@bayharborislands-fl.gov
Comcast Cable	CATV, Fiber	Thornton Szynkarski (954) 562-5309 Thornton_Szynkarski@comcast.com
City of North Miami	Force Main, Sewer, Water	Chuks Okereke (305) 893-6511 x15002 cokereke@northmiamifl.gov
Dade County Public Works and Traffic	Street lights, Traffic Signals	Gaby Calvo (305) 412-0891 GCalvo@htlocating.com
Florida Power & Light -- Dade	Electric	Gabriel Rodriquez (305) 281-9847 GABRIEL.RODRIGUEZ2@FPL.COM
Florida Power & Light – Subaqueous	Electric	Gabriel Rodriquez (305) 281-9847 GABRIEL.RODRIGUEZ2@FPL.COM
Florida Power & Light – Transmission	Electric	Gretchen Dillman (813) 469-0924 Gretchen.Dillman@fpl.com
Hotwire Communications	CATV, Fiber, Telephone	Walter Sancho-Davila (954) 699-0900 walter.sancho-davila@hotwirecommunication.com
Miami-Dade Water Sewer	Water & Sewer	Manuel Diaz (786) 552-4424 Manuel.diaz2@miamidade.gov
Crown Castle NG	Fiber	Danny Haskett (786) 610-7073 Danny.Haskett@crowncastle.com
Teco Peoples Gas South Florida	Gas	David Rivera (954) 453-0794 DRRivera@tecoenergy.com
AT&T/Distribution	Telephone	Steve Low (305) 341-0968 sl4504@att.com

The exact locations of existing utilities and the extent of impacts will be determined during the Final Design phase through coordination with the utility owners. Disruptions to service and utility relocations will be minimized to the greatest extent feasible. Impacts resulting from utility adjustments were considered in the selection of the Preferred Alternative; however, utility relocation costs are not included in the total estimated project costs. Utilities permitted within FDOT ROW are to be relocated at the expense of the owner.

7.23 Cost Estimates

The estimated construction costs for each alternative were developed with a line-item estimate based on preliminary design using the FDOT historical Item Average Cost Reports for unit pricing. Six-month average, twelve-month average, and market specific averages were used to arrive at the individual unit prices. High level items such as MOT, Mobilization, cumulative inflation, and project unknowns were all considered in the cost estimate. The preliminary construction cost for the preferred alternative is shown below in **Table 7-9**.

Table 7-9 Preliminary Construction Cost – Preferred Alternative

Description	Cost
Base Construction	*$ 127,021,000*
MOT (20% of Base Construction Cost)	*$ 25,404,000*
Mobilization (15% of Base Construction + MOT Cost)	*$ 22,864,000*
Cumulative Inflation from 2023 – 2029 (3% annual inflation)	*$ 40,316,000*
Project Unknowns (15% of Base Construction + MOT+Mobilization Cost)	*$ 26,293,000*
TOTAL	***$ 241,898,000***

7.24 Schedule

As shown in **Figure 7-5**, the Design Phase is scheduled to be initiated in 2024. Since there are no ROW acquisitions that phase is not applicable. The project will move from the Design phase directly into the Construction Phase which is anticipated to start in the year 2028. The Design Phase will be funded through grants and toll revenues. Funding for construction has not yet been identified.

Figure 7-5 Project Schedule

7.25 Environmental Effects

7.25.1 Section 4(f)

The project will be constructed within the existing ROW. A portion of the project is located adjacent to the Tot Lot, but the proposed project has no use of the property within the meaning of Section 4(f). A temporary area easement will need to be utilized from the west side of the Tot Lot which will result in a temporary occupancy but will not result in a "use". There will be no adverse impacts to the Tot Lot as a result of this project. As such, the project anticipates meeting the conditions of 23 CFR 774.13(d)(1-5) to have a temporary occupancies of land that is so minimal as to not constitute a use within the meaning of Section 4(f). The duration will be less than the time needed for construction of the project and there will be no change in ownership of land. The scope of work is

minor and there are no adverse impacts to the protected activities, features, and attributes or a temporary or permanent bases. The park will be fully restored to current condition or better and all plans have been concurred with by the OWJ for the park. The Official with Jurisdiction (OWJ) has provided concurrence for this temporary occupancy.

The Florida Circumnavigational Saltwater Paddling Trail follows the ICWW under the existing Broad Causeway Bridge. Since the Florida Circumnavigational Saltwater Paddling Trail at the ICWW under the existing Broad Causeway Bridge cannot be avoided, measures to minimize harm to the trail will be undertaken and a temporary detour route for the trail was developed. The vertical clearance of Bridge No. 875103 between Bay Harbor Islands and Bal Harbour along the detour route is 11.8 ft. As such, the access to the Paddling Trail will be maintained during and after the project. The new bridge is being constructed within the existing right-of-way so there is no acquisition or occupation of land from the protected property on either a temporary or permanent basis, and no meaningful proximity impacts to protected property.

During design coordination with FDEP Office of Greenways and Trails will be conducted regarding the temporary detour of the Florida Circumnavigational Saltwater Paddling Trail during construction of the new Broad Causeway Bridge. Detour notifications will be provided to FDEP for posting on their website regarding the temporary closure.

The Florida Circumnavigational Saltwater Paddling Trail will be a Section 4(f) "No Use" pending OEM approval.

Broad Causeway Bridge, Citgo Service Station, and Bay Harbor Islands Historic District are located within the project corridor and are NRHP-eligible resources that were evaluated for potential Section 4(f) impacts. Coordination with the FDOT and SHPO is ongoing to prepare a Memorandum of Agreement (MOA) for the Section 106 adverse effects to these resources.

The Preferred Alternative proposes to remove and replace the Broad Causeway Bridge (8DA10123, FDOT Bridge 875101) with a fixed-span bridge with a vertical navigational clearance level of 65 feet above the MHW level. Based on the *Criteria of Adverse Effect*, the Preferred Alternative will have an Adverse Effect on the NRHP-eligible Broad Causeway (8DA10123, FDOT Bridge No. 875101) linear resource since it requires the demolition of the existing bridge. The Broad Causeway Bridge (8DA10123) is documented as a Programmatic Section 4(f) Evaluation and Approval for FHWA (Federal Aid) Projects that Necessitate the Use of Historic Bridges pending OEM approval. The programmatic evaluation determined there are no feasible and prudent alternatives to the use of Broad Causeway Bridge and that the project included all possible planning to minimize harm resulting from such use. Mitigation for the demolition of Broad Causeway Bridge is captured in the Section 106 MOA.

In consultation with both of the OWJs (the Town and SHPO), pending OEM approval, it has been concluded that the proposed project has "no use" of the Bay Harbor Islands Historic District (8DA10515) within the meaning of Section 4(f) based on the following analysis and parameters:

- The Bay Harbor Islands Historic District (8DA10515) was originally recorded as having 312 contributing resources built in or prior to 1957. Additional resources would likely be considered contributing if an updated survey was conducted in the Town due to the large number of original buildings and structures built during the 1960s and early 1970s. With

contributing resources numbering in the hundreds, the historic district remains potentially eligible even with the removal of the historic Broad Causeway Bridge (8DA10123) and changes to the Citgo/1501 Broad Causeway (8DA10436) historic setting.

- The Broad Causeway Bridge's contribution to the Bay Harbor Islands Historic District is based in functionally; the construction of said bridge facilitated the development of the historic district by providing access to the area during the period of significance. By constructing a new bridge, functionality is still provided to the Historic District and therefore does not diminish the integrity of, or prohibit access to, the Historic District.
- The replacement bridge alternatives will not be visible from the majority of the Historic District. Therefore, the project will not alter the existing visual and aesthetic conditions of the resource group as a whole, its viewshed or setting, and will not introduce any new visually intrusive elements that will affect the resource group. Therefore, the project will have no constructive use of the Historic District.
- The degree and nature of the project do not rise to the level of substantial impairment to the characteristics, activities, features, and attributes that make the Historic District potentially eligible for the NRHP and a Section 4(f) protected property.
- In consideration of any mitigative or beneficial aspects to this project, the Broad Causeway Bridge project will provide enhancements to the inhabitants of the Historic District since it will improve vehicular, pedestrian and bicyclist safety by providing wider travel lanes, shoulders and a 14 ft. shared-use path. It will also improve access to the Historic District and emergency evacuation since there will no longer be delays from opening a movable bridge. Lastly, it will provide recreational facilities noted above that currently do not exist that can enhance the quality of life for inhabitants of the Historic District. All of which facilitates the continued stewardship and preservation of the Historic District.

The Preferred Alternative was designed to avoid removing the Citgo/1501 Broad Causeway (8DA10436) by starting the elevated bridge approach further west on Broad Causeway Island and flying over a portion of the Citgo/1501 Broad Causeway (8DA10436). While this design is able to avoid all direct physical impacts to the buildings, it does change the historic setting of the resource, which has always been set on a visually open island with no other structures other than toll booths (now removed) in the vicinity. A *CRAS Report* (April 2024) completed for this project confirmed the significance and integrity of the structure remains unchanged and concluded the Citgo structure is still individually eligible and remains a contributing resource to the Bay Harbor Islands Historic District (8DA10515). SHPO concurred with this evaluation on May 6, 2024. Based on the *Criteria of Adverse Effect*, the Preferred Alternative would have an Adverse Effect on the NRHP-eligible Citgo/1501 Broad Causeway (8DA10436) resource.

In consultation with both of the OWJs (the Town and SHPO), pending OEM approval, it has been concluded that the proposed project has "no use" of the Citgo/1501 Broad Causeway (8DA10436) within the meaning of Section 4(f) based on the following analysis and parameters:

- The project will have no acquisition of land from the resource on a temporary or permanent basis.

- The project is not interrupting its function or access (i.e. operation as a rest/gas station).
- There are no proximity impacts to the resource, including the change to the viewshed, that rise to the level of substantial impairment that would cause the structure to lose its NRHP eligibility individually or as contributing to the Bay Harbor Islands Historic District (8DA10515).
- The project improvements around and over the Citgo/1501 Broad Causeway (8DA10436) will not be visible from the majority of the Historic District. Therefore, the project will not alter the existing visual and aesthetic conditions of the resource group as a whole, its viewshed or setting, and will not introduce any new visually intrusive elements that will affect the resource group. Therefore, the project will have no constructive use of the Historic District.

7.25.2 Cultural Resources

A *Cultural Resource Assessment Survey (CRAS) Report* (April 2024) has been prepared and has been coordinated with Miami-Dade County Office of Historic Preservation, OEM and the SHPO

The background research and field survey identified 12 historic resources considered ineligible for listing in the NRHP that are also considered as non-contributing resources to a historic district. The survey determined that thirteen (13) historic resources are eligible for listing in the NRHP either individually, as contributing elements to a historic district within the APE, or which have insufficient information for a definitive eligibility evaluation; resources with insufficient information are presumed eligible until otherwise documented for the purpose of applying the *Criteria of Adverse Effect*. A list of all identified extant resources are shown in **Table 7-10**. The location of the identified NRHP-eligible historic resources can be seen in the Section 106 Resources Map (**Figure 7-6**).

The FDOT submitted the CRAS report to the SHPO on April 22, 2024, along with the District's determination that the proposed project will have an adverse effect on the individually NRHP-eligible Broad Causeway Bridge (8DA10123), the individually NRHP-eligible Citgo historic structure (8DA10436), and the NRHP-eligible Bay Harbor Islands Historic District (8DA10515). The SHPO concurrence was received on May 6, 2024.

Additionally, this CRAS was provided to the Miami-Dade County Office of Historic Preservation for review. The County Historic Preservation Chief responded on January 11, 2024 with no additional comments.

The FDOT submitted the *Case Study Report* (April 2024) to the SHPO on April 9, 2022, along with the District's determination that the proposed project will have an adverse effect on the individually NRHP-eligible Broad Causeway Bridge (8DA10123) linear resource, the individually NRHP-eligible Citgo historic structure (8DA10436), and the NRHP-eligible Bay Harbor Islands Historic District (8DA10515). The Broad Causeway linear resource consists of a fixed bridge, man-made island (Broad Causeway Island, 8DA21594), and bascule bridge (Broad Causeway, 8DA10123, FDOT Bridge No. 875101).

The *Case Study Report* was also provided to the Miami-Dade County Office of Historic Preservation for review on April 17, 2024.

A Memorandum of Agreement (MOA) between the FDOT, Town, and SHPO is currently being drafted. The MOA outlines conditions to minimize and mitigate the adverse effects resulting from the project, including Historic American Engineering Record (HAER) Level II documentation for the historic bridge, public education, which will include historic markers about the historic bridge and

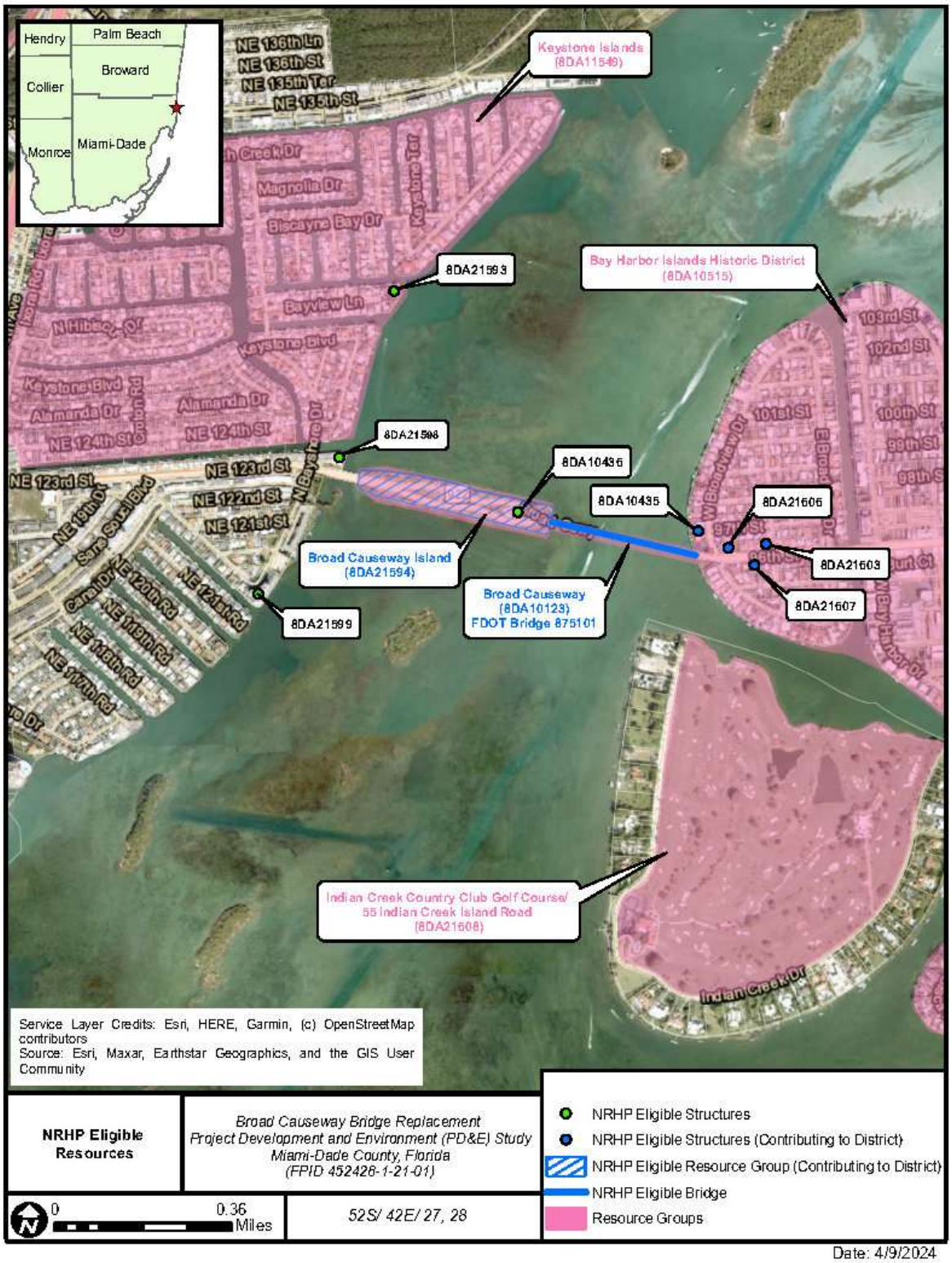
history of the Town; provide an updated survey of the historic district; and incorporation of project design elements. Please refer to the Cultural Resources commitments for more information regarding the MOA stipulations that have been committed to by the Town of Bay Harbor Islands.

Table 7-10 All Extant Resources Identified During Survey

FMSF No.	Address/Name	Construction Date	Type/Style	Recommended NRHP Eligibility
8DA10123	Broad Causeway/ FDOT Bridge No. 875101	c. 1951	Linear Resource	NRHP-Eligible August 15, 2018/ Contributing to Bay Harbor Islands Historic District
8DA10435	9700 W Broadview Drive	c. 1955	Structure/ Masonry Vernacular	Contributing to Bay Harbor Islands Historic District
8DA10436	Citgo/1501 Broad Causeway	c.1951	Structure/ MiMo	NRHP-Eligible August 15, 2018/ Contributing to Bay Harbor Islands Historic District
8DA10515	Bay Harbor Islands Historic District	c.1940s–1960s	Resource Group	Insufficient Information August 15, 2018
8DA11549	Keystone Islands	c. 1948–1964	Resource Group	Not Evaluated by SHPO/ Insufficient Inforamation
8DA21585	12385 Keystone Island Drive	1969	Structure/ Masonry Vernacular	Not Eligible
8DA21586	12405 Keystone Island Drive	1959	Structure/ Masonry Vernacular	Not Eligible
8DA21587	12415 Keystone Island Drive	1955	Structure/ Masonry Vernacular	Not Eligible
8DA21588	12425 Keystone Island Drive	1956	Structure/ Mid-Century Modern	Not Eligible
8DA21589	12445 Keystone Island Drive	1956	Structure/ Masonry Vernacular	Not Eligible
8DA21590	12455 Keystone Island Drive	1961	Structure/ Masonry Vernacular	Not Eligible
8DA21591	12475 Keystone Island Drive	1961	Structure/ Masonry Vernacular	Not Eligible
8DA21592	12505 Keystone Island Drive	1962	Structure/ Masonry Vernacular	Not Eligible
8DA21593	2395 Bayview Lane	1973	Structure/ Classical Revival	Eligible
8DA21594	Broad Causeway Island	1951	Resource Group	Contributing to Bay Harbor Islands Historic District
8DA21598	White House Inn on the Bay/ 2305 NE 123rd Street	1969	Structure/ Colonial Revival	Eligible

FMSF No.	Address/Name	Construction Date	Type/Style	Recommended NRHP Eligibility
8DA21599	Majorca Towers/ 11930 N Bayshore Drive	1969	Structure/ Mid-Century Modern	Eligible
8DA21602	9730 W Broadview Drive	1957	Structure/ Masonry Vernacular	Not Eligible
8DA21603	9600 Broadview Terrace	1971	Structure/ Neo-eclectic Mansard	Contributing to Bay Harbor Islands Historic District
8DA21604	1350 96th Street	1970	Structure/ Masonry Vernacular	Not Eligible
8DA21605	9601 W Broadview Drive	1959	Structure/ Masonry Vernacular	Not Eligible
8DA21606	1371 96th Street	1961	Structure/ Masonry Vernacular	Contributing to Bay Harbor Islands Historic District
8DA21607	1330 96th Street	1971	Structure/ Masonry Vernacular	Contributing to Bay Harbor Islands Historic District
8DA21608	Indian Creek Country Club Golf Course/ 55 Indian Creek Island Road	1930	Resource Group	Insufficient Information
8DA21621	Town of Bay Harbor Islands Playground/ 9600 W Broadview Drive	1954	Resource Group	Not Eligible

Figure 7-6 Map of NRHP Eligible Resources



7.25.3 Archaeological Sites

The causeway island consists entirely of fill material, making it unsuitable for archaeological study. No shovel tests of the archaeological APE were conducted, as a field survey of the project area conducted on September 6 through September 8, 2023, revealed that the area was highly disturbed by construction activities, installation of landscaping, and the installation of underground utilities. Due to the disturbed nature of the area, the natural soils cannot be observed. Soils found on the manmade Broad causeway island near the western end of the project APE are Udorthents that consist primarily of parks, vacant lots, or lawns. Both are highly disturbed soil types unlikely to contain bonded archaeological material (USDA 1996). The project will have no involvement with archeological resources.

7.25.4 Aesthetics/Viewshed

The existing bridge is the main artery into the Town and the community has voiced concerns of the positive and negative impacts a 65 ft. High-Level Fixed Bridge will have during construction and after the new bridge is opened. The proposed option was refined down thru various alternative meetings with the Town officials and community to provide a product that will address more than the Towns transportation needs. Currently, the Town owns and maintains just one park within the project limits (Tot Lot). The Preferred Alternative accommodates extra greenspace along the causeway island and provides the needed space the Town is looking for to potentially develop a park or a fitness destination.

The improvements are intended to enhance the physical use and appeal of the bridge/corridor for pedestrians and bicyclists with the potential provision of 14 ft. shared-use path and overlooks at the top of the bridge. Also, lighting and aesthetic treatments will be evaluated. Context sensitive solutions will be considered to ensure that the project accounts for the community's input on design preferences However, the width and height profiles of the new bridge will alter viewsheds of the area from both the bridge and from the residents and recreational areas along the shoreline.

7.25.5 Wetlands and Other Surface Waters

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. The *NRE (April 2024)* details the wetlands and surface water evaluation which identified a total of 18 jurisdictional wetlands systems (seagrass beds) and eight other surface waters (OSW) within the project study area. As required under Executive Order 11990, 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 18 seagrass beds range in size from 0.00002 ac to 0.29 ac. Are depicted in **Figure 7-7**. The Preferred Alternative is anticipated to result in 0.172 acres of direct impact to seagrass (associated with the project footprint) with a functional loss of 0.018 and 0.107 acres of temporary impact to seagrass (associated with a 25-ft. construction impact buffer established around the project footprint) with a functional loss of 0.004. This equals 0.279 ac of total impacts to seagrass with a functional loss of 0.022. The seagrass beds within the project study area are under the jurisdiction of the USACE, the South Florida Water Management District (SFWMD), and the Miami-Dade County Division of Environmental Resource Management (DERM). Mitigation options are under investigation to offset unavoidable impacts to seagrass habitat associated with the Broad Causeway Bridge project.

Coordination with project stakeholders and regulatory agencies to develop a *Seagrass Mitigation Plan* to offset the unavoidable impacts to seagrass from the proposed project will continue during the PD&E and design phases. The *Seagrass Mitigation Plan* will be sent to the regulatory agencies for review and approval.

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 replacement of the existing seawall) will be re-evaluated during the permitting phase and any impacts to mangroves will be addressed.

Eight OSWs (i.e., artificial stormwater retention features) were documented within the causeway island portion of the project study area. These OSWs consist of impoundments constructed primarily to capture runoff from the existing road features on the causeway island. The grassy slopes of the OSWs are regularly mowed and maintained. No mitigation is anticipated to be required for impacts to these OSWs. **Figure 7-8** depicts the eight OSWs identified within the project study area.

Figure 7-7 Wetlands Within the Biscayne Bay Portion of the Project Study Area

Figure 7-8 Other Surface Waters Within the Causeway Island Portion of the Project Study Area

7.25.6 Protected Species and Habitat

A combination of database searches, 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. As shown in **Table 7-11**, a total of 26 species (3 mammals, 6 birds, 1 insect, 6 reptiles, 3 fish, and 7 corals) that are federally and/or state listed, or prosed for listing, were determined to occur or potentially occur within the project area. The project study area is located within CH for the West Indian manatee and the proposed CH for the green sea turtle. The tricolored bat (*Perimyotis subflavus*) was included due to its Proposed Endangered listing status and the monarch butterfly (*Danaus plexippus*) was included due to its Candidate listing status. By implementing avoidance and minimization techniques, along with BMPs, and Standard Protection Measures, and mitigation for unavoidable impacts to seagrass, the Town anticipates an effect determination of ***may affect, not likely to adversely affect*** for the following species: West Indian manatee, wood stork, Eastern indigo snake, green sea turtle, hawksbill sea turtle, loggerhead sea turtle, giant manta ray, smalltooth sawfish, boulder star coral, lobed star coral, and mountainous star coral.

Table 7-11 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 sublavus*	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 additional 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

7.25.7 Essential Fish Habitat

An EFH Assessment, which included desktop GIS data reviews and benthic surveys (conducted in August 2022 and in July-August 2023), was conducted for the proposed project. 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 SAFMC. Six 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 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. 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 activities that may impact EFH, HAPC, and managed species, including installation of the proposed bridge structures (bridge piers and deck), installation of new seawalls, drainage installation on the causeway island (ponds), and existing bridge demolition. Permanent impacts on EFH and HAPC were calculated based on the footprint of the Preferred Alternative alignment and include both impacts from bridge pier installation and shading of habitats from the bridge deck. **Table 7-12** summarizes potential permanent and temporary direct and indirect impacts to the various EFH habitat types associated the Preferred Alternative. 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 Preferred Alternative. Temporary direct impacts were calculated based on a 25-ft. construction impact buffer established around each alternative alignment. Mitigation is required to offset unavoidable impacts to seagrass habitat and is identified as a commitment for the project. 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 chosen debris containment method differs from a temporary floating platform, consultation with the NMFS will be reinitiated.

The design and construction methodology for the seawall replacement has been tailored to minimize impacts to corals, listed species, and managed species. The existing seawalls is 75 years old and deteriorating beyond repair. The existing seawalls and the habitat adjacent to the seawalls are colonized by corals and octocorals. Removal of the existing seawalls would require relocation of a substantial number of coral and octocoral colonies and would likely result in noise impacts to listed and managed species. In order to minimize impacts from the seawall construction, the new seawalls

will be constructed landward of the existing seawalls and the existing seawalls will remain in place. All seawall construction activities for the seawall will be conducted from land which will avoid the need for in-water construction work and associated in-water noise impacts to listed and managed species.

Table 7-12 Summary of Potential Permanent and Temporary Impacts to EFH and HAPC

Habitat[1]		Impact Type	Build Alternative 1 High-Level Fixed Bridge
Estuarine Water Column EFH	Estuarine Water Column	Permanent – Bridge Piers	4,343 cubic feet
		Temporary	--
Estuarine and Marine Submerged SAV EFH	Community 1 SAV (macroalgal beds)	Permanent - Bridge Piers, Shading	2.74 ac
		Temporary – 25-foot Construction Buffer	1.00 ac
	Community 2 SAV (seagrass)	Permanent – Bridge Piers, Shading	0.17 ac
		Temporary – 25-foot Construction Buffer	0.11 ac
Coral, Coral Reefs, and Live/hard Bottom Habitat EFH	Community 3 Live Bottom	Permanent – Bridge Piers, Shading	0.12 ac[2]
		Temporary – 25-foot Construction Buffer	0.04 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
		Temporary	--
Total Direct Impacts		**Permanent**	**4,343 cubic feet** (Estuarine Water Column) **3.03 ac** (Communities 1-3) **Remove all 29 bridge piers**
		Temporary	**1.15 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]Shading impacts to Community 3 - Live Bottom are 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.

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 Preferred Alternative. 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.

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."

7.25.8 Highway Traffic Noise

In order to assess highway traffic noise levels associated with the project, a highway traffic noise study was completed in accordance with Title 23, Code of Federal Regulations, Part 772 (23 CFR 772), Procedures for Abatement of Highway Traffic Noise and Construction Noise following methodology and procedures established by the FDOT in the FDOT *Traffic Noise Modeling and Analysis Practitioners Handbook (December 2018)*.

The Broad Causeway Bridge is proposed to be replaced on a new southern alignment with alterations to both the vertical and horizontal component of the bridge to bring the bridge to current design standards and USCG requirements. Although capacity is not increasing, the vertical component is being altered in a manner where line of sight between the bridge and noise sensitive sites are changed. Therefore, according to 23 CFR 772, the project qualifies as a Type I project and requires a Nosie Study.

The *Noise Study Report (April 2024)* documents the noise levels that were predicted at 390 receptor points representing 399 residences and 8 special land uses (i.e. non-residential land uses). For the year 2050 Build condition, noise levels are predicted to approach, meet, or exceed the Noise Abatement Criteria (NAC) at 30 residences and one special land use within the project limits. These impacted noise sensitive sites were evaluated to determine the feasibility and cost reasonableness of providing barriers to reduce traffic noise. Additionally, a substantial increase of 15 dB(A) is not predicted to occur at any residence or special land use.

The noise barrier evaluation identified that noise barriers are not a reasonable and feasible form of abatement due to openings in the noise barrier to accommodate access requirements for driveways to residential parcels along Kane Concourse (SR 922). Therefore, noise barriers are not recommended as part of this project.

7.25.9 Air Quality

A project level air quality analysis is only required for federal projects in non-attainment and maintenance areas. However, a screening test using COFL2012 was performed and documented in the *Air Quality Technical Memorandum (December 2023)*. The results of the screening test did not exceed the National Ambient Air Quality Standards (NAAQS) for CO. The project is expected to have no potential Mobile Source Air Toxics (MSAT) effects. Therefore, the project is exempt from MSAT analysis. Minimal, localized impacts to air quality could occur as a result of fugitive dust and exhaust emissions generated from equipment during project construction; no permanent effects to air quality are anticipated.

7.25.10 Contamination

In accordance with the FDOT policy and the FHWA requirements, a contamination screening evaluation has been performed to evaluate potential impacts from contaminated sites to the project. A *Contamination Screening Evaluation Report (CSER) (May 2024)* has been prepared pursuant to the FHWA's Technical Advisory T 6640.8A. Risk rankings were assigned after reviewing

data obtained from on-site reviews of the parcels, a review of historical land use, hazardous/petroleum site lists, and other data.

All sites were evaluated through examination of historical resources such as topographic maps and aerial photographs, regulatory sources at the State and local levels, and site inspections. In addition, Asbestos Containing Materials (ACM), Metal Based Coatings (MBC), and Polychlorinated Biphenyls (PCB) surveys of the bridge were performed. Potential sources of contamination were identified, and the sites were ranked with respect to their potential for contamination impacts.

The contamination screening evaluation has resulted in a High ranking for one site, a Medium ranking for one site, a Low ranking for two sites, and a No ranking for three sites. A discussion of the two sites which received a High or Medium ranking follows.

- At Site 4 (Sunshine #8), project concept plans indicate that roadway improvements, including stormwater structure installation, are to be located south and west of the service station. Bridge piers and other improvements are planned south of the service station. Due to the reported soil and groundwater contamination at this Site 4 (Sunshine #8), there likely are remaining contamination impacts at this property. No remediation has been performed at this site. DERM is currently overseeing investigations of this site, with additional soil and groundwater sampling planned for the near future. Petroleum groundwater plumes are currently located in the planned areas of roadway improvements, including installation of drainage structures. Therefore, the petroleum-contaminated groundwater may impact any dewatering activities in that area drainage design. Design of the bridge and helix structures were developed to avoid known contamination locations. Due to the known groundwater contamination along the north side of the service station and due to the proximity of this site to the Broad Causeway Bridge project, the risk ranking for this site is ***High.*** It is likely that dewatering will be needed both south and north of the service station, and it will likely require a FDEP dewatering permit for contaminated sites. Soil borings and temporary monitoring wells will be installed both north and south of the service station.
- Broad Causeway Bridge (Site/Structure #5) was tested for Asbestos Containing Materials (ACM) and Metal Based Coatings (MBC). In addition, the bridge was observed for potential Polychlorinated Biphenyls (PCB)-containing components. ACMs were not identified in the materials tested. However, based on the age of the bridge, ACMs and MBCs may be present in the faying surfaces (surfaces that are in contact at the joint) of splices and top flanges embedded in concrete decks and other surfaces. Since there is documented lead content in the painted surfaces at this site will be impacted if the bridge is replaced, the contamination risk ranking for this site is ***Medium***. The rating is also justified due to the potential for PCB-containing bascule machinery leaking oils into the equipment bay. The lead-impacted coatings must be handled, managed, and disposed in compliance with United States Occupational Safety and Health Administration (OSHA) worker protection requirements and with USEPA requirements for disposal of hazardous waste (if found to be hazardous). Plans for handling, management, and removal of any MBCs on coatings or ACMs will be prepared before demolition, modification, or rehabilitation of the bridge. Potential PCB-containing components and stained areas will be tested and, if found to contain PCBs, properly disposed.

During the design phase, Medium and High rated sites will be further evaluated to determine if Level II testing is warranted based on the Project's future design.

If dewatering will be necessary during construction, a SFWMD Water Use Permit will be required. FDEP coordination will be required for NPDES dewatering within five hundred feet (≤500') of the service station to determine if the activity must be permitted under Rule 62-621.300(1) and will necessitate effluent treatment, sampling, and reporting. 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.

7.25.11 Social and Economic Resources

In evaluating the potential for disproportionately high and adverse environmental impacts to environmental justice populations, the six SCE Evaluation issues (social, economic, land use changes, mobility, aesthetic effects, and relocation potential) were taken into consideration.

It is anticipated that the proposed project will have a positive impact on community cohesiveness. The project does not add any new physical barriers that would bisect the neighborhoods. Existing pedestrian and bicycle facilities on the bridge, causeway island and bridge approaches will be reconstructed or improved to accommodate the proposed roadway features and enhanced pedestrian features. The proposed project will not alter the existing routes or transit facilities within the corridor.

Quality of life and safety for community and regional residents will be improved by having free flow of vehicular traffic or infrequent bridge openings that will help relieve congestion, potentially reduce crashes, enhance local emergency response time, and facilitate emergency evacuation. Also, a new bridge will eliminate detours due to bridge malfunctions or repairs.

The project is not expected to contribute to social isolation of any protected populations in the study area or disabled or elderly residents. Furthermore, the project will not subdivide neighborhoods, nor does the project separate residences from community facilities such as churches, schools, shopping area or civic or cultural facilities.

There is also no ROW acquisition proposed for the Preferred Alternative. Therefore, there are no direct impacts to social or community resources as the improvements are mainly to the bridges and approaches located on the causeway. Phased construction will be completed within three major phases and will not affect the general traffic flow of two lanes in each direction. No restrictions are anticipated for residents and business owners adjacent to the project limits. Emergency evacuation will be maintained. Bicycle and pedestrian access will be maintained through a temporary 5 ft. sidewalk that will be constructed along the north side of the proposed bridge.

This project is being developed without regard to race, color, national origin, age, sex, religion, disability, or family status. A proactive public involvement approach is being implemented for the project to ensure that opportunity is given to residents and businesses within the study area and surrounding community to provide input. No minority or low-income populations have been identified that would be adversely impacted by the proposed project, as determined above.

Therefore, in accordance with the provisions of Executive Order 12898 and FHWA Order 6640.23a, no further Environmental Justice analysis is required.

Overall, in the long term, the proposed project is expected to improve both the economic conditions of the area and mobility by maintaining an important regional connection to jobs, essential services, and tourist destinations.

The proposed replacement of Broad Causeway Bridge will result in positive economic impacts to the project area. Bridge replacement will improve commercial and recreational boating as the new bridges will have a higher vertical clearance and would allow passage of more vessels without requiring a bridge opening. In addition, the project will reduce escalating maintenance costs of the existing bridge that is projected to continue if no corrective action occurs. The bridge replacement will also ensure the continuation of safe access to employment centers and economic focal points located in the Town of Bay Harbor Islands and in Bal Harbour and Surfside Beaches. In addition, providing a safe vehicular and bicycle/pedestrian facility will enhance access to and from the commercial areas to the east and west of the corridor.

There are no changes to tax base or tax revenue as a result of the Preferred Alternative. The project is compatible with the economic land uses in the area since there is no change in land use and no anticipated change in property values. Therefore, no adverse effects are anticipated as a result of the Preferred Alternative. Additional details of the SCE Evaluation can be found in the *Sociocultural Effects Evaluation Technical Memorandum (May 2024).*

7.26 Preferred Alternative Evaluation Matrix

The Evaluation Matrix for the Preferred Alternative, the 65 ft. High-Level Fixed Bridge, as well as the No Build Alternative is found on **Table 7-13**.

Table 7-13 Preferred Alternative Evaluation Matrix

Criteria/Category		No Build Alternative	Preferred Alternative - High-Level Fixed Bridge
ABILITY TO MEET PURPOSE AND NEED	Address Bridge Deficiencies	☒	☑
	Improve Safety		
	Improve Flow of Traffic		
	Maintain Emergency Evacuation		
BRIDGE FEATURES	Vertical Navigational Clearance Above Mean High Water	15.7 ft.	65 ft.
	Horizontal Clearance (between fenders)	79.7 ft.	90 ft.
	Bridge Profile Grade (West side / East side)	3.44% / 1.55%	5.00% / 5.85%[1]
	Improved Waiting Time for Marine Traffic	No	Yes
	Temporary Bridge Required During Construction	N/A	No
	Bridge Closure or Detour During Construction	N/A	No
TRAFFIC OPERATIONS	Bridge Opening	Yes	No
	Benefit to Vehicular Traffic	No	Yes
	Evacuation / Emergency Response (Improved)	No	Yes
SOCIAL & CULTURAL RESOURCES	Potential Impacts to Archaeological Resources	N/A	None
	Potential Impacts to Historic Resources	N/A	High
	Potential Impacts to Parks/Recreation Areas (#)	0	1
	Town of Bay Harbor Islands Tot Lot	No	Yes[2]
	Florida Circumnavigational Saltwater Paddling Trail	No	Yes[2]
	Aesthetic/Visual Changes	No	Yes
	Pedestrian and Bicycle Facility Improvements	No	Yes
NATURAL & PHYSICAL RESOURCES	Potential Total Impacts to Wetlands (acres)	0	0.279
	Potential Total Impacts to Essential Fish Habitat (acres)	0	4.18
	Threatened/Endangered Species Potential	N/A	Medium[3]
	Potential Impacts to Sovereign Submerged Lands	No	No
	Potential Impacted Noise Sensitive Sites (#)	0	31
	Potential Contamination Sites (#High / #Medium)	0	1 / 1
RIGHT-OF-WAY	Relocations (#)	0	0
	Right-of-Way to be acquired (acres)	0	0
ESTIMATED PROJECT COSTS[4] (2023 Dollars, in millions)	Lifespan of Alternative (Estimated Years) ★	25	75
	Design	N/A	$15.9
	Mitigation	N/A	TBD
	Construction	N/A	$226.7
	Bridge Tender	$30.7	$0
	Inspection & Maintenance	$41.7	$4.8
	TOTAL	**$72.4**	**$247.4**

★Toll bridge to be closed with "No Build Alternative".

[1] The bridge sidewalks will comply with ADA requirements.

[2] Temporary impacts during construction only.

[3] Medium assigned based on mitigation and minimization measures that will be implemented based on regulatory agency coordination.

[4] Preliminary estimates are for planning purposes only. Costs shown are 2023 dollars through 2048 with 3% inflation. Utility relocation costs are not included on the cost estimate.

8.0 REFERENCES

1. Miami-Dade 2040 Bicycle/Pedestrian Plan (Miami-Dade MPO GPC V #7)

   https://miamidadetpo.org/library/plans/miami-dade-2040-bicycle-pedestrian-plan.pdf

2. FDOT's Bike Network Plan (October 2022)

   https://www.arcgis.com/home/webmap/viewer.html?webmap=3639641d82e34aafae60ecbba824c08b&extent=-80.8647,25.4056,-79.7365,26.0076

3. FDOT Pavement Type Selection Manual (2019)

   https://www.fdot.gov/docs/default-source/roadway/PM/Publications/PTSM201901.pdf

4. Miami-Dade Transit Development Plan (TDP)

   https://www.miamidade.gov/transit/library/2023-2032-tdp-annual-update.pdf

5. 2023 FDOT Bridge Management System Inspection Report and Comprehensive Inventory Data Report (CIDR), FDOT District 6, Miami, Florida.

6. FDOT 2023 Multimodal Quality/Level of Service Handbook

   https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/planning/systems/systems-management/document-repository/qlos/fdot_qlos_handbook_v6-0_clean-june-2023.pdf?sfvrsn=198c6846_2

7. FDOT Project Traffic Forecasting Handbook (2019)

   https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/planning/systems/systems-management/document-repository/traffic-analysis/2019-project-traffic-forecasting-handbook.pdf?sfvrsn=e105e71d_2

8. FDOT GIS

   https://www.fdot.gov/statistics/gis/default.shtm

9. Structures Design Guidelines (January 2024)

   https://www.fdot.gov/structures/structuresmanual/currentrelease/structuresmanual.shtm

10. FDOT Structures Manual (2024)

    https://www.fdot.gov/structures/structuresmanual/currentrelease/structuresmanual.shtm

11. Florida Design Manual 2023 (FDM)

    https://www.fdot.gov/roadway/fdm/2023-FDM

12. FDOT's Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways (*Florida Greenbook 2018*)

    https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/roadway/floridagreenbook/2018-florida-greenbook.pdf?

13. As-Built Plans (July 1950), Town of Bay Harbor Islands, Bay Harbor, Florida.

14. Florida Department of Transportation "Standard Specifications for Road and Bridge Construction", January 2023.
15. FDOT, 2018. Traffic Noise Modeling and Analysis Practitioner's Handbook. https://fdotwww.blob.core.windows.net/sitefinity/docs/default-source/environment/pubs/final-practitioners-handbook---december-2018-version.pdf?sfvrsn=95bb91d6_2. December 31, 2018.

9.0 APPENDICES

APPENDIX A – CONSTRUCTION AND LIFE CYCLE COST ESTIMATE

APPENDIX B – PREFERRED ALTERNATIVE CONCEPT PLANS AND PROFILE

APPENDIX C – CAUSEWAY ISLAND CIRCULATION OPTIONS

APPENDIX D – DRAFT TYPICAL SECTION PACKAGE

APPENDIX E – US COAST GUARD COORDINATION

APPENDIX F – RESOURCE AGENCY LETTERS

APPENDIX G – BROAD CAUSEWAY EXISTING CONDITIONS MEMO

APPENDIX H – DESIGN VARIATIONS

APPENDIX A – CONSTRUCTION AND LIFE CYCLE COST ESTIMATE

Discipline	Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Comments
Roadway	104-10-3	SEDIMENT BARRIER	4,533.77	LF	$ 1.68	$ 7,616.73	
Roadway	104-11	FLOATING TURBIDITY BARRIER	4,986.00	LF	$ 10.10	$ 50,358.60	FDOT wtd avg for 2022 = 14/lf | Escalated 10% for low qty
Roadway	104-18	INLET PROTECTION SYSTEM	50.00	EA	$ 155.00	$ 7,750.00	
Roadway	107-1	LITTER REMOVAL	11.00	AC	$ 1,000.00	$ 11,000.00	
Roadway	107-2	MOWING	11.00	AC	$ 2,000.00	$ 22,000.00	
Roadway/Drainage	110-1-1	CLEARING & GRUBBING	11.00	AC	$ 125,000.00	$ 1,375,000.00	Wtd Avg, last 6 months | May increase (see Seq. 12 Drainage comments)
Structures (Bridge)	110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES (TYPICAL SPANS)	68,838.00	SF	$ 45.45	$ 3,128,687.10	Wtd Avg, last 12 months
Structures (Bridge)	110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES (BASCULE SPANS)	8,661.00	SF	$ 68.00	$ 588,948.00	Unit price from from WSP
	110-4-10	REMOVAL OF EXIST CONC	12,063.00	SY	$ 50.00	$ 603,150.00	
Roadway/Drainage	120-1	REGULAR EXCAVATION	12,062.57	CY	$ 22.65	$ 273,217.21	Used CDOT wtd avg for 2022 | May increase (see Seq. 12 Drainage comments)
Roadway	120-6	EMBANKMENT	60,000.00	CY	$ 30.04	$ 1,802,400.00	Used CDOT wtd avg for 2022 | Assumes CIP | May increase (see Seq. 12 Drainage comments)
Roadway	160-4	TYPE B STABILIZATION	30,974.00	SY	$ 12.75	$ 394,918.50	Wtd Avg, last 6 months
Roadway	285-709	OPTIONAL BASE,BASE GROUP 09	26,692.00	SY	$ 45.00	$ 1,201,140.00	
Roadway	327-70-6	MILLING EXIST ASPH PAVT,1 1/2" AVG DEPTH	3,417.36	SY	$ 2.88	$ 9,842.00	
Roadway	334-1-53	2" SUPERPAVE ASPH CONC, TRAF C, PG76-22	2,736.15	TN	$ 200.00	$ 547,230.00	Wtd Avg, last 6 months
Roadway	337-7-83	1-1/2" ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	2,370.05	TN	$ 200.00	$ 474,010.00	Wtd Avg, last 6 months
Structures (Bridge)	400-2-10	CONC CLASS II, APPROACH SLABS	204.33	CY	$ 684.95	$ 139,955.83	Wtd Avg, last 6 months
Structures (Walls)	400-4-8	Concrete Class IV, Bulkhead	2,453.00	CY	$ 1,156.49	$ 2,836,869.97	Existing seawall replacement & extension
Structures (Bridge)	400-7-1	BRIDGE DECK GROOVING (APPROACH SLABS)	612.99	SY	$ 7.73	$ 4,738.41	Wtd Avg, last 6 months
Structures (Bridge)	415-1-9	REINF STEEL- APPROACH SLABS	40,866.00	LB	$ 1.64	$ 67,020.24	Wtd Avg, last 12 months. 200 lbs/cy
Structures (Walls)	415-10-6	Fiber Reinforced Polymer Bars, #6 Bar	150,371.00	LF	$ 2.71	$ 407,505.41	Existing seawall replacement & extension
Drainage	425-1-351	INLETS, CURB, TYPE P-5,	5	EA	$ 7,857.26	$ 39,286.30	
Drainage	425-1-361	INLETS, CURB, TYPE P-6,	4	EA	$ 8,996.13	$ 35,984.52	
Drainage	425-1-521	INLETS, DT BOT, TYPE C,	20	EA	$ 7,573.26	$ 151,465.20	
Drainage	425-1-921	INLETS, ADJACENT BARRIER, <=10'	10	EA	$ 10,540.19	$ 105,401.90	
Drainage	425-2-41	MANHOLES, P-7,	6	EA	$ 7,841.07	$ 47,046.42	FDOT unit rate = 8,476/ea | escalated 10% for low qty
Drainage	430-175-118	PIPE CULV, OPT MATL, ROUND, 18"S/CD	1,000	LF	$ 135.50	$ 135,500.00	FDOT wtd avg, last 6 months
Drainage	430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	600	LF	$ 157.99	$ 94,794.00	
Drainage	506-3	Bridge Drains	6	EA	$ 4,125.00	$ 24,750.00	
Structures (Walls)	451-70	Prestressed Soil Anchors	332.00	EA	$ 6,515.00	$ 2,162,980.00	Existing seawall replacement & extension. Average of FDOT Historical-Prices 2023 & 2022
Structures (Walls)	455-133-3	Sheet Piling F&I	88,702.00	SF	$ 55.54	$ 4,926,509.08	Existing seawall replacement & extension
Structures (Bridge)	471-3-3	POLYMERIC FENDER SYSTEM, 201-400 KIP-FT	1.00	EA	$ 3,200,000.00	$ 3,200,000.00	Wtd Avg, last 12 months, used 471-3-4 as that was the only one we had data on
Structures (Bridge)	510-1	NAVIGATION LIGHTS- FIXED BRIDGE, SYSTEM	1.00	EA	$ 51,909.20	$ 51,909.20	Wtd Avg, 2020
Roadway	520-1-10	CONCRETE CURB & GUTTER, TYPE F	4,500.00	LF	$50.00	$ 225,000.00	
Roadway	520-70	CONCRETE TRAFFIC SEPARATOR, SP- VAR WIDT	84.13	SY	$200.00	$ 16,826.00	
Roadway	521-1-11	MEDIAN CONC BARRIER, 38" HEIGHT	4,139.00	LF	$375.00	$ 1,552,125.00	
Roadway	521-72-40	SHLDR CONC BARRIER,38" OR 44" HEIGHT	9,567.00	LF	$400.00	$ 3,826,800.00	
Roadway	521-8-7	CONC BARRIER, W/JUNCT SL, 36 SS	1,696.10	LF	$285.15	$ 483,642.92	
Roadway	521-8-8	CONC BARRIER, W/JUNCT SL, 42 SS	3,758.02	LF	$518.27	$ 1,947,669.03	
Roadway	522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	4,321.00	SY	$70.08	$ 302,815.68	
Roadway	527-2	DETECTABLE WARNINGS	84	SF	$39.77	$ 3,340.68	
Roadway	536-1-1	GUARDRAIL- ROADWAY, GEN TL-3	620	LF	$21.06	$ 13,057.20	
Structures (Walls)	548-12	RET WALL SYSTEM, PERM, EX BARRIER	24,534.58	SF	$ 59.37	$ 1,456,617.76	Begin/End Bridge & Ramp MSE Walls. Wtd Avg, last 6 months
Structures (Walls)	548-13	RETAINING WALL SYSTEM,TEMP, EXC BAR.	6,133.64	SF	$ 27.96	$ 171,496.68	Wtd Avg, last 6 months. Assume 25% of permanent wall qty
Roadway/Drainage	570-1-2	PERFORMANCE TURF, SOD	24,610	SY	$ 8.00	$ 196,880.00	
ITS	611-1-1	ITSFM SUBSURFACE DOCUMENTATION- PROJECT LENGTH	1.00	MI	$ 2,572.71	$ 2,572.71	
ITS	611-2-2	ITSFM LOCATION DOCUMENTATION- ITS SITE	6.00	EA	$ 1,283.09	$ 7,698.54	
ITS	611-2-3	ITSFM LOCATION DOCUMENTATION- COMMUNICATIONS BUILDING	1.00	EA	$ 3,800.00	$ 3,800.00	
ITS	630-2-11	CONDUIT, F& I, OPEN TRENCH	400.00	LF	$ 10.00	$ 4,000.00	
Lighting	630-2-11	CONDUIT, F& I, OPEN TRENCH	2,000.00	LF	$16.34	$ 32,680.00	Rough Estimation
Lighting	630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	650.00	LF	$36.63	$ 23,809.50	Rough Estimation
ITS	630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	2,500.00	LF	$ 25.00	$ 62,500.00	
ITS	630-2-15	CONDUIT, F& I, BRIDGE MOUNT	3,630.00	LF	$ 32.25	$ 117,067.50	
ITS	633-1-121	FIBER OPTIC CABLE, F&I, UG,2-12	200.00	LF	$ 3.13	$ 626.00	
ITS	633-1-124	FIBER OPTIC CABLE, F&I, UG,97-144	8,300.00	LF	$ 4.71	$ 39,093.00	
ITS	633-2-31	FIBER OPTIC CONNECTION, INSTALL, SPLICE	48.00	EA	$ 40.13	$ 1,926.24	
ITS	633-3-11	FIBER OPTIC CONN HDWR, SPLICE ENCLOSURE	5.00	EA	$ 840.99	$ 4,204.95	
ITS	633-3-12	FIBER OPTIC CONN HDWR, SPLICE TRAY	5.00	EA	$ 57.83	$ 289.15	
ITS	633-3-15	FIBER OPTIC CONN HDWR, PRETERM PATCH PAN	4.00	EA	$ 3,580.62	$ 14,322.48	
ITS	633-3-17	FIBER OPTIC CONNECTION HARDWARE, F&I, CONNECTOR PANEL	6.00	EA	$ 140.54	$ 843.24	

Discipline	Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Comments
ITS	633-8-1	MULTI-CONDUCTOR COMMUNICATION CABLE, FURNISH & INSTALL	110.00	EA	$ 5.91	$ 650.10	
ITS	635-2-11	PULL & SPLICE BOX, F&I, 13" X 24"	25.00	EA	$ 697.35	$ 17,433.75	
Lighting	630-2-15	CONDUIT, FURNISH & INSTALL, BRIDGE MOUNT	4,000.00	LF	$38.54	$ 154,160.00	Rough Estimation
Lighting	635-2-11	PULL & SPLICE BOX, F&I, 13" X 24"	100.00	EA	$1,410.65	$ 141,065.00	ONE FOR EACH POLE, PLUS SPARES
ITS	635-2-12	PULL & SPLICE BOX, F&I, 24" X 36"	4.00	EA	$ 1,301.46	$ 5,205.84	
ITS	635-3-12	JUNCTION BOX, FURNISH & INSTALL, MOUNTED	30.00	EA	$ 817.40	$ 24,522.00	
ITS	639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	5.00	AS	$ 3,161.11	$ 15,805.55	
ITS	639-2-1	ELECTRICAL SERVICE WIRE, F&I	5,500.00	LF	$ 5.54	$ 30,470.00	
ITS	639-3-11	ELEC SERV DISCON, F&I, POLE MNT	7.00	EA	$ 1,026.79	$ 7,187.53	
ITS	639-6-1	ELECTRICAL POWER SERVICE- TRANSF, F&I	7.00	EA	$ 1,490.58	$ 10,434.06	
ITS	641-2-12	PREST CNC POLE,F&I,TYP P-II SRV POLE	7.00	EA	$ 1,551.21	$ 10,858.47	
ITS	649-2-170	STEEL CCTV POLE & FURNISH AND INSTALL WITH LOWERING DEVICE, 70'	4.00	EA	$ 76,884.27	$ 307,537.08	
ITS	654-2-21	MIDBLOCK CROSSWALK: RECTANGULAR RAPID FLASHING BEACON, FURNISH & INSTALL- SOLAR, COMPLETE SIGN ASSY- SINGLE DIRECTION	6.00		$ 10,872.91	$ 65,237.46	
ITS	660-3-11	VEHICLE DETECTION SYSTEM- MICRO,F&I, CAB	6.00	EA	$ 5,243.32	$ 31,459.92	
ITS	660-3-12	VEHICLE DETECTION SYSTEM- MICRO,F&I, ABO	6.00	EA	$ 8,713.76	$ 52,282.56	
ITS	660-7-11	VEHICLE DET SYS- WRONG WAY FOR EXIT, 1-2	4.00	EA	$ 58,419.93	$ 233,679.72	
Signalization	665-1-11	PEDESTRIAN DETECTOR, FURNISH & INSTALL, STANDARD	4.00	EA	$ 507.33	$ 2,029.32	
ITS	676-2-122	ITS CABINET- F&I, POLE, 336S	6.00	EA	$ 7,436.50	$ 44,619.00	
ITS	682-1-113	ITS CCTV CAMERA, F&I, DOME ENCL-PRESS	4.00	EA	$ 8,000.00	$ 32,000.00	
ITS	684-1-1	MANAGED FIELD ETHERNET SWITCH, FURNISH & INSTALL	6.00	EA	$ 5,362.43	$ 32,174.58	
ITS	684-2-1	DEVICE SERVER, FURNISH & INSTALL	6.00	EA	$ 986.45	$ 5,918.70	
ITS	684-5-1	MEDIA CONVERTER, FURNISH & INSTALL	4.00	EA	$ 1,062.84	$ 4,251.36	
ITS	685-1-11	UNINTERRUPTIBLE POWER SUPPLY, FURNISH AND INSTALL, LINE INTERACTIVE	6.00	EA	$ 4,191.03	$ 25,146.18	
ITS	685-2-1	REMOTE POWER MANAGEMENT UNIT - RPMU, FURNISH AND INSTALL	6.00	EA	$ 1,043.13	$ 6,258.78	
TMS	695-6-12	TRAFFIC MONITORING SITE INDUCTIVE LOOP ASSEMBLY, FURNISH & IN	4.00	AS	$ 2,368.15	$ 9,472.60	
TMS	695-7-131	TRAFFIC MONITORING SITE CABINET, FURNISH & INSTALL, TYPE 3, BAS	2.00	EA	$ 6,700.00	$ 13,400.00	
ITS	700-10-124	DMS SUPPORT STRUCTURE, CANT, 41-50 FT	1.00	EA	$ 97,906.16	$ 97,906.16	
SPM	700-1-11	SINGLE POST SIGN, F&I GROUND MOUNT, UP TO 12 SF	65.00	AS	$ 499.50	$ 32,467.50	
SPM	700-1-13	SINGLE POST SIGN, F&I GROUND MOUNT, 21-30 SF	5.00	AS	$ 2,190.13	$ 10,950.65	
SPM	700-1-31	SINGLE POST SIGN, F&I BRIDGE MOUNT INDEX 11870/700-012, UP TO 12 SF	25.00	AS	$ 4,227.02	$ 105,675.50	
SPM	700-1-33	SINGLE POST SIGN, F&I BRIDGE MOUNT INDEX 11870/700-012, 21-30 SF	3.00	AS	$ 1,800.00	$ 5,400.00	
SPM	700-1-60	SINGLE POST SIGN, REMOVE	60.00	AS	$ 50.21	$ 3,012.60	
SPM	700-2-16	MULTI- POST SIGN, F&I GROUND MOUNT, 101-200 SF	10.00	AS	$ 14,904.38	$ 149,043.80	
SPM	700-2-18	MULTI- POST SIGN, F&I GROUND MOUNT, 301-400 SF	5.00	AS	$ 28,716.50	$ 143,582.50	
SPM	700-2-60	MULTI- POST SIGN, REMOVE	10.00	AS	$ 1,023.44	$ 10,234.40	
Signalization	700-3-201	SIGN PANEL, FURNISH & INSTALL OVERHEAD MOUNT, UP TO 12 SF	6.00	EA	$ 887.80	$ 5,326.80	
SPM	700-3-206	SIGN PANEL, F&I OM, 101-200 SF	5.00	EA	$ 7,129.09	$ 35,645.45	
SPM	700-4-113	OVERHEAD STATIC SIGN STRUCTURE, FURNISH & INSTALL, CANTILEVER, 31-40 FT	2.00	EA	$143,975.71	$ 287,951.42	
SPM	700-4-125	OVERHEAD STATIC SIGN STRUCTURE, FURNISH & INSTALL, SPAN, 51-100 FT	2.00	EA	$231,941.40	$ 463,882.80	
ITS	700-9-137	WALK-IN DYN MESS SIGN,F&I, FULL,201-	2.00	EA	$ 150,000.00	$ 300,000.00	
SPM	705-10-1	OBJECT MARKER, TYPE 1	10.00	AS	$ 239.45	$ 2,394.50	
SPM	706-1-3	RAISED PAVEMENT MARKER, TYPE B	1,200.00	EA	$ 4.50	$ 5,400.00	Assumes unit rate is accurate | Not used in last two years by FDOT
SPM	710-90	PAINTED PAVEMENT MARKINGS, FINAL SURFACE	1.00	LS	$ 29,784.84	$ 29,784.84	
SPM	711-11-102	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	0.22	GM	$ 8,200.71	$ 1,787.75	
SPM	711-11-123	THERMOPLASTIC STANDARD, WHITE, SOLID FOR CROSSWALK AND ROUNDABOUT, 12"	105.60	LF	$ 12,706.97	$ 1,341,856.03	
SPM	711-11-124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18" FOR DIAGONALS AND CHEVRONS	100.00	LF	$ 3.56	$ 356.00	
SPM	711-14-160	THERMOPLASTIC, PREFORMED, WHITE, MESSAGE	28.00	EA	$ 311.47	$ 8,721.16	
SPM	711-14-170	THERMOPLASTIC, PREFORMED, WHITE, ARROWS	16.00	EA	$ 176.59	$ 2,825.44	
SPM	711-15-101	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6"	0.28	GM	$ 6,346.70	$ 1,745.34	

Discipline	Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Comments
SPM	711-15-131	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, WHITE, SKIP, 6",10-30 SKIP OR 3-9 LANE DROP	0.28	GM	$ 2,174.90	$ 600.27	
SPM	711-15-201	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, YELLOW, SOLID, 6"	0.22	GM	$ 6,332.64	$ 1,393.18	
SPM	711-11-125	THERMOPLASTIC,STD,WHITE,SOLID,24"	105.00	LF	$ 6.57	$ 689.85	
SPM	713-103-101	PERMANENT TAPE, WHITE, SOLID, 6" FOR CONCRETE BRIDGES	3.21	GM	$ 38,389.05	$ 123,190.46	
SPM	713-103-103	PERMANENT TAPE, WHITE, SOLID LANE DROP MARKING, 12" FOR CONCRETE BRIDGES	0.16	GM	$ 66,850.00	$ 10,696.00	
SPM	713-103-131	PERMANENT TAPE, WHITE, SKIP/DOTTED, 6" FOR CONCRETE SURFACES	1.86	GM	$ 11,801.28	$ 21,973.98	
SPM	713-103-201	PERMANENT TAPE, YELLOW, SOLID, 6" FOR CONCRETE BRIDGES	2.50	GM	$ 37,255.07	$ 93,249.44	
SPM	713-103-231	PERMANENT TAPE, YELLOW, 10-30 SKIP/ 3-9 DOTTED, 6" FOR CONCRETE SURFACES	0.02	GM	$ 14,901.79	$ 283.13	
SPM	920-714-100	GREEN COLORED PAVEMENT MARKINGS, BIKE LANE	50,380.40	SF	$ 9.94	$ 500,781.18	
Lighting	715-11-125	LUMINAIRE,F&I,UNDER DECK, WALL MOUNT	50.00	EA	$ 1,957.18	$ 97,859.00	
Lighting	715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	25,000.00	LF	$ 3.36	$ 84,000.00	3x conduit + 2x8x pull boxes + 40x poles
Lighting	715-61-342	LIGHT POLE COMPLETE, F&I, STANDARD POLE STANDARD FOUNDATION, 40' MOUNTING HEIGHT, 12' ARM LENGTH	20.00	EA	$ 10,324.75	$ 206,495.00	
Lighting	715-500-1	POLE CABLE DISTRIBUTION SYS, CONVENTIONAL	73.00	EA	$ 765.82	$ 55,904.86	
Lighting	715-517-140	LIGHT POLE COMPLETE- SPECIAL DESIGN, F&I, DOUBLE ARM BRIDGE MOUNT, ALUMINUM, 40'	53.00	EA	$ 11,100.00	$ 588,300.00	Based on 2021 estimates
Lighting	715-7-11	LOAD CENTER, F&I, SECONDARY VOLTAGE	2.00	EA	$ 20,971.16	$ 41,942.32	Assumed 2 are needed, one at the beggining and one at the end of project
Structures (Bridge)	NA	Bridge No. XXXXXX (B1: Mainline)	260,972.00	SF	$ 300.00	$ 78,291,600.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B2: EB On-Ramp)	2,642.83	SF	$ 300.00	$ 792,850.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B3: EB Off-Ramp)	6,520.00	SF	$ 300.00	$ 1,956,000.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B4: WB Off-Ramp)	4,876.67	SF	$ 300.00	$ 1,463,000.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B5: Ped loop)	14,599.78	SF	$ 200.00	$ 2,919,956.06	
					Subtotal:	**$ 127,020,663.83**	

					LRE	
MOT	102-1	MAINTENANCE OF TRAFFIC		20%	$ 25,404,132.77	TC typically 5-10% | This project will need heavy TC
	101-1	MOBILIZATION		15%	$ 22,863,719.49	Mobilization typically 10-15%
		Cumulative Inflation (from 2023 - 2029, assuming 3% annual inflation)		20%	$ 40,316,358.70	
		Project Unknowns		15%	$ 26,293,277.41	

**Percentages are compounding upon each other as of now

Project Grand Total: **$241,898,152.19**

Without Inflation: **$201,581,793.49**

Discipline	Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Comments
Roadway	104-10-3	SEDIMENT BARRIER	4,533.77	LF	$ 1.68	$ 7,616.73	
Roadway	104-11	FLOATING TURBIDITY BARRIER	4,986.00	LF	$ 10.10	$ 50,358.60	FDOT wtd avg for 2022 = 14/lf | Escalated 10% for low qty
Roadway	104-18	INLET PROTECTION SYSTEM	50.00	EA	$ 155.00	$ 7,750.00	
Roadway	107-1	LITTER REMOVAL	11.00	AC	$ 1,000.00	$ 11,000.00	
Roadway	107-2	MOWING	11.00	AC	$ 2,000.00	$ 22,000.00	
Roadway/Drainage	110-1-1	CLEARING & GRUBBING	11.00	AC	$ 125,000.00	$ 1,375,000.00	Wtd Avg, last 6 months | May increase (see Seq. 12 Drainage comments)
Structures (Bridge)	110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES (TYPICAL SPANS)	68,838.00	SF	$ 45.45	$ 3,128,687.10	Wtd Avg, last 12 months
Structures (Bridge)	110-3	REMOVAL OF EXISTING STRUCTURES/BRIDGES (BASCULE SPANS)	8,661.00	SF	$ 68.00	$ 588,948.00	Unit price from from WSP
	110-4-10	REMOVAL OF EXIST CONC	12,063.00	SY	$ 50.00	$ 603,150.00	
Roadway/Drainage	120-1	REGULAR EXCAVATION	12,062.57	CY	$ 22.65	$ 273,217.21	Used CDOT wtd avg for 2022 | May increase (see Seq. 12 Drainage comments)
Roadway	120-6	EMBANKMENT	60,000.00	CY	$ 30.04	$ 1,802,400.00	Used CDOT wtd avg for 2022 | Assumes CIP | May increase (see Seq. 12 Drainage comments)
Roadway	160-4	TYPE B STABILIZATION	30,974.00	SY	$ 12.75	$ 394,918.50	Wtd Avg, last 6 months
Roadway	285-709	OPTIONAL BASE,BASE GROUP 09	26,692.00	SY	$ 45.00	$ 1,201,140.00	
Roadway	327-70-6	MILLING EXIST ASPH PAVT,1 1/2" AVG DEPTH	3,417.36	SY	$ 2.88	$ 9,842.00	
Roadway	334-1-53	2" SUPERPAVE ASPH CONC, TRAF C, PG76-22	2,736.15	TN	$ 200.00	$ 547,230.00	Wtd Avg, last 6 months
Roadway	337-7-83	1-1/2" ASPH CONC FC,TRAFFIC C,FC-12.5,PG 76-22	2,370.05	TN	$ 200.00	$ 474,010.00	Wtd Avg, last 6 months
Structures (Bridge)	400-2-10	CONC CLASS II, APPROACH SLABS	204.33	CY	$ 684.95	$ 139,955.83	Wtd Avg, last 6 months
Structures (Walls)	400-4-8	Concrete Class IV, Bulkhead	2,453.00	CY	$ 1,156.49	$ 2,836,869.97	Existing seawall replacement & extension
Structures (Bridge)	400-7-1	BRIDGE DECK GROOVING (APPROACH SLABS)	612.99	SY	$ 7.73	$ 4,738.41	Wtd Avg, last 6 months
Structures (Bridge)	415-1-9	REINF STEEL- APPROACH SLABS	40,866.00	LB	$ 1.64	$ 67,020.24	Wtd Avg, last 12 months. 200 lbs/cy
Structures (Walls)	415-10-6	Fiber Reinforced Polymer Bars, #6 Bar	150,371.00	LF	$ 2.71	$ 407,505.41	Existing seawall replacement & extension
Drainage	425-1-351	INLETS, CURB, TYPE P-5,	5	EA	$ 7,857.26	$ 39,286.30	
Drainage	425-1-361	INLETS, CURB, TYPE P-6,	4	EA	$ 8,996.13	$ 35,984.52	
Drainage	425-1-521	INLETS, DT BOT, TYPE C,	20	EA	$ 7,573.26	$ 151,465.20	
Drainage	425-1-921	INLETS, ADJACENT BARRIER, <=10'	10	EA	$ 10,540.19	$ 105,401.90	
Drainage	425-2-41	MANHOLES, P-7,	6	EA	$ 7,841.07	$ 47,046.42	FDOT unit rate = 8,476/ea | escalated 10% for low qty
Drainage	430-175-118	PIPE CULV, OPT MATL, ROUND, 18"S/CD	1,000	LF	$ 135.50	$ 135,500.00	FDOT wtd avg, last 6 months
Drainage	430-175-124	PIPE CULV, OPT MATL, ROUND, 24"S/CD	600	LF	$ 157.99	$ 94,794.00	
Structures (Walls)	451-70	Prestressed Soil Anchors	332.00	EA	$ 6,515.00	$ 2,162,980.00	Existing seawall replacement & extension. Average of FDOT Historical-Prices 2023 & 2022
Structures (Walls)	455-133-3	Sheet Piling F&I	88,702.00	SF	$ 55.54	$ 4,926,509.08	Existing seawall replacement & extension
Drainage	506-3	Bridge Drains	6	EA	$ 4,125.00	$ 24,750.00	
Structures (Bridge)	471-3-3	POLYMERIC FENDER SYSTEM, 201-400 KIP-FT	1.00	EA	$ 3,200,000.00	$ 3,200,000.00	Wtd Avg, last 12 months, used 471-3-4 as that was the only one we had data on
Structures (Bridge)	510-1	NAVIGATION LIGHTS- FIXED BRIDGE, SYSTEM	1.00	EA	$ 51,909.20	$ 51,909.20	Wtd Avg, 2020
Roadway	520-1-10	CONCRETE CURB & GUTTER, TYPE F	4,500.00	LF	$50.00	$ 225,000.00	
Roadway	520-70	CONCRETE TRAFFIC SEPARATOR, SP- VAR WIDT	84.13	SY	$200.00	$ 16,826.00	
Roadway	521-1-11	MEDIAN CONC BARRIER, 38" HEIGHT	4,139.00	LF	$375.00	$ 1,552,125.00	
Roadway	521-72-40	SHLDR CONC BARRIER,38" OR 44" HEIGHT	9,567.00	LF	$400.00	$ 3,826,800.00	
Roadway	521-8-7	CONC BARRIER, W/JUNCT SL, 36 SS	1,696.10	LF	$285.15	$ 483,642.92	
Roadway	521-8-8	CONC BARRIER, W/JUNCT SL, 42 SS	3,758.02	LF	$518.27	$ 1,947,669.03	
Roadway	522-2	CONCRETE SIDEWALK AND DRIVEWAYS, 6"	4,321.00	SY	$70.08	$ 302,815.68	
Roadway	527-2	DETECTABLE WARNINGS	84	SF	$39.77	$ 3,340.68	
Roadway	536-1-1	GUARDRAIL- ROADWAY, GEN TL-3	620	LF	$21.06	$ 13,057.20	
Structures (Walls)	548-12	RET WALL SYSTEM, PERM, EX BARRIER	24,534.58	SF	$ 59.37	$ 1,456,617.76	Wtd Avg, last 6 months
Structures (Walls)	548-13	RETAINING WALL SYSTEM,TEMP, EXC BAR.	6,133.64	SF	$ 27.96	$ 171,496.68	Wtd Avg, last 6 months. Assume 25% of permanent wall qty
Roadway/Drainage	570-1-2	PERFORMANCE TURF, SOD	24,610	SY	$ 8.00	$ 196,880.00	
ITS	611-1-1	ITSFM SUBSURFACE DOCUMENTATION- PROJECT LENGTH	1.00	MI	$ 2,572.71	$ 2,572.71	
ITS	611-2-2	ITSFM LOCATION DOCUMENTATION- ITS SITE	6.00	EA	$ 1,283.09	$ 7,698.54	
ITS	611-2-3	ITSFM LOCATION DOCUMENTATION- COMMUNICATIONS BUILDING	1.00	EA	$ 3,800.00	$ 3,800.00	
ITS	630-2-11	CONDUIT, F& I, OPEN TRENCH	400.00	LF	$ 10.00	$ 4,000.00	
Lighting	630-2-11	CONDUIT, F& I, OPEN TRENCH	2,000.00	LF	$16.34	$ 32,680.00	Rough Estimation
Lighting	630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	650.00	LF	$36.63	$ 23,809.50	Rough Estimation
ITS	630-2-12	CONDUIT, F& I, DIRECTIONAL BORE	2,500.00	LF	$ 25.00	$ 62,500.00	
ITS	630-2-15	CONDUIT, F& I, BRIDGE MOUNT	3,630.00	LF	$ 32.25	$ 117,067.50	
ITS	633-1-121	FIBER OPTIC CABLE, F&I, UG,2-12	200.00	LF	$ 3.13	$ 626.00	
ITS	633-1-124	FIBER OPTIC CABLE, F&I, UG,97-144	8,300.00	LF	$ 4.71	$ 39,093.00	
ITS	633-2-31	FIBER OPTIC CONNECTION, INSTALL, SPLICE	48.00	EA	$ 40.13	$ 1,926.24	
ITS	633-3-11	FIBER OPTIC CONN HDWR, SPLICE ENCLOSURE	5.00	EA	$ 840.99	$ 4,204.95	
ITS	633-3-12	FIBER OPTIC CONN HDWR, SPLICE TRAY	5.00	EA	$ 57.83	$ 289.15	
ITS	633-3-15	FIBER OPTIC CONN HDWR, PRETERM PATCH PAN	4.00	EA	$ 3,580.62	$ 14,322.48	
ITS	633-3-17	FIBER OPTIC CONNECTION HARDWARE, F&I, CONNECTOR PANEL	6.00	EA	$ 140.54	$ 843.24	

Discipline	Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Comments
ITS	633-8-1	MULTI-CONDUCTOR COMMUNICATION CABLE, FURNISH & INSTALL	110.00	EA	$ 5.91	$ 650.10	
ITS	635-2-11	PULL & SPLICE BOX, F&I, 13" X 24"	25.00	EA	$ 697.35	$ 17,433.75	
Lighting	630-2-15	CONDUIT, FURNISH & INSTALL, BRIDGE MOUNT	4,000.00	LF	$38.54	$ 154,160.00	Rough Estimation
Lighting	635-2-11	PULL & SPLICE BOX, F&I, 13" X 24"	100.00	EA	$1,410.65	$ 141,065.00	ONE FOR EACH POLE, PLUS SPARES
ITS	635-2-12	PULL & SPLICE BOX, F&I, 24" X 36"	4.00	EA	$ 1,301.46	$ 5,205.84	
ITS	635-3-12	JUNCTION BOX, FURNISH & INSTALL, MOUNTED	30.00	EA	$ 817.40	$ 24,522.00	
ITS	639-1-112	ELECTRICAL POWER SRV,F&I,OH,M,PUR BY CON	5.00	AS	$ 3,161.11	$ 15,805.55	
ITS	639-2-1	ELECTRICAL SERVICE WIRE, F&I	5,500.00	LF	$ 5.54	$ 30,470.00	
ITS	639-3-11	ELEC SERV DISCON, F&I, POLE MNT	7.00	EA	$ 1,026.79	$ 7,187.53	
ITS	639-6-1	ELECTRICAL POWER SERVICE- TRANSF, F&I	7.00	EA	$ 1,490.58	$ 10,434.06	
ITS	641-2-12	PREST CNC POLE,F&I,TYP P-II SRV POLE	7.00	EA	$ 1,551.21	$ 10,858.47	
ITS	649-2-170	STEEL CCTV POLE & FURNISH AND INSTALL WITH LOWERING DEVICE, 70'	4.00	EA	$ 76,884.27	$ 307,537.08	
ITS	654-2-21	MIDBLOCK CROSSWALK: RECTANGULAR RAPID FLASHING BEACON, FURNISH & INSTALL- SOLAR, COMPLETE SIGN ASSY- SINGLE DIRECTION	6.00		$ 10,872.91	$ 65,237.46	
ITS	660-3-11	VEHICLE DETECTION SYSTEM- MICRO,F&I, CAB	6.00	EA	$ 5,243.32	$ 31,459.92	
ITS	660-3-12	VEHICLE DETECTION SYSTEM- MICRO,F&I, ABO	6.00	EA	$ 8,713.76	$ 52,282.56	
ITS	660-7-11	VEHICLE DET SYS- WRONG WAY FOR EXIT, 1-2	4.00	EA	$ 58,419.93	$ 233,679.72	
Signalization	665-1-11	PEDESTRIAN DETECTOR, FURNISH & INSTALL, STANDARD	4.00	EA	$ 507.33	$ 2,029.32	
ITS	676-2-122	ITS CABINET- F&I, POLE, 336S	6.00	EA	$ 7,436.50	$ 44,619.00	
ITS	682-1-113	ITS CCTV CAMERA, F&I, DOME ENCL-PRESS	4.00	EA	$ 8,000.00	$ 32,000.00	
ITS	684-1-1	MANAGED FIELD ETHERNET SWITCH, FURNISH & INSTALL	6.00	EA	$ 5,362.43	$ 32,174.58	
ITS	684-2-1	DEVICE SERVER, FURNISH & INSTALL	6.00	EA	$ 986.45	$ 5,918.70	
ITS	684-5-1	MEDIA CONVERTER, FURNISH & INSTALL	4.00	EA	$ 1,062.84	$ 4,251.36	
ITS	685-1-11	UNINTERRUPTIBLE POWER SUPPLY, FURNISH AND INSTALL, LINE INTERACTIVE	6.00	EA	$ 4,191.03	$ 25,146.18	
ITS	685-2-1	REMOTE POWER MANAGEMENT UNIT - RPMU, FURNISH AND INSTALL	6.00	EA	$ 1,043.13	$ 6,258.78	
TMS	695-6-12	TRAFFIC MONITORING SITE INDUCTIVE LOOP ASSEMBLY, FURNISH & IN	4.00	AS	$ 2,368.15	$ 9,472.60	
TMS	695-7-131	TRAFFIC MONITORING SITE CABINET, FURNISH & INSTALL, TYPE 3, BAS	2.00	EA	$ 6,700.00	$ 13,400.00	
ITS	700-10-124	DMS SUPPORT STRUCTURE, CANT, 41-50 FT	1.00	EA	$ 97,906.16	$ 97,906.16	
SPM	700-1-11	SINGLE POST SIGN, F&I GROUND MOUNT, UP TO 12 SF	65.00	AS	$ 499.50	$ 32,467.50	
SPM	700-1-13	SINGLE POST SIGN, F&I GROUND MOUNT, 21-30 SF	5.00	AS	$ 2,190.13	$ 10,950.65	
SPM	700-1-31	SINGLE POST SIGN, F&I BRIDGE MOUNT INDEX 11870/700-012, UP TO 12 SF	25.00	AS	$ 4,227.02	$ 105,675.50	
SPM	700-1-33	SINGLE POST SIGN, F&I BRIDGE MOUNT INDEX 11870/700-012, 21-30 SF	3.00	AS	$ 1,800.00	$ 5,400.00	
SPM	700-1-60	SINGLE POST SIGN, REMOVE	60.00	AS	$ 50.21	$ 3,012.60	
SPM	700-2-16	MULTI- POST SIGN, F&I GROUND MOUNT, 101-200 SF	10.00	AS	$ 14,904.38	$ 149,043.80	
SPM	700-2-18	MULTI- POST SIGN, F&I GROUND MOUNT, 301-400 SF	5.00	AS	$ 28,716.50	$ 143,582.50	
SPM	700-2-60	MULTI- POST SIGN, REMOVE	10.00	AS	$ 1,023.44	$ 10,234.40	
Signalization	700-3-201	SIGN PANEL, FURNISH & INSTALL OVERHEAD MOUNT, UP TO 12 SF	6.00	EA	$ 887.80	$ 5,326.80	
SPM	700-3-206	SIGN PANEL, F&I OM, 101-200 SF	5.00	EA	$ 7,129.09	$ 35,645.45	
SPM	700-4-113	OVERHEAD STATIC SIGN STRUCTURE, FURNISH & INSTALL, CANTILEVER, 31-40 FT	2.00	EA	$143,975.71	$ 287,951.42	
SPM	700-4-125	OVERHEAD STATIC SIGN STRUCTURE, FURNISH & INSTALL, SPAN, 51-100 FT	2.00	EA	$231,941.40	$ 463,882.80	
ITS	700-9-137	WALK-IN DYN MESS SIGN,F&I, FULL,201-	2.00	EA	$ 150,000.00	$ 300,000.00	
SPM	705-10-1	OBJECT MARKER, TYPE 1	10.00	AS	$ 239.45	$ 2,394.50	
SPM	706-1-3	RAISED PAVEMENT MARKER, TYPE B	1,200.00	EA	$ 4.50	$ 5,400.00	Assumes unit rate is accurate | Not used in last two years by FDOT
SPM	710-90	PAINTED PAVEMENT MARKINGS, FINAL SURFACE	1.00	LS	$ 29,784.84	$ 29,784.84	
SPM	711-11-102	THERMOPLASTIC, STANDARD, WHITE, SOLID, 8"	0.22	GM	$ 8,200.71	$ 1,787.75	
SPM	711-11-123	THERMOPLASTIC STANDARD, WHITE, SOLID FOR CROSSWALK AND ROUNDABOUT, 12"	105.60	LF	$ 12,706.97	$ 1,341,856.03	
SPM	711-11-124	THERMOPLASTIC, STANDARD, WHITE, SOLID, 18" FOR DIAGONALS AND CHEVRONS	100.00	LF	$ 3.56	$ 356.00	
SPM	711-14-160	THERMOPLASTIC, PREFORMED, WHITE, MESSAGE	28.00	EA	$ 311.47	$ 8,721.16	
SPM	711-14-170	THERMOPLASTIC, PREFORMED, WHITE, ARROWS	16.00	EA	$ 176.59	$ 2,825.44	
SPM	711-15-101	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES WHITE, SOLID, 6"	0.28	GM	$ 6,346.70	$ 1,745.34	

Discipline	Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Comments
SPM	711-15-131	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, WHITE, SKIP, 6",10-30 SKIP OR 3-9 LANE DROP	0.28	GM	$ 2,174.90	$ 600.27	
SPM	711-15-201	THERMOPLASTIC, STANDARD-OPEN GRADED ASPHALT SURFACES, YELLOW, SOLID, 6"	0.22	GM	$ 6,332.64	$ 1,393.18	
SPM	711-11-125	THERMOPLASTIC,STD,WHITE,SOLID,24"	105.00	LF	$ 6.57	$ 689.85	
SPM	713-103-101	PERMANENT TAPE, WHITE, SOLID, 6" FOR CONCRETE BRIDGES	3.21	GM	$ 38,389.05	$ 123,190.46	
SPM	713-103-103	PERMANENT TAPE, WHITE, SOLID LANE DROP MARKING, 12" FOR CONCRETE BRIDGES	0.16	GM	$ 66,850.00	$ 10,696.00	
SPM	713-103-131	PERMANENT TAPE, WHITE, SKIP/DOTTED, 6" FOR CONCRETE SURFACES	1.86	GM	$ 11,801.28	$ 21,973.98	
SPM	713-103-201	PERMANENT TAPE, YELLOW, SOLID, 6" FOR CONCRETE BRIDGES	2.50	GM	$ 37,255.07	$ 93,249.44	
SPM	713-103-231	PERMANENT TAPE, YELLOW, 10-30 SKIP/ 3-9 DOTTED, 6" FOR CONCRETE SURFACES	0.02	GM	$ 14,901.79	$ 283.13	
SPM	920-714-100	GREEN COLORED PAVEMENT MARKINGS, BIKE LANE	50,380.40	SF	$ 9.94	$ 500,781.18	
Lighting	715-11-125	LUMINAIRE,F&I,UNDER DECK, WALL MOUNT	50.00	EA	$ 1,957.18	$ 97,859.00	
Lighting	715-1-13	LIGHTING CONDUCTORS, F&I, INSUL, NO.4-2	25,000.00	LF	$ 3.36	$ 84,000.00	3x conduit + 2x8x pull boxes + 40x poles
Lighting	715-61-342	LIGHT POLE COMPLETE, F&I, STANDARD POLE STANDARD FOUNDATION, 40' MOUNTING HEIGHT, 12' ARM LENGTH	20.00	EA	$ 10,324.75	$ 206,495.00	
Lighting	715-500-1	POLE CABLE DISTRIBUTION SYS, CONVENTIONAL	73.00	EA	$ 765.82	$ 55,904.86	
Lighting	715-517-140	LIGHT POLE COMPLETE- SPECIAL DESIGN, F&I, DOUBLE ARM BRIDGE MOUNT, ALUMINUM, 40'	53.00	EA	$ 11,100.00	$ 588,300.00	Based on 2021 estimates
Lighting	715-7-11	LOAD CENTER, F&I, SECONDARY VOLTAGE	2.00	EA	$ 20,971.16	$ 41,942.32	Assumed 2 are needed, one at the beggining and one at the end of project
Structures (Bridge)	NA	Bridge No. XXXXXX (B1: Mainline, B2: EB On-Ramp, B3: EB Off-Ramp, B4: WB Off-Ramp)	234,138.50	SF	$ 300.00	$ 70,241,550.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B1: Bascule Spans)	26,833.50	SF	$ 3,000.00	$ 80,500,500.00	SF from WSP
Structures (Bridge)	NA	Bridge No. XXXXXX (B2: EB On-Ramp)	2,642.83	SF	$ 300.00	$ 792,850.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B3: EB Off-Ramp)	6,520.00	SF	$ 300.00	$ 1,956,000.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B4: WB Off-Ramp)	4,876.67	SF	$ 300.00	$ 1,463,000.00	$240 per 2022 Atkins report, add 25% for bridge over water. Last few FIB lettings in 2022 were ~$300/sf per Atkins report as well. SF is total including ramps
Structures (Bridge)	NA	Bridge No. XXXXXX (B5: Ped loop)	14,599.78	SF	$ 200.00	$ 2,919,956.06	
					Subtotal:	**$ 199,471,113.83**	

				LRE	
MOT	102-1	MAINTENANCE OF TRAFFIC	20%	$ 39,894,222.77	**Percentages are compounding upon each other as of now TC typically 5-10% | This project will need heavy TC
	101-1	MOBILIZATION	15%	$ 35,904,800.49	Mobilization typically 10-15%
		Cumulative Inflation (from 2023 - 2029, assuming 3% annual inflation)	20%	$ 63,312,131.53	
		Project Unknowns	15%	$ 41,290,520.56	
					Recommend this be removed - should be covered in Project Unknowns

Project Grand Total: **$379,872,789.17**

Without Inflation: **$316,560,657.64**

Cost Estimate - Alternative 3

Discipline	Pay Item	Description	Total Quantity	Unit	Weighted Avg. Unit Price	Total Amount	Comments
Structures (Bridge)	NA	Tender Annual	25.00	YEAR	$ 600,000.00	$ 15,000,000.00	Salary to be verified by Rodney
Structures (Bridge)	NA	Maintenance/Insp (BIR) Annual	25.00	YEAR	$ 280,977.10	$ 7,024,427.50	$0.45/SF/Yr for typical spans, $250k/Yr for moveable spans
Structures (Bridge)	NA	Major Repair Annual	25.00	YEAR	$ 2,000,000.00	$ 50,000,000.00	Last 2 repair jobs over past 10 years: $3 million & $17 million
						$ 72,024,427.50	

Broad Causeway - Life Cycle Cost

Alternative 1 - New High Level Fixed Bridge

Inflation Rate = 3.0%

	Base Price	Expenditure Year	Base Year	Discount Rate =	Present Worth 1%	Present Worth 3%	Present Worth 5%
New High Level Fixed Bridge Construction (includes removal of exist. bridge and new fender)	$201,572,000	2029	2023		$226,738,522	$201,572,000	$179,604,725
Bridge Operation (4 yrs of construction)	$0	2033	2023		$0	$0	$0
Repair Project	$600,000	2048	2023		$979,597	$600,000	$370,979
Routine Annual Maintenance & Inspection ($0.45/SF)	$116,500	2048	2023		$3,827,594	$2,909,469	$2,274,483
				Grand Total =	**$231,545,713**	**$205,081,469**	**$182,250,187**

Alternative 2 - New Mid Level Bascule Spans and Prestress Beam Approaches

Inflation Rate = 3.0%

Tender Inflation Rate (COLA) = 5.0%

	Base Price	Expenditure Year	Base Year	Discount Rate =	Present Worth 1%	Present Worth 3%	Present Worth 5%
New Mid Level Bascule Bridge Construction (includes removal of exist. bridge and new fender)	$316,561,000	2029	2023		$356,084,045	$316,561,000	$282,062,248
Bridge Operation (4 Town staff = 24/7 coverage, see 7/20/23 email)	$600,000	2048	2023		$30,668,072	$30,668,072	$30,668,072
Repair Project	$3,000,000	2048	2023		$4,897,986	$3,000,000	$1,854,895
Routine Annual Maintenance & Inspection	$530,000	2048	2023		$17,413,088	$13,236,212	$10,347,432
				Grand Total =	**$409,063,191**	**$363,465,285**	**$324,932,648**

Alternative 3 - Maintain Existing Bascule Bridge (Do Nothing Alternative)

Inflation Rate = 3.0%

Tender Inflation Rate (COLA) = 5.0%

	Base Price	Expenditure Year	Base Year	Discount Rate =	Present Worth 1%	Present Worth 3%	Present Worth 5%
Bridge Operation (4 Town staff = 24/7 coverage, see 7/20/23 email)	$600,000	2048	2023		$30,668,072	$30,668,072	$30,668,072
Repair Project	$20,000,000	2033	2023		$24,332,599	$20,000,000	$16,500,962
Routine Annual Maintenance & Inspection	$530,000	2048	2023		$17,413,088	$13,236,212	$10,347,432
New High Level Fixed Bridge Construction (includes removal of exist. bridge and new fender)	$201,572,000	2048	2023		$329,098,936	$201,572,000	$124,631,650
				Subtotal =	**$401,512,696**	**$265,476,285**	**$182,148,116**

APPENDIX B – PREFERRED ALTERNATIVE CONCEPT PLANS AND PROFILE

BAY HARBOR ISLANDS

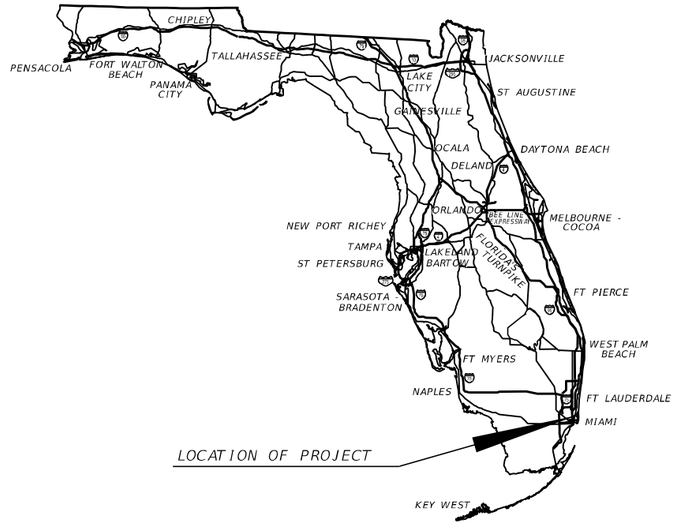
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

CONTRACT PLANS

FINANCIAL PROJECT ID 425428-1-21-01

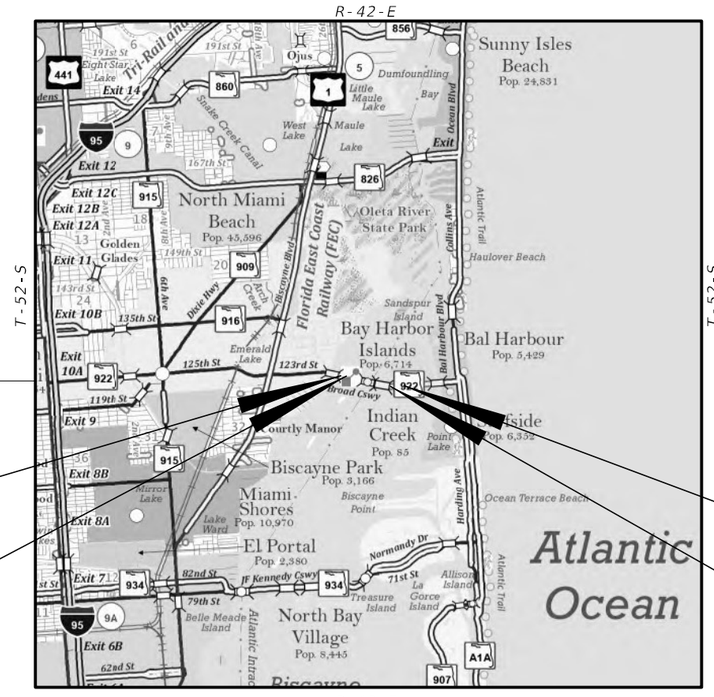
MIAMI-DADE COUNTY

BROAD CAUSEWAY / KANE CONCOURSE



INDEX OF ROADWAY PLANS

R-42-E



CITY OF NORTH MIAMI

BEGIN PROJECT:
STA. 105+21.37
℄ CONST. FL-922

BEGIN BRIDGE:
STA. 109+71.97
℄ CONST. FL-922

END PROJECT:
STA. 145+56.01
℄ CONST. FL-922

END BRIDGE:
STA. 141+39.63
℄ CONST. FL-922

R-42-E

GOVERNING STANDARD PLANS:

Florida Department of Transportation, FY2023-24 Standard Plans for Road and Bridge Construction and applicable Interim Revisions (IRs).

Standard Plans for Road Construction and associated IRs are available at the following website: http://www.fdot.gov/design/standardplans

Standard Plans for Bridge Construction are included in the Structures Plans Component

GOVERNING STANDARD SPECIFICATIONS:

Florida Department of Transportation, June 2023 Standard Speci cations for Road and Bridge Construction at the following website: http://www.fdot.gov/programmanagement/Implemented/SpecBooks

ROADWAY PLANS ENGINEER OF RECORD:

RYAN M. JENSEN, P.E.
P.E. LICENSE NUMBER 86609
ATKINS NORTH AMERICA
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126
CONTRACT NO.: C0000
VENDOR NO.: 99-999999

FDOT PROJECT MANAGER:

KIMBERLY TAVERAS

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
	23	1

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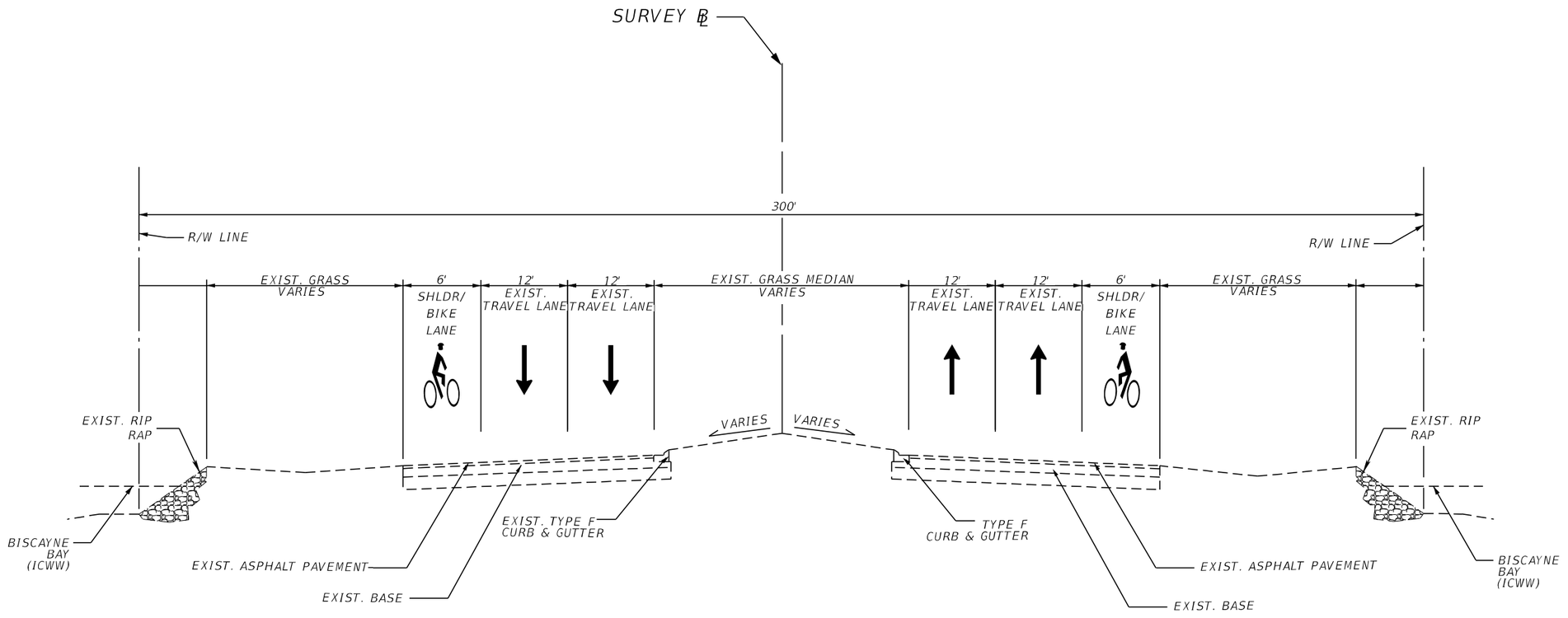

EXIST. TYPICAL SECTION NO. 1
BROAD CAUSEWAY BRIDGE/SR-922
STA. 105+21.37 TO STA. 123+85.28

NOT TO SCALE

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	EXISTING TYPICAL SECTION	2
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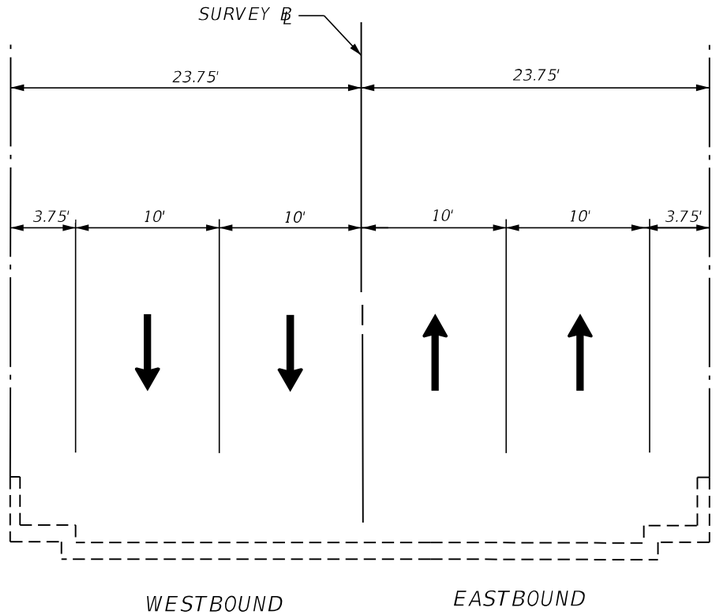

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BROAD CAUSEWAY BRIDGE NO. 875101
STA. 123+85.28 TO STA. 140+15.28

NOT TO SCALE

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	ROAD NO.	COUNTY	FINANCIAL PROJECT ID	EXISTING TYPICAL SECTION	3
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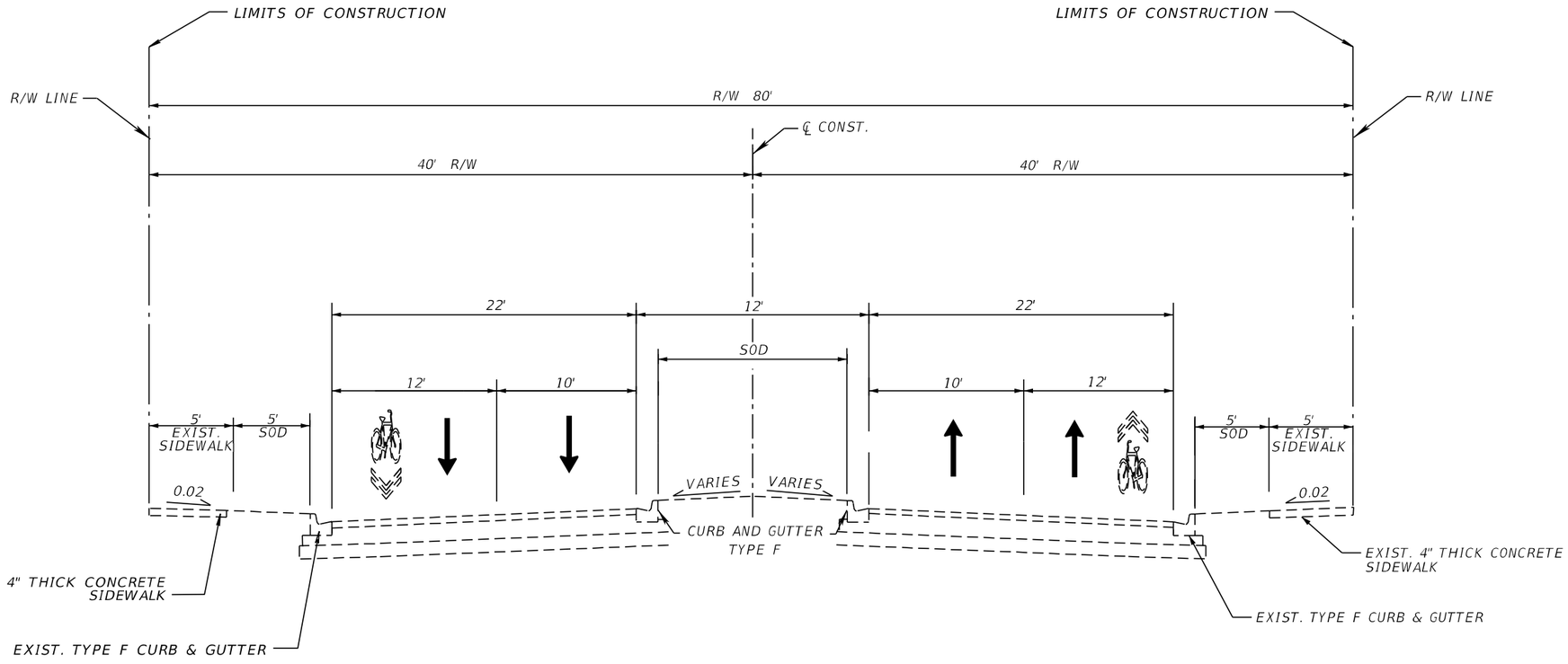

EXIST. TYPICAL SECTION NO. 3
KANE CONCOURSE
STA. 141+41.25 TO STA. 145+56.01

NOT TO SCALE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

EXISTING TYPICAL SECTION

SHEET NO. 4

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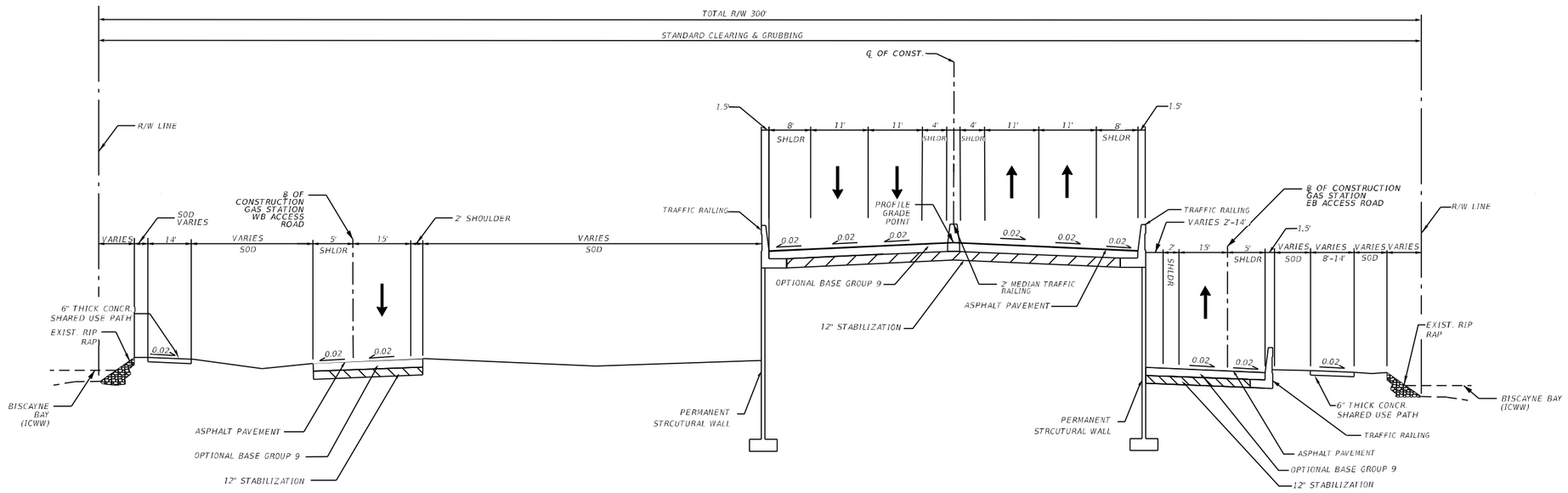

PROP. TYPICAL SECTION NO. 1
BROAD CAUSEWAY WALL PORTION WEST OF ICWW
MSE ROAD TRANSITION FROM EXISTING GRADE TO PROP. BRIDGE ELEVATION
STA. 105+21.37 TO STA. 111+79.50

NOT TO SCALE

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PROPOSED TYPICAL SECTION	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		5
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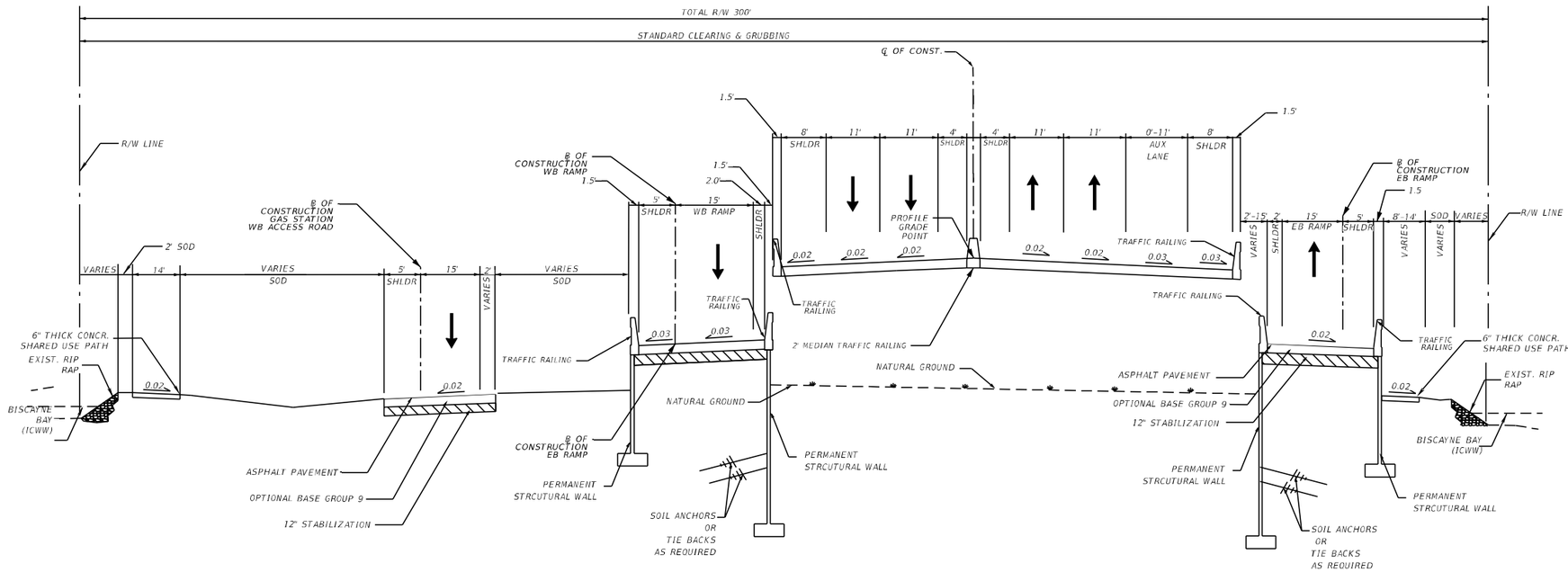

PROP. TYPICAL SECTION NO. 2
BROAD CAUSEWAY WESTBOUND AND EASTBOUND RAMP OF ICWW
STA. 111+79.50 TO STA. 124+00.00

NOT TO SCALE

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PROPOSED TYPICAL SECTION	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		6
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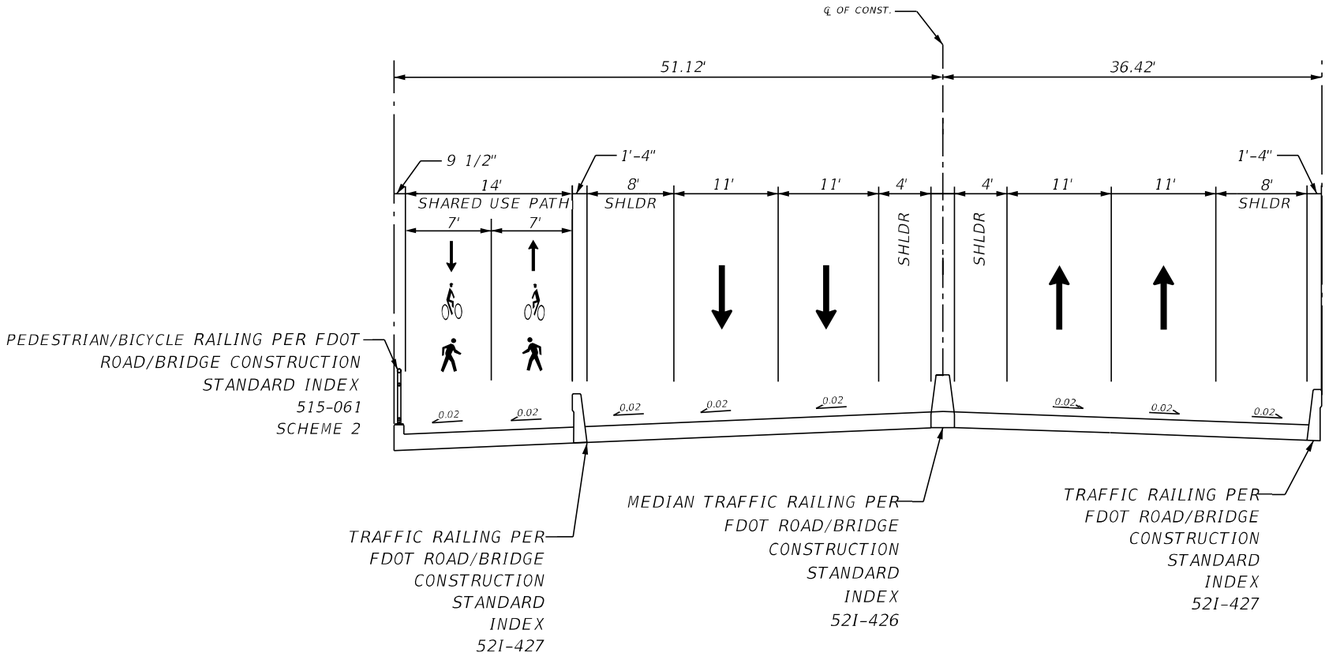

PROP. TYPICAL SECTION NO. 3
BROAD CAUSEWAY BRIDGE OVER ICWW
STA. 124+00.00 TO STA. 141+41.25

NOT TO SCALE

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PROPOSED TYPICAL SECTION	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		7
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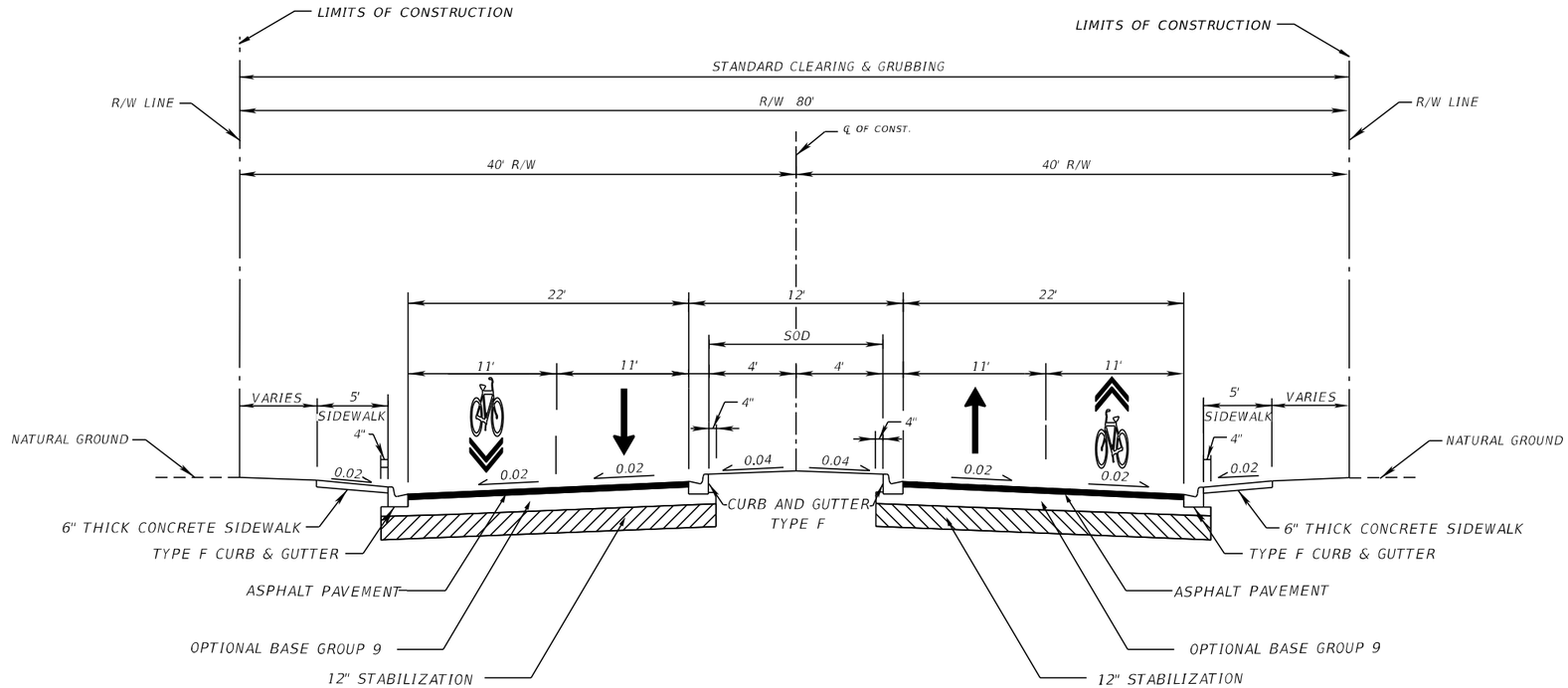

PROP. TYPICAL SECTION NO. 4
KANE CONCOURSE EAST OF ICWW
ROAD RECONSTRUCTION
STA. 141+41.25 TO STA. 145+56.01

NOT TO SCALE

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PROPOSED TYPICAL SECTION	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		8
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D = 02°36'16"
T = 148.16
L = 295.87
R = 2,200.00
PC STA. = 105+01.89
PT STA. = 107+97.76
e = NC

C2
PI STA. = 109+15.26
Δ = 07°03'09" (LT)
D = 03°00'17"
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L = 234.70
R = 1,906.78
PC STA. = 107+97.76
PT STA. = 110+32.46
e = NC

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PI STA. = 119+45.69
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PI STA. = 127+15.55
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C5
PI STA. = 139+78.96
Δ = 16°49'15" (LT)
D = 05°05'51"
T = 166.19
L = 329.98
R = 1,124.00
PC STA. = 138+12.77
PT STA. = 141+42.76
e = NC

C6
PI STA. = 206+43.97
Δ = 04°01'32" (RT)
D = 03°55'28"
T = 51.31
L = 102.58
R = 1,460.00
PC STA. = 205+92.66
PT STA. = 206+95.24
e = NC

C7
PI STA. = 207+45.58
Δ = 15°36'59" (RT)
D = 15°36'24"
T = 50.34
L = 100.06
R = 367.13
PC STA. = 206+95.24
PT STA. = 207+95.30
e = NC

C8
PI STA. = 208+41.77
Δ = 22°41'49" (LT)
D = 24°44'52"
T = 46.47
L = 91.71
R = 231.52
PC STA. = 207+95.30
PT STA. = 208+87.01
e = NC

C9
PI STA. = 222+43.89
Δ = 91°36'17" (LT)
D = 122°21'46"
T = 48.15
L = 74.86
R = 46.82
PC STA. = 221+95.74
PT STA. = 222+70.60
e = NC

C10
PI STA. = 313+97.96
Δ = 18°38'57" (LT)
D = 08°11'06"
T = 114.94
L = 227.84
R = 700.00
PC STA. = 312+83.02
PT STA. = 315+10.86
e = NC

C11
PI STA. = 22+87.31
Δ = 87°09'04" (RT)
D = 74°47'41"
T = 72.89
L = 116.52
R = 76.60
PC STA. = 22+14.42
PT STA. = 23+30.94
e = NC

C12
PI STA. = 1120+45.00
Δ = 359°22'07" (LT)
D = 124°33'22"
T = 0.25
L = 288.52
R = 46.00
PC STA. = 1120+44.74
PT STA. = 1123+33.26
e = NC

C13
PI STA. = 2117+65.40
Δ = 359°48'54" (LT)
D = 108°06'19"
T = 0.09
L = 332.84
R = 53.00
PC STA. = 2117+65.31
PT STA. = 2120+98.15
e = NC

C14
PI STA. = 3119+89.08
Δ = 318°34'18" (LT)
D = 95°29'35"
T = 22.69
L = 333.61
R = 60.00
PC STA. = 3119+66.39
PT STA. = 3123+00.00
e = NC

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

PROJECT LAYOUT

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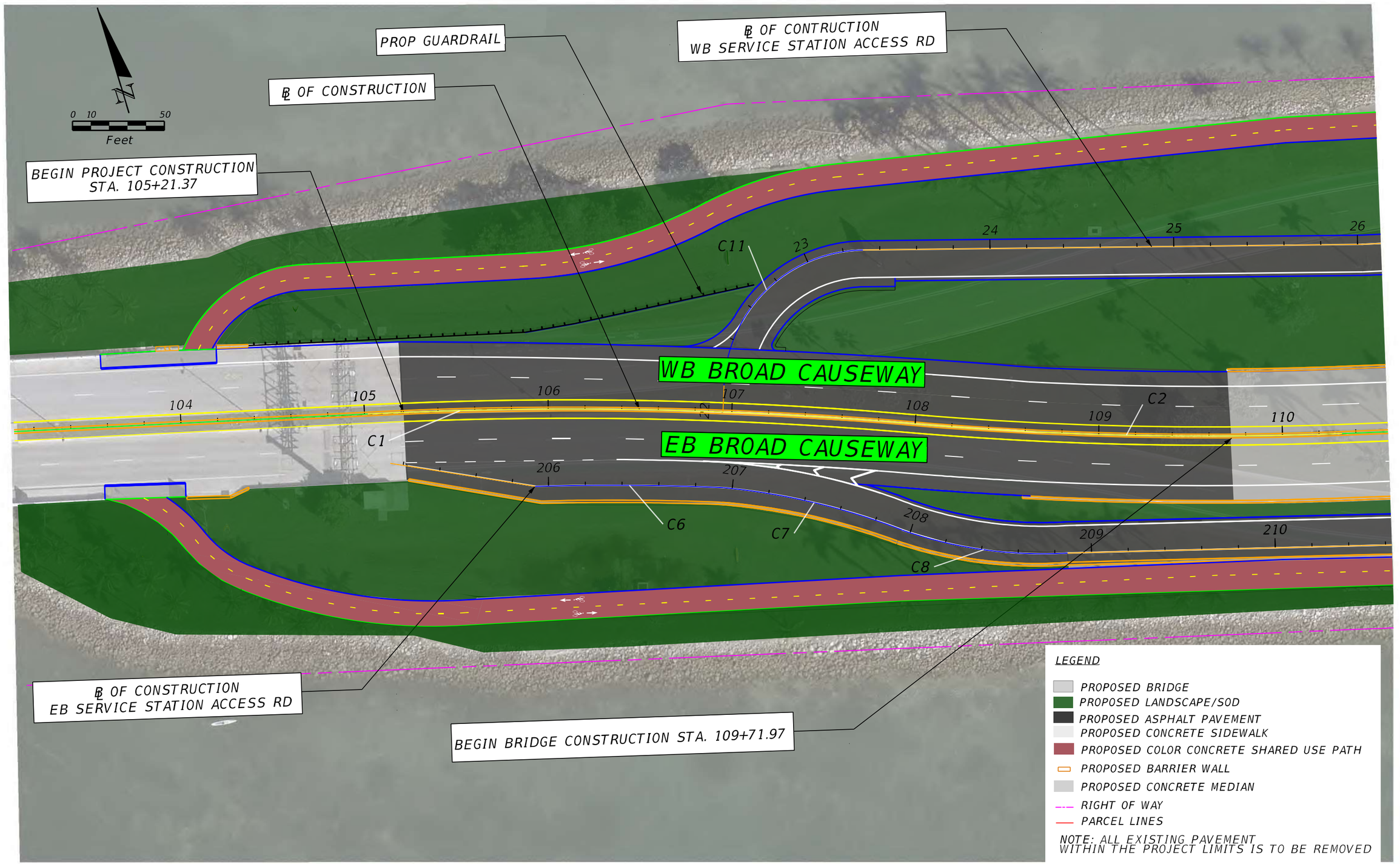

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℄ OF CONSTRUCTION

WB SERVICE STATION ACCESS RD

℄ OF CONSTRUCTION WB RAMP
BEGIN BRIDGE STA 315+68.25

℄ OF CONSTRUCTION
WB SERVICE STATION ACCESS RD

N

0 10 50
Feet

27 28 29 30 31 32 33

313 314 C10 315 316 317 318

WB BROAD CAUSEWAY

111 112 113 114 115 116 117 118

EB BROAD CAUSEWAY

211 212 213 214 215 216 217 218

END EB RAMP STA 218+15.36

EB RAMP

℄ OF CONSTRUCTION EB
SERVICE STATION ACCESS RD

BEGIN BRIDGE STA 215+00.00

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED COLOR CONCRETE SHARED USE PATH
- PROPOSED BARRIER WALL
- PROPOSED CONCRETE MEDIAN
- RIGHT OF WAY
- PARCEL LINES

NOTE: ALL EXISTING PAVEMENT WITHIN THE PROJECT LIMITS IS TO BE REMOVED

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

PLAN SHEET (2)

SHEET NO. 11

WB SERVICE STATION ACCESS RD

EXIST. SERVICE GAS STATION

N

0 10 50
Feet

C12

C14

EXIST. BRIDGE TO BE REMOVED

C13

℄ OF CONSTRUCTION WB RAMP

34

319 320 321 322

WB BROAD CAUSEWAY

119 120 121 122 123 124 125

C3

EB BROAD CAUSEWAY

219 220 221 222

C9

EB SERVICE STATION ACCESS RD

℄ OF CONSTRUCTION

℄ OF CONSTRUCTION EB
SERVICE STATION ACCESS RD

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED COLOR CONCRETE SHARED USE PATH
- PROPOSED BARRIER WALL
- PROPOSED CONCRETE MEDIAN
- RIGHT OF WAY
- PARCEL LINES

NOTE: ALL EXISTING PAVEMENT WITHIN THE PROJECT LIMITS IS TO BE REMOVED

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

PLAN SHEET (3)

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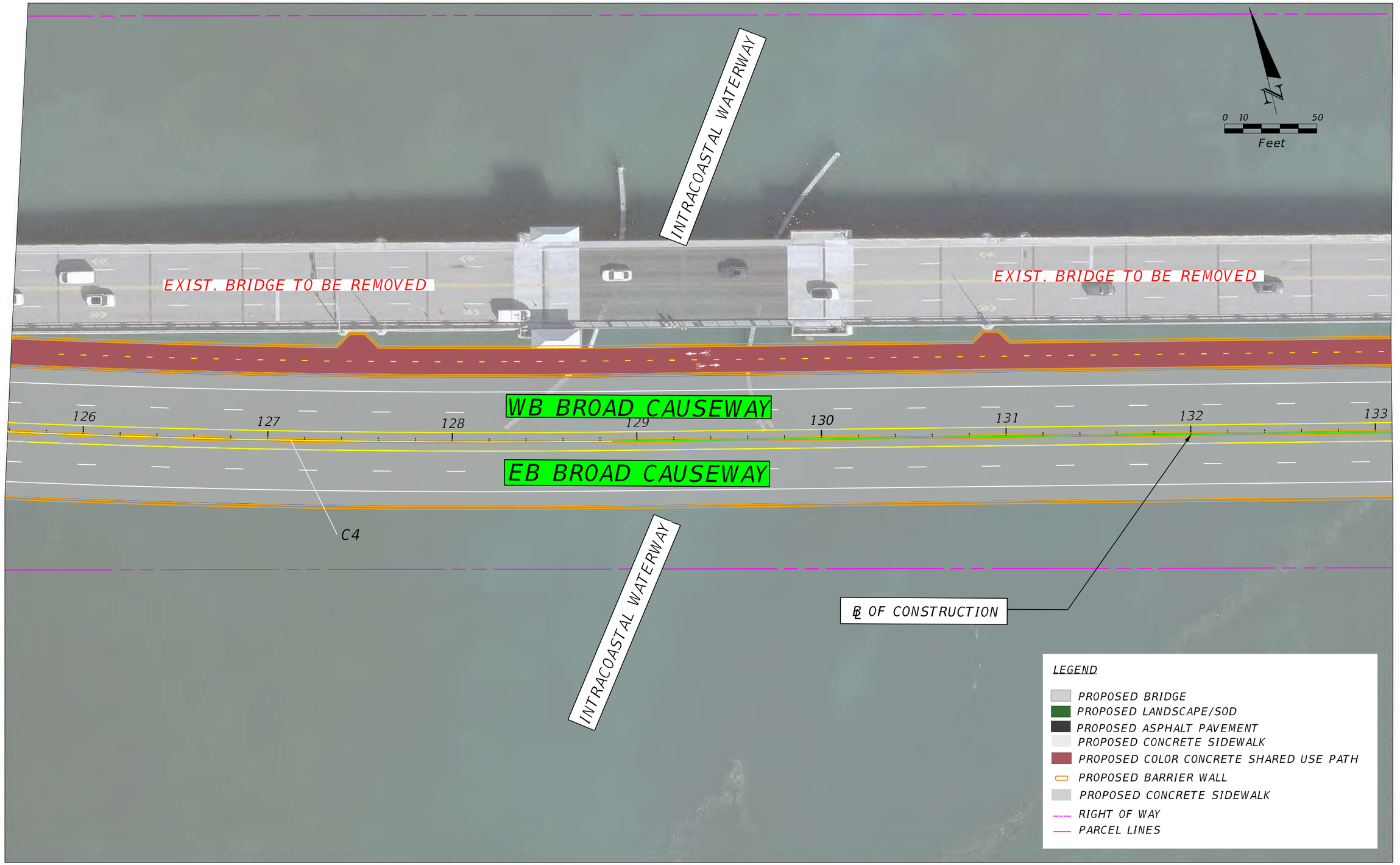

REVISIONS				JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PLAN SHEET (4)	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
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EXIST. BRIDGE TO BE REMOVED

WB BROAD CAUSEWAY

EB BROAD CAUSEWAY

135

140

C5

℄ OF CONSTRUCTION

0 10 50

Feet

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED COLOR CONCRETE SHARED USE PATH
- PROPOSED BARRIER WALL
- PROPOSED CONCRETE MEDIAN
- RIGHT OF WAY
- PARCEL LINES

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

PLAN SHEET (5)

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BAY HARBOR ISLANDS TOT LOT

W. BROADVIEW DR.

℄ OF CONSTRUCTION

EXIST. BRIDGE TO BE REMOVED

P.I. STA. +12.76

KANE CONCOURSE

KANE CONCOURSE

141 142 143 144 145 146 147 148

END PROJECT CONSTRUCTION
STA. 145+56.01
MATCH EXISTING

N86°57'37"E

END BRIDGE CONSTRUCTION
STA. 141+39.63

W. BROADVIEW DR.

N

0 10 50
Feet

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED COLOR CONCRETE SHARED USE PATH
- PROPOSED BARRIER WALL
- PROPOSED CONCRETE MEDIAN
- RIGHT OF WAY
- PARCEL LINES

NOTE: ALL EXISTING PAVEMENT WITHIN THE PROJECT LIMITS IS TO BE REMOVED

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
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STATE OF FLORIDA
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

PLAN SHEET (6)

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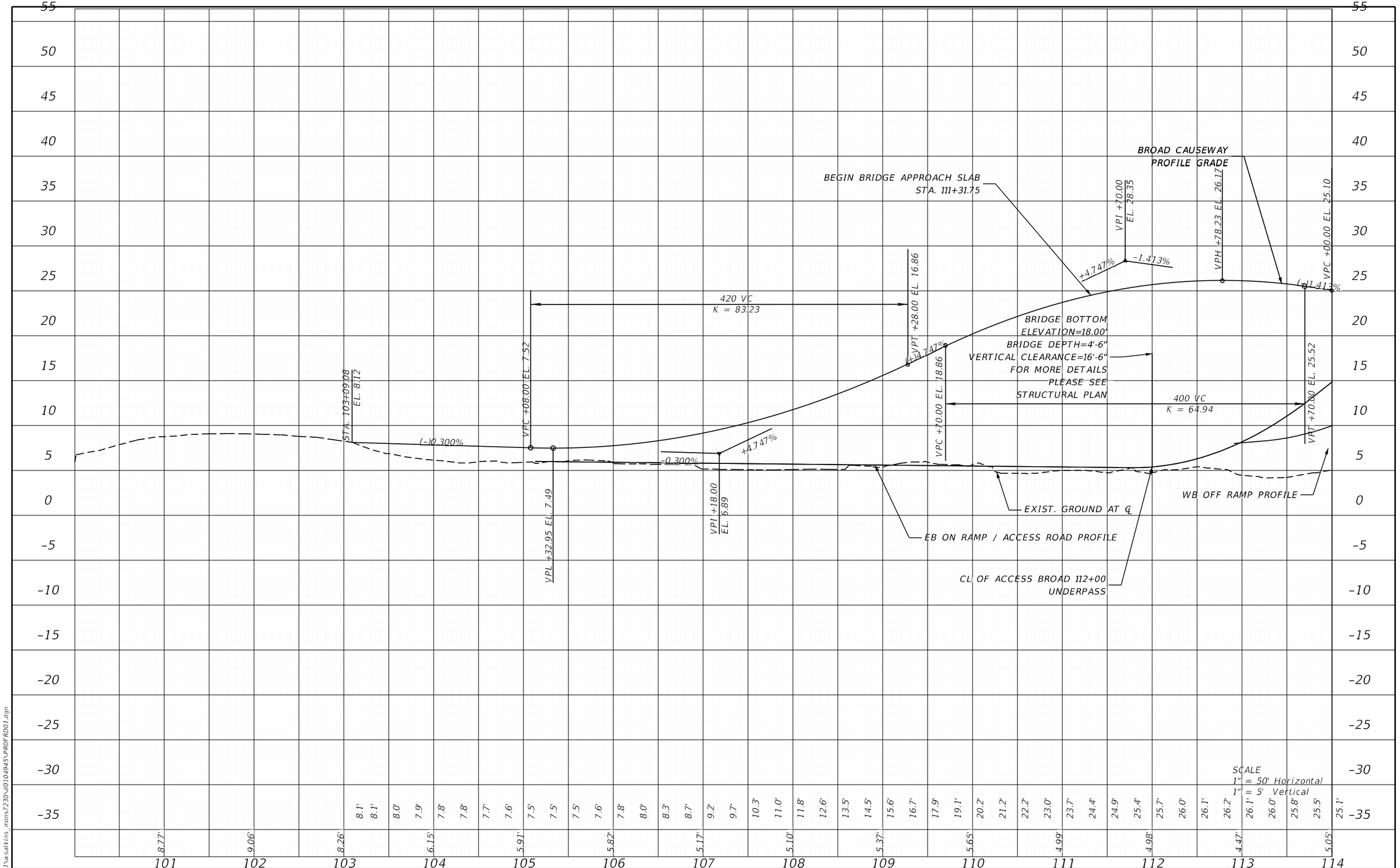

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JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

BROAD CAUSEWAY PROFILE

SHEET NO. 16

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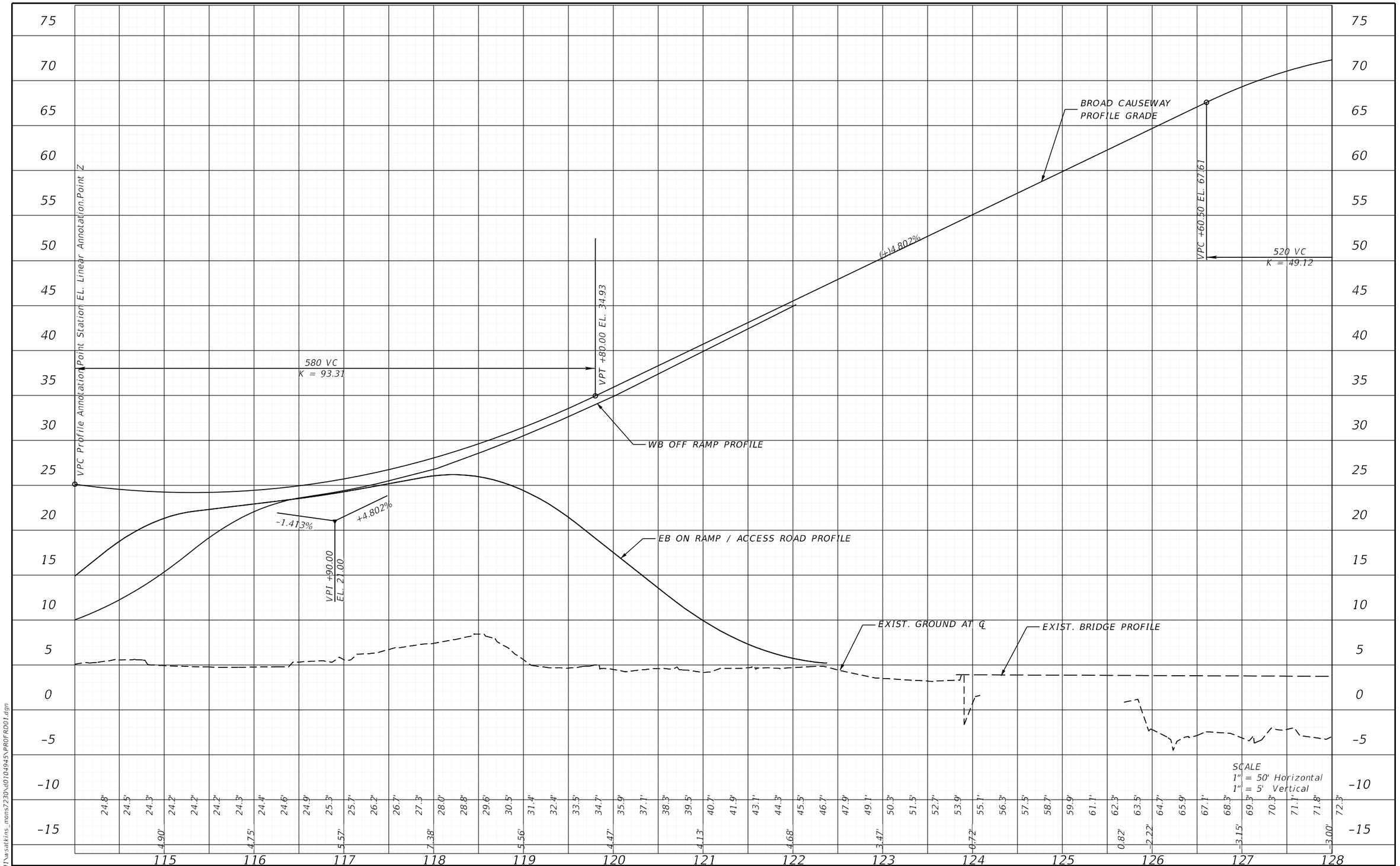

REVISIONS			
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JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

BROAD CAUSEWAY PROFILE

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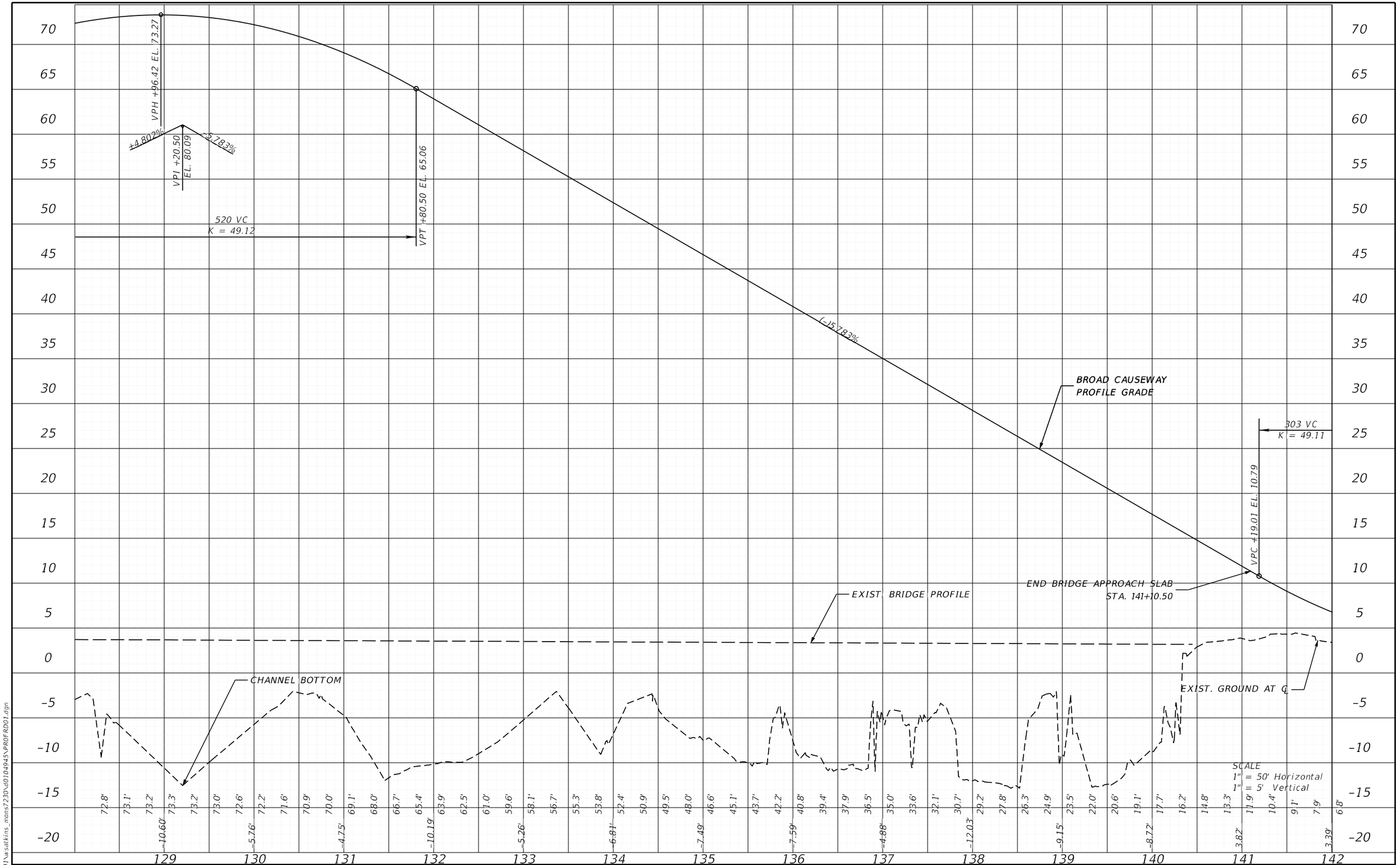

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JOHN A. SALATINO, P.E.
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ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

BROAD CAUSEWAY PROFILE

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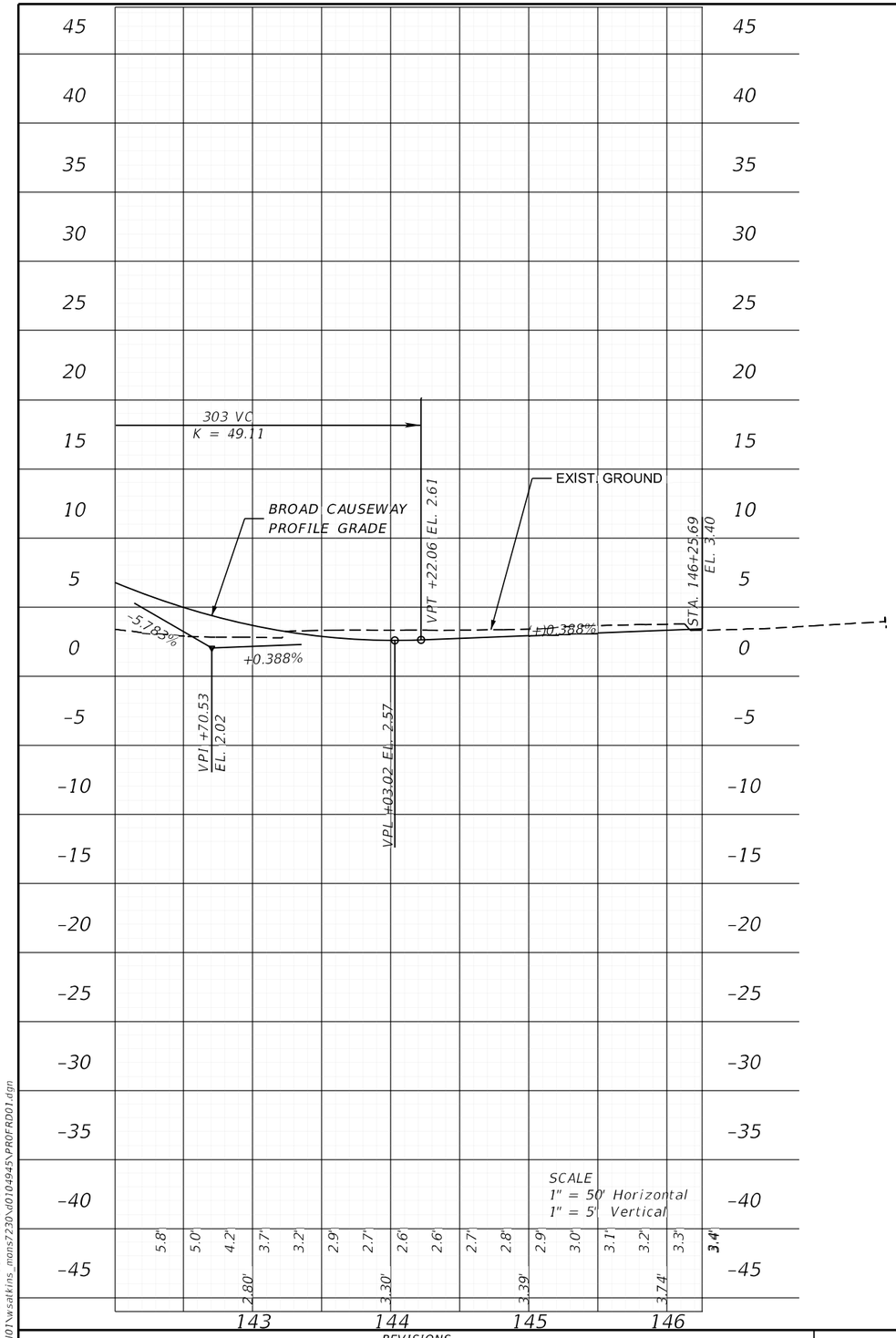

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

BROAD CAUSEWAY PROFILE

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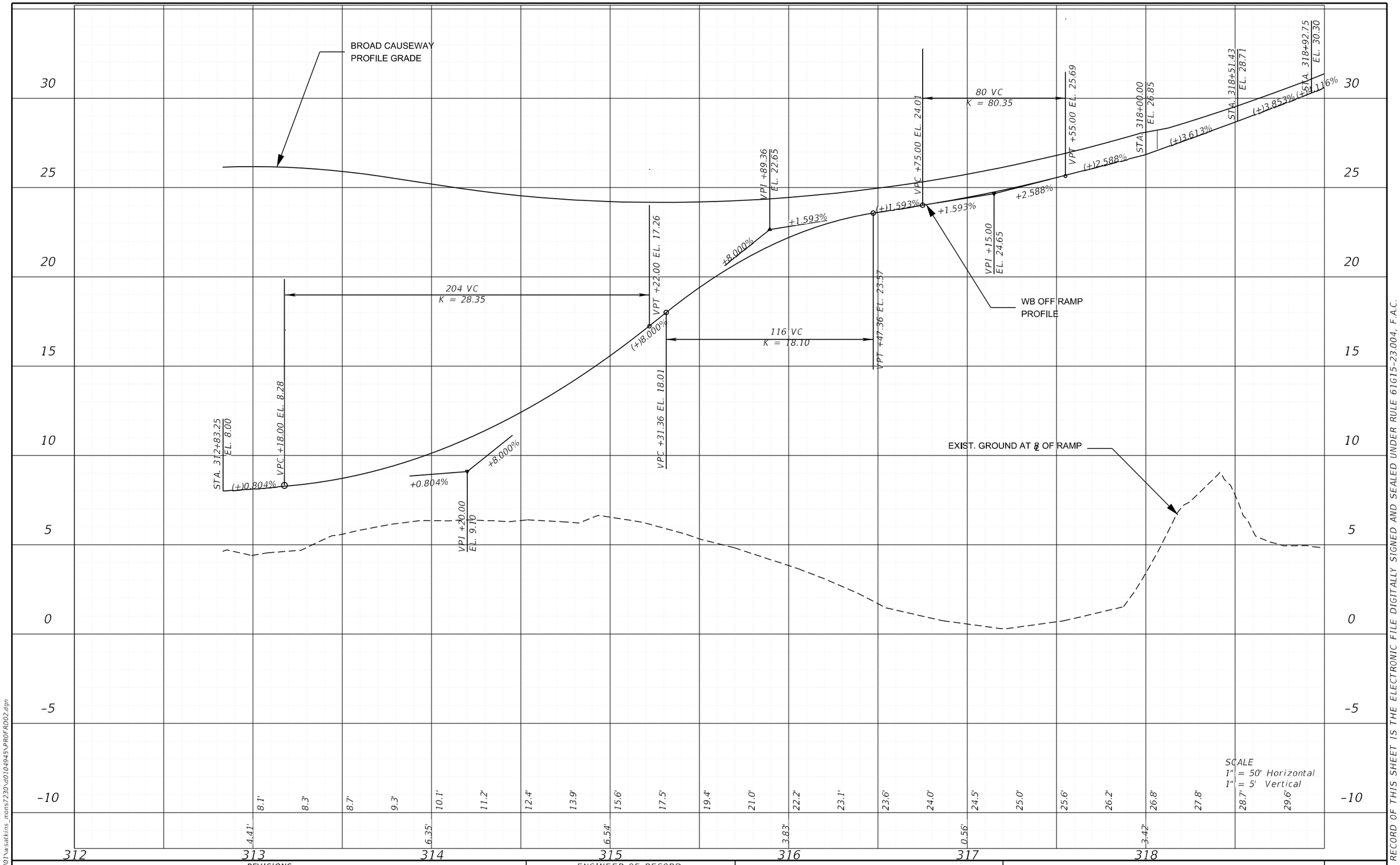

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

WB OFF RAMP PROFILE

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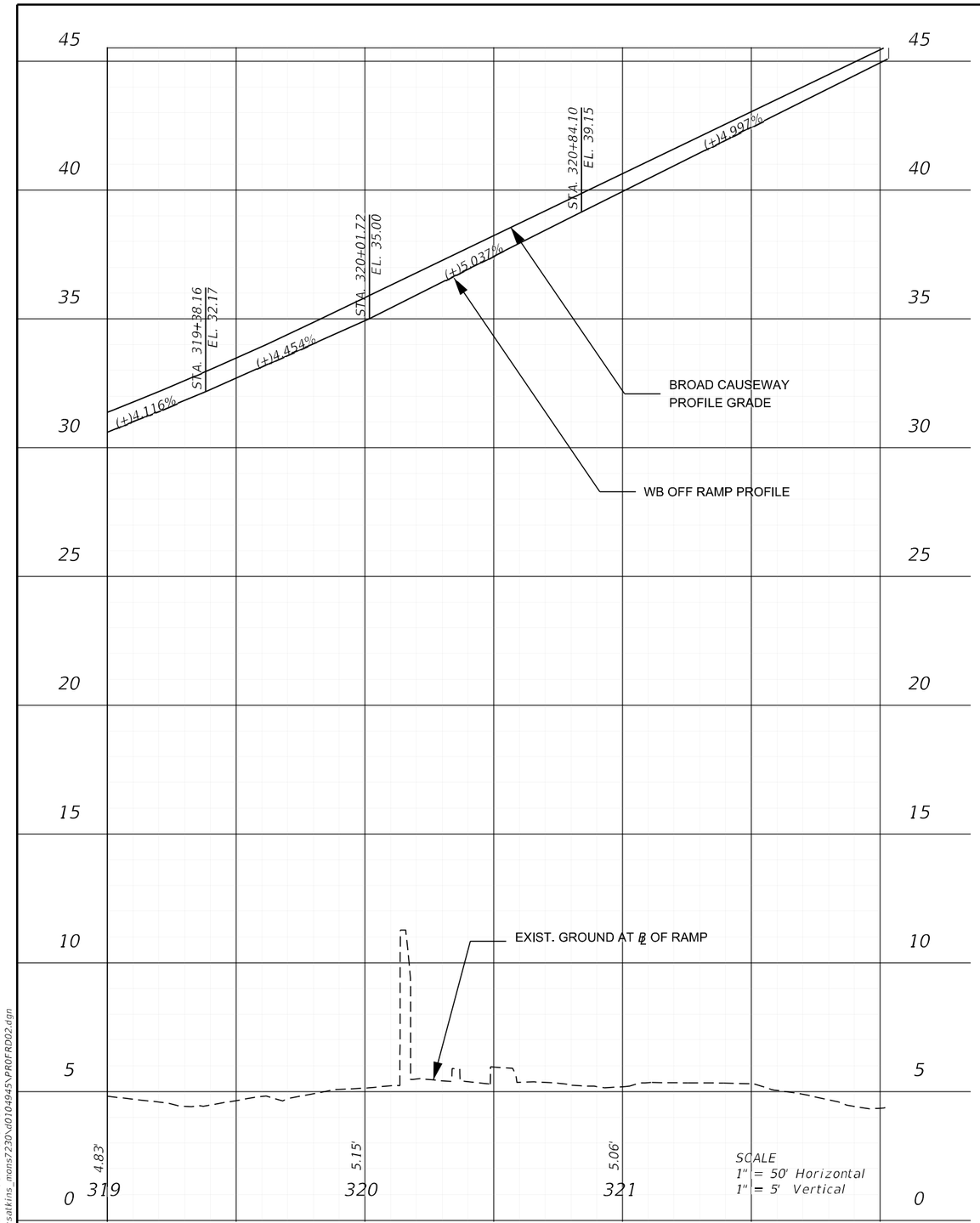

REVISIONS				ENGINEER OF RECORD	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			WB OFF RAMP PROFILE	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	JOHN A. SALATINO, P.E. LICENSE NUMBER: 60921 ATKINSREALIS 800 WATERFORD WAY, SUITE 700 MIAMI, FL 33126	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		21
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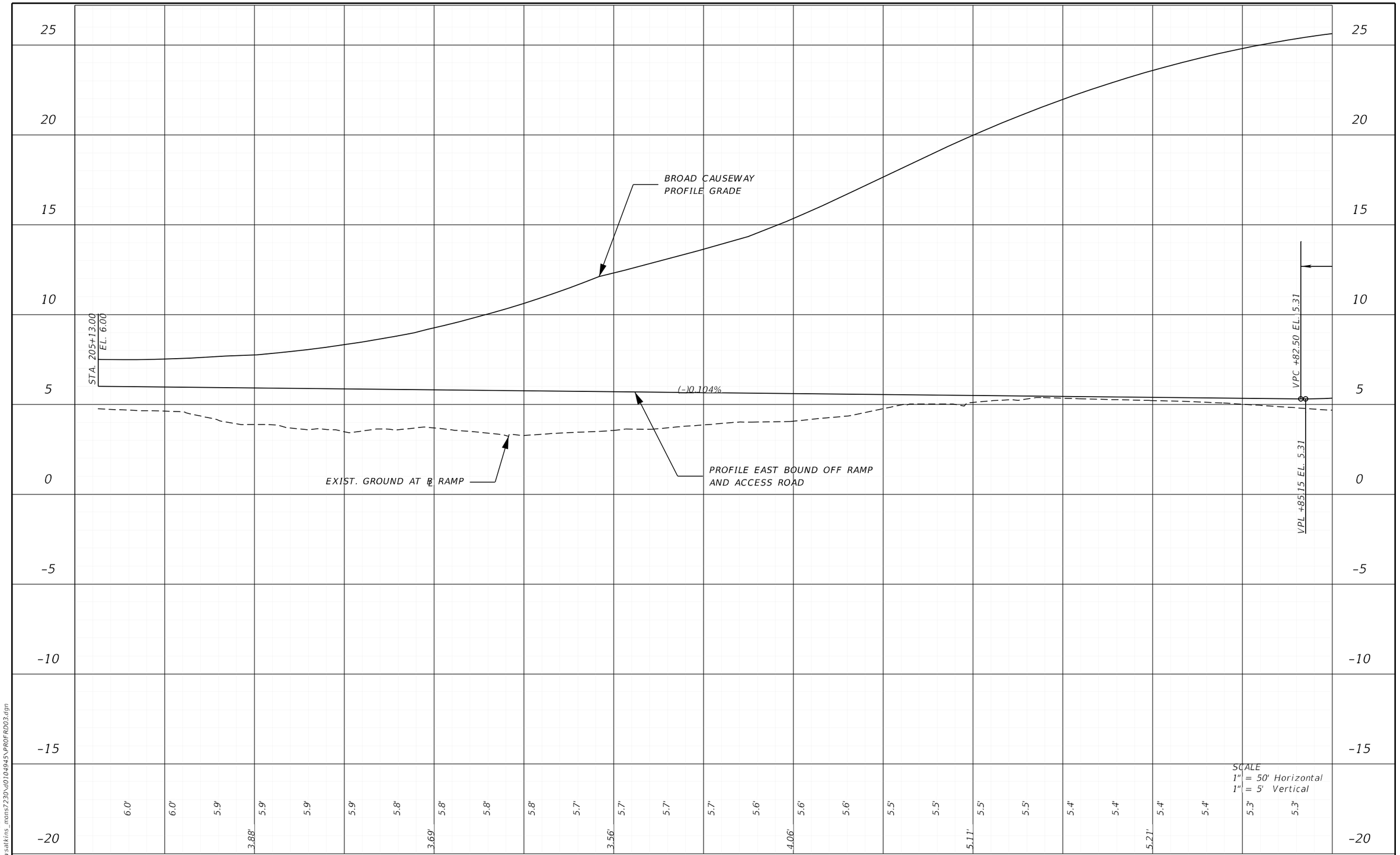

SCALE
1" = 50' Horizontal
1" = 5' Vertical

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

N/A

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

EB RAMP PROFILE

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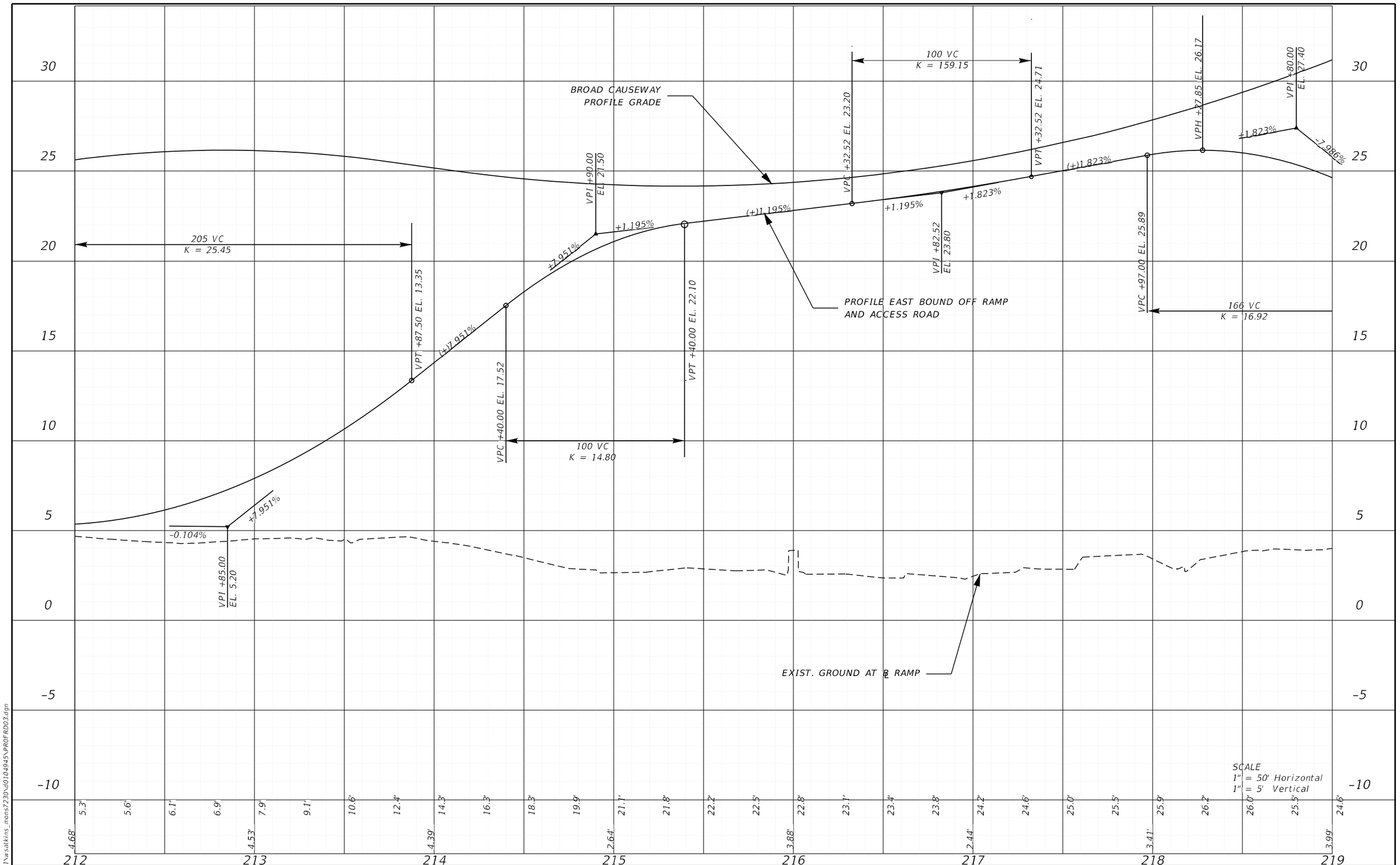

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

N/A

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

EB RAMP PROFILE

SHEET NO. 23

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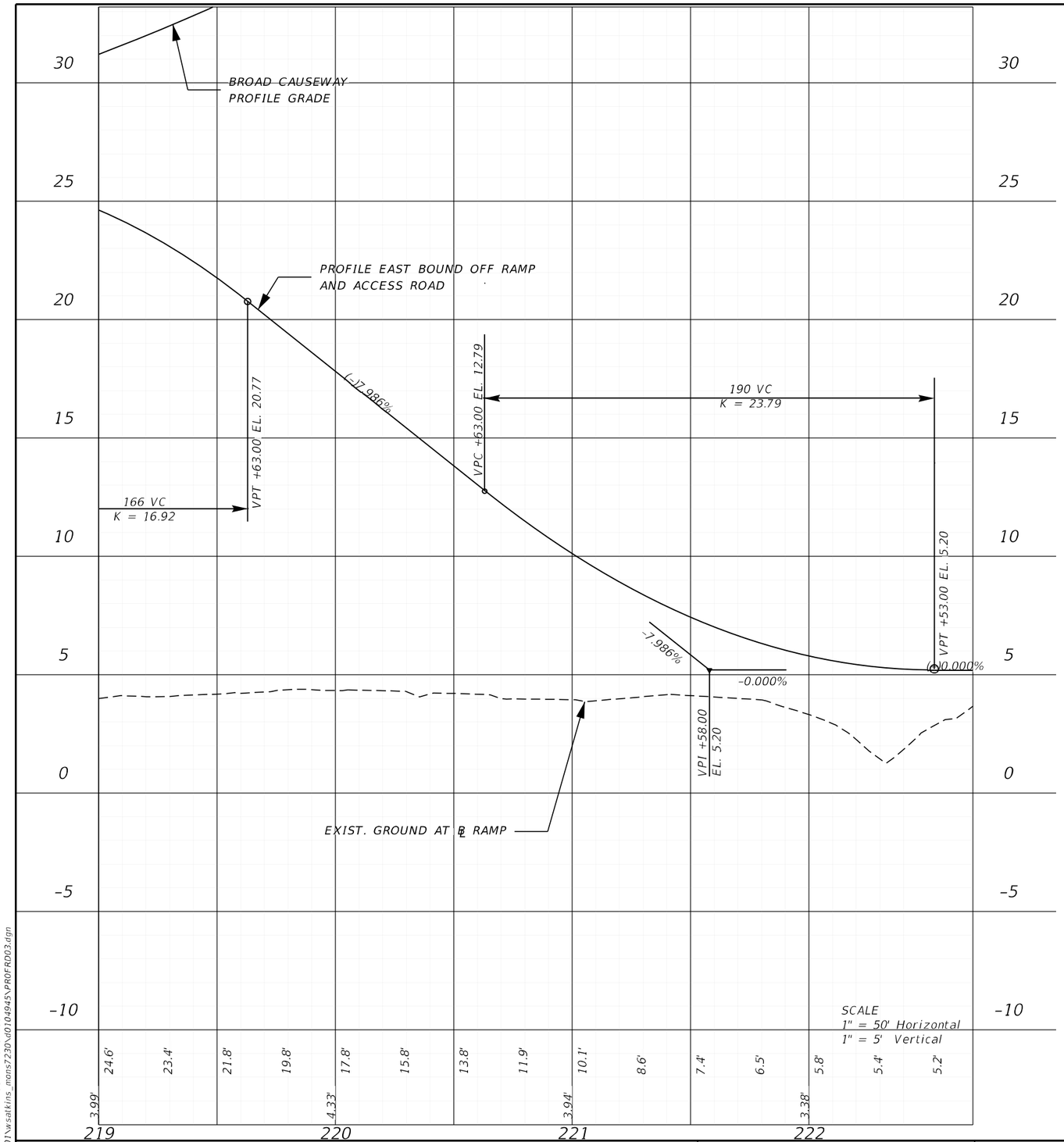

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

EB RAMP PROFILE

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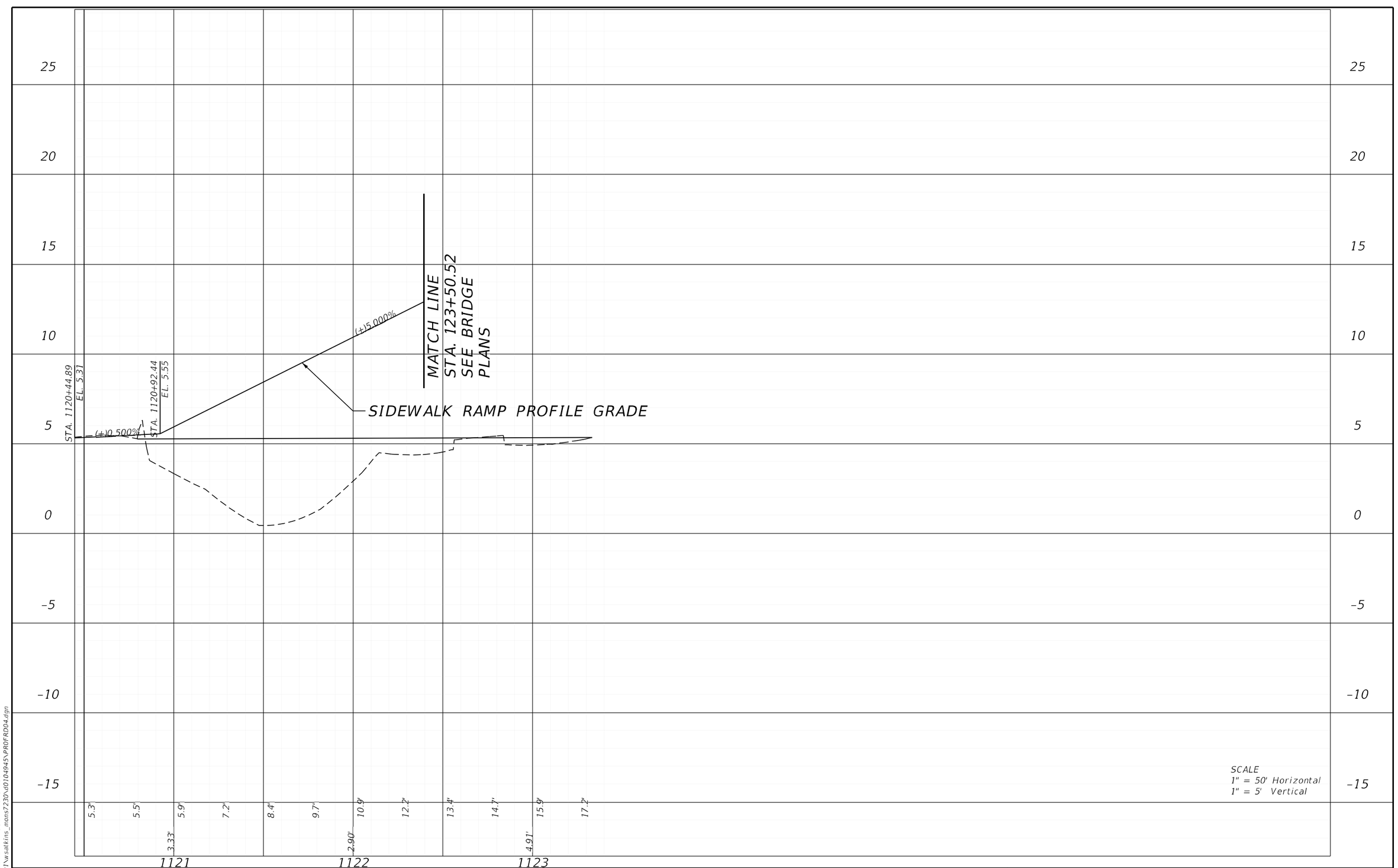

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

N/A

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
MIAMI, FL 33126

STATE OF FLORIDA
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

PEDESTRIAN RAMP LANDING

SHEET NO. 25

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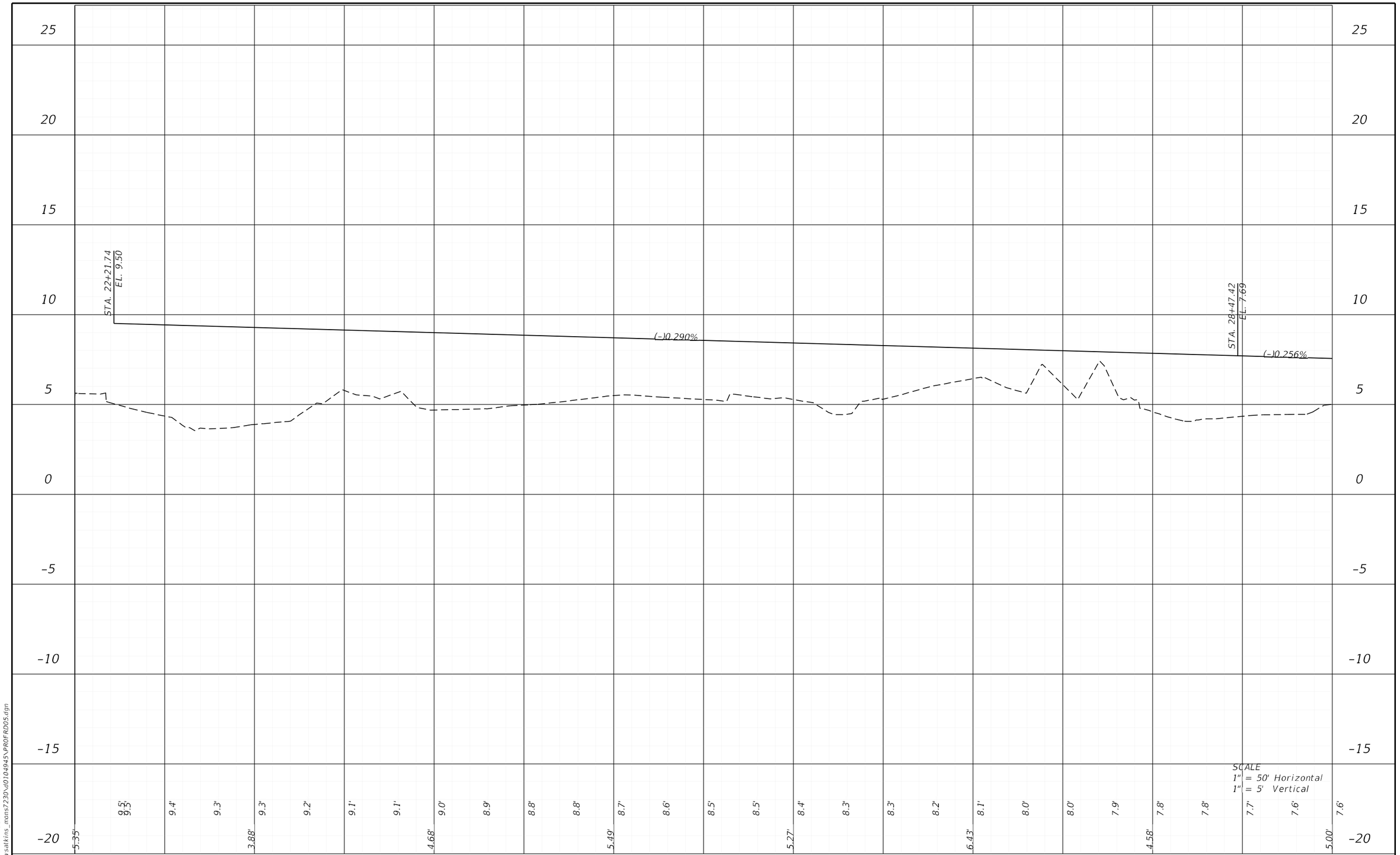

SCALE
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1" = 5' Vertical

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

N/A

JOHN A. SALATINO, P.E.
LICENSE NUMBER: 60921
ATKINSREALIS
800 WATERFORD WAY, SUITE 700
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STATE OF FLORIDA
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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR-922	MIAMI-DADE	425428-1-21-01

WB SERVICE STATION ACCESS ROAD

SHEET NO. 26

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APPENDIX C – CAUSEWAY ISLAND CIRCULATION OPTIONS

Minutes

Project:	Broad Causeway Bridge Replacement PD&E Study
Subject:	Causeway Island Circulation Options
Meeting place:	Teams Meeting
Date and time:	August 30, 2023 | 3:00 p.m.
Attendees:	Maria Lasday: Town of Bay Harbor Islands Josh Fuller: Town of Bay Harbor Islands Rodney Carrero-Santana: Town of Bay Harbor Islands Jason Atkinson: Town of Bay Harbor Islands David Konz: AtkinsRéalis - PM Wendy Lasher: AtkinsRéalis - DPM Andrea Garcia: AtkinsRéalis – Planning/NEPA Dylan Scheinman: AtkinsRéalis - Roadway Alidys Monsantos: AtkinsRéalis - Roadway Steve Tissier: AtkinsRéalis - Structures

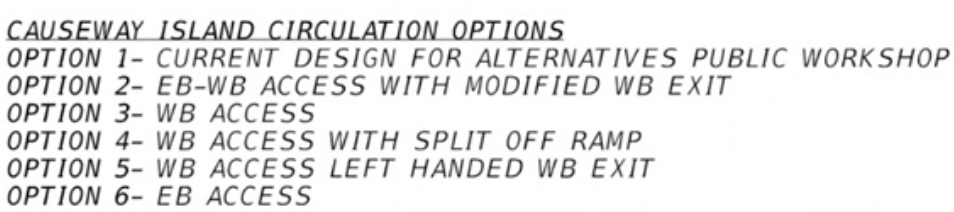
AtkinsRéalis met with the Town of Bay Harbor Islands (Town) on July 20, 2023 to review the Alternatives Public Workshop materials. During that meeting, the Town requested that AtkinsRéalis revisit the circulation options on the causeway island. Feedback included the Town's desire for:

- Less pavement on the Causeway Island.
- Safety concerns for pedestrians. Do not want them to have to cross roadways.
- Do not want roadway near the north side of the island along the water.
- Open to eliminating EB or WB access to the service station (westbound most likely) if necessary.

AtkinsRéalis responded the feedback noting the following:

- The September 2023 Alternatives Public Workshop is intended to gain clarity on No Build, Fixed, or Movable Alternatives. Recirculation ramps can be revisited and optimized as the Preferred Alternative is developed.
- Access commitments to the lease must be considered.
- A commitment to generate 5 new Causeway Island Circulation options that could be considered.

During this 8/30/23 meeting, AtkinsRéalis presented the following options developed for the circulation of the causeway island based on the takeaways listed above. Each graphic shows the Fixed Bridge Alternative, but the Causeway Island configuration is the same for both the Fixed and Movable Bridge Alternatives.



Option 1 - EB-WB access (Initial design to be shown at Alternatives Public Workshop)

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED BIKE LANE
- PROPOSED COLOR CONCRETE SIDEWALK
- PROPOSED BARRIER WALL
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE MEDIAN

- This option was the service station access and island circulation layout for the causeway island that provides for both Eastbound (EB) and westbound (WB) access to the service station. This will be shown at the September 2023 Alternatives Public Workshop.

Option 2 - EB-WB access with modified WB exit (Option 2 approved for further study)

- Provides for both EB and WB access to the service station.
- Design is compressed.
- Maximizes grass and green space by the water edge on the northside of the island. Less pavement surface area (improved drainage) when compared to Option 1.
- Illuminates the 'candy cane' return for westbound that goes back into service station by combining the westbound access with the eastbound service station access.
- Pedestrians can get to the water without crossing into roadway.
- Roadway is away from north side of the island along the water.
- Sidewalk around the perimeter of the island.

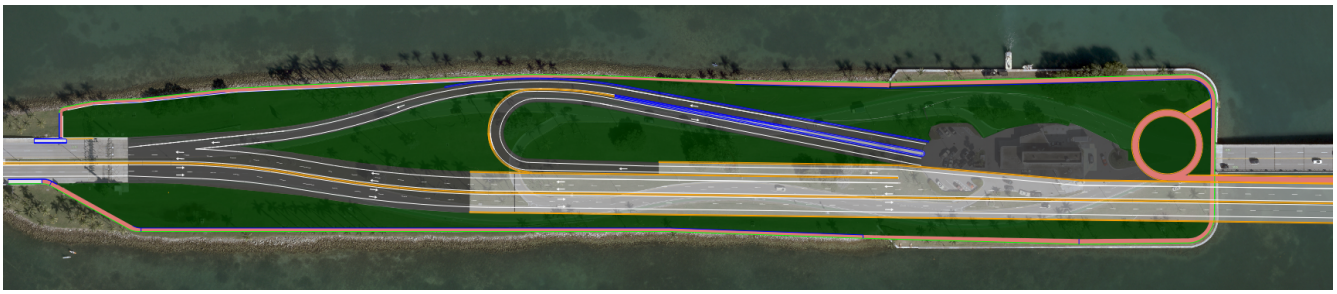
Discussion

1. Vice-Mayor Fuller asked if there was a walking path on the southside, and it was advised there was a 10' walking path to the north and the southside sidewalk would be maximized (6' to 8').
2. Vice-Mayor Fuller informed the team that this looked much better than Option 1, and the team advised this was the recommended option.
3. David informed the group that with the lease with the gas station, Option 2 maximized the grass, maintained both eastbound and westbound access, and addressed the 7/20/23 request from Vice-Mayor

Fuller in the most complete manner. Rodney also advised that there will be a pedestrian barrier and bicycle pathway on the northside of the bridge.

4. Vice-Mayor Fuller asked if this was elevating the Causeway with the Option 2 design, and David advised it is the same profile as Option 1 and that profile of the mainline did not change. It was also asked for the circular helix complied with ADA, and it does.
5. Maria advised that a wider sidewalk would be best wherever possible, and discussion was made that people do stand at the seawall. Vice-Mayor Fuller stated that he did not want to see a true boat/marine access point for the public. Jason added that his team would want to get down the seawall to conduct maintenance. Safety was brought up, and it was discussed that metal ladders could be mounted to the seawall every 400 or 500 feet to allow for Town maintenance team and emergencies egress from the water. This would not require a permit.

Option 3 - WB access

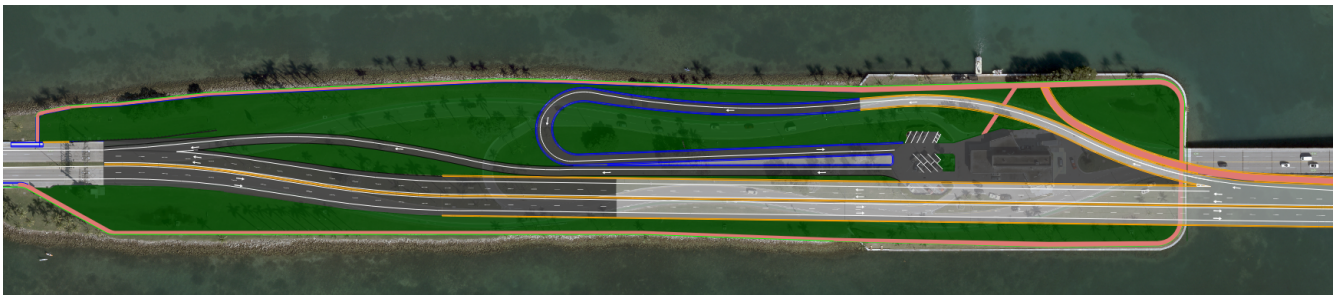


- Provides only WB access to the service station.
- 1-way in, 1-way out with larger design vehicle
- Provides grass along he southside of the island
- Mainline bridge could be shortened by approximately 500' by shifting west abutment (not shown in graphic)
- Lowest cost option

Discussion

David advised we have removed eastbound service station access, which needs to be considered with the lease.

Option 4 - WB access with split offramp (no helix)

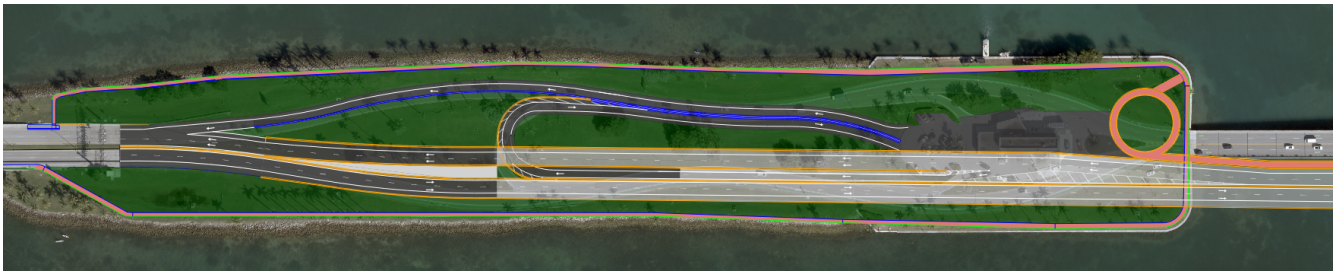


- Provides only WB access to the service station.
- Detached off ramp for the service station would have to be built using phased construction, after demolition of the existing bridge.
- No pedestrian helix. Detached pedestrian path.
- Provides grass along he southside of the island

Discussion

Vice-Mayor Fuller stated that he understands we can't use the entire island for recreation, and that we need to allow traffic to move safely. He noted that the Option 2 maximizes the land and functionality for the exits a bit better than Option 4. Again, David advised we have removed eastbound service station access, which needs to be considered with the lease.

Option 5 - WB access left-handed WB exit

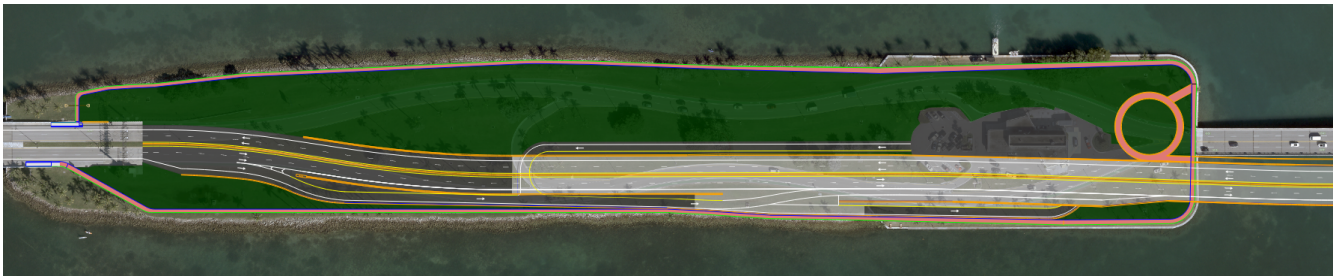


- Provides only WB access to the service station.
- This is a left-hand exit.
- Provides grass along he southside and northside of the island

Discussion

Vice-Mayor Fuller mentioned that drivers may be confused with a lefthand exit ramp and could try and cut across and was concerned about safety and accidents. Dylan advised that left exits are allowed in Florida. Again, David advised we have removed eastbound service station access, which needs to be considered with the lease.

Option 6 - EB access



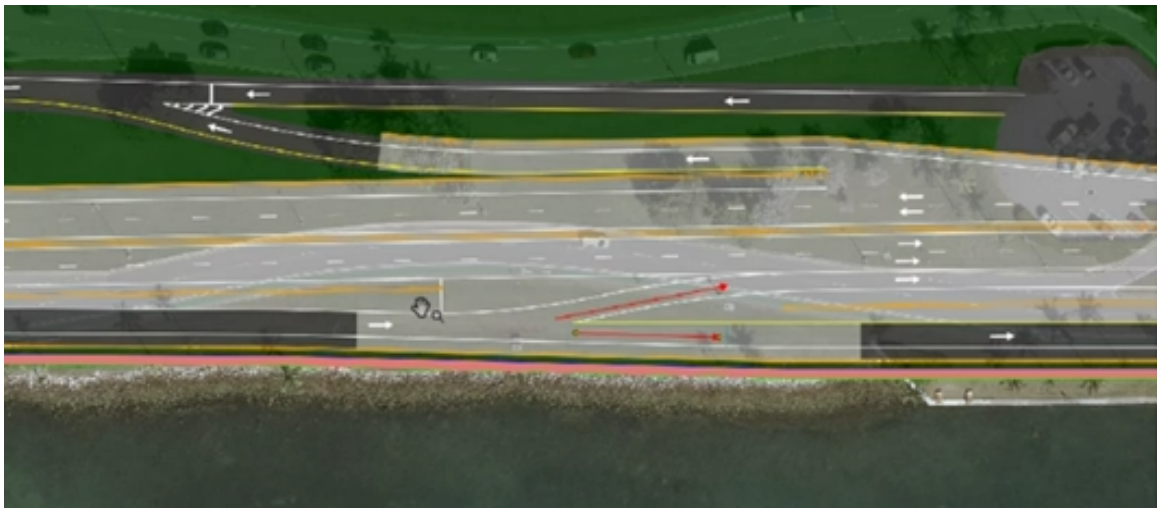
- EB only access would could go to the gas station under mainline and come back around and re-enter the mainline heading EB (or WB with a minor adjustment).
- Maximizes grass and green space by the water edge on the northside of the island. Less pavement surface area (improved drainage) when compared to Option 1.
- Most of the movement in the eastbound have the rise and fall for the single lanes.

Discussion

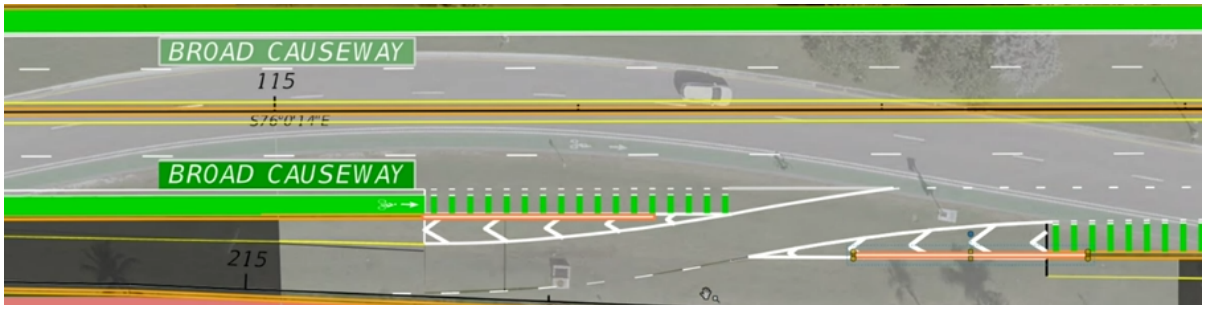
Wendy advised that the design the vehicles have the lowest turn radius, which could be an issue for gas delivery vehicles. Again, David advised we have removed westbound service station access, which needs to be considered with the lease.

Additional Option Discussions:

1. Vice-Mayor Fuller advised that most of the other options remove the existing turnaround. He said there needs to be an east and west access for a turnaround. People use the turnarounds to change directions a lot. David did advise that additional signage and striping would be needed to improve safety and the decision point (shown below) as the exit ramp rises and either joins with the mainline or continues toward the service station. If the mainline traffic illegally cuts across and tries to exit right, there would be a safety concern. The team recommended extending the traffic barrier in the gore areas.

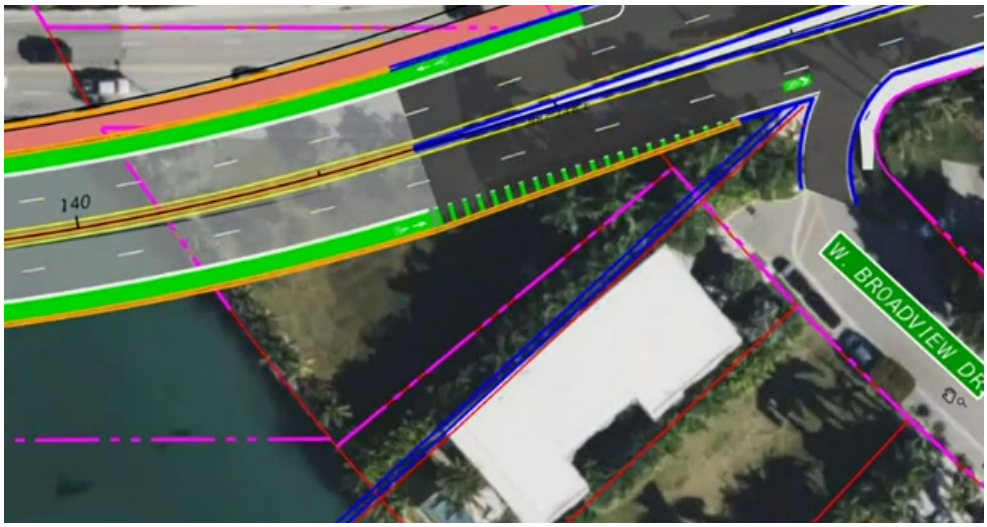


2. Vice-Mayor Fuller advised that a barrier or something permeant would need to be placed at the weave location noted in the above item. Dylan advised that the concrete traffic barrier walls can be extended to narrow the gap (orange lines and white chevron lines below). This was agreed by the group that it would improve safety.



3. David advised that Option 2 would be further optimized, verified for compliance, and would be included with the Preferred Alternative. Maria liked having the grass and access to the service station from both directions. She also advised having the perimeter island sidewalk for walkers and bicycles be 8' wide or more.
4. Wendy reminded the group that the public meeting was still going to see the previous version (Option 1). The Option 2 would be at the next public meeting with refinements and that this was part of the process. The AtkinsRéalis team will work to incorporate Option 2 for the September Public Alternatives Workshop with a board and/or a slide in the presentation to be referenced during Q&A.
5. Vice-Mayor Fuller asked if he could disclose that he would be available for discussions with citizens after the meeting and the steps needed to ensure this could be done. Vice-Mayor Fuller did advise that this would need to be noticed formally because of other councilmen in the room when he talks with citizens.
6. Maria advised to discuss with Yvonne and Wendy to publish both meetings for Vice-Mayor Fuller discussion after the public meeting. Wendy asked if AtkinsRéalis should prepare to present the Preferred Alternative to the Council in October. Discussions were made about publishing meetings, but Vice-Mayor Fuller asked Maria to not include this agenda item in the council meeting, but instead asked Maria to add it to the manager report instead.
7. Vice-Mayor Fuller thanked everyone and complimented the team on getting these options put together in a through and complete manner.
8. David advised that AtkinsRéalis would proceed with Option 2 moving forward with the Causeway Island. The decision from the September 26 meeting would be related to the No-Build, Fixed Bridge, or Moveable Bridge Alternatives, and will not be focused on the island circulation roads and access. Either build alternative will advance with Option 2 of the island circulation design.

9. Vice-Mayor Fuller did ask to see how close the build alternatives are to the existing home at the southeast quadrant of the bridge. David advised that there was a shift with the design that created more space. David has measured the distance, and we were looking at approximately 8' to the property line (below). Vice-Mayor Fuller noted that the Town would likely receive questions about that offset, even though the homeowner is aware that this project was happening before the land and house was sold.



10. Vice-Mayor Fuller asked if additional September 2023 Workshop notices were sent to people outside of Bay Harbor Islands. Wendy responded that notices were also sent to some residents in Indian Creek and North Miami.
11. Ranking based on Advantages and Disadvantages

Option	1	2	3	4	5	6
Cost	6	3	1	4	5	2
Constructability	6	2	3	5	4	1
Vehicle Safety	5	4	1	3	2	6
Access	2	1	5	3	6	4
Total	19	10	10	15	17	13
Average	4.75	2.5	2.5	3.75	4.25	3.25
Rank	**6**	**1**	**1**	**4**	**5**	**3**

Adjourn

TBHI Broad Causeway Bridge PD&E

Causeway Island Circulation Options – Comparative Analysis (8/30/23)

Option	Description (Category - rank)	Advantages	Disadvantages
Option 1	**EB & WB Ingress/Egress to gas station – Base Design for Alternatives Public Workshop** • Cost – 6/6 • Constructability – 6/6 • Vehicle Safety – 5/6 • Access – 2/6 • AVERAGE SCORE (RANK) = 4.75 (6th)	▪ 2-way ingress/egress to gas station ▪ Circulation under the mainline (status quo is maintained)	▪ Most amount of pavement (more impervious) ▪ Very close to environmental footprint areas/limits ▪ Less green-space (drainage areas/ponds/grass swales) ▪ Pedestrian interaction with vehicles needed to access gas station and sidewalks
Option 2	**EB & WB Ingress/Egress to gas station - Modified circulation routing** • Cost – 3/6 • Constructability – 2/6 • Vehicle Safety – 4/6 • Access – 1/6 • AVERAGE SCORE (RANK) = 2.50 (1st)	▪ 2-way ingress/egress to gas station ▪ Circulation under the mainline (status quo is maintained) ▪ Design is compressed to have more green-space/less pavement ▪ No pedestrian interaction with vehicles (separate facilities/no crossings)	▪ At design minimums (tighter turning movements and sight-distance issues) ▪ Potential congestion causing delays
Option 3	**WB Ingress/Egress to gas station – Right Exit** • Cost – 1/6 • Constructability – 3/6 • Vehicle Safety – 1/6 • Access – 5/6 • AVERAGE SCORE (RANK) = 2.50 (1st)	▪ 1-way in, 1-way out with larger design vehicle ▪ Less pavement (more green-space) ▪ Easier pedestrian flow ▪ No pedestrian interaction with vehicles (separate facilities/no crossings)	▪ Only WB access to and from gas station ▪ No circulation possible ▪ Mainline bridge is closer to gas station (potential conflict with structural components) ▪ Very close to environmental footprint areas/limits on North side
Option 4	**WB Ingress/Egress to gas station – Right Exit shifted East** • Cost – 4/6 • Constructability – 5/6 • Vehicle Safety – 3/6 • Access – 3/6 • AVERAGE SCORE (RANK) = 3.75 (4th)	▪ 1-way in, 1-way out with larger design vehicle ▪ Bridge further from gas station (not under bridge) ▪ Detached ramp allows for more green-space ▪ Easier pedestrian flow ▪ No pedestrian interaction with vehicles (separate facilities/no crossings)	▪ Only WB access to and from gas station ▪ No circulation possible ▪ Less area for future development on current plot of land gas station occupies ▪ Sight-lines from gas station will be obscured by the bridge ▪ Potential site/civil issues with parking configuration flipped
Option 5	**WB Ingress/Egress to gas station - Left Exit** • Cost – 5/6 • Constructability – 4/6 • Vehicle Safety – 2/6 • Access – 6/6 • AVERAGE SCORE (RANK) = 4.25 (5th)	▪ 1-way in, 1-way out with larger design vehicle ▪ Less pavement (lots of green-space) ▪ Easier pedestrian flow ▪ No pedestrian interaction with vehicles (separate facilities/no crossings) ▪ Frontage road uses existing WB roadway footprint (existing pavement/subgrade could be reused)	▪ Only WB access to and from gas station ▪ No circulation possible ▪ More bridge structure over gas station (result in horizontal alignment shift to South)
Option 6	**EB Ingress/Egress to gas station** • Cost – 2/6 • Constructability – 1/6 • Vehicle Safety – 6/6 • Access – 4/6 • AVERAGE SCORE (RANK) = 3.25 (3rd)	▪ 1-way in, 1-way out ▪ Circulation under the mainline (status quo is maintained) ▪ Most green-space on North side of any option ▪ No pedestrian interaction with vehicles (separate facilities/no crossings)	▪ Only EB access to and from gas station ▪ Smallest design vehicle (limited emergency vehicle access) ▪ Need to reconfigure parking to make access to exit road work

OPTION 1 - FIXED BRIDGE

N

SCALE:1'=60'

CAUSEWAY ISLAND CIRCULATION OPTIONS
OPTION 1- CURRENT DESIGN FOR ALTERNATIVES PUBLIC WORKSHOP
OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT
OPTION 3- WB ACCESS
OPTION 4- WB ACCESS WITH SPLIT OFF RAMP
OPTION 5- WB ACCESS LEFT HANDED WB EXIT
OPTION 6- EB ACCESS

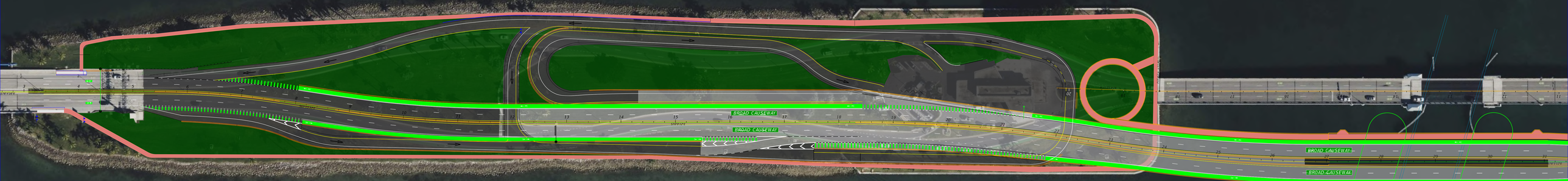
LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED BIKE LANE
- PROPOSED COLOR CONCRETE SIDEWALK
- PROPOSED BARRIER WALL
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE MEDIAN

OPTION 1-MOVABLE BRIDGE

N

SCALE:1'=60'



CAUSEWAY ISLAND CIRCULATION OPTIONS

OPTION 1- CURRENT DESIGN FOR ALTERNATIVES PUBLIC WORKSHOP
OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT
OPTION 3- WB ACCESS
OPTION 4- WB ACCESS WITH SPLIT OFF RAMP
OPTION 5- WB ACCESS LEFT HANDED WB EXIT
OPTION 6- EB ACCESS

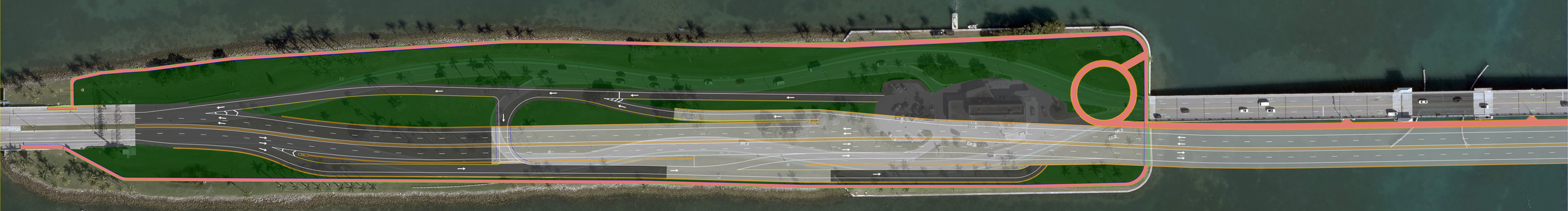
LEGEND

- *PROPOSED BRIDGE*
- *PROPOSED LANDSCAPE/SOD*
- *PROPOSED ASPHALT PAVEMENT*
- *PROPOSED CONCRETE SIDEWALK*
- *PROPOSED BIKE LANE*
- *PROPOSED COLOR CONCRETE SIDEWALK*
- *PROPOSED BARRIER WALL*
- *PROPOSED CURB AND GUTTER*
- *PROPOSED CONCRETE MEDIAN*

OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT

N

SCALE:1'=60'



CAUSEWAY ISLAND CIRCULATION OPTIONS

OPTION 1- CURRENT DESIGN FOR ALTERNATIVES PUBLIC WORKSHOP
OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT
OPTION 3- WB ACCESS
OPTION 4- WB ACCESS WITH SPLIT OFF RAMP
OPTION 5- WB ACCESS LEFT HANDED WB EXIT
OPTION 6- EB ACCESS

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED BIKE LANE
- PROPOSED COLOR CONCRETE SIDEWALK
- PROPOSED BARRIER WALL
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE MEDIAN

OPTION 3-WB ACCESS

N

SCALE:1'=60'

CAUSEWAY ISLAND CIRCULATION OPTIONS
OPTION 1- CURRENT DESIGN FOR ALTERNATIVES PUBLIC WORKSHOP
OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT
OPTION 3- WB ACCESS
OPTION 4- WB ACCESS WITH SPLIT OFF RAMP
OPTION 5- WB ACCESS LEFT HANDED WB EXIT
OPTION 6- EB ACCESS

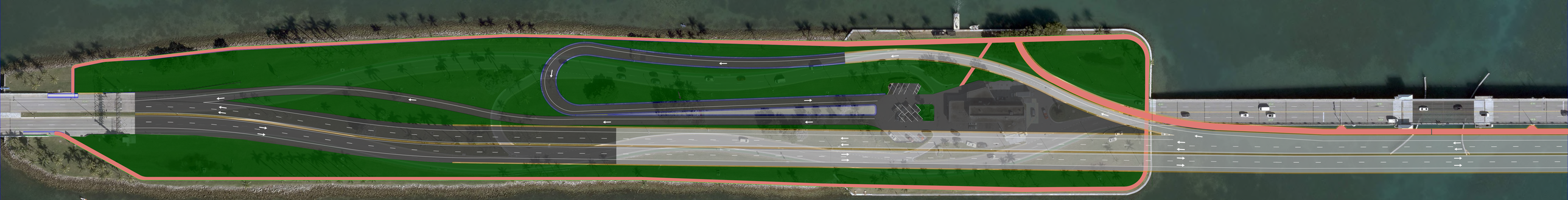
LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED BIKE LANE
- PROPOSED COLOR CONCRETE SIDEWALK
- PROPOSED BARRIER WALL
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE MEDIAN

OPTION 4-WB ACCESS WITH SPLIT OFF RAMP (NO HELIX)

N

SCALE:1'=60'



CAUSEWAY ISLAND CIRCULATION OPTIONS
OPTION 1- CURRENT DESIGN FOR ALTERNATIVES PUBLIC WORKSHOP
OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT
OPTION 3- WB ACCESS
OPTION 4- WB ACCESS WITH SPLIT OFF RAMP
OPTION 5- WB ACCESS LEFT HANDED WB EXIT
OPTION 6- EB ACCESS

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED BIKE LANE
- PROPOSED COLOR CONCRETE SIDEWALK
- PROPOSED BARRIER WALL
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE MEDIAN

OPTION 5-WB ACCESS LEFT HANDED WB EXIT

N

SCALE:1'=60'

CAUSEWAY ISLAND CIRCULATION OPTIONS
OPTION 1- CURRENT DESIGN FOR ALTERNATIVES PUBLIC WORKSHOP
OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT
OPTION 3- WB ACCESS
OPTION 4- WB ACCESS WITH SPLIT OFF RAMP
OPTION 5- WB ACCESS LEFT HANDED WB EXIT
OPTION 6- EB ACCESS

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED BIKE LANE
- PROPOSED COLOR CONCRETE SIDEWALK
- PROPOSED BARRIER WALL
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE MEDIAN

OPTION 6-EB ACCESS

N

SCALE:1"=60'

CAUSEWAY ISLAND CIRCULATION OPTIONS
OPTION 1- CURRENT DESIGN FOR ALTERNATIVES PUBLIC WORKSHOP
OPTION 2- EB-WB ACCESS WITH MODIFIED WB EXIT
OPTION 3- WB ACCESS
OPTION 4- WB ACCESS WITH SPLIT OFF RAMP
OPTION 5- WB ACCESS LEFT HANDED WB EXIT
OPTION 6- EB ACCESS

LEGEND

- PROPOSED BRIDGE
- PROPOSED LANDSCAPE/SOD
- PROPOSED ASPHALT PAVEMENT
- PROPOSED CONCRETE SIDEWALK
- PROPOSED BIKE LANE
- PROPOSED COLOR CONCRETE SIDEWALK
- PROPOSED BARRIER WALL
- PROPOSED CURB AND GUTTER
- PROPOSED CONCRETE MEDIAN

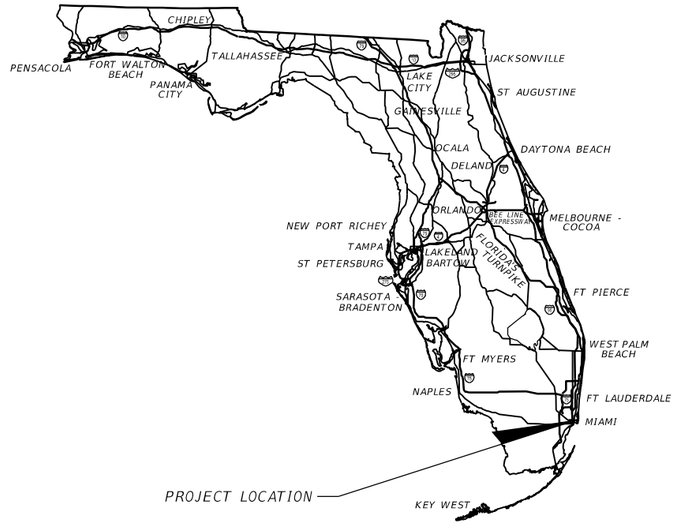
APPENDIX D – DRAFT TYPICAL SECTION PACKAGE

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION PACKAGE

FINANCIAL PROJECT ID 452428-1-21-01

BROAD CAUSEWAY BRIDGE/SR-922 REPLACEMENT
PROJECT DEVELOPMENT & ENVIRONMENT STUDY



PROJECT LOCATION URL:	https://tinyurl.com/2rujep6z
PROJECT LIMITS:	BEGIN MP 3.854 – END MP 4.868*
EXCEPTIONS:	NONE
BRIDGE LIMITS:	MP 4.207 – MP 4.498*
RAILROAD CROSSING:	NONE

*MP 3.741 – MP 4.546 NOT ON SHS

FDOT DISTRICT DESIGN ENGINEER

CONCURRING WITH:
TYPICAL SECTION ELEMENTS
TARGET SPEED
DESIGN & POSTED SPEEDS

FDOT DISTRICT TRAFFIC OPERATIONS ENGINEER

CONCURRING WITH:
TARGET SPEED
DESIGN & POSTED SPEEDS

FDOT DISTRICT INTERMODAL SYSTEMS DEVELOPMENT MANAGER

CONCURRING WITH:
CONTEXT CLASSIFICATION
TARGET SPEED

FDOT DISTRICT STRUCTURES DESIGN ENGINEER

CONCURRING WITH:
TYPICAL SECTION ELEMENTS

FHWA TRANSPORTATION ENGINEER

CONCURRING WITH:
TYPICAL SECTION ELEMENTS

TOWN OF BAY HARBOR ENGINEER

CONCURRING WITH:
TYPICAL SECTION ELEMENTS

APPROVED BY:

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY

ON THE DATE ADJACENT TO THE SEAL

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

ATKINS NORTH AMERICA, INC.
800 WATERFORD WAY SUITE 700
MIAMI, FL 33126
RYAN M. JENSEN, P.E. NO. 86609

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

INDEX OF SHEETS

SHEET NO.
1

PROJECT CONTROLS

CONTEXT CLASSIFICATION

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

FUNCTIONAL CLASSIFICATION

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

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

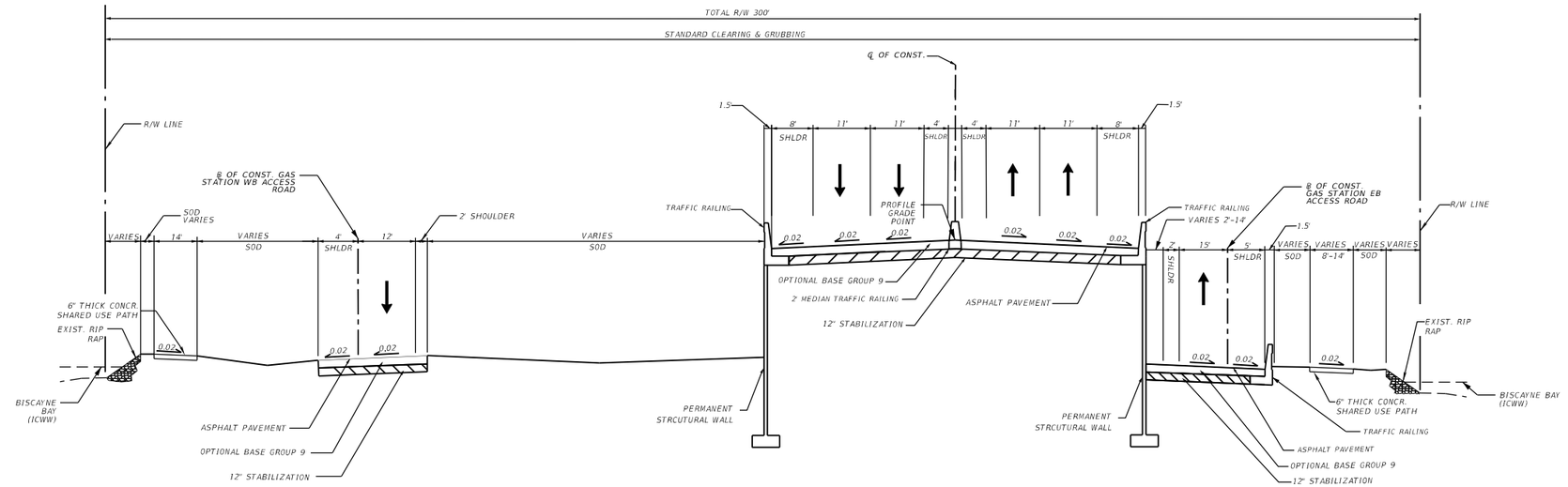
( ) 1 - FREEWAY
( ) 2 - RESTRICTIVE w/Service Roads
( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
(X) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
( ) 7 - BOTH MEDIAN TYPES

CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

TYPICAL SECTION No. 1



PROP. TYPICAL SECTION NO. 1
BROAD CAUSEWAY WALL PORTION WEST OF ICWW
MSE ROAD TRANSITION FROM EXISTING GRADE TO PROP. BRIDGE ELEVATION
STA. 105+21.37 TO STA. 111+79.50

TRAFFIC DATA

CURRENT YEAR = 2023 AADT = 22000
ESTIMATED OPENING YEAR = 2030 AADT = 26900
ESTIMATED DESIGN YEAR = 2050 AADT = 31900
K = 9.0% D = 56.5% T = 2.6 % (24 HOUR)
DESIGN HOUR T = 8.0%
TARGET SPEED = 30 MPH
DESIGN SPEED = 30 MPH
POSTED SPEED = 30 MPH
DESIGN SPEED FOR RAMPS = 25 MPH

NOT TO SCALE

FINANCIAL PROJECT ID	SHEET NO.
452428-1-21-01	2

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

1/30/2024 4:27:49 PM USER: MONS7230
c:\pw_work\atkraf01\wsatkins_mons7230\d0104945\TYPDRD02.dgn

PROJECT CONTROLS

CONTEXT CLASSIFICATION

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

FUNCTIONAL CLASSIFICATION

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

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

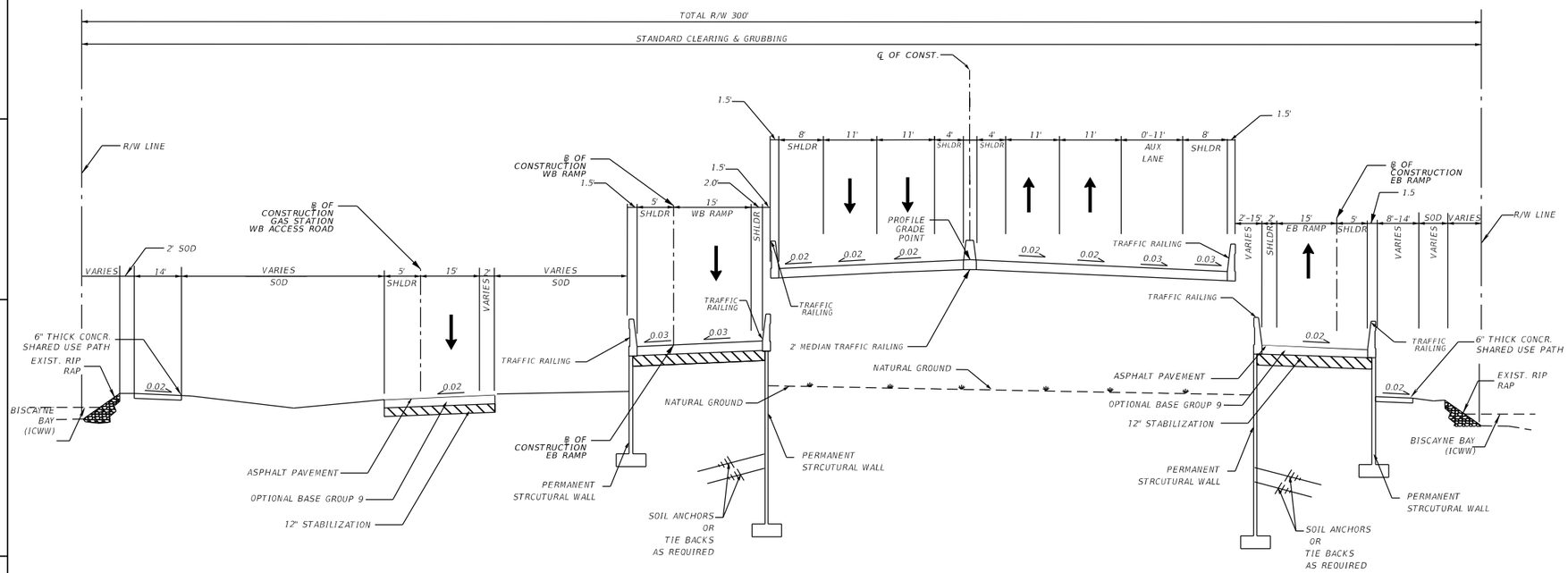
( ) 1 - FREEWAY
( ) 2 - RESTRICTIVE w/Service Roads
( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
(X) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
( ) 7 - BOTH MEDIAN TYPES

CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

TYPICAL SECTION No. 2



PROP. TYPICAL SECTION NO. 2
BROAD CAUSEWAY WESTBOUND AND EASTBOUND RAMP OF ICWW
STA. 111+79.50 TO STA. 124+00.00

TRAFFIC DATA

CURRENT YEAR = 2023 AADT = 22000
ESTIMATED OPENING YEAR = 2030 AADT = 26900
ESTIMATED DESIGN YEAR = 2050 AADT = 31900
K = 9.0% D = 56.5% T = 2.6 % (24 HOUR)
DESIGN HOUR T = 8.0%
TARGET SPEED = 30 MPH
DESIGN SPEED = 30 MPH
POSTED SPEED = 30 MPH
DESIGN SPEED FOR RAMPS = 25 MPH

NOT TO SCALE

FINANCIAL PROJECT ID	SHEET NO.
452428-1-21-01	3

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

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

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

FUNCTIONAL CLASSIFICATION

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

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

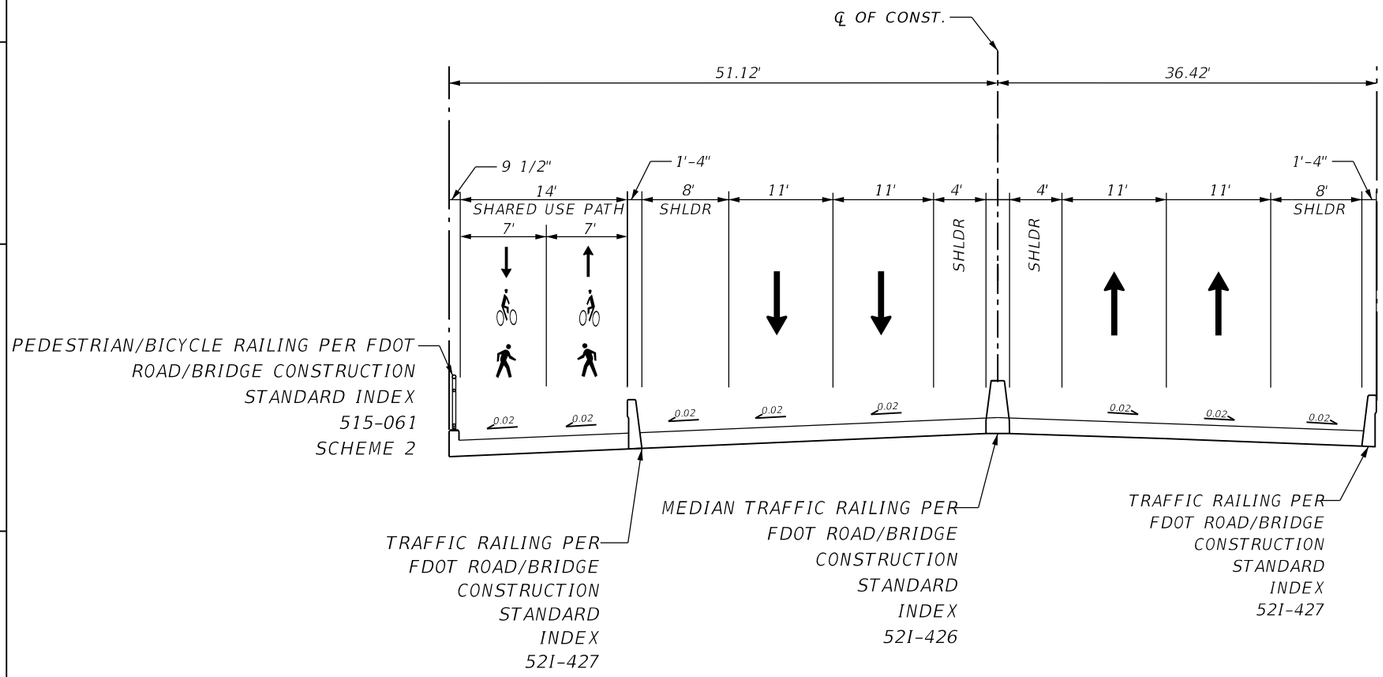
( )	1 - FREEWAY
( )	2 - RESTRICTIVE w/Service Roads
( )	3 - RESTRICTIVE w/660 ft. Connection Spacing
(X)	4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
( )	5 - RESTRICTIVE w/440 ft. Connection Spacing
(_)	6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
( )	7 - BOTH MEDIAN TYPES

CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

TYPICAL SECTION No. 3



PROP. TYPICAL SECTION NO. 3
BROAD CAUSEWAY BRIDGE OVER ICWW
STA. 124+00.00 TO STA. 141+41.25

TRAFFIC DATA

CURRENT YEAR = 2023 AADT = 22000
ESTIMATED OPENING YEAR = 2030 AADT = 26900
ESTIMATED DESIGN YEAR = 2050 AADT = 31900
K = 9.0% D = 56.5% T = 2.6 % (24 HOUR)
DESIGN HOUR T = 8.0%
TARGET SPEED = 30 MPH
DESIGN SPEED = 30 MPH
POSTED SPEED = 30 MPH

NOT TO SCALE

FINANCIAL PROJECT ID	SHEET NO.
452428-1-21-01	4

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PROJECT CONTROLS

CONTEXT CLASSIFICATION

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

FUNCTIONAL CLASSIFICATION

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

HIGHWAY SYSTEM

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

ACCESS CLASSIFICATION

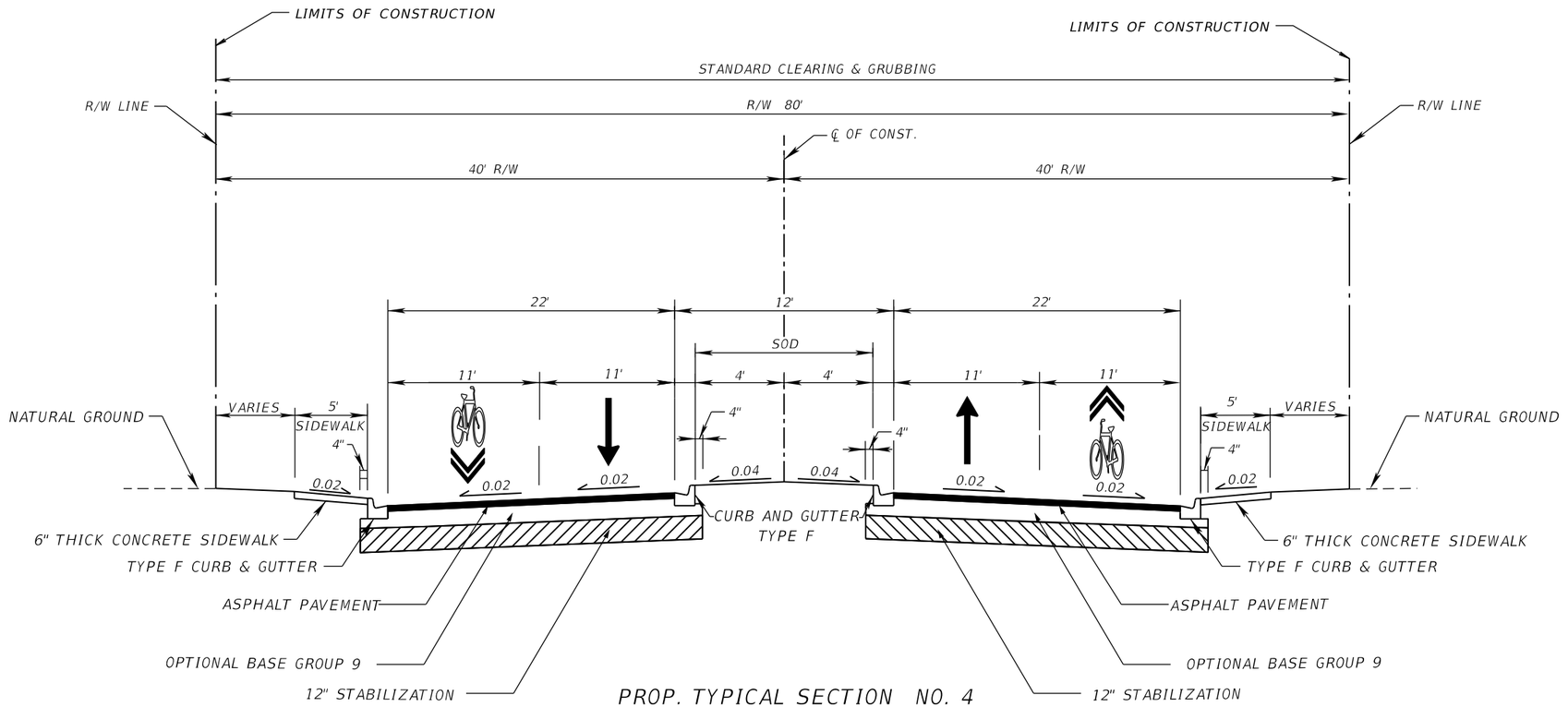
( ) 1 - FREEWAY
( ) 2 - RESTRICTIVE w/Service Roads
( ) 3 - RESTRICTIVE w/660 ft. Connection Spacing
(X) 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
( ) 5 - RESTRICTIVE w/440 ft. Connection Spacing
( ) 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
( ) 7 - BOTH MEDIAN TYPES

CRITERIA

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

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

TYPICAL SECTION No. 4



PROP. TYPICAL SECTION NO. 4
KANE CONCOURSE EAST OF ICWW
ROAD RECONSTRUCTION
STA. 141+41.25 TO STA. 145+56.01

TRAFFIC DATA

CURRENT YEAR = 2023 AADT = 22000
ESTIMATED OPENING YEAR = 2030 AADT = 26900
ESTIMATED DESIGN YEAR = 2050 AADT = 31900
K = 9.0% D = 56.5% T = 2.6 % (24 HOUR)
DESIGN HOUR T = 8.0%
TARGET SPEED = 30 MPH
DESIGN SPEED = 30 MPH
POSTED SPEED = 30 MPH

NOT TO SCALE

FINANCIAL PROJECT ID	SHEET NO.
452428-1-21-01	5

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

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APPENDIX E – US COAST GUARD COORDINATION

Minutes

Project:	Broad Causeway Bridge Replacement PD&E Study		
Subject:	Project Initiation and Navigation Coordination Meeting		
Meeting place:	Teams Meeting		
Date and time:	January 20, 2023 | 10:00 a.m.		
Attendees:	Randall Overton Omar Beceiro Jennifer Zercher Dat Huynh Nicholas Danu Rodney Carrero Santana David Konz Wendy Lasher Andrea Garcia Ryan Jensen Steve Tissier Matt Robertson John Salatino Megan McKinney Kristi Savio	Representing:	USCG District 7 USCG District 7 USCG District 7 FDOT FDOT Town of Bay Harbor Islands Atkins Atkins Atkins Atkins Atkins Atkins Atkins AECOM RS&H

AGENDA

ITEM	DESCRIPTION
1.	Project Background
2.	Major Project Site Conditions ICW Bridges and Facilities
3.	Potential Alternatives No-Build – Repair Mid-level Moveable Bridge High-Level Fixed Bridge
4.	Bridge Project Information Request for Permit Document Constraints Flexibility
5.	Next Steps

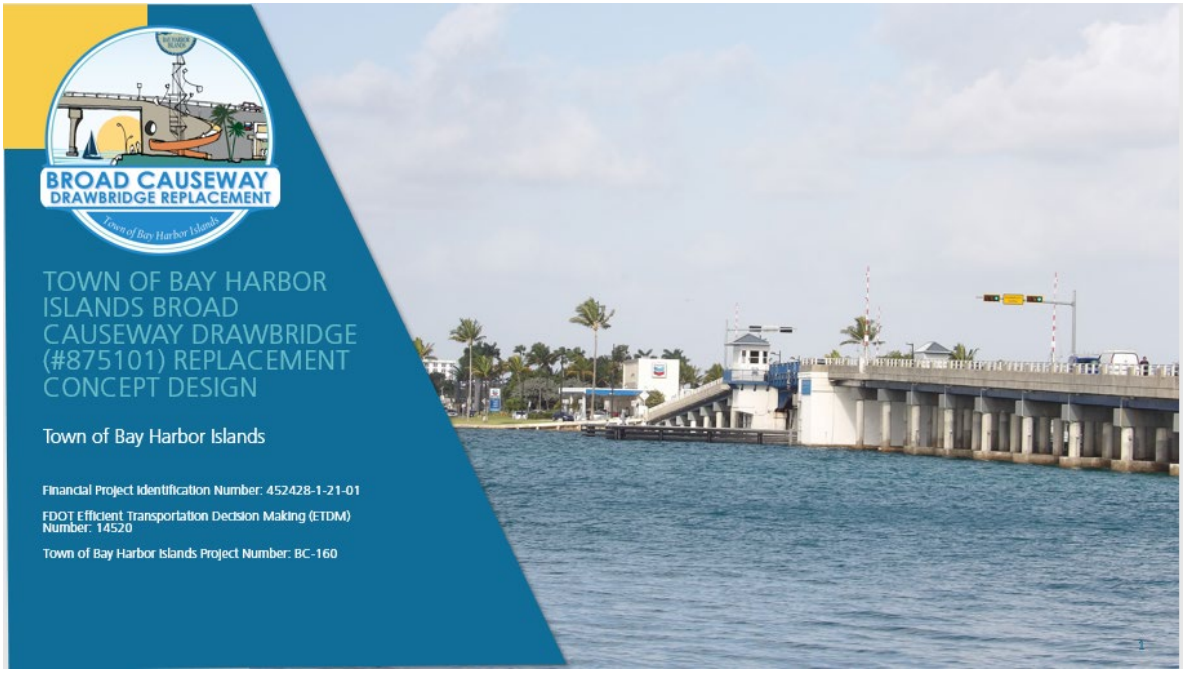
MINUTES:

1. Introductions: Attendees listed above.
    a. Omar Beceiro is the USCG Project Manager for the project.
    b. FDOT is the Lead Federal Agency for the project.
    c. USCG is a Cooperating Agency for the project.
    d. Atkins is the Town's consultant for the project.
2. Project Overview: See PowerPoint below which was presented by Atkins.
3. Alternatives: Atkins stated that the Town is looking at No-Build (Repair), Movable, and High-level Fixed options.
    a. The USCG stated that it is "highly unlikely that a fixed bridge with less than a 65 ft vertical clearance would be approved."
    b. USCG will not require a "Navigation Impact Study" (NIS) if providing a 65 ft vertical clearance fixed bridge or a moveable bridge 21 ft or over is evaluated. Just provide a paragraph describing the impacts to navigation such as, "No vessels can move between these points" identifying the surrounding constraining bridges (Bakers Haulover, Julia Tuttle, William Layman). If an NIS has already been started, please include what you have done when you submit for the bridge permit in the next phase.
    c. The USCG stated that if the Town wants to have a bridge lower than 65 ft, they should consider a movable bridge.
    d. In the bridge permit application, there is a box to be checked that the new bridge would not restrict access.
    e. What is north of parallel bridges along the ICW? The William Layman Causeway is next fixed bridge to the north (65 ft vertical, 90 ft horizontal).
    f. Guide clearance for Moveable Bridges → 21 ft minimum vertical clearance closed, but the higher the better. The higher the bridge the less openings will be needed because more vessels will fit under the bridge. If the Town considers a moveable bridge under 21 ft in closed position, the USCG would require a Navigation Impact Report.
4. Navigation Survey: To clarify, if the Town considers any alternatives that have a guide clearance less than what is required by the USCG, then a NIS would be required. The Town should not evaluate a fixed bridge alternative less than 65 ft. If the Town decides to evaluate for alternatives with a vertical clearance less than 65 ft fixed bridge and 21 ft movable bridge, they will be required to complete the NIS to identify vessels moving through there. There may not be any due to Julia Tuttle and Baker Haulover, but they need to see that.
    a. Atkins noted that the tender logs do not identify heights, only vessel type. The USCG said they would need a survey with vessel heights.
    b. When asked by Atkins if a boat survey is conducted, would a 2-day (over the weekend) be acceptable? The USCG said they would like to see a canvas of the area between the William Layman Causeway to Julia Tuttle.
    c. When asked if the Town needs to do a boat survey or navigation survey if they have a 65 ft fixed bridge or movable bridge at 21 ft or greater as the alternatives. Again, the USCG responded, "no". See notes above concerning this.
5. Town Question : If providing a moveable bridge, are there height restrictions? The USCG said that this would be the Town's decision based on number of openings being planned for. The Town is under Part B of the Federal Regulations where they are allowed to keep the bridge closed except during designated times and not opening at regular intervals, only opening if vessels are waiting at the designated time each hour. There is a regulation

(set of rules) for every single movable bridge (21 ft through 65 ft), ¼ hour and ¾ hour are needed if mast height queuing.

6. Resiliency: FDOT mentioned a recent project that required 67 ft due to resiliency and sea-level rise. The USCG stated that in an area like this, there are several bridges at 65 ft so the USCG policy Guide Clearance is 65 ft recommendation. The USGS is not aware of resiliency criteria or anything in writing related to changes to the guide clearances for this area.
7. Submittal: The documents provided with this meeting invitation will be placed in the USCG project file.
8. Future Coordination: Atkins noted that additional involvement with the USCG will include the Programming Screen and all requests through the Cooperating Agency Role including review and approval of the Environmental Assessment. When asked if there is other coordination that needs to occur, the USCG stated that there is no need to meet again. The USCG suggested requesting other agencies who would provide input on this project to participate as Cooperating Agencies. The agencies can always decline and provide a reason for that.
9. Project Kick-off Meeting: This will be held on 2/9/23 @ 6:00. The USCG will receive an invitation.
    a. FDOT District 6 suggested hybrid format. Atkins stated that the Public Hearing and Public Workshop will be in a hybrid format, however, the Town did not plan for a hybrid (virtual option) for the Public Kick-off. The Town has ordered new equipment for hybrid meetings, but it is not in place for the Kick-off Meeting.
    b. A hybrid format is needed for the Agency Kick-off, and Atkins considered the ETAT Meeting as the "Agency Kick-off Meeting". FDOT usually conducts separate kick-off meetings for a) elected officials, and b) the public. Best practices suggest the elected officials meeting should be first, so when the constituents ask questions, the elected officials have knowledge and can inform public on next steps.

Minutes were provided to all attendees for review. Please provide comments for revision ***no later than 2/3/23 at 5:00pm EST***, otherwise the minutes are assumed to be accepted and final.



Agenda

Project Background

Major Site Conditions

- ICW Bridges and Facilities

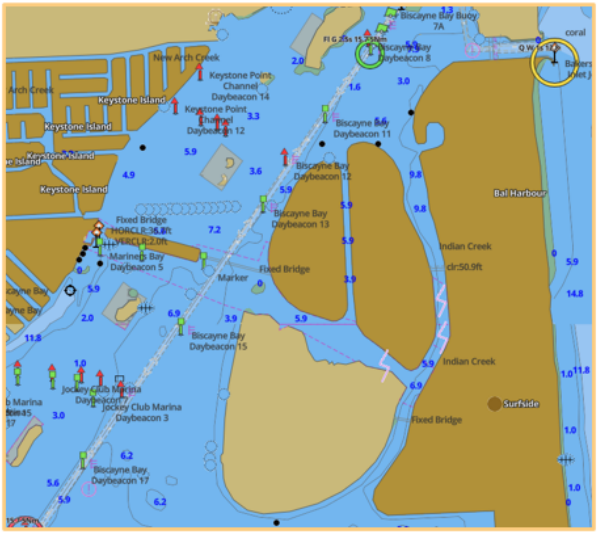
Potential Alternatives

Bridge Project Information

Request for Permit Document

- Constraints
- Flexibility

Next Steps



Project Location Map

Project Information

- Limits: Broad Causeway Island to east of West Broadview Drive
- Length: 0.782 mile
- Connects the Town of Bay Harbor Islands with the City of North Miami
- Bridge crosses Atlantic Intracoastal Waterway – navigable waterway
- Bascule is required by the USCG to open at :15 and :45 minutes of each hour to allow boat traffic
- Town of Bay Harbor Islands and Causeway Island are man-made spoil islands

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.

Purpose & Need – Bridge Deficiencies

1951 construction – 71 years old
Length 1,630 feet
Moveable-bascule bridge
Ongoing extensive repair projects

Bridge Condition

Sufficiency Rating	Bridge Rating	Bridge Railings & Guardrail Ends	Maintenance Issues	Power Generation
46.3 / 100 Functionally Obsolete	Intolerable: Deck Geometry Fair: Condition, Deck, & Superstructure Good: Substructure	Does Not Meet Acceptable Standards	Increasing Costs to Operate Bridge	Undersized Emergency Power Generator

4

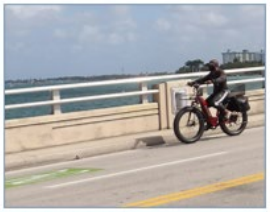
Purpose & Need – Bridge Deficiencies & Safety

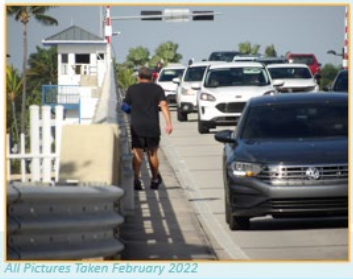
Existing Sidewalks

- No passing spaces
- Does not meet ADA width
- No guardrails dividing sidewalk from roadway

Bicycles

- Share outside traffic lane





All Pictures Taken February 2022

5

Purpose & Need – Bridge Deficiencies & Safety

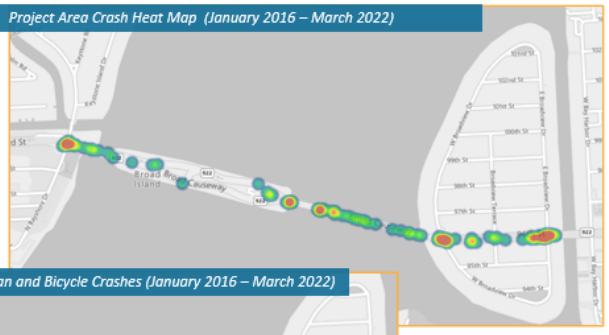
Bridge Deficiencies

Safety

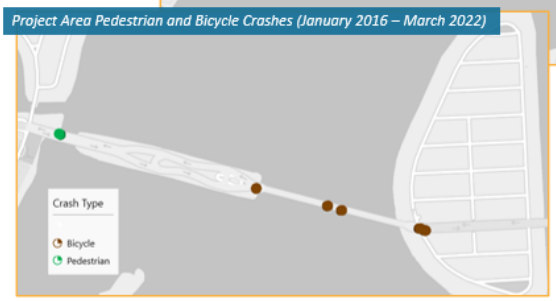
- Pedestrian and Bicyclists
- 17% of crashes – vehicle to bicycle interactions
- Average vehicle to bicycle interactions in M-D County for same type facility - 1.2%

Emergency Evacuation

Project Area Crash Heat Map (January 2016 – March 2022)



Project Area Pedestrian and Bicycle Crashes (January 2016 – March 2022)



6

Purpose & Need – Transportation Demand

High Traffic Volumes

Traffic Congestion

- Peak Hour
- Bascule opens at :15 and :45 minutes of each hour
- 4-minute bridge cycle
- 12-minute traffic flush

7

Major Project Site Conditions

Biscayne Bay Bridges

- 32 bridges upstream, downstream, and adjacent to Broad Causeway Bridge
- Bakers Haulover Inlet to Atlantic Ocean (upstream)
- Miami Main Channel to Atlantic Ocean (downstream)

8

Major Project Site Conditions

ICW Bridges

ID	Bridge Name	Bridge Type	Vertical Clearance
1	Broad Causeway Drawbridge	Bascule	15.7 ft.
5	Parallel Bridges South	Bascule	29.9 ft.
6	Parallel Bridges North	Bascule	29.9 ft.
7	MacArthur Causeway ICW Bridge (WB)	Fixed	65 ft.
8	MacArthur Causeway ICW Bridge (EB)	Fixed	65 ft.
13	Venetian Bridge West	Bascule	11.8 ft.
26	Julia Tuttle Causeway Bridge Over ICW	Fixed	55.8 ft.
28	John F. Kennedy Causeway West Bridge	Bascule	24.9 ft.
32	Bakers Haulover Inlet Bridge	Fixed	31.8 ft.

9

Major Project Site Conditions

Facilities in Biscayne Bay

- Within 3-mile radius
- Seven Marina Facilities
- Two Boat Storage Facilities
- Four Public Boat Ramps

10

Alternative Analysis

Alternatives Have Not Been Determined

Options

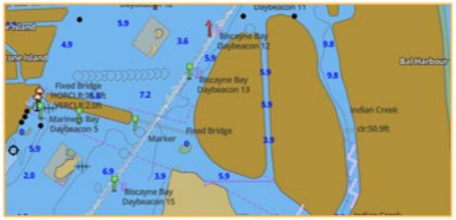
- Repair (No-Build)
- Mid-Level Moveable
- High-Level Fixed

Alignment

Typical Section

Utilize Town Owned Vacant Parcel

USCG Coordination



11

Replacement Bridge Constraints

- Evacuation Route
- Tot Lot - Section 4(f)

12

Replacement Bridge Constraints

- Historic Resources
- Residential Relocations
- Project Funding

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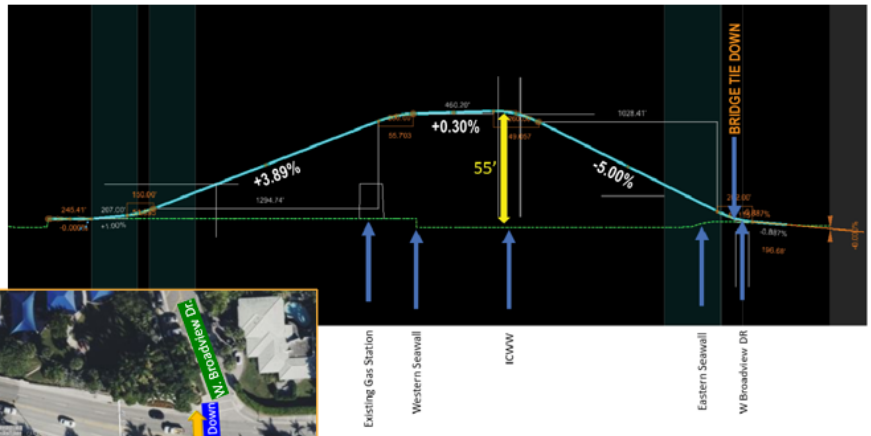
Potential Flexibility Options

Option 1
55-foot Fixed Bridge
5% Grade

- Pedestrian facilities included on structure, meets 5% ADA requirements.
- Minor intersection regrading at W. Broadview Dr.
- Viewsheds will be altered.



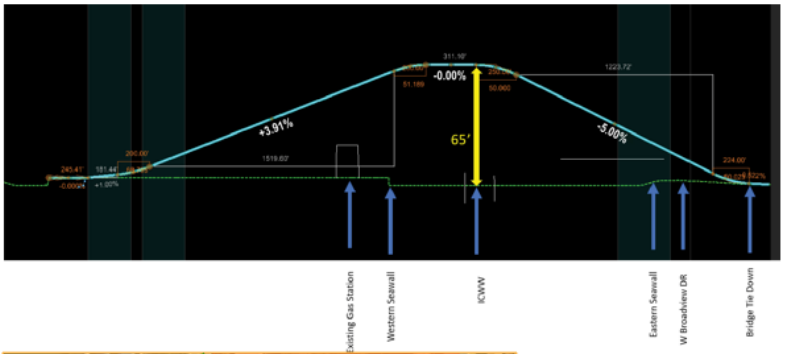
Note, these are not alternatives, but options to show potential impacts based on bridge height and grade. All costs are estimated.

14

Potential Flexibility Options

Option 2
65-foot Fixed Bridge
5% Grade

- Pedestrian facilities included on structure, meets 5% ADA requirements.
- Additional viewsheds will be altered since the bridge will be higher and can be seen from more residential and recreational properties.
- Bridge tie down is after West Broadview Drive blocking access to up to 8 properties which would likely result in relocations.
- Redesign W. Broadview Dr. intersection as a dead end/cul-de-sac/traffic circle on both sides of Kane Concourse.
- Schedule would be impacted by Right-of-way acquisitions.
- Increased project costs due to additional right-of-way acquisitions totaling over $20M.



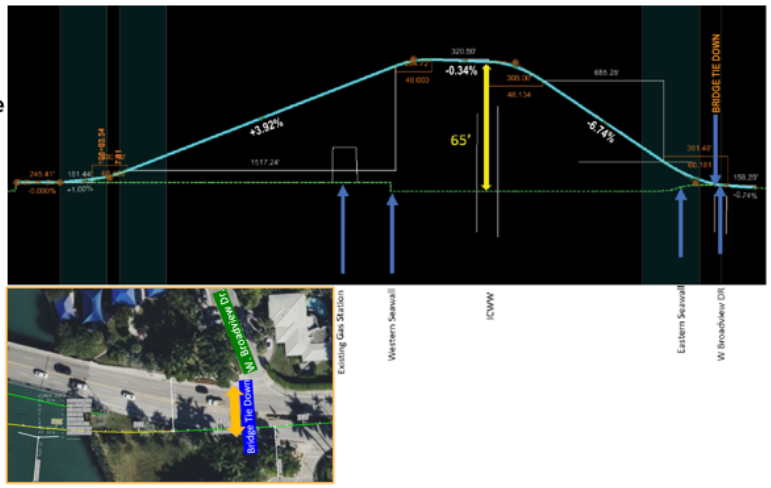
Note, these are not alternatives, but options to show potential impacts based on bridge height and grade. All costs are estimated.

15

Potential Flexibility Options

Option 3
65-foot Fixed Bridge
6.74% Grade with Separate
Pedestrian Bridge with 5% Grade

- Pedestrian facilities on separate superstructure on shared foundation to meet 5% ADA requirements. Uses multiple switchbacks/spiral ramps.
- Minor intersection regrading at W. Broadview Dr.
- Additional viewsheds will be altered since the bridge will be higher and can be seen from more residential and recreational properties.
- Steeper grade causes concerns about deceleration into Town, potential for speeding cars to enter residential area and near children's playground (Tot Lot).
- Grade would cause bottoming out for cars and rutting on the bridge deck.
- Additional construction time for pedestrian bridge.
- Increased project costs due to $12 – 15M for separate pedestrian structure. Additional structure cost for longer main span length.



Note, these are not alternatives, but options to show potential impacts based on bridge height and grade. All costs are estimated.

16

Next Steps

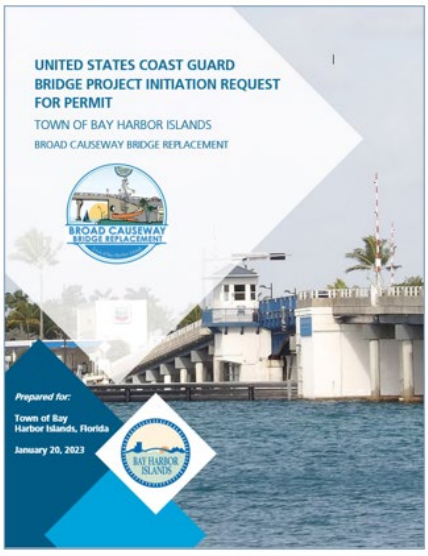
Bridge Project Initiation Request

USCG Recommendations

Bridge Survey

Navigation Impact Report

Future USCG Coordination



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Public Project Kick-off Meeting Announcement

Public Project Kick-off Meeting
Broad Causeway Bridge PD&E Study

Thursday, February 9, 2023
6:00 p.m.

Town Hall
9665 Bay Harbor Terrace
Bay Harbor Islands, FL 33154

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Project Contacts

Rodney Carrero-Santana, PE, CPM, LEED AP
Town of Bay Harbor Islands
Town Engineer
(305) 866-6241
rcarrerosantana@bayharborislands-fl.gov

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ATKINS
Broad Causeway Bridge PM
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David.konz@atkinsglobal.com

Wendy Lasher, AICP
ATKINS
Broad Causeway Bridge Assistant PM and ETDM Specialist
(813) 281-8309
wendy.lasher@atkinsglobal.com

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APPENDIX F – RESOURCE AGENCY LETTERS

Florida Fish and Wildlife Conservation Commission Concurrence

May 13, 2024

Florida Fish and Wildlife Conservation Commission

Commissioners
Rodney Barreto
Chairman
Coral Gables

Steven Hudson
Vice Chairman
Fort Lauderdale

Preston Farrior
Tampa

Gary Lester
Oxford

Albert Maury
Coral Gables

Gary Nicklaus
Jupiter

Sonya Rood
St. Augustine

Office of the Executive Director
Roger A. Young
Executive Director

Charles "Rett" Boyd
Assistant Executive Director

George Warthen
Chief Conservation Officer

Jessica Crawford
Chief of Staff

850-487-3796
850-921-5786 FAX

Managing fish and wildlife resources for their long-term well-being and the benefit of people.

620 South Meridian Street
Tallahassee, Florida
32399-1600
Voice: 850-488-4676

Hearing/speech-impaired:
800-955-8771 (T)
800-955-8770 (V)

MyFWC.com

May 13, 2024

Steven James
Florida Department of Transportation District 6
1000 NW 111th Avenue
Miami, FL 33172-5800
Steven.James@dot.state.fl.us

Re: Town of Bay Harbor Islands Broad Causeway Bridge Replacement, Natural Resource Evaluation, Miami-Dade County

Dear Mr. James:

Florida Fish and Wildlife Conservation Commission (FWC) staff reviewed the above-referenced Natural Resources Evaluation (NRE) report in accordance with FWC's authorities under Chapter 379, Florida Statutes, and Chapter 68A-27, Florida Administrative Code.

The Town of Bay Harbor Islands conducted a Project Development and Environment (PD&E) Study in cooperation with the Florida Department of Transportation (FDOT) District 6 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. The project was previously evaluated through the Efficient Transportation Decision Making screening process (No. 14520). The limits of the project are from Broad Causeway Island to east of West Broadview Drive, approximately 0.97 miles in length. The preferred alternative will address the structural and functional deficiencies of the existing bridge by replacing it with a new 65-foot high-level fixed bridge on a southern alignment. 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, 8-foot-wide outside shoulders, and a 14-foot shared use path along the north side of the new bridge. The project also includes new access ramps to the service station on the causeway island, stormwater management facilities, and installation of new seawalls east and west of the existing bridge. In-water work is anticipated with installation of the new bridge piers and demolition of the existing bridge. The new seawalls will be constructed landward of the existing seawalls which will be abandoned in place. All seawall construction activities will be conducted from land. Demolition of the two existing bascule piers is anticipated to require the use of explosives.

The NRE report was prepared as part of the PD&E study to document wetlands, surface waters, protected species, critical habitat, and essential fish habitat within the project's corridor; evaluate potential impacts associated with the proposed project; provide effect determinations for protected species; identify mitigation needs, and coordinate with federal and state regulatory and resource agencies. FWC staff agrees with the effect determinations and supports the project implementation measures and commitments for protected species. Further coordination could be required during future species-specific surveys and project permitting.

For specific technical questions regarding the content of this letter, please contact Kristee Booth at (850) 363-6298 or KristeeBooth@MyFWC.com. All other inquiries may be directed to ConservationPlanningServices@MyFWC.com.

Sincerely,

Laura DiGruttolo
Land Use Planning Supervisor
Office of Conservation Planning Services

ld/kb
Broad Causeway Bridge NRE_58846_05092024

State Historic Preservation Officer Cultural Resource Assessment Survey Concurrence

May 6, 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.

Florida Department of Transportation

RON DESANTIS
GOVERNOR

1000 N.W. 111 Avenue
Miami, Florida 33172

JARED W. PERDUE, P.E.
SECRETARY

April 29, 2024

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

Attn: Alyssa McManus, Transportation Compliance Review Program

Re: Cultural Resource Assessment Survey for the Broad Causeway Bridge Replacement PD&E Study, Financial Project Identification (FPID) No. 452428-1-21-01

Dear Ms. Lotane,

On behalf of the Town of Bay Harbor Islands and the Florida Department of Transportation District 6 (FDOT), AtkinsRéalis has prepared this Cultural Resource Assessment Survey (CRAS) for the Broad Causeway Bridge Replacement Project Development and Environment (PD&E) Study, Financial Project Identification (FPID) No. 452428-1-21-01. This locally funded project spans the Broad Causeway Bridge (FDOT Bridge No. 875101) that crosses the Intracoastal Waterway and connects the City of North Miami with the Town of Bay Harbor Islands within Section 27 of Township 52 South, Range 42 East in Miami-Dade County, Florida. The project will require state and federal permits.

Proposed improvements for this project include the replacement of the current Broad Causeway Bridge. This PD&E Study will evaluate the potential effects of bridge replacement alternatives. The height and width of the bridge will be increased to meet current design standards and United States Coast Guard (USCG) requirements, which have the potential to change the visual setting of the area. Future bridge concepts may incorporate dedicated bicycle lanes and sidewalks as well as guardrails to comply with the Americans with Disabilities Act of 1990 (ADA) and increase safety for pedestrians and cyclists. No right-of-way (ROW) acquisition is anticipated for the project.

This assessment is designed to comply with Section 106 of the *National Historic Preservation Act* (NHPA) of 1966 (Public Law 89-665), as amended, as implemented by 36 Code of Federal Regulations (CFR) 800 (Protection of Historic Properties, effective August 2004), as well as Chapter 267, *Florida Statutes* (FS), Chapter 1A-46, *Florida Administrative Code* (FAC), and Stipulation VII of the *Section 106 Programmatic Agreement* among the Federal Highway Administration (FHWA), the Florida Department of Transportation (FDOT), the Advisory Council on Historic Preservation (ACHP), and the Florida State Historic Preservation Officer (SHPO) regarding Implementation of the Federal-aid Highway Program in Florida (2023 PA). All work will be performed in accordance with the standards outlined in the *Cultural Resources Management Standards and Operational Manual* (Florida Division of Historical Resources [FDHR], 2003), the *Cultural Resource Management Handbook* (Florida Department of Transportation [FDOT] 2013), and the *Project Development and Environment Manual* (FDOT 2023). All work also conforms to professional guidelines set forth in the *Secretary of Interior's Standards and Guidelines for Archaeology and Historic Preservation* (48 FR 44716, as amended and annotated). Principal Investigators meet the *Secretary of the Interior's Professional Qualification Standards* (48 FR 44716) for archaeology, history, architecture, architectural history, or historic architecture.

The purpose of this CRAS is to locate and identify any cultural resources located within the Area of Potential Effects (APE) that have been established based on the proposed bridge replacement alternatives. Because the anticipated changes could potentially affect existing historic districts and other cultural resources, the historical APE has been developed through a viewshed analysis using the Geodesic Viewshed tool in the Environmental Systems Research Institute (ESRI) Arc GIS Pro proprietary software. Conceptual bridge locations were extracted from the concept designs developed by AtkinsRéalis and the visual impacts were evaluated to establish the historical APE for the project using the Geodesic Viewshed tool. The APE was then refined to only include parcels within a ½ mile radius that orient towards the project area. Based upon the scale and nature of the activities, the archaeological APE was limited to the parcels in which potential ground disturbance may take place.

Background research identified a total of nine (9) previously recorded historic resources and no previously recorded archaeological sites within the project APE. These included one (1) previously recorded linear resource (Broad Causeway [8DA10123, FDOT Bridge No. 875101]), six (6) previously recorded historic structures (9530 W Broadview Drive [8DA10268], 9520 W Broadview Drive [8DA10269], 9740 W Broadview Drive [8DA10431], 9720 W Broadview Drive [8DA10433], 9700 W Broadview Drive [8DA10435], and Citgo [8DA10436]), and two (2) previously recorded resource groups (Bay Harbor Islands Historic District [8DA10515] and Keystone Islands [8DA11549]). No previously recorded archaeological sites were identified within a half-mile radius of the project area. A FMSF update form was prepared for the previously recorded 9700 W Broadview Drive (8DA10435) historic structure since the previous FMSF form did not meet current Florida Division of Historical Resources (FDHR) standards. FMSF forms were not updated for other previously recorded resources as they met current standards and had not been altered since last recording.

The architectural field survey also identified 20 previously unrecorded resources within the project APE. This included 17 structures (8DA21585-8DA21593, 8DA21598-8DA21599, and 8DA21602-8DA21607) and three (3) resource groups (Broad Causeway Island [8DA21594], Indian Creek Country Club Golf Course [8DA21608], and Town of Bay Harbor Islands Playground [8DA21621]). New FMSF forms were prepared for each of these unrecorded historic resources. No previously unrecorded archaeological sites were identified during the field survey.

The results of the CRAS identified five (5) historic resources eligible for listing in the National Register of Historic Places (NRHP) within the historical APE. This includes one (1) linear resource (Broad Causeway [8DA10123, FDOT Bridge No. 875101]) and four (4) structures (Citgo [8DA10436], 2395 Bayview Lane [8DA21593], Whitehouse Inn on the Bay [8DA21598], and Majorca Towers [8DA21599]). Three (3) resource groups (Bay Harbor Islands Historic District [8DA10515], Keystone Islands [8DA11549], and Indian Creek Country Club Golf Course [8DA21608]) were identified that had insufficient information to evaluate eligibility for listing in the NRHP as part of this project. Additionally, seven (7) historic resources were found within the APE that contribute to the Bay Harbor Islands Historic District (8DA10515) (Broad Causeway [8DA10123, FDOT Bridge No. 875101], 9700 W Broadview Drive [8DA10435], Citgo [8DA10436], Broad Causeway Island [8DA21594], 9600 Broadview Terrace [8DA21603], 1371 96th Street [8DA21606], and 1330 96th Street [8DA21607]), although this district has insufficient information to fully evaluate. The background research and field survey also identified 12 historic resources considered ineligible for listing in the NRHP that are also considered as non-contributing resources to a historic district. No archaeological sites were identified that are potentially eligible for listing in the NRHP within the archaeological APE.

Based on the results of this CRAS, adverse effects to historic properties are anticipated. A Section 106 Determination of Effects Case Study Report will be provided to the SHPO for review.

We kindly request that this cover letter is reviewed, and concurrence is provided by your office. This information is provided in accordance with the provisions contained in 36 CFR, Part 800, as well as the provisions contained in the revised F.S. Chapter 267. If you have any questions regarding the subject project, please contact me at Victoria.Vogt@dot.state.fl.us or (305) 470-5420.

Sincerely,

DocuSigned by:
Victoria Vogt
D3427C9EEE844D5...

Victoria Vogt, M.S.
District Cultural Resources Coordinator

The Florida State Historic Preservation Officer finds the attached Cultural Resource Assessment Survey Report complete and sufficient and ✓ concurs / ____ does not concur with the recommendations and findings provided in this cover letter for SHPO/FDHR Project File Number 2024-945D. Or, the SHPO finds the attached document contains ____ insufficient information.

In accordance with the *Programmatic Agreement Among the FHWA, the FDOT, the ACHP, and the SHPO Regarding Implementation of the Federal-Aid Highway Program in Florida* (2023 PA), and appended materials, if providing concurrence with a finding of ***No Historic Properties Affected*** for a whole project, or to ***No Adverse Effect*** on a specific historic property, SHPO shall presume that FDOT may pursue a *de minimis* use of the affected historic property in accordance with Section 4(f) as set forth within *23 C.F.R. Part 774* and its implementing authorities, as amended, and that their concurrence as the official with jurisdiction (OWJ) over the historic property is granted.

SHPO Comments:

Alissa S. Lotane, Director, and
State Historic Preservation Officer
Florida Division of Historical Resources

[DATE] 5/6/24

US Fish and Wildlife Service Concurrence

May 2, 2024

Florida Ecological Services Field Office

Service Project Code No. 2024-0071206

The U.S. Fish and Wildlife Service has reviewed the information provided and finds that the proposed action is not likely to adversely affect any federally listed species or designated critical habitat protected by the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 et. seq.). A record of this consultation is on file at the Florida Ecological Services Field Office.

This fulfills the requirements of section 7 of the Act and further action is not required. If modifications are made to the project, if additional information involving potential effects to listed species becomes available, or if a new species is listed, reinitiation of consultation may be necessary.

Environmental Review Supervisor

RON DESANTIS
GOVERNOR

, P.E.

April 30, 2024

Mr. John Wrublik
U.S. Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, FL 32256-7517

Subject: **ESA Section 7 Coordination**
Project Name: Town of Bay Harbor Islands Broad Causeway Bridge Replacement
Limits: Broad Causeway Bridge from Broad Causeway Island to East of West Broadview Drive
Financial Management No.: 452428-1-21-01
Federal Aid No.: Not Assigned
County: Miami-Dade

Dear Mr. Wrublik,

The Town of Bay Harbor Islands (Town) conducted a Project Development and Environment (PD&E) Study in cooperation with the Florida Department of Transportation (FDOT), District Six, 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. As part of the study, a Natural Resources Evaluation (NRE), including a Protected Species and Habitat Evaluation was completed to determine potential impacts to federal and state listed species as a result of the proposed bridge replacement project. The Protected Species and Habitat Evaluation was conducted in accordance with Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq), and the FDOT PD&E Manual. The following summarizes the project and federally listed species evaluation and effect determinations. This letter, and the attached NRE, are being transmitted to US Fish and Wildlife Service (USFWS) for review and concurrence in support of the PD&E Study.

The Preferred Alternative will address the structural and functional deficiencies of the existing Broad Causeway Bridge by replacing the existing bridge with a new 65-foot High-Level Fixed Bridge on a southern alignment. 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. In addition to the bridge replacement, the proposed project also includes new access ramps to the service station on the causeway island, a mid-block pedestrian crosswalk on Kane Concourse, signing, stormwater management facilities, and installation of new seawalls east and west of the existing bridge. In-water construction work is anticipated in association with the installation of the new bridge piers and demolition of the existing bridge. The 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. All seawall construction activities will be conducted from land. 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.

It is anticipated that the new bridge pilings/piers will be installed via impact hammer. The pile caps for the new bridge piers will be installed at the mean high water 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.

To identify and characterize the benthic habitats and biological resources to support the PD&E study, benthic surveys were conducted in August 2022 (Preliminary Benthic Survey) and July-August 2023 (Quantitative Benthic Survey). In addition, a June 2023 pedestrian field survey found occasional mangrove propagules and saplings (no mature trees) within the riprap along the causeway island. These mangroves are not considered essential fish habitat since they are very small and do not provide canopy or any substantial root structure that would provide any significant habitat for managed species. Five distinct benthic community types were identified within the survey area: Community 1 (Macroalgal Beds); Community 2 (Seagrass); Community 3 (Live Bottom); Community 4 (Coral Habitat Adjacent to the Seawalls); and Community 5 (Existing Seawalls and Bridge Piers). Each of these community types is described in the NRE and anticipated impacts to each community type are discussed below.

The following federal listed species were identified as having the potential to occur within the project study area – Florida bonneted bat (*Eumops floridanus*), West Indian manatee (*Trichechus manatus*), piping plover (*Charadrius melodus*), wood stork (*Mycteria americana*), American crocodile (*Crocodylus acutus*), and eastern indigo snake (*Drymarchon corais couperi*). Additionally, the tricolored bat (*Perimyotis subflavus*) and monarch butterfly (*Danaus plexippus*) were assessed as part of this project. The USFWS Information for Planning and Consultation (IPaC) and/or Florida Natural Areas Inventory (FNAI) Biodiversity Matrix Query reports identified 16 federally listed plant species with the potential to occur within the project study area: beach jacquemontia (*Jacquemontia reclinata*), Blodgett's silverbush (*Argythamnia blodgettii*), Cape Sable thoroughwort (*Chromolaena frustrata*), Carter's mustard (*Warea carteri*), Carter's small-flowered flax (*Linum carteri carteri*), crenulate lead-plant (*Amorpha crenulata*), deltoid spurge (*Chamaesyce deltoidea ssp. deltoidea*), Everglades bully (*Sideroxylon reclinatum ssp. austrofloridense*), Florida brickell-bush (*Brickellia mosieri*), Florida pineland crabgrass (*Digitaria pauciflora*), Florida prairie-clover (*Dalea carthagenensis floridana*), Florida semaphore cactus (*Consolea corallicola*), pineland sandmat (*Chamaesyce deltoidei pinetorum*), sand flax (*Linum arenicola*), Small's milkpea (*Galactia smallii*), tiny polygala (*Polygala smallii*), and Florida filmy fern (*Trichomanes punctatus ssp. floridanum*).

The project is within the USFWS designated Consultation Areas for the West Indian manatee, piping plover, American crocodile, and Florida bonneted bat. The project area also occurs within the Core Foraging Area of one previously documented wood stork colony. The project study area is located within the designated critical habitat (CH) for the West Indian manatee.

The effect determination for each of the federally listed species is discussed below and shown in **Table 1**.

Mammals

Florida bonneted bat (FBB) - Because the project study area is located within the limits of the USFWS-designated 2019 FBB Consultation Area and within the South Florida Urban Bat Area, a FBB survey was conducted in 2023 which included a combination of acoustic and visual surveys (potential roost search). Based on the lack of FBB calls during the acoustic survey, the lack of potential roost trees, and the poor suitability of roosting habitat within the project study area, an effect determination of ***no effect*** has been made for the FBB.

West Indian manatee - The project study area is located within the designated critical habitat for the manatee and foraging habitat (seagrass) is located within the project study area. Manatees are known to travel through the project study area; however, no manatees were observed during any of the field surveys. 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. Because the proposed project will: 1) implement the *Standard Manatee Conditions for In-water Work*, the National Marine Fisheries Service (NMFS) *Protected Species Construction Conditions* and the NMFS *Vessel Strike Avoidance Measures* during in-water construction activities (Appendix G of the NRE); 2) implement best management practices (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* - Appendix G of the NRE); 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 critical habitat***.

Birds

Piping plover - No piping plovers were observed within the project study area 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 – The only potential wood stork suitable foraging habitat (SFH) within the project study area consists of two other surface waters (OSW 2 and OSW 7) that are stormwater features comprised almost entirely of mowed and maintained St. Augustine grass that may hold ponded water year-round. Permanent direct impacts to OSW 2 and OSW 7 are anticipated in association with construction of the proposed stormwater management ponds (a total impact 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→B→*not likely to adversely affect (NLAA)*.

Reptiles

American crocodile - 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. Therefore, the project determination of effect for the American crocodile is ***no effect*.**

Eastern indigo snake – No eastern indigo snakes 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→B→C→D→*may affect, not likely to adversely affect.* To increase protection of this species during construction, the Town will adhere to the most current version of the *Standard Protection Measures for The Eastern Indigo Snake* (Appendix G of the NRE).

Plants

The USFWS IPaC and/or FNAI Biodiversity Matrix Query reports identified 16 federally listed plant species with the potential to occur within the project study area (see above and Table 1). None of these federally listed plant species have the 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 1 is ***no effect***.

Other Species

Tricolored bat - A FBB survey was conducted in 2023 which included a combination of acoustic and visual surveys (potential roost search). No tricolored bat calls were documented during the acoustic survey. Furthermore, the project study area lacks potential roost trees, and contains poor suitability of roosting habitat. Based on the lack of FBB calls during the acoustic survey, the lack of potential roost trees, and the poor suitability of roosting habitat within the project study area, the probability of occurrence is low.

Monarch butterfly - 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, and the probability of occurrence is low.

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

Species Name	Listing Status[1]	Occurrence Potential	Effect Determination[2]
MAMMALS			
Florida bonneted bat	FE	Low[3]	*No effect*
Tricolored bat	P(E)	Low[3]	*N/A*
West Indian manatee	FT	High (CH)[4]	*May affect, not likely to adversely affect*
BIRDS			

Species Name	Listing Status[1]	Occurrence Potential	Effect Determination[2]
Piping plover	FT	Low	*No effect*
Wood stork	FT	Low	*May affect, not likely to adversely affect*
INSECTS			
Monarch butterfly	C	Low	*N/A*
REPTILES			
American crocodile	FT	Low	*No effect*
Eastern indigo snake	FT	Low	*May affect, not likely to adversely affect*
PLANTS			
Beach jacquemontia	FE	None	*No effect*
Blodgett's silverbush	FT	None	*No effect*
Cape Sable thoroughwort	FE	None	*No effect*
Carter's mustard	FE	None	*No effect*
Carter's small-flowered flax	FE	None	*No effect*
Crenulate lead-plant	FE	None	*No effect*
Deltoid spurge	FE	None	*No effect*
Everglades bully	FT	None	*No effect*
Florida Brickell-bush	FE	None	*No effect*
Florida pineland crabgrass	FT	None	*No effect*
Florida prairie-clover	FE	None	*No effect*
Florida semaphore cactus	FE	None	*No effect*
Pineland sandmat	FT	None	*No effect*
Sand flax	FE	None	*No effect*
Small's milkpea	FE	None	*No effect*
Tiny polygala	FE	None	*No effect*
Florida filmy fern	FE	None	*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 of the NRE for details).
[4](CH) – the project study area is located within designated CH for the manatee

The following commitments are proposed by the Town to avoid and minimize impacts to protected species:

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 Florida Fish and Wildlife Conservation Commission (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. 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.

9. 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, US Army Corps of Engineers (USACE), South Florida Water Management District (SFWMD), and Miami-Dade County Department of Regulatory and Economic Resources Division of Environmental Resource Management (DERM) during the permitting process.

10. 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.

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

12. 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.

13. 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, US Coast Guard (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*.

14. 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.

We ask that USFWS review the attached NRE for this project and provide concurrence to support the PD&E Study. Thank you for your continued cooperation on various FDOT projects. If you have any questions or require additional information, please contact Steven James at Steven.James@dot.state.fl.us or by phone at (305) 470-5221.

Sincerely,

DocuSigned by:
Steven James
44A2F58851B5476...

Steven Craig James
District Environmental Manager, FDOT District 6

cc: Rob McMullen, Environmental Scientist III / District Noise Specialist, FDOT District 6
Megan Moore, Environmental Specialist III, FDOT District 6
Rodney Carrero-Santana, Town Engineer, Town of Bay Harbor Islands
David Konz, Senior Technical Manager, AtkinsRéalis

Attachments: Natural Resources Evaluation

APPENDIX G – BROAD CAUSEWAY EXISTING CONDITIONS MEMO

AtkinsRéalis

January 17, 2024

Broad Causeway in Miami-Dade County, Florida – Revetment Existing Conditions

AtkinsRéalis was tasked with evaluating the existing conditions of a stone revetment located along a portion of Broad Causeway in Miami-Dade County, Florida. The area of interest included the portion of Broad Causeway that crosses Biscayne Bay, connecting the Bay Harbor Islands to the Keystone Islands. The existing revetment runs parallel to Broad Causeway and provides protection from wave action and erosion from Biscayne Bay. The following summarizes the revetment existing conditions, including field observations and an evaluation of the existing stone size.

Field Observations:

AtkinsRéalis performed a site visit on December 1, 2023 to document the existing conditions of the north and south revetments located along the Broad Causeway Bridge, as seen in Figure 1. Based on the site evaluation, the existing revetment appears to be composed of limestone ranging from one (1) to four (4) feet in diameter, as seen in Figure 2. The northern and southern ends of the revetments tie into an existing seawall, as shown in Figure 3. There appeared to be some stone displacement due to wave action, resulting in larger stone sizes being located along the revetment crest and smaller stones toward the structure toe.

The revetment slopes varied and appeared to be steeper on both ends (where it tied into the existing seawalls), compared to the remainder of the structure. The average width of each revetment was measured to be approximately 17 feet. The shortest distance from the landward edge of the revetment to the nearest structure was approximately seven (7) feet on the south revetment (measured to roadway railing) and approximately 30 feet on the north revetment (measured to roadway). Four (4) 18-inch reinforced concrete pipes (RCP) were located along the revetments as presented in Figure 4, with half of them damaged. Some areas of the revetment also showed evidence of erosion and scarping near the structure crest, as seen in Figures 5 and 6. Despite evidence of some stone displacement and erosion, the existing revetments appear to be in stable condition.

Figure 1: North (left) and south (right) existing revetments facing east.

Figure 2: Samples of the revetment limestone with size ranging from 1 to 4 feet in diameter.

Figure 3: South revetment at north (left) and south (right) tie-in to existing seawall. The north revetment has the same configuration.

Figure 4: Discharge outfalls located along both existing revetments. There are two discharge outfall structures on each existing revetment.

Figure 5: Erosion observed at both the north (left) and south (right) revetments, close to the discharge outfalls.


Figure 6: Erosion observed at both the north (left) and south (right) revetments, close to the discharge outfalls.

Evaluation of Existing Stone Size:

AtkinsRéalis performed a stone sizing analysis to determine the minimum armor stone size required for various return period events. Four (4) design scenarios were evaluated, including the 10-year, 20-year, 50-year, and 100-year return period events. The stillwater level, wave height, and wave period associated with each design scenario was determined based on the U.S. Army Corps of Engineers (USACE) Coastal Hazards System (V2.0), South Atlantic Coastal Study, which included analysis for Biscayne Bay, as summarized in Table 1 and Table 2.

Table 1 – North revetment return period parameters.

Design Scenario	Wave Height, feet	Wave Period, seconds	Stillwater Elevation, feet NAVD88
10-year Return Period	2.31	2.84	4.18
20-year Return Period	2.79	2.97	4.88
50-year Return Period	3.29	3.07	5.65
100-year Return Period	3.59	3.13	6.17

Table 2 – South revetment return period parameters.

Design Scenario	Wave Height, feet	Wave Period, seconds	Stillwater Elevation, feet NAVD88
10-year Return Period	2.51	3.01	4.17
20-year Return Period	3.02	3.15	4.89
50-year Return Period	3.55	3.28	5.67
100-year Return Period	3.87	3.35	6.20

The stone specific weight was assumed to be 145 pounds per cubic foot (pcf), which is a conservative estimate for the unit weight of limestone. Although the structure crest elevations, toe elevations, and structure slopes varied across the shoreline, these parameters were estimated based on aerial imagery and the 2019 topographic and bathymetric survey data available through the National Oceanic and Atmospheric Administration (NOAA) National Geodetic Survey (NGS). The north revetment was estimated to have a crest elevation of +2.0 feet referenced to the North American Vertical Datum of 1988 (NAVD88) and a toe elevation of -4.0 feet NAVD88. The south revetment was estimated to have a crest elevation of +3.0 feet NAVD88 and a toe elevation of -3.0 feet NAVD88. Both the north and south revetments were conservatively assumed to have a structure slope of 3H:1V. Based on the design wave parameters and estimated structure parameters, Table 3 and Table 4 summarize the minimum median armor stone weight and diameter required for each design scenario.

Table 3 – Stone sizing analysis results for the north revetment.

Design Scenario	Minimum Stone Median Weight (W_{50}), pounds	Minimum Stone Median Diameter (D_{50}), feet
10-year Return Period	153	1.02
20-year Return Period	259	1.21
50-year Return Period	425	1.43
100-year Return Period	552	1.56

Table 4 – Stone sizing analysis results for the south revetment.

Design Scenario	Minimum Stone Median Weight (W_{50}), pounds	Minimum Stone Median Diameter (D_{50}), feet
10-year Return Period	202	1.12
20-year Return Period	329	1.31
50-year Return Period	534	1.54
100-year Return Period	691	1.68

Overall, based on the above parameter estimates, the existing north and south revetments appear to have a sufficient median armor stone diameter for the 10-year, 20-year, 50-year, and 100-year return period events. However, if future revetment improvements intend to change the structure crest elevation, toe elevation, or slope, it is recommended that the stone size be re-evaluated.

APPENDIX H – DESIGN VARIATIONS

Information will be included in Final version

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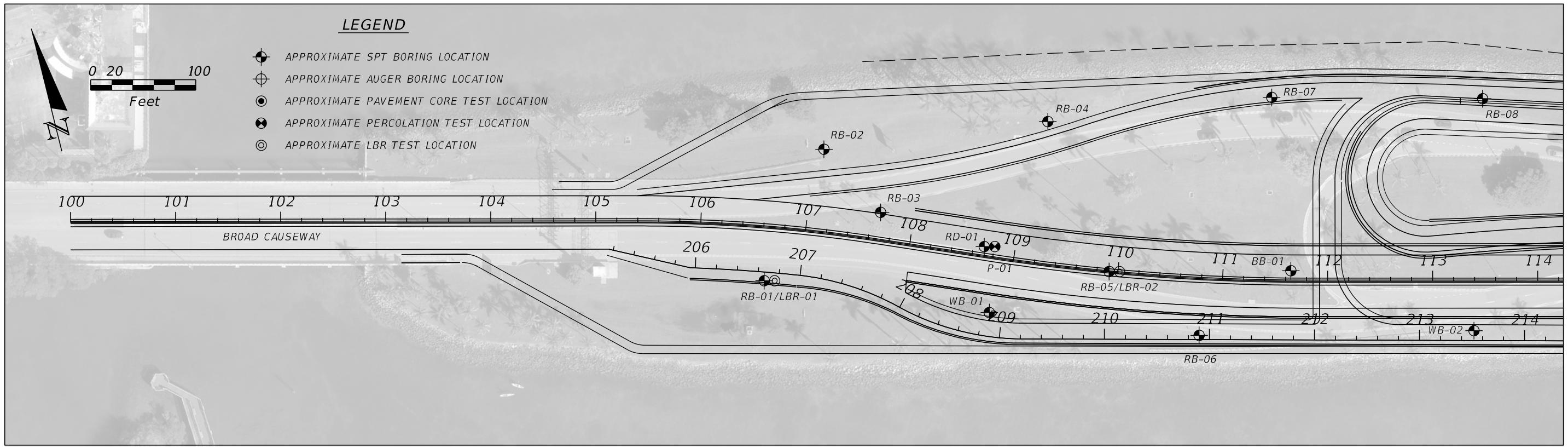
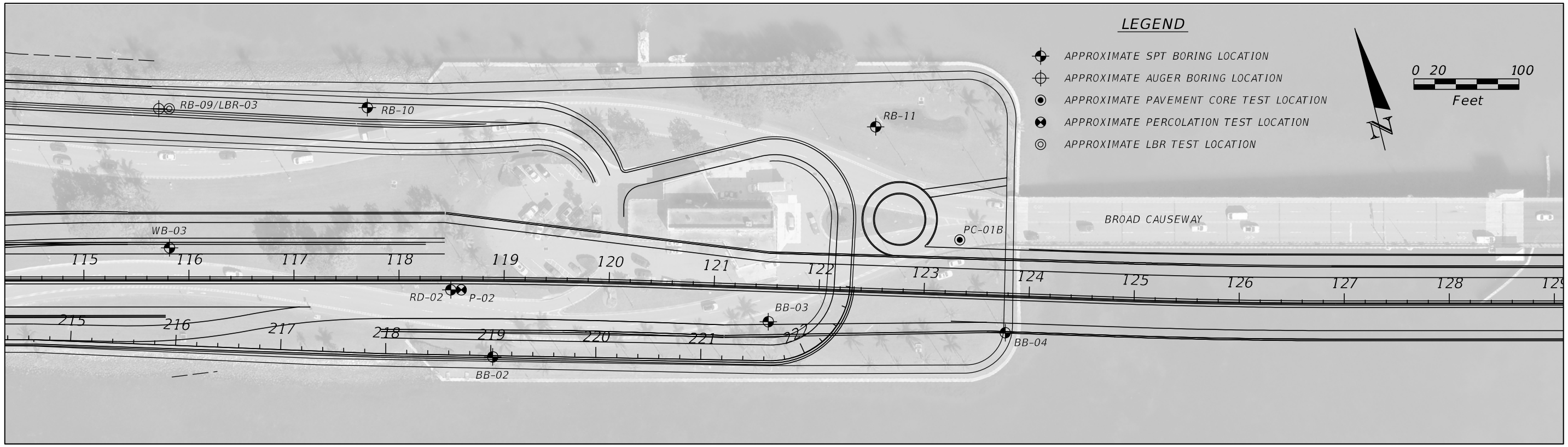
APPENDIX I – GEOTECHNICAL BORING LOCATION PLAN





REVISIONS				ENGINEER OF RECORD	TOWN OF BAY HARBOR ISLANDS			BORING LOCATION PLAN	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ANGELA L. ALBA, P.E. LICENSE NUMBER: 58538 AREHNA ENGINEERING, INC. 12296 WILES ROAD CORAL SPRINGS, FL 33076	ROAD NO.	COUNTY	PROJECT ID		
					922	MIAMI-DADE	BC-160		

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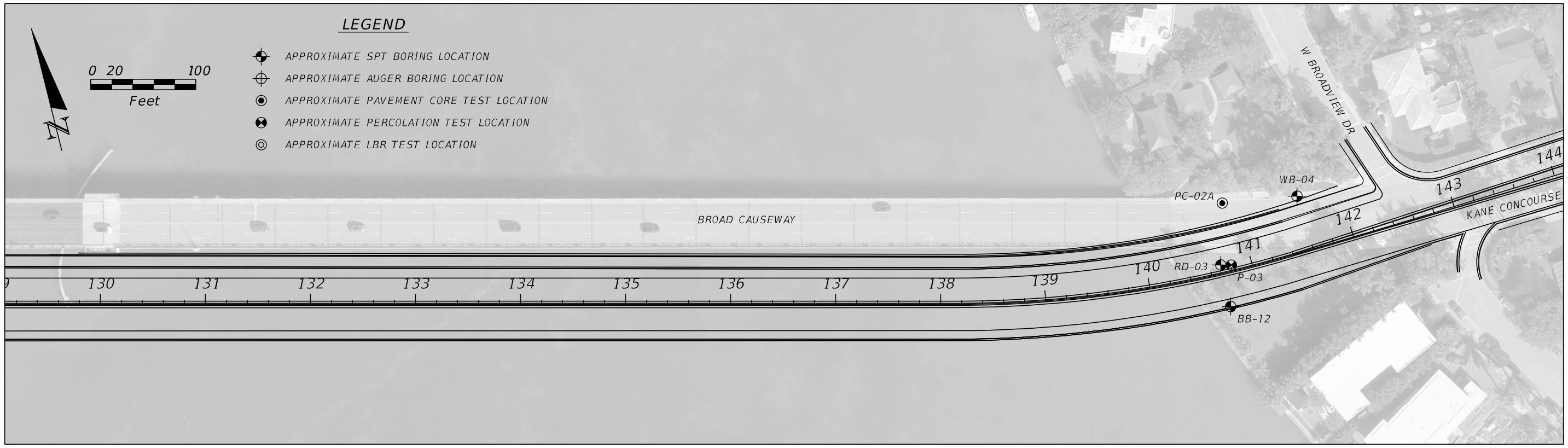

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