Final Location Hydraulics Report

TOWN OF BAY HARBOR ISLANDS

BROAD CAUSEWAY BRIDGE REPLACEMENT
PROJECT DEVELOPMENT & ENVIRONMENT STUDY

Prepared for:

Town of Bay Harbor Islands, Florida

July 31, 2024

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

Final Location Hydraulics Report

July 31, 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 Federal Highway Administration (FHWA) and FDOT.

Prepared for:

Town of Bay Harbor Islands

Prepared by:

AtkinsRéalis

FINAL LOCATION HYDRAULICS REPORT

Florida Department of Transportation

District 6

In cooperation with the Town of Bay Harbor Islands

Financial Management Number: 452428-1-21-01

Federal Project Number: N/A

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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

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.

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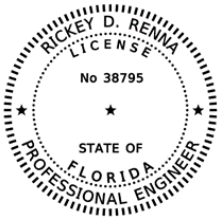
PROFESSIONAL ENGINEER CERTIFICATE

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:	Final Location Hydraulics Report
PROJECT:	Broad Causeway Bridge Replacement PD&E Study
LOCATION:	Miami-Dade County, Florida
FINANCIAL MANAGEMENT NO.:	452428-1-21-01
FEDERAL PROJECT NO.:	N/A
FDOT ETDM NO.:	14520

This Location Hydraulics Report (LHR) 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.



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July 31, 2024

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

EXECUTIVE SUMMARY

This *Location Hydraulics Report* has been prepared to document compliance with the Federal-Aid Policy Guide 23 CRF 650A Sec. 650.111 and has been prepared in accordance with Part 2, Chapter 13 of the Florida Department of Transportation (FDOT) Project Development and Environment (PD&E) Manual (dated July 1, 2023).

The project location is within Mami-Dade County, Florida, and the project limits are Broad Causeway Bridge from Broad Causeway Island to East of West Broadview Drive.

There are no regional cross drains within the project except for the Broad Causeway Bridge over the Intracoastal Waterway (ICWW). During the design phase a Bridge Hydraulics Report (BHR) will be prepared for this structure.

No stormwater flooding problems were reported by the Town of Bay Harbor Islands at the eat bridge touchdown, but problems occur further northward on the West Island. Future seal level rise is expected to exacerbate these "sunny day" flooding problems.

The project discharges to the Biscayne Bay Aquatic Preserve within the South Florida Water Management District (SFWMD) jurisdiction, the regional water management district. Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), the project area has no FEMA Floodways. The entire project is in the 100-year floodplain.

Stormwater runoff will be collected within ponds on the island; if percolation is sufficient, retention will be explored to attain greater water quality treatment.

A small retention pond will be constructed, at the southeast corner of the bridge, on land currently owned by the Town. The roadway east of the bridge is too low to store runoff in either the planned retention pond or in French drains and will therefore be directly discharged in the proposed condition, as occurs currently.

The proposed typical section for the high level bridge alternative is shown below:

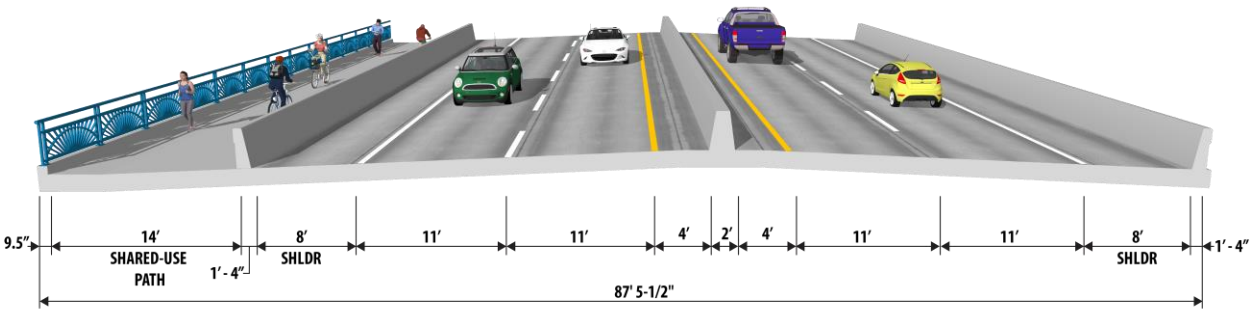

Figure ES-1: 65-ft High-Level Fixed Bridge Typical Section

Because the FEMA floodplains on this project are driven entirely by storm surge through Biscayne Bay, fill placed as part of this project will have no impact on the floodplain elevations. If the SFWMD requires demonstration of this relationship between project fill and the floodplain elevation, pre- and post-development storm surge modeling will be presented to verify this concept.

The Broad Causeway Bridge project will result in transverse encroachments of floodplains. There is no practical way to avoid these given the elevation of the 100-year storm surge floodplains for the entire length of the project. There are no longitudinal encroachments. The area surrounding the project is completely built out and is not expected to further develop in the future.

There will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. In fact, the project will have a positive effect on emergency services in that the bascule bridge will be higher, resulting in fewer openings, or will be a fixed high-level bridge.

Based on the above, it has been determined that the encroachments associated with this project are minimal.

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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
	CCTV	Closed-Circuit Television
	CO	Carbon Monoxide
D	3D	Three Dimensional
	D	Directional
	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	EA	Environmental Assessment
	EAA	Expedited Administrative Authorization
	EFH	Essential Fish Habitat
	EL	Elevation

	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
	FDOS	Florida Department of State
	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
	ITS	Intelligent Transportation Systems
J		
K	SPH	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
	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

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
	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
	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 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 and (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 mile in length.

The existing bascule bridge consists of four lanes, undivided (two lanes 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 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, 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

Figure 1-3: Existing Bridge over ICWW - Bascule Span

The channel data presented below is based on the 2023 FDOT Bridge Management System Inspection report.

Table 1-1: 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

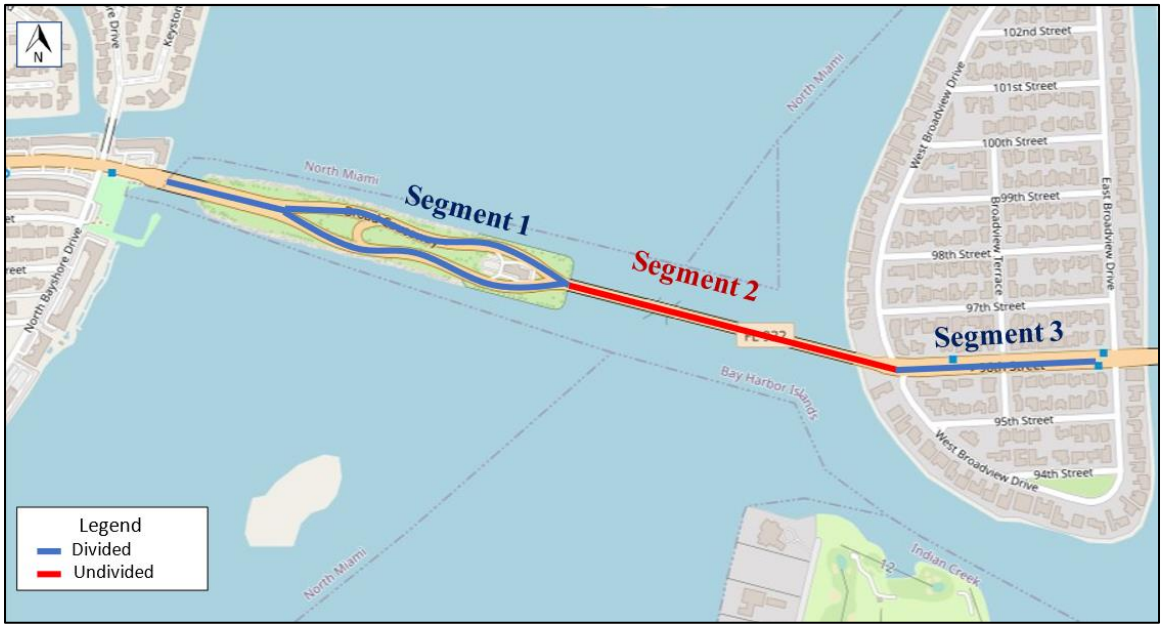
Because of the structure type, the number of structural deficiencies, and high maintenance costs, the Town of Bay Harbor Islands is considering replacement of the bridge. This Project Development and Environment (PD&E) Study has been conducted to evaluate bridge replacement alternatives.

For the discussion within this report, the project may be divided into three segments:

Segment 1: Causeway Island
Segment 2: ICWW Bridge
Segment 3: Town of Bay Harbor Islands West Island

These segments are illustrated in **Figure 1-4**, below:

Figure 1-4: Broad Causeway Segments for Hydraulic Analysis



2 PURPOSE AND NEED

The purpose of this project is to address the structural and functional deficiencies of the existing Broad Causeway Bridge. The need for the project is to improve bridge deficiencies because the 73-year-old bridge is structurally deficient, functionally obsolete, and contains fracture critical components; improve safety since there have been several vehicular crashes in the project corridor, many involving bicycles and pedestrians that resulted in injuries; improve flow of traffic along the project corridor which has high traffic volumes and frequent bridge openings; and to maintain emergency evacuation.

2.1 Existing and Future Land Use

Existing land use is shown below in **Figure 2-1.** The project area is fully built out and land use is not expected to change in the future.

Figure 2-1: Generalized Existing Land Use Map

3 EXISTING HYDRAULIC CONDITIONS

3.1 Bridges and Cross Drains

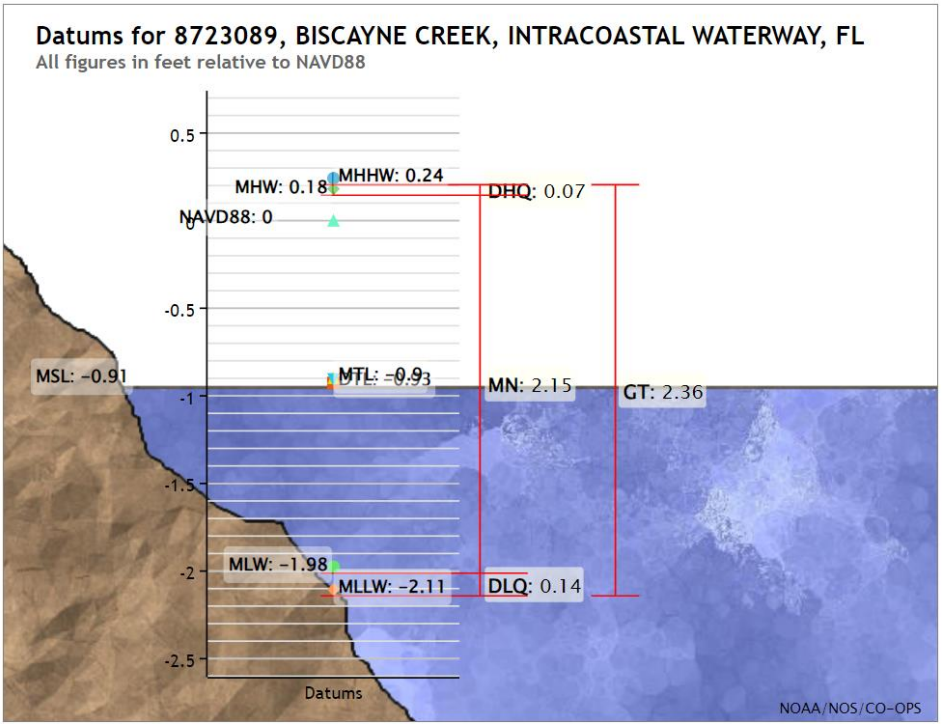
There are no regional cross drains within the project except for the Broad Causeway Bridge over the ICWW. During the design phase a Bridge Hydraulics Report (BHR) will be prepared for this structure.

3.2 Existing Surface Water Drainage

In an interview with Jason Atkinson, 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.

Future seal level rise is expected to exacerbate these "sunny day" flooding problems. The nearby Biscayne Creek tidal datum information is shown below:

Figure 3-1: Tidal Datum for Broad Causeway Bridge, 8723089 Biscayne Creek, ICWW, FL



1.24 ft. of sea level rise is expected over the life of the structure, per the FDOT Drainage Manual sea level rise methodology.

The project discharges to the Biscayne Bay Aquatic Preserve 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) Division of Environmental Resource Management (DERM) jurisdiction, the local water management district. Biscayne Bay Aquatic Preserve is designated as an Outstanding Florida Water (OFW).

On the 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" pipe outfall. Runoff from the bridge goes directly into Biscayne Bay through the grate of the bascule span or through scuppers on the bridge.

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 island, realizing only informal water quality improvements.

3.3 Floodplains and Floodways

Based on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), the project area has no FEMA Floodways. The entire project is in the 100-year floodplain as shown in **Figure 3-2**, below:

Figure 3-2: Flood Insurance Rate Maps (FIRMs) within the Project Area

Table 3-1: 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

The applicable Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) are included in **Appendix A**: . The impacted floodplains in Miami-Dade County are classified as Zone VE and AE, as shown above in **Table 3-1**. Zone VE and AE on the FIRM maps are the areas between the limits of the base flood and the 0.2-percent-annual-chance (or 500-year) flood.

3.4 Soils

A review of the Natural Resources Conservation Service (NRCS) Web Soil Survey was conducted for the project. **Table 3-2**, below, provides a summary of the predominant soils and their hydrologic characteristics. See **Appendix B:** for Soil Survey information.

Table 3-2: Predominant Soils

Soil Name	Map No.	Percent of Corridor	Hydrologic Soil Group	Drainage
Udorthents-Water-Urban Land Complex	9	1.0%	A	Well drained
Urban Land	15	52.2%	-	-
Baggs Cape fine sand	47	3.2%	A	Well drained
Beach Complex	51	0.8%	-	-
Water	99	41.1%	N/A	N/A
Waters of the Atlantic Ocean	100	1.7%	N/A	N/A

4 REGULATORY REQUIREMENTS

4.1 South Florida Water Management District (SFWMD)

This project lies within the jurisdiction of the SFWMD. The WMD publishes an Applicants Handbook, Part 2 with their design requirements. For this project, the SFWMD rules on retention and French drains systems will be followed.

4.2 Florida Department of Transportation (FDOT)

Chapter 4 of the FDOT Drainage Manual, January 2023 defines the Department's requirements on cross drains. Since there are no regional cross drains on this project, these Chapter 4 requirements are not applicable.

4.3 Local Government

The Broad Causeway Bridge project falls within Miami-Dade County. This project will comply with Miami-Dade County Ordinance Chapter 11C – Floodplain Regulations. These requirements appear to be no more stringent than SFWMD requirements.

5 PROPOSED CONDITIONS AND RISK EVALUATION

5.1 Proposed Drainage Design

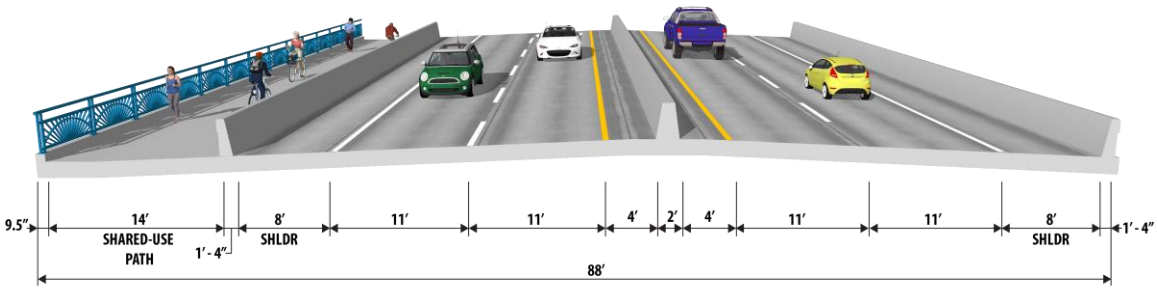
Stormwater runoff will be collected within ponds on the island; if percolation is sufficient, retention will be explored to attain greater water quality treatment.

A small retention pond will be constructed, at the southeast corner of the bridge, on land currently owned by the Town. The roadway east of the bridge is too low to store runoff in either the planned retention pond or in French drains and will therefore be directly discharged in the proposed condition, as occurs currently.

Roadway drainage needs will not be a determining factor in determining the preferred alternative but will remain unchanged between alternatives.

The proposed typical section for the high level bridge alternative is shown below:

Figure 5-1: 65-ft High-Level Fixed Bridge Typical Section



5.2 Floodplain Impacts from the Proposed Project

No regional cross drains are proposed for this project. The hydraulic capacity of the replacement Broad Causeway Bridge over the ICWW will be similar to the capacity of the existing bridge. The conceptual bridge length, conceptual scour considerations, and preliminary vertical and horizontal clearances, will be addressed in the Bridge Development Report.

Because the FEMA floodplains on this project are driven entirely by storm surge through Biscayne Bay, fill placed as part of this project will have no impact on the floodplain elevations shown in **Table 3-1**. If the SFWMD requires demonstration of this relationship

between project fill and the floodplain elevation, pre- and post-development storm surge modeling will be presented to verify this concept.

5.3 Risk Assessment

The Broad Causeway Bridge project will result in transverse encroachments of floodplains. There is no practical way to avoid these given the elevation of the 100-year storm surge floodplains for the entire length of the project. There are no longitudinal encroachments. The primary risks of the encroachments and their assessments are provided in **Table 5-1**, below:

Table 5-1: Risk Assessments

Risk	Assessment
Road Damage	The storm surge will rise evenly on all sides of the project and no overtopping flows will be generated. As such the risk of damage due to flow velocity will be minimal.
Road Closure – Disruption to the Highway User	The Broad Causeway crossing will be closed in advance of the storm surge according to the Miami-Dade County Emergency Plan. Highway users should be aware of this plan and no unexpected disruption will occur.
Loss of Life	The foreknown plan to close Broad Causeway during a hurricane will eliminate the roadway overtopping as a cause of loss of life.
Adjacent Land Use or Structure (Building) Damage.	The hurricane surge stages surrounding Broad Causeway are independent of the Causeway. Therefore, damage will not be caused by the Causeway.

5.4 Hydraulic Evaluation

There are no regional cross drains on this project. The hydraulics of the Broad Causeway Bridge over the ICWW, will be evaluated in the BHR during the design phase.

5.5 Natural and Beneficial Floodplain Values

Because flood stages are driven by hurricane surge, stages for the surrounding lands will not be increased by the placement of fill associated with the proposed project. There will therefore be no impacts to the natural and beneficial values of the surrounding floodplain.

Wetland impacts will be evaluated in detail in a separate report.

5.6 Floodplain Development

The area surrounding the project is completely built out and is not expected to further develop in the future.

6 CONCLUSION

There are no regional cross drains on this project, and the hydraulics of the Broad Causeway Bridge over the ICWW, will be evaluated in the BHR during the design phase.

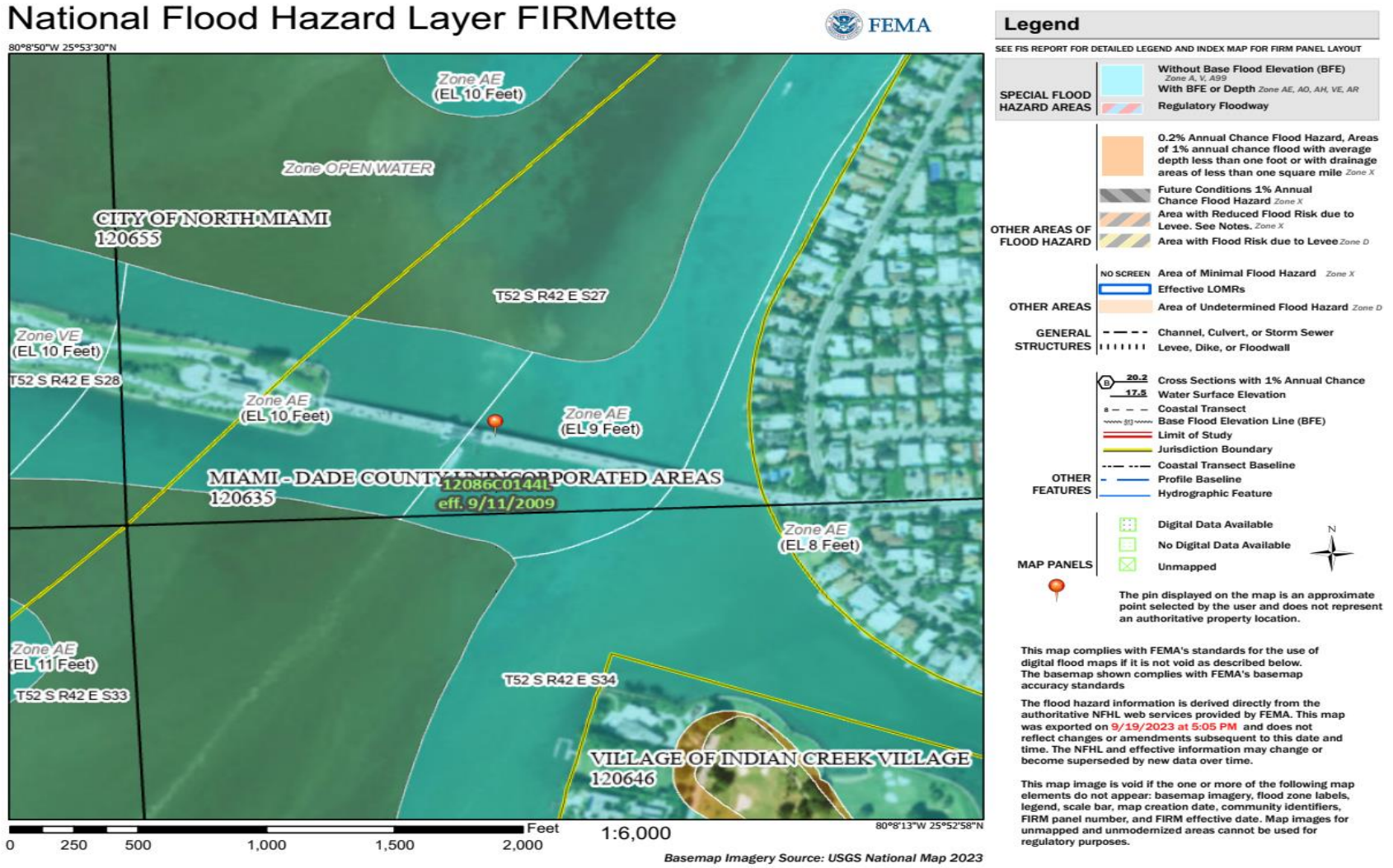
This project and its surrounding lands are fully within mapped FEMA floodplains. Because the FEMA floodplains on this project are driven entirely by storm surge through Biscayne Bay, fill placed as part of this project will have no impact on the floodplain elevations.

There will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. In fact, the project will have a positive effect on emergency services in that the bascule bridge will be higher, resulting in fewer openings, or will be a fixed high-level bridge.

No future floodplain development is expected on this project, since it is already fully built out.

Based on the above, it has been determined that the encroachments associated with this project are minimal.

Appendix A: FEMA Flood Insurance Rate Maps


National Flood Hazard Layer FIRMette
FEMA
80°8'50"W 25°53'30"N
Zone AE
(EL 10 Feet)
Zone OPEN WATER
CITY OF NORTH MIAMI
120655
T52 S R42 E S27
Zone VE
(EL 10 Feet)
T52 S R42 E S28
Zone AE
(EL 10 Feet)
Zone AE
(EL 9 Feet)
MIAMI-DADE COUNTY UNINCORPORATED AREAS
120635
12086C0144L
eff. 9/11/2009
Zone AE
(EL 8 Feet)
Zone AE
(EL 11 Feet)
T52 S R42 E S33
T52 S R42 E S34
VILLAGE OF INDIAN CREEK VILLAGE
120646
0 250 500 1,000 1,500 2,000 Feet
1:6,000
80°8'13"W 25°52'58"N
Basemap Imagery Source: USGS National Map 2023
Legend
SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE) Zone A, V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD
0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
Future Conditions 1% Annual Chance Flood Hazard Zone X
Area with Reduced Flood Risk due to Levee. See Notes. Zone X
Area with Flood Risk due to Levee Zone D
OTHER AREAS
NO SCREEN Area of Minimal Flood Hazard Zone X
Effective LOMRs
Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES
Channel, Culvert, or Storm Sewer
Levee, Dike, or Floodwall
OTHER FEATURES
20.2 Cross Sections with 1% Annual Chance
17.5 Water Surface Elevation
Coastal Transect
Base Flood Elevation Line (BFE)
Limit of Study
Jurisdiction Boundary
Coastal Transect Baseline
Profile Baseline
Hydrographic Feature
MAP PANELS
Digital Data Available
No Digital Data Available
Unmapped
N
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.
This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/19/2023 at 5:05 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

National Flood Hazard Layer FIRMette

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

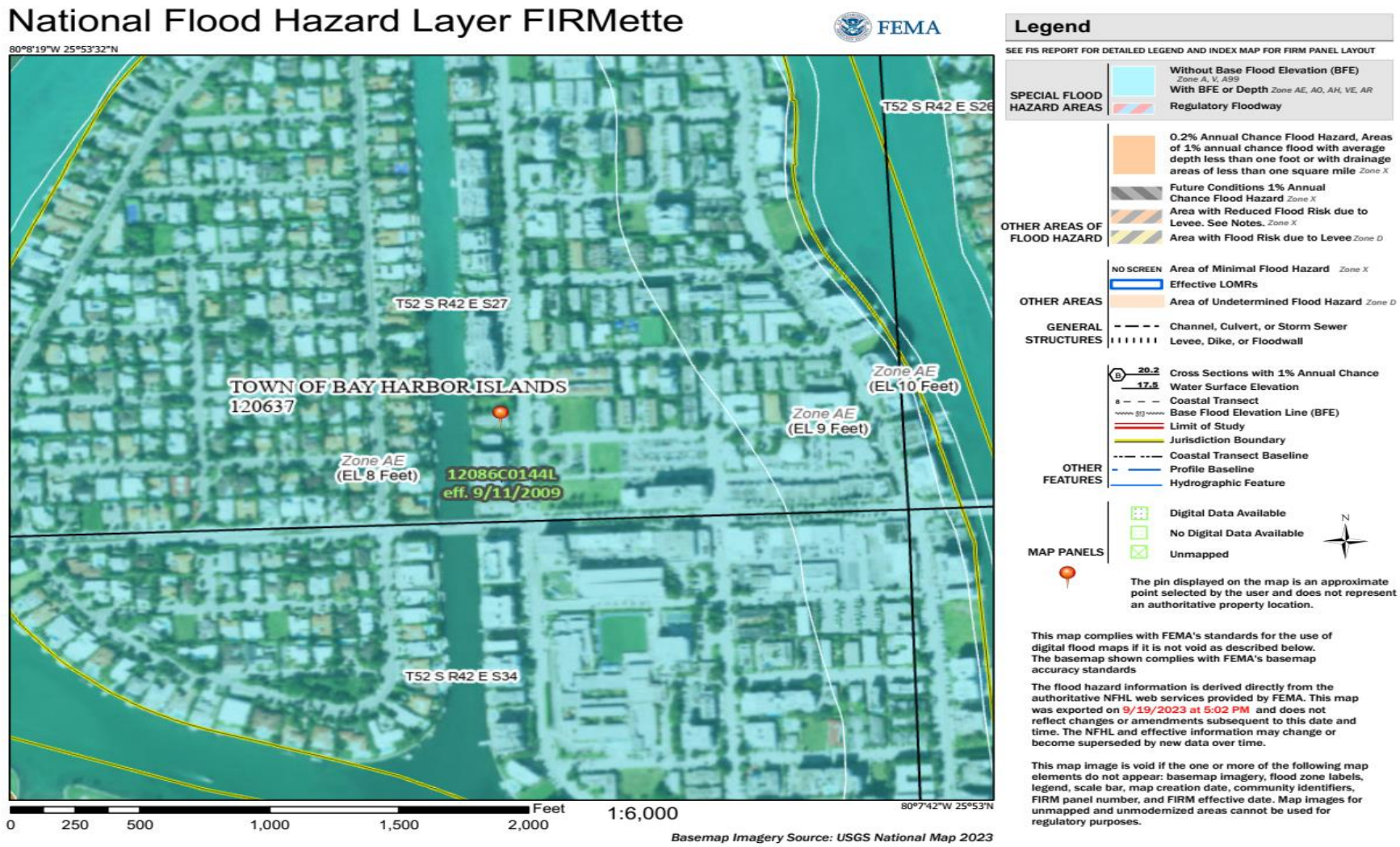
N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/19/2023 at 5:10 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.


National Flood Hazard Layer FIRMette
FEMA
80°8'19"W 25°53'32"N
T52 S R42 E S26
T52 S R42 E S27
TOWN OF BAY HARBOR ISLANDS
120637
Zone AE
(EL 10 Feet)
Zone AE
(EL 9 Feet)
Zone AE
(EL 8 Feet)
12086C0144L
eff. 9/11/2009
T52 S R42 E S34
0 250 500 1,000 1,500 2,000 Feet
1:6,000
80°7'42"W 25°53'N
Basemap Imagery Source: USGS National Map 2023
Legend
SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT
SPECIAL FLOOD HAZARD AREAS
Without Base Flood Elevation (BFE) Zone A, V, A99
With BFE or Depth Zone AE, AO, AH, VE, AR
Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD
0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile Zone X
Future Conditions 1% Annual Chance Flood Hazard Zone X
Area with Reduced Flood Risk due to Levee. See Notes. Zone X
Area with Flood Risk due to Levee Zone D
OTHER AREAS
NO SCREEN Area of Minimal Flood Hazard Zone X
Effective LOMRs
Area of Undetermined Flood Hazard Zone D
GENERAL STRUCTURES
Channel, Culvert, or Storm Sewer
Levee, Dike, or Floodwall
OTHER FEATURES
20.2
17.5
Cross Sections with 1% Annual Chance
Water Surface Elevation
Coastal Transect
Base Flood Elevation Line (BFE)
Limit of Study
Jurisdiction Boundary
Coastal Transect Baseline
Profile Baseline
Hydrographic Feature
MAP PANELS
Digital Data Available
No Digital Data Available
Unmapped
N
The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.
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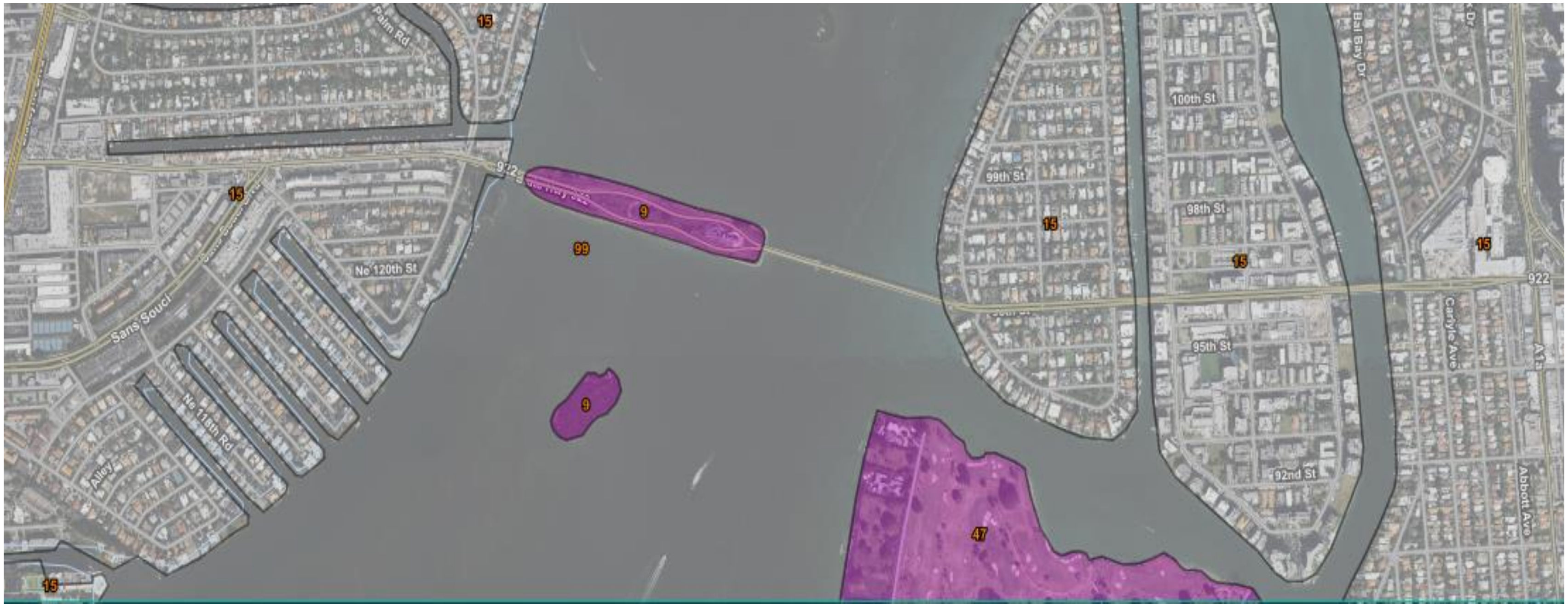
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 9/19/2023 at 5:02 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Appendix B: NRCS Soils Map


Palm Rd
15
100th St
99th St
98th St
95th St
92nd St
Bal Bay Dr
922
9
99
Ne 120th St
Sans Souci
Ne 118th Rd
Alley
47
Carlyle Ave
Abbott Ave

Tables — Hydrologic Soil Group — Summary By Map Unit

Summary by Map Unit — Miami-Dade County Area, Florida (FL686)

Summary by Map Unit — Miami-Dade County Area, Florida (FL686)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
9	Udorthents-Water-Urban land complex, 0 to 60 percent slopes	A	22.8	0.5%
15	Urban land, 0 to 2 percent slopes		1,565.2	36.2%
39	Beach complex, tidal, 0 to 3 percent slopes		10.0	0.2%
41	Dade fine sand-Urban land complex, 0 to 2 percent slopes	A	4.5	0.1%
47	Baggs Cape fine sand-Urban land complex, 0 to 2 percent slopes	A	274.5	6.3%
51	Beach complex, tidal-Urban land complex, 0 to 3 percent slopes		22.4	0.5%
53	Biscayne marly silt loam, drained-Urban land complexx, 0 to 1 percent slopes	C/D	8.9	0.2%
99	Water		1,584.6	36.6%
100	Waters of the Atlantic Ocean		662.3	15.3%
Totals for Area of Interest			**4,325.5**	**100.0%**

Appendix C: Checklist of LHR Requirements

From FDOT PD&E Manual, Part 2, Chapter 13, Section 13.2.2.5 Location Hydraulic Report,

"The following *items must* be included in the **LHR** for all alternatives containing minimal encroachments. Each item should be discussed to a level that adequately addresses the environmental impacts and flood risks:

a. General description of the project including location, length, existing and proposed typical sections, drainage basins, and cross drains;
b. Determination of whether the proposed action is in the base floodplain;
c. The history of flooding of the existing facilities and/or measures to minimize any impacts due to the proposed improvements;
d. Determination of whether the encroachment is longitudinal or transverse, and if it is a longitudinal encroachment, an evaluation and discussion of practicable avoidance alternatives;
e. The practicability of avoidance alternatives and/or measures to minimize impacts;
f. Impact of the project on emergency services and evacuation;
g. Impacts of the project on the base flood, likelihood of flood risk, overtopping, location of overtopping, backwater.;
h. Determination of the impact of the project on regulatory floodways, if any, and documentation of coordination with FEMA and local agencies to determine the requirements for the project to be developed consistent with the regulatory floodway;
i. The impacts on natural and beneficial floodplain values, and measures to restore and preserve these values (this information may also be addressed as part of the wetland impact evaluation and recommendations);
j. Consistency of the project with the local floodplain development plan or the land use elements in the Local Government Comprehensive Plan (LGCP), and the potential of encouraging development in the base floodplain;

k. Measures to minimize flood-plain impacts associated with the project, and measures to restore and preserve the natural and beneficial flood-plain values impacted by the project.

l. A map showing project, location, and impacted floodplains. A **FIRM Map** should be used if available. If not, other maps (e.g., US Geological Survey (USGS), USACE, Soil Conservation Service (SCS), Bureau of Land Management, U.S. Forest Service, or best available information from the WMDs) may be used. Copies of applicable maps should be included in the appendix; and,

m. Results of any risk assessments performed."

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