DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
4400 PGA BLVD. SUITE 500
PALM BEACH GARDENS, FLORIDA 33410

August 17, 2020

Regulatory Division
North Permits Branch
Panama City Permits Section

PUBLIC NOTICE

Permit Application No. SAJ-2019-04155(SP-MMT)

TO WHOM IT MAY CONCERN: The Jacksonville District of the U.S. Army Corps of Engineers (Corps) has received an application for a Department of the Army permit pursuant to Section 404 of the Clean Water Act (33 U.S.C. §1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403) as described below:

APPLICANT: Florida Department of Transportation, District 4
Attn: Wilord Metellus
3400 West Commercial Blvd.
Fort Lauderdale, Florida 33309

WATERWAY AND LOCATION: The project would affect waters of the United States associated with C-13 Canal. The project site is located at Oakland Park Boulevard Bridge (No. 860139), over C-13 Canal (FPID 441474-1-52-01), Broward County, Florida.

Directions to the site are as follows: The project is located under the Oakland Park Boulevard bridge (No. 860139) where it crosses the C-13 Canal at the I-95 interchange in Broward County. Heading east on W Oakland Park Boulevard, the project site is 0.58-mile past NW 21st Avenue.

APPROXIMATE CENTRAL COORDINATES: Latitude N 26°09'57.48"
Longitude W -80°09'48.37"

PROJECT PURPOSE:

Basic: Scour countermeasure protection.

Overall: To install scour countermeasure protection at the Oakland Park Boulevard Bridge (No. 860139), over C-13 Canal in Broward County.

EXISTING CONDITIONS: Scour countermeasure protection is needed for the channel bottom underneath the bridge in order to maintain the integrity of the bridge, since the Scour Evaluation Report concluded that there is insufficient pile embedment, degradation of the channel, and damaged abutment protection. The wetland system

consists of a brackish water system. The onsite vegetation consists of unvegetated sandy bottom. The existing area surrounding the project area consists of mangroves, pond apple, Brazilian pepper, and other tree species.

PROPOSED WORK: The applicant seeks authorization to dredge 1,695 cubic yards of existing substrate and fill the bottom of C-13 canal with 1,328 cubic yards of gabion mattress (total work area is 0.358 acre). The 18-inch gabion mattress for erosion control is made with wire baskets filled with small riprap stones. Five cubic yards of existing riprap will be replaced along the edges of the mattress around the bridge piles. The mattress will be placed on unvegetated, sandy bottom and is not expected to impact any wildlife (a benthic survey in 2018 confirmed absence of protected wildlife or habitat).

AVOIDANCE AND MINIMIZATION INFORMATION – The applicant has provided the following information in support of efforts to avoid and/or minimize impacts to the aquatic environment:

From an engineering perspective, the erosion control mattress scour countermeasure method is recommended over other potential alternatives (e.g. rubble rip-rap covering a smaller footprint) for this particular location given the severity of the identified scour and site-specific conditions including velocity during storm events. It has been determined that the entire footprint of the bridge requires stabilization, regardless of the selected material. Since there are no seagrass communities, hardbottom communities, oyster beds, or other submerged resources within or immediately adjacent to the project area, and since the white mangroves are outside of the footprint of work, no adverse effects are anticipated to occur as part of this project.

COMPENSATORY MITIGATION – The applicant has provided the following explanation why compensatory mitigation should not be required:

Since no submerged resources or mangrove habitat will be impacted, and since the affected area consists only of unvegetated sandy bottom, no mitigation is proposed.

CULTURAL RESOURCES:

FDOT has been delegated NEPA authority to consult on Section 106 of the National Historic Preservation Act. FDOT determined that this project would have “no potential to cause effect” to Historical or cultural resources since the permit area has been extensively modified by previous work. SHPO concurred with this determination in consultation letter dated 25 March 2015.

ENDANGERED SPECIES: FDOT has been delegated NEPA authority to consult under Section 7 of the Endangered Species Act (ESA). FDOT has determined the proposed project may affect but is not likely to adversely affect the West Indian manatee and the small tooth sawfish. The manatee effect determination was reached utilizing The Corps of Engineers, Jacksonville District, and the State of Florida Effect Determination Key for

the Manatee in Florida, April, 2013. The National Marine Fisheries Service – Protected Resources Division concurred with the small tooth sawfish determination by consultation letter dated 21 April 2020.

ESSENTIAL FISH HABITAT (EFH): This notice initiates consultation with the National Marine Fisheries Service on EFH as required by the Magnuson-Stevens Fishery Conservation and Management Act 1996. The proposal would impact approximately 0.358 acres of unvegetated sandy bottom and estuarine water utilized by various life stages of penaeid shrimp. Our initial determination is that the proposed action would not have a substantial adverse impact on EFH or Federally managed fisheries in the Fishery Ecosystem Plan of the South Atlantic Region. Our final determination relative to project impacts and the need for mitigation measures is subject to review by and coordination with the National Marine Fisheries Service.

NOTE: This public notice is being issued based on information furnished by the applicant. This information has not been verified or evaluated to ensure compliance with laws and regulation governing the regulatory program. The jurisdictional line has not been verified by Corps personnel.

AUTHORIZATION FROM OTHER AGENCIES: Water Quality Certification may be required from the Florida Department of Environmental Protection and/or one of the state Water Management Districts.

COMMENTS regarding the potential authorization of the work proposed should be submitted in writing to the attention of the project manager, Mark Tamblyn, Panama City Permits Section 4400 PGA BLVD, Suite 500, Palm Beach Gardens, FL within 15 days from the date of this notice.

The decision whether to issue or deny this permit application will be based on the information received from this public notice and the evaluation of the probable impact to the associated wetlands. This is based on an analysis of the applicant's avoidance and minimization efforts for the project, as well as the compensatory mitigation proposed.

QUESTIONS concerning this application should be directed to the project manager, Mark M. Tamblyn in writing at the Panama City Permits Section, 4400 PGA BLVD. Suite 500 Palm Beach Gardens, FL 33410; by electronic mail at mark.m.tamblyn@usace.army.mil; by telephone at (561)-472-3519.

IMPACT ON NATURAL RESOURCES: Coordination with U.S. Fish and Wildlife Service, Environmental Protection Agency (EPA), the National Marine Fisheries Services, and other Federal, State, and local agencies, environmental groups, and concerned citizens generally yields pertinent environmental information that is instrumental in determining the impact the proposed action will have on the natural resources of the area.

EVALUATION: The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefits, which reasonably may be expected to accrue from the proposal, must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including cumulative impacts thereof; among these are conservation, economics, esthetics, general environmental concerns, wetlands, historical properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food, and fiber production, mineral needs, considerations of property ownership, and in general, the needs and welfare of the people. Evaluation of the impact of the activity on the public interest will also include application of the guidelines promulgated by the Administrator, EPA, under authority of Section 404(b) of the Clean Water Act or the criteria established under authority of Section 102(a) of the Marine Protection Research and Sanctuaries Act of 1972. A permit will be granted unless its issuance is found to be contrary to the public interest.

The US Army Corps of Engineers (Corps) is soliciting comments from the public; Federal, State, and local agencies and officials; Indian Tribes; and other Interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps to determine whether to issue, modify, condition, or deny a permit for this proposal. To make this determination, comments are used to assess impacts to endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

COASTAL ZONE MANAGEMENT CONSISTENCY: In Florida, the State approval constitutes compliance with the approved Coastal Zone Management Plan. In Puerto Rico, a Coastal Zone Management Consistency Concurrence is required from the Puerto Rico Planning Board. In the Virgin Islands, the Department of Planning and Natural Resources permit constitutes compliance with the Coastal Zone Management Plan.

REQUEST FOR PUBLIC HEARING: Any person may request a public hearing. The request must be submitted in writing to the District Engineer within the designated comment period of the notice and must state the specific reasons for requesting the public hearing.

RECEIVED
SAJ-2019-04155
13 Nov 2019
JACKSONVILLE DISTRICT
COCOA REGULATORY

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 01-08-2018

The public reporting burden for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Wilord Middle - Last -Metellus	First - Katie Middle - Last - Castor
Company - Florida Department of Transportation District 4	Company - Scalar Consulting Group
E-mail Address - Wilord.Metellus@dot.state.fl.us	E-mail Address - kcastor@scalarinc.net
6. APPLICANT'S ADDRESS:	**9. AGENT'S ADDRESS:**
Address- 3400 W Commercial Blvd	Address- 13337 North 56th Street
City - Fort Lauderdale State - FL Zip - 33309 Country - U.S.	City - Tampa State - FL Zip - 33617 Country - U.S.
7. APPLICANT'S PHONE NOs. w/AREA CODE	**10. AGENTS PHONE NOs. w/AREA CODE**
a. Residence b. Business (954) 777-4461 c. Fax	a. Residence b. Business 813-988-1199 ex. 213 c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Katie Castor to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Metellus Wilord

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Oakland Park Blvd. Bridge Scour Countermeasure (FPID: 441474-1-52-01)

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
C-13 Canal	Address Oakland Park Blvd. just west of I-95 (bridge No. 860139)
15. LOCATION OF PROJECT	City - Fort Lauderdale State- FL Zip- 33311
Latitude: ◦N 26°09'57.48" Longitude: ◦W 80°09'48.37"	

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality

Section - 21 and 28 Township - 49S Range - 42E

17. DIRECTIONS TO THE SITE

The project is located under the Oakland Park Boulevard bridge (No. 860139) where it crosses the C-13 Canal at the I-95 interchange in Broward County. Heading east on W Oakland Park Boulevard, the project site is 0.58-mile past NW 21st Avenue.

18. Nature of Activity (Description of project, include all features)

The proposed solution is an 18-inch gabion mattress for erosion control made with wire baskets filled with small riprap stones and lined with the existing riprap around the two bridge piles (the piles are currently lined with riprap which will remain in place on top of the mattress edges). Proposed work will consist of minor excavation of existing sediment and placement of the 18-inch thick mattress. The total work area is equal to the area of the mattress; approximately 13,920 sf (0.32 acres). The proposed work in surface waters will result in the permanent excavation of 773.3 cubic yards of sediment, and the placement of 773.3 cubic yards of fill material (the gabion mattress). Approximately five cubic yards of existing riprap will be replaced along the edges of the mattress around the bridge piles. The mattress will be placed on unvegetated, sandy bottom and is not expected to impact any wildlife (a benthic survey in 2018 confirmed absence of protected wildlife or habitat).

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

Based on the Scour Evaluation Report, due to insufficient pile embedment, degradation of the channel, and damaged abutment protection, scour countermeasure protection is needed for the channel bottom underneath the bridge in order to maintain the integrity of the bridge.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Dredge is required at this location to remove sediment, and filling is required for placement of the gabion mattress.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
773.3 of dredging	773.3 of fill	

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres 0.32

or

Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

From an engineering perspective, the erosion control mattress scour countermeasure method is recommended over other potential alternatives (e.g. rubble rip-rap covering a smaller footprint) for this particular location given the severity of the identified scour and site-specific conditions including velocity during storm events. It has been determined that the entire footprint of the bridge requires stabilization, regardless of the selected material. Since there are no seagrass communities, hardbottom communities, oyster beds, or other submerged resources within or immediately adjacent to the project area, and since the white mangroves are outside of the footprint of work, no adverse effects are anticipated to occur as part of this project.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

N/A

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- SFWMD - 80 South Hoagland Blvd

City - Kissimmee State - FL Zip - 34741

b. Address- South Florida Hospitality - 1595 W Oakland Park Blvd

City - Oakland Park State - FL Zip - 33311

c. Address- CSX Transportation Inc. - 500 Water Street

City - Jacksonville State - FL Zip - 32202

d. Address- Broward County - 960 NW 38 Street

City - Oakland Park State - FL Zip - 33309

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
SFWMD	General Permit				

* Would include but is not restricted to zoning, building, and flood plain permits

27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

Melissa Wilson

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

Florida Department of Transportation

ENVIRONMENTAL SUPPORT DOCUMENT

For SFWMD Environmental Resource General Permit Application and USACE Nationwide Permit 14 Application and Section 408 Authorization

Oakland Park Boulevard (SR 816) Bridge
Scour Countermeasure at C-13 Canal
FPID: 441474-1-52-01
Broward County, Florida

October 2019

Prepared for:

HNTB Corporation
5900 N. Andrews Avenue, Suite #400
Fort Lauderdale, Florida 33309
and
The Florida Department of Transportation
District Four
3400 W. Commercial Boulevard
Fort Lauderdale, Florida 33309

Prepared by:

Scalar Consulting Group, Inc.
13337 North 56th Street
Tampa, Florida 33617

1.0 Project Description

The Florida Department of Transportation (FDOT) District Four is proposing to construct scour countermeasures under the existing Oakland Park Boulevard bridge (No. 860139) (**Figure 1**) to address identified scour concerns (see **Attachment A**, dredge and fill sketch). Based on the Bridge Inspection and Scour Evaluation Reports (**Attachment B**), which include a Phase I Assessment (qualitative evaluation), Phase II Assessment (hydraulic/hydrologic), Phase III Assessment (structural/geotechnical) and Phase IV Assessment (plan of action), the site was recommended for a permanent hydraulic countermeasure. The bridge, built in 1965, crosses the C-13 Canal and is supported by two 18-inch square pre-stressed concrete piles protected with sand-cement riprap. At this location, the C-13 Canal is a perennially flowing, tidal waterway that flows into the South Fork of the Middle River. Due to insufficient pile embedment, degradation of the channel, and damaged abutment protection, scour countermeasure protection is proposed for the channel bottom underneath the bridge.

The proposed solution is an 18-inch gabion mattress for erosion control made with wire baskets filled with small riprap stones and lined with the existing riprap around the two bridge piles (the piles are currently lined with riprap which will remain in place on top of the mattress edges). Proposed work will consist of minor excavation of existing sediment and placement of the 18-inch thick mattress. The total work area is equal to the area of the mattress; approximately 13,920 sf (0.32 acres). The proposed work in surface waters will result in the permanent excavation of 773.3 cubic yards of sediment, and the placement of 773.3 cubic yards of fill material (the gabion mattress). Approximately five cubic yards of existing riprap will be replaced along the edges of the mattress around the bridge piles. The scour countermeasure will be placed on unvegetated, sandy bottom and is not expected to impact any wildlife (see section 9.0). The FDOT District Four requests a SFWMD General Permit (pursuant to section 62-330.443, F.A.C.) and a USACE Nationwide Permit 14 for this project.

There are no new surface water management systems proposed for this project, and there are no impacts to the 100-year floodplain. No formal water quantity attenuation or formal water quality treatment are required for this project type. The following graphics and attachments are included with this document to support the state and federal permit applications:

Figure 1 – Project Location Map
Attachment A – Dredge and Fill Sketch
Attachment B – Bridge Inspection and Scour Evaluation Report
Attachment C – FDEP Sovereign Submerged Lands Title Determination
Attachment D – Benthic Survey Technical Memorandum
Attachment E – Standard Manatee Conditions for In-Water Work
Attachment F – USACE Effect Determination Key for the Manatee in Florida
Attachment G – USACE Effect Determination Key for the Wood Stork
Attachment H – Sea Turtle and Smalltooth Sawfish Construction Conditions
Attachment I – Full Plan Set

2.0 Proposed Impacts to Wetlands/Surface Waters

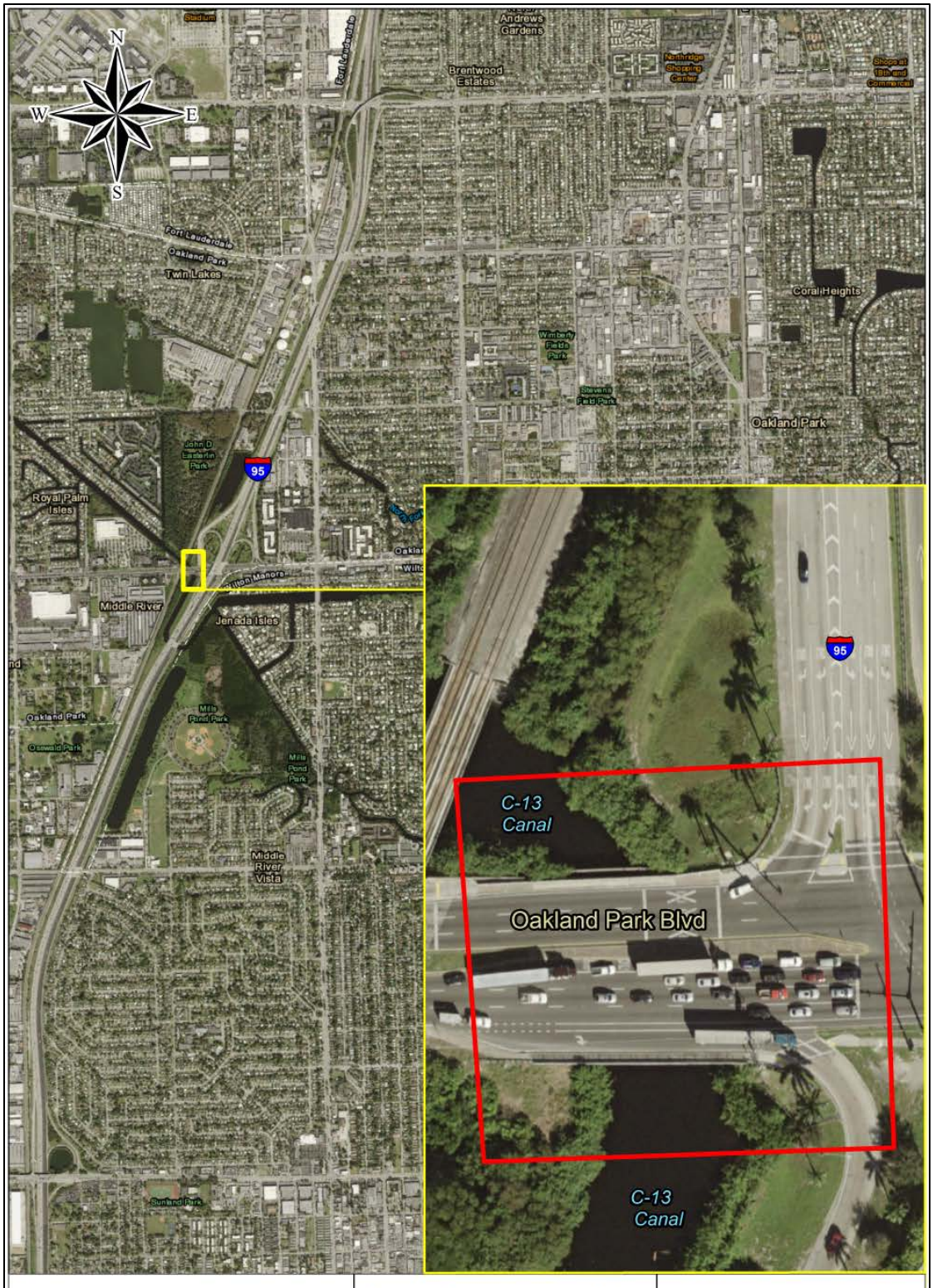
The C-13 canal is an estuarine deepwater habitat with Brazilian pepper (*Shinus terebinthifolia*) dominating the shoreline. All available seagrass data was reviewed for the project area. Seagrass has never been documented to occur within the project limits, and given the hydrodynamics and water depths, it is not anticipated to occur. The submerged land within the canal is not considered sovereign submerged lands (SSL), according to the Florida Department of Environmental Protection State Lands Division (**see Attachment C**). However, the project is within the right-of-way of the South Florida Water Management District.

A benthic survey was performed in August 2018 (**Attachment D**). No seagrass, corals, or oyster beds were observed within the project limits. Shoreline vegetation at the four corners of the bridge consist primarily of Brazilian pepper and coin vine (*Dalbergia ecastaphyllum*). However, a few individual white mangroves (*Laguncularia racemosa*) were observed within the shoreline vegetation in the southeast corner of the project area (shown in **Attachment A**). Impacts to mangroves will be avoided.

A total of 0.32 acres of C-13 canal, an open water, sandy bottom estuarine surface water, will be affected as a result of this project. The entire project will take place below the Mean High Water Line (MHWL) and no wetlands will be impacted. Proposed impacts to the canal consist of dredge and fill to sandy bottom; therefore, no mitigation is proposed or anticipated to be required by state or federal permitting agencies.

3.0 Avoidance and Minimization

The erosion control mattress scour countermeasure method is recommended over other potential alternatives (e.g. rubble rip-rap covering a smaller footprint) for this particular location given the severity of the identified scour and site-specific conditions including velocity during storm events. It has been determined that the entire footprint of the bridge requires stabilization, regardless of the selected material. Since there are no seagrass communities, hardbottom communities, oyster beds, or other submerged resources within or immediately adjacent to the project area, and since the placement of the mattress is such that no impacts to mangroves are proposed, no adverse environmental effects are anticipated to occur as part of this project.



Florida Department of Transportation
District IV
3400 W Commercial Blvd
Ft Lauderdale, FL

Figure 1: Project Location Map

FM 441474-1 Oakland Park Blvd
Bridge 860139 Over Canal C-13
Broward County, Fl
Section: 21, Township: 49S, Range: 42E

Legend

Project Location

Feet
0 40 80 160

4.0 Navigation

Bridge No. 860139 is considered navigable but does not span a federal navigation channel. The maximum water depth is approximately ten feet, and this will remain approximately the same after sediment removal and installation of the mattress. The project will not preclude vessels from using this waterway and it is anticipated that the same type of watercraft currently using the crossing will continue to do so following project construction.

5.0 Threatened and Endangered Species

Potential state and federal listed species within the project area are summarized below.

- West Indian manatee (*Trichechus manatus*) – The project is within the Consultation Area (CA) and a FWC-designated slow-speed zone for this species, which is listed as endangered by the USFWS and FWC. The nearest recorded manatee mortality is approximately 0.4 mile from the project area. The Standard Manatee Construction Conditions will be followed for this project (**Attachment E**). The project *may affect but is not likely to adversely affect* (MANLAA) the manatee, based on the USACE Effect Determination Key (**Attachment F**). Plan notes will include specifications (such as 50% maximum canal width obstruction during construction) to ensure adherence to construction methodology that satisfies criteria of the MANLAA effect determination.

- Wood stork (*Mycteria americana*) – The project is within the USFWS designated 18.6-mile Core Foraging Area (CFA) of one south Florida wood stork nesting colony (2B Melaleuca), a species that is federally listed as threatened. Since suitable foraging habitat will not be affected, the project will have *no effect* on the wood stork (see **Attachment G**; USACE Effect Determination Key).

- Everglade snail kite (*Rostrahamus sociabilis plumbeus*) – The project is within the CA of this state and federally listed endangered species. Since snail kite habitat was not observed within or adjacent to the project area, the project will have *no effect* on the snail kite.

- Wading birds – State listed threatened wading birds with potential to occur include the little blue heron (*Egretta caerulea*), tri-colored heron (*Egretta tricolor*), and roseate spoonbill (*Platalea ajaja*). A wading bird rookery was identified 1.8 miles northwest of the project area in 1999. Since foraging habitat (shallow edges of wetlands and surface waters) will not be affected, no adverse impacts to the species are anticipated to occur as a result of this project.

- Bald eagle (*Haliaeetus leucocephalus*) - This species is protected under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act. There are no documented nests within a mile of the project area, and no nests were identified during field surveys. No adverse impacts to the species are anticipated to occur as a result of this project.

- Mangroves – Shoreline vegetation at the four corners of the bridge consist primarily of Brazilian pepper and coin vine (*Dalbergia ecastaphyllum*). However, a few individual white mangroves (*Laguncularia racemosa*) were observed within the shoreline vegetation in the southeastern corner of the project area (shown in Attachment A). Impacts to mangroves will be avoided.
- Penaeid shrimp – The area is considered Essential Fish Habitat for penaeid shrimp, but the National Marine Fisheries Service (NMFS) stated that no consultation is required since the project qualifies for a USACE Nationwide Permit. No adverse affects to the species are anticipated.
- Smalltooth Sawfish (*Pristis pectinata*) – Since the area could support smalltooth sawfish, informal consultation with NMFS is required and a request for consultation has been submitted separately. FDOT District Four will coordinate with NMFS and USACE to ensure that requirements as per Section 7 of the Endangered Species Act are satisfied as part of this application process. Sea Turtle and Smalltooth Sawfish Construction Conditions will be followed (**Attachment H**). A Benthic Survey Technical Memorandum is provided in **Attachment D**. It is anticipated that the project *may affect but is not likely to adversely affect* the species.
- SAV and coral – All available seagrass data was reviewed for the project area. Seagrass has never been documented to occur within the project limits, and given the hydrodynamics and water depths, it is not anticipated to occur. No seagrass, corals, or oyster beds were observed within the project limits.
- Other wetland vegetation – Isolated pond apple trees (*Annona glabra*) were identified in the NE, NW, and SW quadrants of the bridge. None of the trees are located within the project footprint. During construction, impacts to these trees will be avoided.

Thank you for reviewing the FDOT District Four application for Oakland Park Boulevard bridge scour countermeasure. The full plan set is included in **Attachment I**.

11.0 References

Broward County Environmental Protection Department, Manatee Protection Plan (2007). https://myfwc.com/media/7355/browardcountympp_2007.pdf

FDOT, Florida Land Use, Cover and Forms Classification System (FLUCFCS), 1999. http://www.fdot.gov/geospatial/documentsandpubs/fluccmanual1999.pdf

Florida Fish and Wildlife Conservation Commission (FWC), Telemetry data sets, 2014. http://geodata.myfwc.com/datasets/

Florida Natural Areas Inventory (FNAI), Guide to the Natural Communities of FL, 2010. http://fnai.org/PDF/FNAI-Natural-Community-Classification-Guide-2010_20150218.pdf

FNAI (2000). Natural Communities and Species of Florida. http://www.fnai.org/FieldGuide/pdf

United States Code Title 16, Chapter 5A, Subchapter II, Section 668. Protection of Bald and Golden Eagles.

U.S. Army Corps of Engineers, Jacksonville District, and the State of Florida, Effect Determination Key for the Manatee in Florida (2013). https://www.saj.usace.army.mil/Portals/44/docs/regulatory/sourcebook/endangered_species/Manatee/2013_FINAL_ManateeKey.pdf

U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) (1995). Accessed through https://ca.dep.state.fl.us/mapdirect/?focus=standard

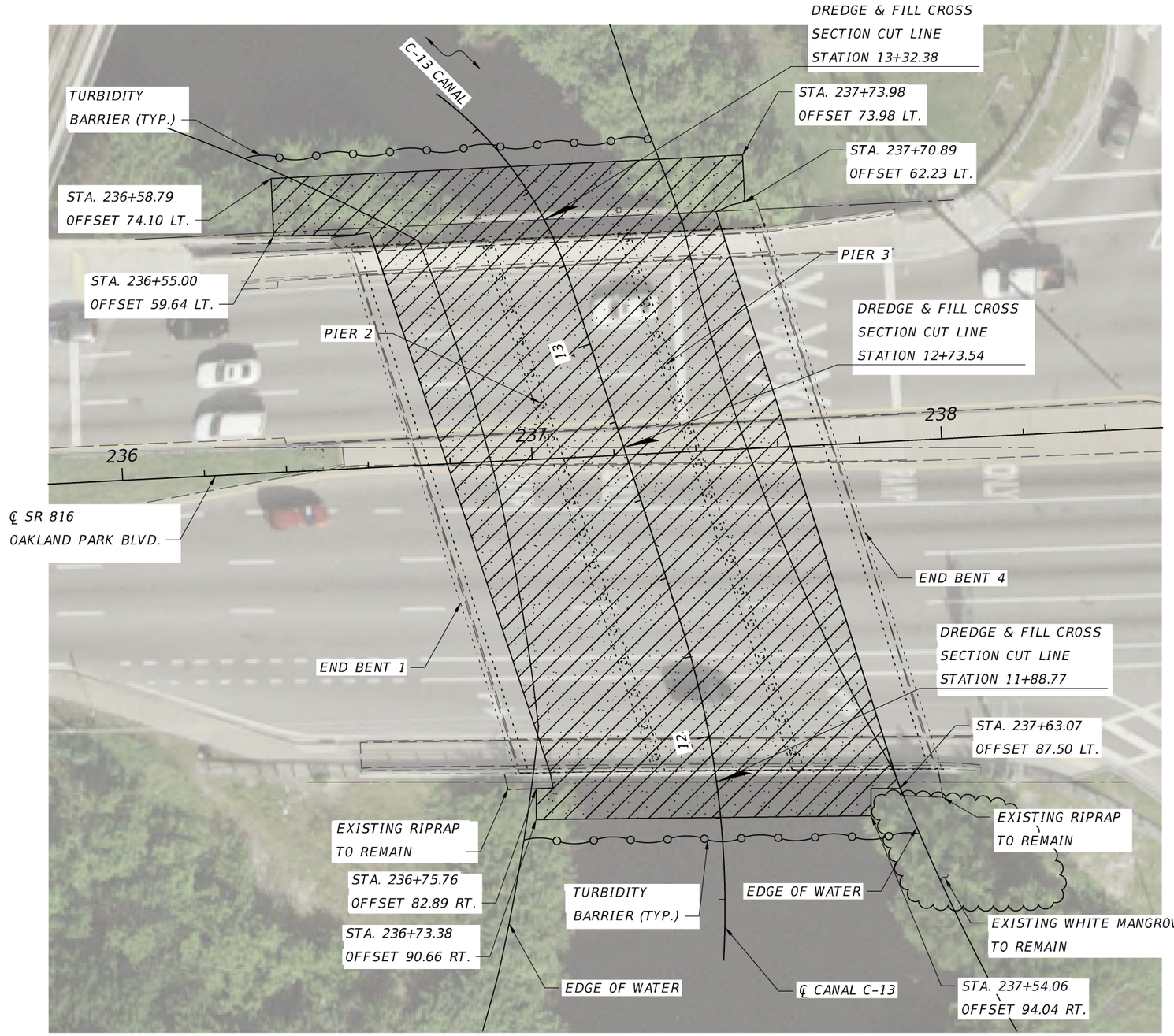
U.S. Fish and Wildlife Service (USFWS), National Wetlands Inventory (2014). http://www.fws.gov/wetlands/Data/Mapper.html

United States Code Title 16, Chapter 7, Subchapter II, Sections 703-712. Migratory Bird Treaty Act.

USFWS. 2018. Federally Listed Species in Florida. Downloaded from: https://www.fws.gov/southeast/florida/

USFWS and USACE (2010). The Corps of Engineers, Jacksonville District, U. S. Fish and Wildlife Service, Jacksonville Ecological Services Field Office and State of Florida Effect Determination Key for the Wood Stork in South Florida. http://www.saj.usace.army.mil/Portals/44/docs/regulatory/sourcebook/endangered_species/wood_stork/20100518_letter_ServicetoCorps_FLProgrammaticStorkrevised.pdf

Attachment A
Dredge and Fill Sketch



LEGEND

EXCAVATION

FILL

EXCAVATION AREA = 13920 SF
EXCAVATION VOLUME = 773.3 CY

FILL AREA = 13920 SF
FILL VOLUME = 773.3 CY

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

PLAN

BRIDGE NO. 860139

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
DEJ	LPR	DPV	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

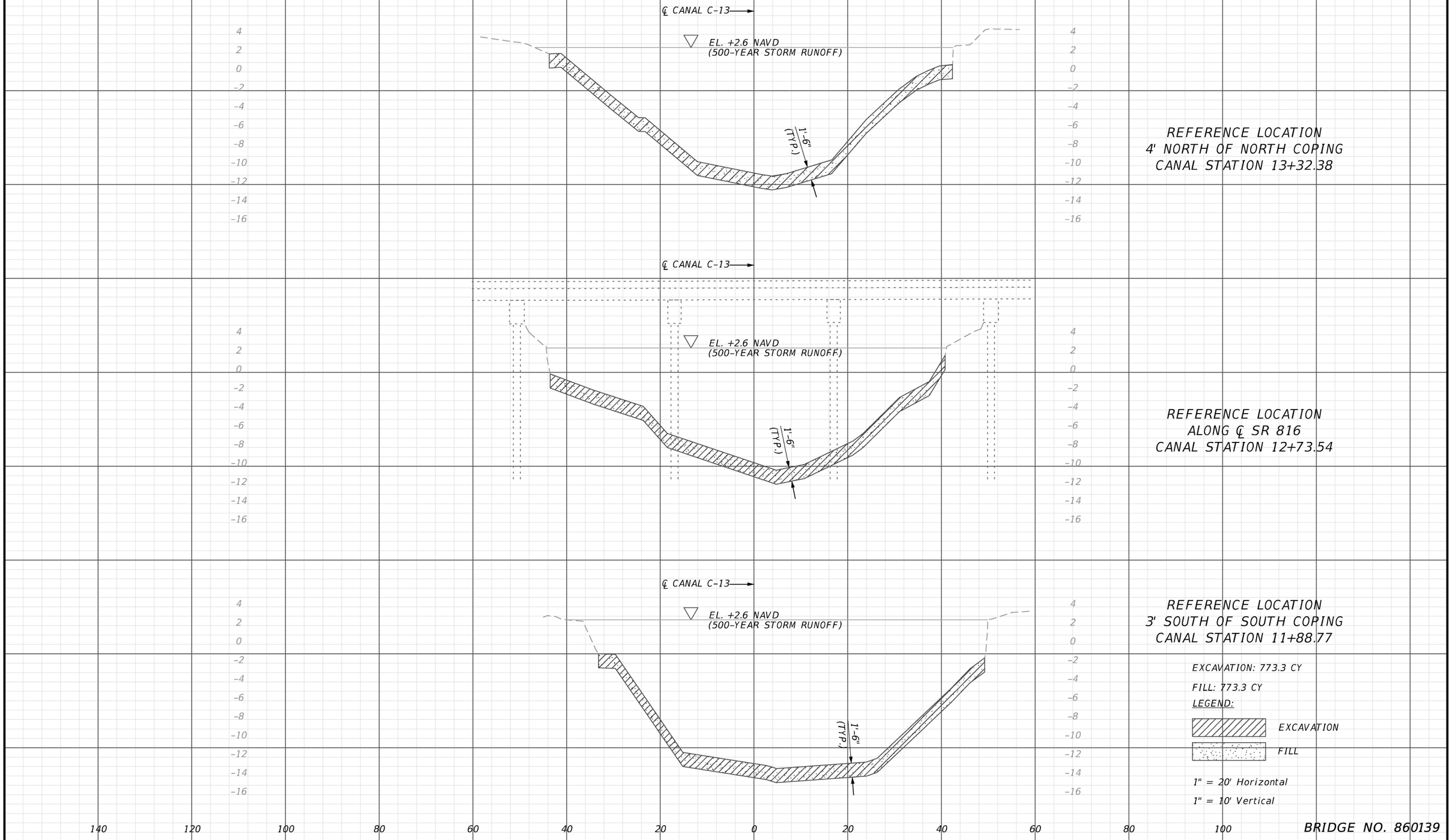
SHEET TITLE: PLAN DREDGE & FILL SKETCH

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 1

djonas 7/12/2019 4:22:32 PM \\ftlw00\PMwork\Jobs\69358_D4_DW_Design\WorkTasks\TWO_6_Oakland Pk Blvd Bridge Sc



NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
DEJ	LPR	DPV	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: DREDGE & FILL CROSS SECTIONS

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 2

Attachment B
Scour Evaluation Reports

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CID/Bridge Profile Report

BY:	Kisinger Campo & Assoc.	STRUCTURE NAME:	Not Recorded
OWNER:	1 State Highway Agency	YEAR BUILT:	1965
MAINTAINED BY:	1 State Highway Agency	SECTION NO.:	86 090 000
STRUCTURE TYPE:	5 Prestressed Concrete - 01 Slab	MP:	5.919
LOCATION:	SR-816 just W. of I-95	ROUTE:	00816
SERVICE TYPE ON:	5 Highway-pedestrian	FACILITY CARRIED:	Oakland Park Blvd.
SERV TYPE UND:	5 Waterway	FEATURE INTERSECTED:	C-13 Canal

☐ FUNCTIONALLY OBSOLETE ☐ STRUCTURALLY DEFICIENT

TYPE OF INSPECTION: Regular NBI

DATE FIELD INSPECTION WAS PERFORMED: ABOVE WATER: 12/11/2015 UNDERWATER: 12/11/2015

SUFFICIENCY RATING: 77.0

HEALTH INDEX: 86.97

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CID/Bridge Profile Report

BY: Kisinger Campo & Assoc.
OWNER: 1 State Highway Agency
MAINTAINED BY: 1 State Highway Agency
STRUCTURE TYPE: 5 Prestressed Concrete - 01 Slab
LOCATION: SR-816 just W. of I-95
SERVICE TYPE ON: 5 Highway-pedestrian
SERV TYPE UND: 5 Waterway

STRUCTURE NAME: Not Recorded
YEAR BUILT: 1965
SECTION NO.: 86 090 000
MP: 5.919
ROUTE: 00816
FACILITY CARRIED: Oakland Park Blvd.
FEATURE INTERSECTED: C-13 Canal

- [ ] THIS BRIDGE CONTAINS FRACTURE CRITICAL COMPONENTS
- [X] THIS BRIDGE IS SCOUR CRITICAL
- [ ] THIS REPORT IDENTIFIES DEFICIENCIES WHICH REQUIRE PROMPT CORRECTIVE ACTION
- [ ] FUNCTIONALLY OBSOLETE
- [ ] STRUCTURALLY DEFICIENT

TYPE OF INSPECTION: Regular NBI
DATE FIELD INSPECTION WAS PERFORMED: ABOVE WATER: 12/11/2015 UNDERWATER: 12/11/2015

SMART FLAGS:
None

OVERALL NBI RATINGS:
DECK: 7 Good
SUPERSTRUCTURE: 7 Good
SUBSTRUCTURE: 5 Fair
PERF. RATING: Fair
CHANNEL: 7 Minor Damage
CULVERT: N N/A (NBI)
SUFF. RATING: 77.0
HEALTH INDEX: 86.97

FIELD PERSONNEL / TITLE / NUMBER	INITIALS
Lambert, Eric - Bridge Inspector(CBI #00454) (lead)	
Bunn, Tyson - BI Tech	
Coon, Elliott - Certified Bridge Inspector (CBI #00530) - Lead Diver	
Payne, Timothy - Diver	
Belangia, Korye - Diver	

REVIEWING BRIDGE INSPECTION SUPERVISOR:
Ferrera, Carlo - Bridge Inspector (CBI#00156)

CONFIRMING REGISTERED PROFESSIONAL ENGINEER:
Cochran, Robert - (PE #45177)
Kisinger Campo & Associates
9270 Bay Plaza Boulevard
Certificate of Authorization #2317
Tampa, FL 33619

ROBERT PAUL COCHRAN LICENSE No. 45177 STATE OF FLORIDA PROFESSIONAL ENGINEER

SIGNATURE:
DATE: 01/21/16

This report contains information relating to the physical security of a structure and depictions of the structure. This information is confidential and exempt from public inspection pursuant to sections 119.071(3)(a) and 119.071(3)(b), Florida Statutes. Only the cover page of this report may be inspected and copied.

All Elements

UNIT: 0 DECKS

ELEMENT/ENV: 39/3 Unp Conc Slab/AC Ovl 4010 sf. **ELEM CATEGORY:** Decks/Slabs

CONDITION STATE (5)	DESCRIPTION	QUANTITY
1	Repaired areas and/or potholes or impending potholes and/or cracks and/or raveling or rutting exist. Their combined area is less than 2% of the deck area.	4010 sf.

ELEMENT INSPECTION NOTES:

Note:
This element represents the concrete deck along centerline and the south end.

INCIDENTAL:
Span 2 right (south) sidewalk has a span length x 1/64in. wide longitudinal crack near centerline – NEW.

All Elements

UNIT: 0 DECKS

ELEMENT/ENV: 99/3 PS Conc Slab **9035 sf.** **ELEM CATEGORY:** Decks/Slabs

CONDITION STATE (5)	DESCRIPTION	QUANTITY
2	Repaired areas and/or potholes or impending potholes and/or raveling or rutting exist. Their combined area is more than 2% but less than 10% of the total deck area.	9035 sf.

ELEMENT INSPECTION NOTES:

Note:
The top face of the slab units is not visible due to an asphalt overlay. No independent movement was observed in the prestressed panels during inspection.

DECK TOP:
CS2:
The asphalt overlay has full length x 1/16in. wide longitudinal cracks over the slab unit joints – INCREASE.

The asphalt over the expansion joints has full roadway width x 1/2in. wide transverse cracks – INCREASE. Refer to photo 1.

The asphalt over Abutment 1 joint eastbound has a 30in. x 3in. x 2in. pothole at the left shoulder stripe – Refer to photo 1.

INCIDENTAL:
The northeast sidewalk in Span 3 has a 26ft. long x 2ft. wide hollow sounding area. The deck underside beneath this area is sound – NO CHANGE.

The deck underside has water staining between all prestressed panels - NO CHANGE.

Several of the scuppers are clogged – NEW.

ELEMENT/ENV: 301/3 Pourable Joint Seal **88 lf.** **ELEM CATEGORY:** Joints

CONDITION STATE (3)	DESCRIPTION	QUANTITY
1	The element shows minimal deterioration. Adhesion is sound with no signs of leakage. There are no cohesion cracks. The adjacent deck and/or header is sound.	76 lf.

All Elements

UNIT: 0 DECKS

ELEMENT/ENV: 301/3 Pourable Joint Seal 88 lf. ELEM CATEGORY: Joints

CONDITION STATE (3)	DESCRIPTION	QUANTITY
3	Major adhesion and/or cohesion failures may be present. Signs or observance of leakage along the joint may be present. Joint may be heavily impacted with debris and/or stones. Major spalls may be present in the deck and/or header adjacent to the joint.	12 lf.

ELEMENT INSPECTION NOTES:

Note:
This element represents the sidewalk and median joints only. The joints in the travel are not visible.

CS3:
The left (north) sidewalk joints at Bents 2 and 3 are filled with dirt and vegetation – NEW. Refer to photo 2.

ELEMENT/ENV: 333/3 Other Bridge Railing 201 lf. ELEM CATEGORY: Railing

CONDITION STATE (3)	DESCRIPTION	QUANTITY
1	The element shows little or no deterioration. There may be minor cracking, corrosion and/or other minor deterioration having no affect on strength or serviceability.	177 lf.
2	Minor cracking, spalls, decay of timber portions or corrosion of metal may be present.	24 lf.

ELEMENT INSPECTION NOTES:

Note:
This element represents the concrete barriers with aluminum rail attached to the top.

CS2:
Random aluminum rail anchor bolts have moderate surface corrosion – NEW.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
Paint over the graffiti on the south fascia of the barrier at Span 3.

CORRECTIVE ACTION EVALUATION:
The corrective action noted above was completed.

All Elements

UNIT: 0 SUPERSTRUCTURE

ELEMENT/ENV: 310/3 Elastomeric Bearing 6 ea. **ELEM CATEGORY:** Bearings

CONDITION STATE (3)	DESCRIPTION	QUANTITY
1	The element shows little or no deterioration. Shear deformations are correct for existing temperatures.	6 ea.

All Elements

UNIT: 0 SUBSTRUCTURE

ELEMENT/ENV: 204/3 P/S Conc Column 38 ea. **ELEM CATEGORY:** Substructure

CONDITION STATE (4)	DESCRIPTION	QUANTITY
1	The element shows little or no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without affect on strength and/or serviceability.	33 ea.
2	Minor cracks, spalls and scaling may be present and there may be exposed reinforcing with no evidence of corrosion. There is no exposure of the prestress system.	5 ea.

ELEMENT INSPECTION NOTES:

CS2:
Pile 2-8 has two edge spalls up to 3in. x 5in. x 1in. in the northwest corner, 2ft. below the cap - NO CHANGE.

The following was noted by the underwater inspectors:
CS2:
Pile 2-8 has a 13in. x 2in. x 3/4in. spall in the southwest corner, 30in. below the cap – NO CHANGE.

Pile 3-7 has an 8in. x 2in. x 3/4in. spall in the southeast corner, 3ft. 2in. below the cap – NEW.

Pile 3-8 has a 17in. x 3in. x 1in. spall in the northeast corner, 3-1/2ft. below the cap – NO CHANGE.

Pile 3-17 southeast corner and Pile 3-18 southeast and northeast corners have intermittent spalls up to 2ft. x 3in. x 3/4in. – INCREASE.

CS1:
Random piles have unpatched pick up points - NO CHANGE.

ELEMENT/ENV: 215/3 R/Conc Abutment 278 lf. **ELEM CATEGORY:** Substructure

CONDITION STATE (4)	DESCRIPTION	QUANTITY
1	The element shows little or no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without affect on strength and/or serviceability.	269 lf.
2	Minor cracks, spalls and scaling may be present but there is no exposed reinforcing or surface evidence of rebar corrosion.	2 lf.

All Elements

UNIT: 0 SUBSTRUCTURE

ELEMENT/ENV: 215/3 R/Conc Abutment **278 lf.** **ELEM CATEGORY:** Substructure

CONDITION STATE (4)	DESCRIPTION	QUANTITY
3	Some delaminations, moderate cracks, spalls and/or scaling may be present and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.	7 lf.

ELEMENT INSPECTION NOTES:

CS3:
Abutment 1 cap has a 3-1/2ft. x 30in. x 1-1/2in. spall/delamination under Slab Units 1-2 and 1-3 – INCREASE. Refer to photo 3.

Abutment 1 cap has three vertical cracks up to 2ft. long x 1/64in. wide with efflorescence and corrosion staining in the south face – NO CHANGE.

Abutment 4 cap has a 5in. x 3in. x 1in. spall with 5in. of exposed rebar below Slab Unit 3-2 – NO CHANGE. Refer to photo 4.

CS2:
Abutment 4 cap below the north soffit has a diagonal hairline crack 2ft. long with moderate efflorescence - NO CHANGE.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1. Repair the undermining at Abutment 4 cap at the south end.
2. Repair and seal the crack and spall at Abutment 1.
3. Repair spall at Abutment 4.

CORRECTIVE ACTION EVALUATION:
1. thru 3. The corrective actions noted above were not completed. A recommendation will be repeated in this report.

ELEMENT/ENV: 234/3 R/Conc Cap **275 lf.** **ELEM CATEGORY:** Substructure

CONDITION STATE (4)	DESCRIPTION	QUANTITY
1	The element shows little or no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without affect on strength and/or serviceability.	266 lf.

All Elements

UNIT: 0 SUBSTRUCTURE

ELEMENT/ENV: 234/3 R/Conc Cap **275 lf.** **ELEM CATEGORY:** Substructure

CONDITION STATE (4)	DESCRIPTION	QUANTITY
3	Some delaminations, moderate cracks, spalls and/or scaling may be present and some reinforcing may be exposed. Corrosion of rebar may be present but loss of section is incidental and does not significantly affect the strength and/or serviceability of either the element or the bridge.	9 lf.

ELEMENT INSPECTION NOTES:

CS3:
Bent 2 cap west and east faces above Pile 2-11 has three reflective 2ft. long hairline cracks with moderate efflorescence and minor rust staining – NO CHANGE. Refer to photo 5.

Bent 3 cap east face 5ft. from the north end has a spall with a delamination up to 30in. diameter x 2in. in the east face - NO CHANGE. Refer to photo 6.

Bent 3 cap east face above Piles 3-6, 3-12 and 3-19 has 2ft. long hairline cracks with moderate efflorescence and rust staining - NO CHANGE.

INCIDENTAL:
There is moderate vegetation at the south end of Bent 2 and 3 caps – NEW. Refer to photo 7.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1. Remove vegetation growth from Bents 2 and 3 caps north faces.
2. Repair hairline cracking at Bent 3 above Piles 3-6, 3-12 and 3-19.
3. Repair spall and delamination to the east face of Bent 3.
4. Repair reflective hair line vertical cracking at Bent 2.

CORRECTIVE ACTION EVALUATION:
1. The corrective action noted above was completed.
2. The corrective action noted above was not completed. A recommendation will not be repeated in this report.
3. Repair the spall and delamination to the east face of Bent 3. A recommendation will be repeated in this report.
4. The corrective action noted above was not completed. A recommendation will not be repeated in this report.

All Elements

UNIT: 0 SUBSTRUCTURE

ELEMENT/ENV: 396/3 Other Abut Slope Pro 1851 sf. **ELEM CATEGORY:** Substructure

CONDITION STATE (4)	DESCRIPTION	QUANTITY
1	There is little or no deterioration. Surface defects only are in evidence. Random open joints may exist.	1722 sf.
2	There may be minor deterioration, random open joints, cracking and weathering. Mortar in joints may show minor deterioration.	42 sf.
3	Moderate to major deterioration and cracking. Major deterioration of joints. Minor settlement may be present.	87 sf.

ELEMENT INSPECTION NOTES:

Note:
This element represents the sand-cement rip rap bag slope protection at both abutments.

CS3:
The slope protection at Abutment 4 below the north soffit has an area of settlement over 10ft. long x 7ft. wide x 5in. deep (70sf) – NO CHANGE. Refer to photo 8.

The slope rip rap at Abutment 4, 10ft. south of the north end has an area of settlement over 18ft. long x 6in. wide x 3in. deep leaving a gap up to 3in. wide (9sf) – NO CHANGE. Refer to photo 9.

The slope rip rap at Abutment 4, 25ft. from the south end has an area of settlement 4ft. long x 2ft. wide x 4in. deep (8sf) – NO CHANGE.

CS2:
There is a gap between the slope rip rap and the cap at Abutment 1 over 36ft. long x 2in. wide x 17in. deep (36sf) – NO CHANGE. Refer to photo 10.

Abutment 4 slope has a 6ft. long x 1in. wide crack in the grout slurry along the cap at the north end (6sf) – NEW. Refer to photo 11.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1. Repair the gap between the slope riprap and the cap at Abutment 1.
2. Repair the settlements in the slope rip rap at Abutment 4.

CORRECTIVE ACTION EVALUATION:
1. & 2. The corrective actions noted above were not completed. A recommendation will be repeated in this report.

All Elements

UNIT: 0 CHANNEL

ELEMENT/ENV: 290/3 Channel **1 ea.** **ELEM CATEGORY:** Channel

CONDITION STATE (4)	DESCRIPTION	QUANTITY
2	Bank protection is in need of minor repairs, bank may be beginning to slump, minor stream bed movement may be evident or debris may be present.	1 ea.

ELEMENT INSPECTION NOTES:

The following was noted by the underwater inspectors:
CS2:
Between several piling, there are sections of corrugated metal panels attached to both sides of the pile. Some of the sections are no longer attached and are on the channel bottom around and between the piles with rebar and one H-Pile adjacent to Bent 3. The corrugated panels are causing minor areas of aggradation at various locations along the shore side of the bents - NO CHANGE.

All Elements

UNIT: 0 MISCELLANEOUS

ELEMENT/ENV: 321/3 R/Conc Approach Slab 2 ea. **ELEM CATEGORY:** Other Elements

CONDITION STATE (4)	DESCRIPTION	QUANTITY
1	The slab has not settled and shows no sign of deterioration other than superficial surface cracks.	1 ea.
3	Cracks may extend completely through the slab cross-section, but the slab does not act as if it is broken. Spalls may be heavy but they do not affect the structural integrity of the slab. Minor undermining may be present. Settlement may be occurring which increases the traffic impact on the bridge.	1 ea.

ELEMENT INSPECTION NOTES:

Note:
The approach slabs are not visible due to an asphalt overlay.

CS3:
The east approach slab south edge has a 3ft. long x 3in. high x 18in. back under area of undermining at the abutment cap – NEW. Refer to photo 12. This was previously noted under Element 215 R/Conc Abutment.

INCIDENTAL:
The west approach slab asphalt east bound has a slab length x 1/8in. wide longitudinal crack, 5ft. from the median – NEW.

The asphalt over the approach slab/approach roadway transitions has a roadway width x 1/4in. wide transverse crack – NEW.

The north edge of the east approach slab median has impact scrapes up to 1/2in. deep – NEW.

The northeast and northwest approach sidewalks have minor sidewalk width x 1in. x 1in. spalls/delaminations along the abutment joints – NEW.

All Elements

UNIT: 0 MISCELLANEOUS

ELEMENT/ENV: 475/3 R/Conc Walls **204 lf.** **ELEM CATEGORY:** Other Elements

CONDITION STATE (4)	DESCRIPTION	QUANTITY
1	The element shows little or no deterioration. There may be discoloration, efflorescence, and/or superficial cracking but without affect on strength and/or serviceability. Random open joints may exist.	204 lf.

ELEMENT INSPECTION NOTES:

Note:
This element represents the wingwalls at the four corners of the bridge.

Inspector Recommendations

UNIT: 0 DECKS

ELEMENT/ENV:99/3 PS Conc Slab ELEM CATEGORY: Decks/Slabs

CONDITION STATE (5)		Priority
2	**9035 sf.**	3

WORK ORDER RECOMMENDATION:

Clean and seal transverse cracks in asphalt over joints and repair pothole ABT 1 EB joint. 8MH

ELEMENT/ENV:301/3 Pourable Joint Seal ELEM CATEGORY: Joints

CONDITION STATE (3)		Priority
3	**12 lf.**	3

WORK ORDER RECOMMENDATION:

Clean and seal left-north sidewalk joints at Bents 2 and 3. 6MH

Inspector Recommendations

UNIT: 0 SUBSTRUCTURE

ELEMENT/ENV:215/3 R/Conc Abutment ELEM CATEGORY: Substructure

CONDITION STATE (4)		Priority
3	**7 lf.**	3

WORK ORDER RECOMMENDATION:
Repair spall with exposed rebar in Abutment 4 cap under Slab Unit 3-2. 4MH

3	**7 lf.**	3

WORK ORDER RECOMMENDATION:
Repair spall-delamination in Abutment 1 cap under Slab Units 1-2 and 1-3. 6MH

ELEMENT/ENV:234/3 R/Conc Cap ELEM CATEGORY: Substructure

CONDITION STATE (4)		Priority
1	**266 lf.**	3

WORK ORDER RECOMMENDATION:
Remove vegetation from south end of Bent 2 and 3 caps. 4MH

3	**9 lf.**	3

WORK ORDER RECOMMENDATION:
Repair spall-delamination in east face of Bent 3 cap 5ft. from north end. 6MH

ELEMENT/ENV:396/3 Other Abut Slope Pro ELEM CATEGORY: Substructure

CONDITION STATE (4)		Priority
2	**42 sf.**	3

WORK ORDER RECOMMENDATION:
Repair gaps and cracks in grout slurry at both slopes along abutment caps. 6MH

3	**87 sf.**	3

WORK ORDER RECOMMENDATION:
Repair areas of settlement along Abutment 4 slope. 10MH

Inspector Recommendations

UNIT: 0 MISCELLANEOUS

ELEMENT/ENV:321/3 R/Conc Approach Slab ELEM CATEGORY: Other Elements

CONDITION STATE (4)		Priority
3	**1 ea.**	3

WORK ORDER RECOMMENDATION:

Repair undermining along south edge of east approach slab. 6MH

Structure Notes

TRAFFIC RESTRICTIONS: According to the load rating analysis dated 3/18/05, this structure does not require posting. This structure is not posted.

LOAD CAPACITY EVALUATION:
Since the current load rating dated 3/18/05, there is no indication that deterioration, geometric changes or additional dead load have occurred that would warrant a new load rating analysis.

This structure is inventoried as per the federal coding manual, the lowest mile point from the strait line diagram is the start of the bridge. The west end is Abutment-1 and east end is Abutment-4.

The following elements were inspected underwater by the divers:
204 P/S Conc Column – Bents 2 and 3 each with nineteen 18in. concrete piles
396 Other Abut Slope Pro
290 Channel (All)

There is a 4-1/2in. steel utility attached to the outside face of the right barrier wall. Anchorage types is unknown.

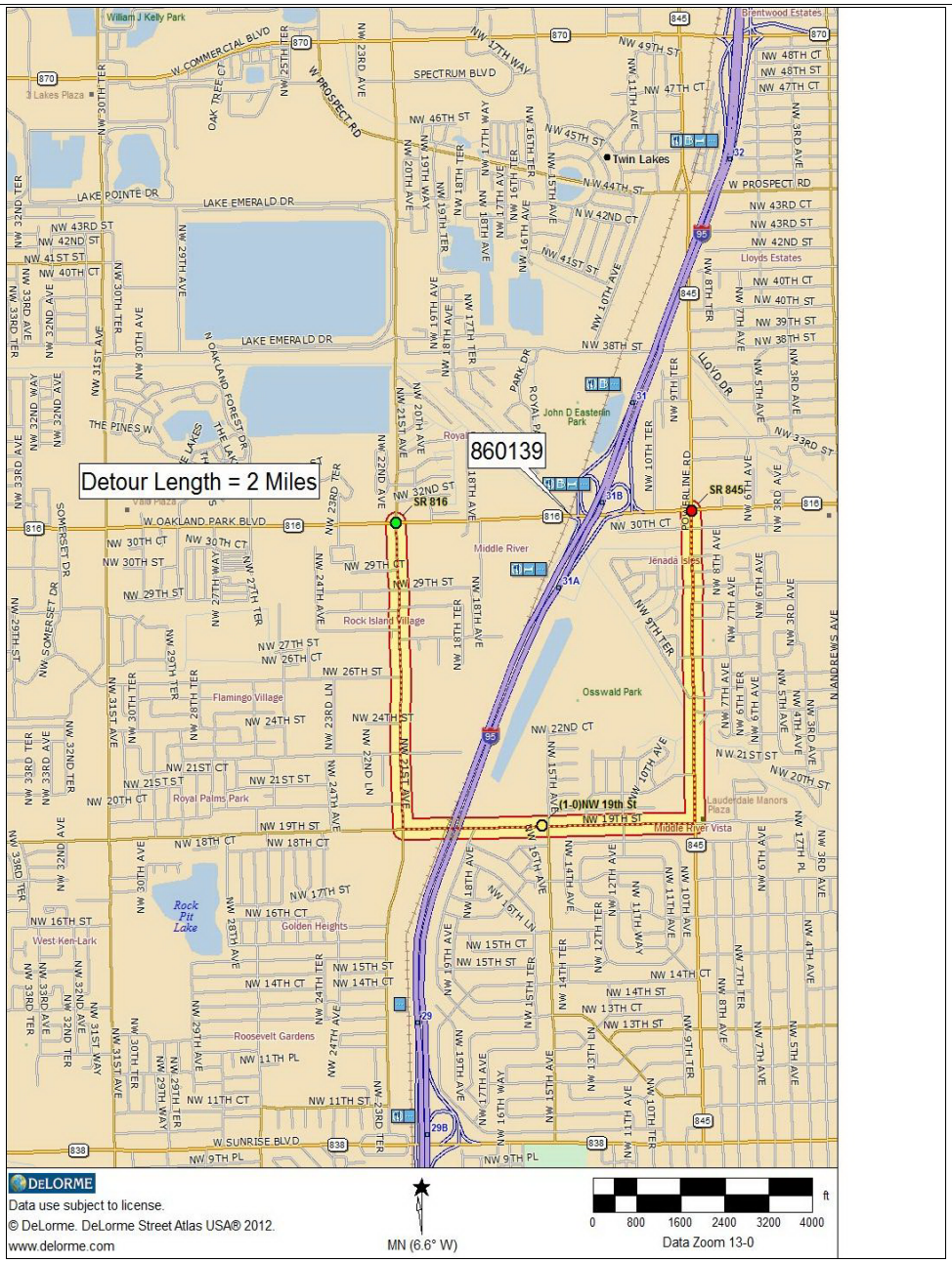
INSPECTION NOTES: QDCW 12/11/2015

Sufficiency Rating Calculation Accepted by KNKCADG-P at 2016-01-20 15:06:57

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CID/Bridge Profile Report

NORTH ELEVATION

FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE MANAGEMENT SYSTEM
Inspection/CID/Bridge Profile Report



Oakland Park Blvd. over C-13 Canal **SR-816 just W. of I-95**

D: LOAD CAPACITY INFORMATION

GE DATA:
: Number 860139
Type Main [BMIS Item B1(43)] 5021133
Date March 18, 2005
STR Type APR [BMIS Item B2(44)] 000

ING DATE:
d NO If yes, Existing
ctions NONE
Item H8(41) A
Posting Needed NO If Yes, Proposed
Restrictions NONE
BMIS Item H11(70) 5
BMIS Item H7(31) 6

LYSIS DATA:
od of Analysis:
___ Load Factor
Working Stress

sis System:
___ BARS
___ SALOD
___ BRUFEM
Load Test
Other

C. Analysis Based On:
__X__ Design Drawings(FINAL PLANS)
_____ As-Built Record Plans
_____ Shop Drawings
_____ Field Measurement
_____ Catalogs
_____ Sample Testing
_____ Other

D. Data Stored:
__X__ District Office
_____ Central Office
_____ Microfilm
_____ Bridge Owner
_____ Materials Test Lab
_____ Other

rolling Member Analyzed:
rial:
Steel
___ Concrete
_____ Cast in Place
___1___ Precast
___1___ Prestressed
Post Tensioned
Timber
Other

Function:
___1___ Slab
_____ Stringer
_____ Floor Beam
_____ Girder
_____ Culvert
_____ Truss

Substructure:
__X__ Bent Construction
__X__ Piling
__X__ Cap
_____ Pier Construction
_____ Piling
_____ Footing
_____ Column
_____ Cap

Shape:
_____ Rolled
_____ Built-up Welded
_____ Built-up Riveted
_____ Box Shape
_____ AASHTO Girders (Inverted T-Beam)
__X__ Other (PSC UNITS, SONOVOID)

1___ Simple
___ Continuous
Frame

1___ Non-Composite
___ Composite

d Rating Summary Table:

LOAD RATING SUMMARY FOR OPERATING RATING (GROSS TONS)

VEHICLE TYPE	TONS	OPR RATING	OPR FACTOR	SPAN NO.	SPAN LENGTH	CONTR. MEMBER	M OR V	*LLDF	OPI (M
SU2	17	44.25	2.603	1	31.75	1	M	0.677	40.1
SU3	33	46.17	1.399	1	31.75	1	M	0.677	41.8
SU4	35	45.40	1.297	1	31.75	1	M	0.677	41.1
C3	28	66.64	2.380	1	31.75	1	M	0.677	60.4
C4	36.6	60.24	1.646	1	31.75	1	M	0.677	54.(
C5	36.6	60.24	1.646	1	31.75	1	M	0.677	54.(
ST5	40	70.20	1.755	1	31.75	1	M	0.677	63.(
HS20	36	61.67	1.713	1	31.75	1	M	0.677	55.5

HS 20 Inventory Rating (36) 37.01 Tons 33.57 Metric Tons R Factor 1.028 Member (1)

mments:
3- Span Prestressed Precast Slab Unit built in 1967 and widened in 2004. Member 1 is a three feet wide P.S.C. Unit in Span 1, 2 and 3 .
AASHTO LLDF is used.

mputations:
formed By Sudhir N. Shahane
Date February 18, 2005.
Date March 4, 2005.

LOAD RATING SUMMARY ANALYSIS

Photo 1 - Element 99 PS Conc Slab

Transverse crack and pothole over Abutment 1 joint eastbound

WORK ORDER RECOMMENDATION:
Clean and seal transverse cracks in asphalt over joints and repair pothole ABT 1 EB joint. 8MH

Photo 2 – Element 301 Pourable Joint Seal

Bent 3 left (north) sidewalk joint filled with dirt and vegetation

WORK ORDER RECOMMENDATION:
Clean and seal left-north sidewalk joints at Bents 2 and 3. 6MH

Photo 3 - Element 215 R/Conc Abutment

Spall/delamination in Abutment 1 cap under Slab Units 1-2 and 1-3

WORK ORDER RECOMMENDATION:
Repair spall-delamination in Abutment 1 cap under Slab Units 1-2 and 1-3. 6MH

Photo 4 - Element 215 R/Conc Abutment

Spall with exposed rebar in Abutment 4 cap under Slab Unit 3-2

WORK ORDER RECOMMENDATION:
Repair spall with exposed rebar in Abutment 4 cap under Slab Unit 3-2. 4MH

Photo 5 - Element 234 R/Conc Cap

Vertical cracks with staining in the west face of Bent 2 cap

WORK ORDER RECOMMENDATION:
None

Photo 6 - Element 234 R/Conc Cap

Spall/delamination in the east face of Bent 3 cap, 5ft. from the north end

WORK ORDER RECOMMENDATION:
Repair spall-delamination in east face of Bent 3 cap 5ft. from north end. 6MH

Photo 7 - Element 234 R/Conc Cap

Vegetation at the south end of Bent 2 and 3 caps

WORK ORDER RECOMMENDATION:
Remove vegetation from south end of Bent 2 and 3 caps. 4MH

Photo 8 - Element 396 Other Abut Slope Pro

Area of settlement in Abutment 4 slope under the north soffit

WORK ORDER RECOMMENDATION:
Repair areas of settlement along Abutment 4 slope. 10MH

Photo 9 - Element 396 Other Abut Slope Pro

Separation in Abutment 4 slope, 10ft. from the north end

WORK ORDER RECOMMENDATION:
Refer to photo 8.

Photo 10 – Element 396 Other Abut Slope Pro

Gap between Abutment 1 cap and the slope protection

WORK ORDER RECOMMENDATION:
Repair gaps and cracks in grout slurry at both slopes along abutment caps. 6MH

Photo 11 - Element 396 Other Abut Slope Pro

Crack in Abutment 4 grout slurry at the north end

WORK ORDER RECOMMENDATION:
Refer to photo 10.

Photo 12 - Element 321 R/Conc Approach Slab

Undermining along the south edge of the east approach slab

WORK ORDER RECOMMENDATION:
Repair undermining along south edge of east approach slab. 6MH

SCOUR EVALUATION

Channel Looking South

SCOUR EVALUATION

Channel Looking North

Routine Underwater Bridge Inspection Report
BOLT UNDERWATER SERVICES, INC.
for
KISINGER CAMPO & ASSOCIATES, CORP.

NBI Structure ID. (8): **860139** Underwater Date (93): 12/11/15

Structure/Roadway Identification:		Underwater Inspection Details:	
District (2):	04 AM Broward	Special Crew Hours:	3.0
County (3):	Broward	Max. Depth:	16ft. at Bent 2
Feature Intersected (6):	C-13 Canal	Type of Dive Insp.:	Level II (SCUBA)
Facility Carried (7):	Oakland Park Blvd.	Type of Boat Used:	N/A
		Water Type/Marine Growth:	Brackish/Tidal – Barnacles

Previous Inspection:

Lead Diver:	C.B.I. No.:	Inspection Date:
Sojo, Fernando	00214	11/19/13

Inspection Personnel:

Field Personnel:	Title	C.B.I. No.:	Duty:	Signature:
Coon, Elliott J.	C.B.I. Diver-Inspector	00530/Lead	Dive	
Payne, Timothy N.	Diver-Inspector		Dive	
Belangia, Korye A.	Diver		Tend	

PILES/COLUMNS
ELEMENT: 204 P/S CONCRETE **38:** ea.
NBI: **6**

Condition State:	QTY:	Recommended Feasible Action:
CS-2	**4**	**Do Nothing**

Pile 2-8: SW corner 30in. below cap, spall, 13in. H x 2in. W x ¾in. D – NO CHANGE.
NW corner 24in. below cap, two spalls, up to 3in. H x 5in. W x 1in. D – NO CHANGE.

Pile 3-7: SE corner 3ft. 2in. below cap, spall, 8in. H x 2in. W x ¾in. D – NEW.

Pile 3-8: NE corner 3ft. 6in. below cap, spall, 17in. H x 3in. W x 1in. D – NO CHANGE.

Pile 3-17, SE corner and Pile 3-18, NE and *SE* corners, intermittent spalls, up to 24in. H x 3in. W x ¾in. D – INCREASE.

CS-1	**34**	**Do Nothing**

INCIDENTAL:
Random piles have unpatched pick-up points

Cleaning Log: Bents 2-15, 2-16, 2-17, 2-18 and 2-19 were cleaned.

This report contains information relating to the physical security of a structure and depictions of the structure. This information is confidential and exempt from public inspection pursuant to sections 119.071(3)(a) and 119.071(3)(b), Florida Statutes.

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UNDERWATER INSPECTION REPORT

BOLT UNDERWATER SERVICES, INC.

Structure ID: 860139
District: 04 AM Broward **Inspection Date: 12/11/15**

ABUTMENT SLOPE PROTECTION
ELEMENT: 396 OTHER: **130** sf.

NOTE: The toe of the slope is vertical 3ft. H only on south half of structure. The northern half has less than 12in. of water.

Condition State:	QTY:	Recommended Feasible Action:
CS-1	130	Do Nothing

CHANNEL
ELEMENT: 290 **1**: ea.
NBI: **6**

Condition State:	QTY:	Recommended Feasible Action:
CS-2	1	Do Nothing

There is drift and debris in the channel – NEW.

Between several piles there are sections of corrugated metal panels attached to both sides of the pile. Some sections are no longer attached and on channel bottom. The corrugated panels are causing areas of aggradation at various locations along the shore side of bents.

INSPECTION NOTES: Divers inspected Bents 2 and 3 each with nineteen 18in. concrete piles, Slope Protection and Channel.
STRUCTURE NOTES: Structure inventoried west to east

This report contains information relating to the physical security of a structure and depictions of the structure. This information is confidential and exempt from public inspection pursuant to sections 119.071(3)(a) and 119.071(3)(b), Florida Statutes.

(c:mydoc\bridgereports\86-broward\860139_BIR_12-11-15_UW) Page 2 of 2

UNDERWATER INSPECTION REPORT

Description

Structure Unit Identification

Bridge/Unit Key: 860139 0
Structure Name:
Description: Spans 1 thru 3
Type: M Main

Roadway Identification:

NBI Structure No (8) 860139
Position/Prefix (5) Route On Structure
Kind Hwy (Rte Prefix) 3 State Hwy
Design Level of Service 1 Mainline
Route Number/Suffix 00816/ 0 N/A (NBI)
Feature Intersect (6) C-13 Canal
Critical Facility Not Defense-crit
Facility Carried (7) Oakland Park Blvd.
Mile Point (11) 5.919
Latitude (16) 026d09'57.4" Long (17) 080d09'40.9"

Roadway Traffic and Accidents

Lanes (28) 8 Medians 1 Speed 45 mph
ADT Class ADT Class 4
Recent ADT (29) 57500 Year (30) 2014
Future ADT (114) 99763 Year (115) 2036
Truck % ADT (109) 5
Detour Length (19) 2.0 mi
Detour Speed -1 mph
Accident Count -1 Rate -1

Roadway Classification

Nat. Hwy Sys (104) 0 Not on NHS
National base Net (12) Not on Base Network
LRS Inventory Rte (13a) 86 090 000 Sub Rte (13b) 00
Functional Class (26) 14 Urban Other Princ
On Federal Aid System Y
Defense Hwy (100) 0 Not a STRAHNET hwy
Direction of Traffic (102) 2 2-way traffic
Emergency ☐

Roadway Clearances

Vertical (10) 99.99 ft Appr. Road (32) 76.1
Horiz. (47) 130 ft Roadway (51) 107.257 ft
Truck Network (110) 0 Not part of natl netwo
Toll Facility (20) 3 On free road
Fed. Lands Hwy (105) 0 N/A (NBI)
School Bus Route ☐
Transit Route ☐

Structure Identification

Admin Area	Broward
District (2)	D4 - Ft. Lauderdale
County (3)	(86)Broward
Place Code (4)	Oakland Park
Location (9)	SR-816 just W. of I-95
Border Br St/Reg (98)	Not Applicable (P) Share 0 %
Border Struct No (99)	
FIPS State/Region (1)	12 Florida Region 4-Atlanta
NBIS Bridge Len (112)	Meets NBI Length
Parallel Structure (101)	No || bridge exists
Temp. Structure (103)	Not Applicable (P)
Maint. Resp. (21)	1 State Highway Agency
Owner (22)	1 State Highway Agency
Historic Signif. (37)	5 Not eligible for NRHP

Geometrics

Spans in Main Unit (45)	3
Approach Spans (46)	0
Length of Max Span (48)	33.4 ft
Structure Length (49)	100.5 ft
Total Length	140.5 ft
Deck Area	13045 sqft
Structure Flared (35)	1 Yes, flared

Age and Service

Year Built (27)	1965
Year Reconstructed (106)	2004
Type of Service On (42a)	5 Highway-pedestrian
Under (42b)	5 Waterway
Fracture Critical Details	Not Applicable

Structure Type and Material

Curb/Sidewalk (50):	Left 5.8 ft Right 6.6 ft
Bridge Median (33):	2 Closed Med w/o Barrier
Main Span Material (43A):	5 Prestressed Concrete
Appr Span Material (44A):	Not Applicable
Main Span Design (43B):	01 Slab
Appr Span Design (44B):	Not Applicable

Deck Type and Material

Deck Width (52):	129.8
Skew (34):	15
Deck Type (107):	2 Concrete Precast Panel
Surface (108):	6 Bituminous
Membrane:	0 None
Deck Protection:	None

Appraisal

Structure Appraisal

Open/Posted/Closed (41)	A Open, no restriction
Deck Geometry (68)	5 Above Tolerable
Underclearances (69)	N Not applicable (NBI)
Approach Alignment (72)	9-No Speed Red No Curve
Bridge Railings (36a)	1 Meets Standards
Transitions (36b)	0 Substandard
Approach Guardrail (36c)	1 Meets Standards
Approach Guardrail ends (36d)	0 Substandard
Scour Critical (113)	3 SC - Unstable

Navigation Data

Navigation Control (38)	Permit Not Required
Nav Vertical Clr (39)	0 ft
Nav Horizontal Clr (40)	0 ft
Min Vert Lift Clr (116)	0 ft
Pier Protection (111)	Not Applicable (P)

NBI Condition Rating

Sufficiency Rating	77
Health Index	86.97
Structural Eval (67)	5 Above Min Tolerable
Deficiency	Not Deficient

Minimum Vertical Clearance

Over Structure (53)	99.99 ft
Under (reference) (54a)	N Feature not hwy or RR
Under (54b)	0 ft

Minimum Lateral Underclearance

Reference (55a)	N Feature not hwy or RR
Right Side (55b)	0 ft
Left Side (56)	0 ft

Load Rating

Design Load (31)	6 MS18(HS20)+mod
Rating Date	3/18/2005 Initials -1
Posting (70)	5 At/Above Legal Loads
Operating Type (63)	1 LF Load Factor
Operating rating (64)	61.6 tons Alternate 0
Inventory Type (65)	1 LF Load Factor
Inventory Rating (66)	37 tons Alternate 0
	Alt Meth -1

Schedule

Current Inspection

Inspection Date:	12/11/2015
Inspector:	KNKCALE-P - Eric Lambert
Bridge Group:	E4Q30
Primary Type:	Regular NBI
Review Required:	☒

Next Inspection Date — Scheduled

NBI:	12/11/2017
Element:	12/11/2017
Fracture Critical:	
Underwater:	12/11/2017
Other/Special:	

Schedule Cont.

Inspection Types Performed NBI ☒ Element ☒ Fracture Critical ☐ Underwater ☒ Other Special ☐

Inspection Intervals	Required (92)	Frequency (92)		Last Date (93)
Fracture Critical	☐	mos		
Underwater	☒	24 mos		12/11/2015
Other Special	☐	mos		
NBI		24 mos	(91)	12/11/2015 (90)

Inspection Resources

Crew Hours	4
Flagger Hours	0
Helper Hours	0
Snooper Hours	0
Special Crew Hours	3
Special Equip Hours	0

Custom

General Bridge Information

Parallel Bridge Seq		Bridge Rail 1	Concrete bicycle barrier
Channel Depth	12.1 ft	Bridge Rail 2	Not applicable-No rail
Radio Frequency	-1	Electrical Devices	No electric service
Phone Number	(000) 000-0000	Culvert Type	Not applicable
Exception Date		Maintenance Yard	491-Ft. Lauderdale
Exception Type	Unknown	FIHS ON / OFF	No Routes on FIHS
Accepted By Construction	01/01/1965	Previous Structure	
Warranty Expiration	00/00/0000	2nd Previous Structure	
		Replacement Structure	

Bridge Load Rating Information

HS20 Govr. Span Length	31.8 ft	Single Unit Truck 2 Axles	44.2 tons
L-Rating Origination	Design Plans	Single Unit Truck 3 Axles	46.1 tons
Load Rating Date	03/18/2005	Single Unit Truck 4 Axles	45.4 tons
Method Calculation	AASHTO formula	Combination Unit Truck 3 Axles	66.601 tons
Load Dist. Factor	0.677	Combination Unit Truck 4 Axles	60.201 tons
Impact Factor	30	Combination Unit Truck 5 Axles	60.201 tons
Design Method	Load Factor	Truck Trailer 5 Axles	70.2 tons
Design Measure	Systeme Internationale	Posting Weight	99 tons
Recommend SU Posting	99 tons	Actual SU Posting	99 tons
Recommend C Posting	99 tons	Actual C Posting	99 tons
Recommend ST Posting	99 tons	Actual ST Posting	99 tons
Gov FB Span	0 ft	FL 120 Long Gov Span	-1 tons
Gov FB Spacing	0 ft	FL 120 Trans	-1 tons
FB HS20 Rating	0 tons	Single Axle Trans	-1 tons
FB SU4 Rating	0 tons	Tandem Axle Trans	-1 tons
FB Present	N	Wing Span	-1 ft
FB INV Rating Factor	0	Web to Web Span	-1 ft
FB OPR Rating Factor	0	HS20 OPR Rating Max Span	61.6 tons
FB FL 120	tons	FL120 Long Max Span	-1 tons

Bridge Scour and Storm Information

Pile Driving Record	No pile driving records	Scour Recommended I	Perform countermeasures
Foundation Type	No foundation details	Scour Recommended II	Perform add'l monitoring
Mode of Flow	Tidal	Scour Recommended III	No recommendation
Rating Scour Eval	Scour Critical	Scour Elevation	-29.199 ft
Highest Scour Eval	Phase IV completed	Action Elevation	-11.601 ft
		Storm Frequency	100

Condition

NBI Rating

Channel (61)	7 Minor Damage	Culvert (62)	N N/A (NBI)
Deck (58)	7 Good	Waterway (71)	9 Above Desirable
Superstructure (59)	7 Good	Unrepaired Spalls	-1 sq.ft.
Substructure (60)	5 Fair	Review Required	☒

Elements

Inspection Date: 12/11/2015 QDCW

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	39/3	Unp Conc Slab/AC Ovl	4010	100.	0	.	0	.	0	.	0	.	**4010 sf.**

Notes Note:
This element represents the concrete deck along centerline and the south end.

INCIDENTAL:
Span 2 right (south) sidewalk has a span length x 1/64in. wide longitudinal crack near centerline – NEW.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	99/3	PS Conc Slab	0	.	9035	100.	0	.	0	.	0	.	**9035 sf.**

Notes Note:
The top face of the slab units is not visible due to an asphalt overlay. No independent movement was observed in the prestressed panels during inspection.

DECK TOP:
CS2:
The asphalt overlay has full length x 1/16in. wide longitudinal cracks over the slab unit joints – INCREASE.

The asphalt over the expansion joints has full roadway width x 1/2in. wide transverse cracks – INCREASE. Refer to photo 1.

The asphalt over Abutment 1 joint eastbound has a 30in. x 3in. x 2in. pothole at the left shoulder stripe – Refer to photo 1.

INCIDENTAL:
The northeast sidewalk in Span 3 has a 26ft. long x 2ft. wide hollow sounding area. The deck underside beneath this area is sound – NO CHANGE.

The deck underside has water staining between all prestressed panels - NO CHANGE.

Several of the scuppers are clogged – NEW.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	301/3	Pourable Joint Seal	76	86.36	0	.	12	13.64	0	.	0	.	**88 lf.**

Notes Note:
This element represents the sidewalk and median joints only. The joints in the travel are not visible.

CS3:
The left (north) sidewalk joints at Bents 2 and 3 are filled with dirt and vegetation – NEW. Refer to photo 2.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	333/3	Other Bridge Railing	177	88.06	24	11.94	0	.	0	.	0	.	**201 lf.**

Notes Note:
This element represents the concrete barriers with aluminum rail attached to the top.

CS2:
Random aluminum rail anchor bolts have moderate surface corrosion – NEW.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
Paint over the graffiti on the south fascia of the barrier at Span 3.

CORRECTIVE ACTION EVALUATION:
The corrective action noted above was completed.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	310/3	Elastomeric Bearing	6	100.	0	.	0	.	0	.	0	.	**6 ea.**

Notes

Elements

Inspection Date: 12/11/2015 QDCW

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	204/3	P/S Conc Column	33	86.84	5	13.16	0	.	0	.	0	.	**38 ea.**

Notes CS2:
Pile 2-8 has two edge spalls up to 3in. x 5in. x 1in. in the northwest corner, 2ft. below the cap - NO CHANGE.

The following was noted by the underwater inspectors:
CS2:
Pile 2-8 has a 13in. x 2in. x 3/4in. spall in the southwest corner, 30in. below the cap – NO CHANGE.

Pile 3-7 has an 8in. x 2in. x 3/4in. spall in the southeast corner, 3ft. 2in. below the cap – NEW.

Pile 3-8 has a 17in. x 3in. x 1in. spall in the northeast corner, 3-1/2ft. below the cap – NO CHANGE.

Pile 3-17 southeast corner and Pile 3-18 southeast and northeast corners have intermittent spalls up to 2ft. x 3in. x 3/4in. – INCREASE.

CS1:
Random piles have unpatched pick up points - NO CHANGE.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	215/3	R/Conc Abutment	269	96.76	2	.72	7	2.52	0	.	0	.	**278 lf.**

Notes CS3:
Abutment 1 cap has a 3-1/2ft. x 30in. x 1-1/2in. spall/delamination under Slab Units 1-2 and 1-3 – INCREASE. Refer to photo 3.

Abutment 1 cap has three vertical cracks up to 2ft. long x 1/64in. wide with efflorescence and corrosion staining in the south face – NO CHANGE.

Abutment 4 cap has a 5in. x 3in. x 1in. spall with 5in. of exposed rebar below Slab Unit 3-2 – NO CHANGE. Refer to photo 4.

CS2:
Abutment 4 cap below the north soffit has a diagonal hairline crack 2ft. long with moderate efflorescence - NO CHANGE.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1. Repair the undermining at Abutment 4 cap at the south end.
2. Repair and seal the crack and spall at Abutment 1.
3. Repair spall at Abutment 4.

CORRECTIVE ACTION EVALUATION:
1. thru 3. The corrective actions noted above were not completed. A recommendation will be repeated in this report.

Elements

Inspection Date: 12/11/2015 QDCW

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	234/3	R/Conc Cap	266	96.73	0	.	9	3.27	0	.	0	.	**275 lf.**

Notes CS3:
Bent 2 cap west and east faces above Pile 2-11 has three reflective 2ft. long hairline cracks with moderate efflorescence and minor rust staining – NO CHANGE. Refer to photo 5.

Bent 3 cap east face 5ft. from the north end has a spall with a delamination up to 30in. diameter x 2in. in the east face - NO CHANGE. Refer to photo 6.

Bent 3 cap east face above Piles 3-6, 3-12 and 3-19 has 2ft. long hairline cracks with moderate efflorescence and rust staining - NO CHANGE.

INCIDENTAL:
There is moderate vegetation at the south end of Bent 2 and 3 caps – NEW. Refer to photo 7.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1. Remove vegetation growth from Bents 2 and 3 caps north faces.
2. Repair hairline cracking at Bent 3 above Piles 3-6, 3-12 and 3-19.
3. Repair spall and delamination to the east face of Bent 3.
4. Repair reflective hair line vertical cracking at Bent 2.

CORRECTIVE ACTION EVALUATION:
1. The corrective action noted above was completed.
2. The corrective action noted above was not completed. A recommendation will not be repeated in this report.
3. Repair the spall and delamination to the east face of Bent 3. A recommendation will be repeated in this report.
4. The corrective action noted above was not completed. A recommendation will not be repeated in this report.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	396/3	Other Abut Slope Pro	1722	93.03	42	2.27	87	4.7	0	.	0	.	**1851 sf.**

Notes Note:
This element represents the sand-cement rip rap bag slope protection at both abutments.

CS3:
The slope protection at Abutment 4 below the north soffit has an area of settlement over 10ft. long x 7ft. wide x 5in. deep (70sf) – NO CHANGE. Refer to photo 8.

The slope rip rap at Abutment 4, 10ft. south of the north end has an area of settlement over 18ft. long x 6in. wide x 3in. deep leaving a gap up to 3in. wide (9sf) – NO CHANGE. Refer to photo 9.

The slope rip rap at Abutment 4, 25ft. from the south end has an area of settlement 4ft. long x 2ft. wide x 4in. deep (8sf) – NO CHANGE.

CS2:
There is a gap between the slope rip rap and the cap at Abutment 1 over 36ft. long x 2in. wide x 17in. deep (36sf) – NO CHANGE. Refer to photo 10.

Abutment 4 slope has a 6ft. long x 1in. wide crack in the grout slurry along the cap at the north end (6sf) – NEW. Refer to photo 11.

PREVIOUS RECOMMENDED CORRECTIVE ACTION:
1. Repair the gap between the slope riprap and the cap at Abutment 1.
2. Repair the settlements in the slope rip rap at Abutment 4.

CORRECTIVE ACTION EVALUATION:
1. & 2. The corrective actions noted above were not completed. A recommendation will be repeated in this report.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	290/3	Channel	0	.	1	100.	0	.	0	.	0	.	**1 ea.**

Notes The following was noted by the underwater inspectors:
CS2:
Between several piling, there are sections of corrugated metal panels attached to both sides of the pile. Some of the sections are no longer attached and are on the channel bottom around and between the piles with rebar and one H-Pile adjacent to Bent 3. The corrugated panels are causing minor areas of aggradation at various locations along the shore side of the bents - NO CHANGE.

Elements

Inspection Date: 12/11/2015 QDCW

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	321/3	R/Conc Approach Slab	1	50.	0	.	1	50.	0	.	0	.	**2 ea.**

Notes Note:
The approach slabs are not visible due to an asphalt overlay.

CS3:
The east approach slab south edge has a 3ft. long x 3in. high x 18in. back under area of undermining at the abutment cap – NEW. Refer to photo 12. This was previously noted under Element 215 R/Conc Abutment.

INCIDENTAL:
The west approach slab asphalt east bound has a slab length x 1/8in. wide longitudinal crack, 5ft. from the median – NEW.

The asphalt over the approach slab/approach roadway transitions has a roadway width x 1/4in. wide transverse crack – NEW.

The north edge of the east approach slab median has impact scrapes up to 1/2in. deep – NEW.

The northeast and northwest approach sidewalks have minor sidewalk width x 1in. x 1in. spalls/delaminations along the abutment joints – NEW.

Span Id	Elem/Env	Description	Qty1	%1	Qty2	%2	Qty3	%3	Qty4	%4	Qty5	%5	T Qty
0	475/3	R/Conc Walls	204	100.	0	.	0	.	0	.	0	.	**204 lf.**

Notes Note:
This element represents the wingwalls at the four corners of the bridge.

Total Number of Elements: 12

Inspection Information

Inspection Date: 12.11.2015 **Type:** Regular NBI
Inspector: KNKCALE-P - Eric Lambert

Inspection Notes: Sufficiency Rating Calculation Accepted by KNKCADG-P at 2016-01-20 15:06:57

Inspection Date: 04.14.2014 **Type:** Regular NBI
Inspector: KNTCCFS-P - Fernando Sojo

Inspection Notes: Sufficiency Rating Calculation Accepted by kn853lm-P at 2014-05-30 10:57:53

Note: The scope of this Regular NBI inspection for elements 204, 290 and 396 is limited to the areas above the waterline at the time of inspection. Comments relative to this inspection for these elements, if applicable, are provided under the heading "Topside Report". For a comprehensive list of all other elements and deficiencies, refer to the most recent Routine (NBI) inspection report dated 04/14/2014.

Inspection Date: 11.19.2013 **Type:** UW-Contract SCUBA
Inspector: KNIEIAY-P - Andrew Young

Inspection Notes: Sufficiency Rating Calculation Accepted by KNIEISM-P at 2013-12-12 11:19:35

Note: This is the Routine Underwater Inspection report. Only Elements 204, 396, and 290 are included in this report. Element inspection notes relative to the underwater inspection are provided after the heading "DIVE REPORT". Any previously reported element inspection notes from the Routine Inspection report date 4/23/2012 relative to these elements are provided after the heading "TOPSIDE REPORT". For a comprehensive list of all other elements and deficiencies, refer to the most recent Routine (NBI) Inspection report dated 4/23/2012.

Inspection Information

Inspection Date: 04.23.2012 **Type:** Regular NBI

Inspector: KNOMEJR-P - James Richardson

Inspection Notes: The scope of this Regular NBI inspection for elements 204, 290 and 396 is limited to the areas above the waterline at the time of inspection. Comments relative to this inspection for these elements, if applicable, are provided under the heading "Topside Report". Comments relative to the previous 11/17/2011 UW Contracted Services report for these elements, if applicable, are provided under the heading "Dive Report".

Inspection Date: 11.17.2011 **Type:** UW-Contract SCUBA

Inspector: INACTIVE - Timothy Stickland

Inspection Notes: Sufficiency Rating Calculation Accepted by KNIEIZV-P at 2011-11-30 13:23:26

Note: This is the Routine underwater inspection report. Only Elements 204, 396, and 290 are included in this report. Element inspection notes relative to the underwater inspection are provided after the heading "DIVE REPORT". Any previously reported element inspection notes from the Routine inspection report dated 04/19/2010 relative to these elements are provided after the heading "TOPSIDE REPORT". For a comprehensive list of all other elements and deficiencies, refer to the most recent Routine (NBI) inspection report dated 04/19/2010.

UNDERWATER ELEMENTS INSPECTED:

Element 204 - P/S Conc Column (Bents 2 and 3, all below the high waterline)
Element 396 - Other Abut Slope Pro (West and east sides, all below the high waterline)
Element 290 - Channel (All)

Inspection Date: 04.19.2010 **Type:** Regular NBI

Inspector: MT438RC-P - Russell Coffey

Inspection Notes: Comments from the most recent Dive Report are contained in this report.

Inspection Date: 11.10.2009 **Type:** UW-Contract SCUBA

Inspector: INACTIVE - Jeff Zawacki

Inspection Notes: Sufficiency Rating Calculation Accepted by KNIEIIC-P at 2009-12-01 14:15:38

NOTE: This is the Routine underwater inspection report. Only Elements 204, 396, and 290 are included in this report. Element inspection notes relative to the underwater inspection are provided after the heading "DIVE REPORT". Any previously reported element inspection notes from the Routine inspection report dated 4/28/2008 relative to these elements are provided after the heading "TOPSIDE REPORT". For a comprehensive list of all elements and deficiencies, refer to the most recent Routine (NBI) inspection report dated 4/28/2008.

Inspection Date: 04.28.2008 **Type:** Regular NBI

Inspector: INACTIVE - Mike Rausch

Inspection Notes: Note: The scope of this Regular NBI inspection for elements 204, 396 and 290 is limited to the areas above the waterline at the time of inspection. Comments relative to this inspection for these elements, if applicable, are provided under the heading "Topside Report". Comments relative to the previous 11/12/07 UW Contract Force Scuba report for these elements, if applicable, are provided under the heading "Dive Report".

Inspection Information

Inspection Date: 11.12.2007 **Type:** UW-Contract SCUBA

Inspector: INACTIVE - Stephen Hays

Inspection Notes: Sufficiency Rating Calculation Accepted by KNHWLSH-P at 2007-11-30 08:34:49

NOTE: This is the Routine underwater inspection. Only Elements 204, 396 and 290 are included in this report. Element inspection notes relative to the underwater inspection are provided after the heading "DIVE REPORT". Any previously reported element inspection notes from the Routine inspection report dated 4/21/05 or the Special Inspection report dated 3/26/07 relative to these elements are provided after the heading "TOPSIDE REPORT". For a comprehensive list of all elements and deficiencies, refer to the most recent Routine (NBI) inspection report dated 4/21/05.

Inspection Date: 03.26.2007 **Type:** Special

Inspector: 92

Inspection Notes:

Inspection Date: 03.29.2006 **Type:** Regular NBI

Inspector: MT438RC-P - Russell Coffey

Inspection Notes:

The scope of this Regular NBI inspection for element 204 is limited to the areas above the waterline at the time of inspection. Comments relative to this inspection for this element, if applicable, are provided under the heading "ELEMENT INSPECTION NOTES". Comments relative to the previous UW Scuba report for this element, if applicable, are provided under the heading "Dive Report" 10/12/05.

Inspection Date: 10.12.2005 **Type:** UW-Contract SCUBA

Inspector: 793

Inspection Notes: Sufficiency Rating Calculation Accepted by knhwlhn-P at 2005-11-18 15:33:03

This is the routine underwater inspection. Only Elements 204 and 290 are included in this report. Element inspection notes relative to the underwater inspection are provided after the heading "DIVE REPORT". Any previously reported element inspection notes from the Routine inspection report dated 04/21/05 relative to these elements are provided under the heading "TOPSIDE REPORT". For a comprehensive list of all elements and deficiencies, refer to the most recent Routine (NBI) inspection report dated 04/21/05.

Inspection Date: 04.21.2005 **Type:** Regular NBI

Inspector: 92

Inspection Notes: The scope of this Regular NBI inspection for elements 204 and 396 is limited to the areas above the waterline at the time of inspection.

Inspection Date: 04.21.2005 **Type:** UW-State force SCUBA

Inspector: 251

Inspection Notes: NOTE: Elements 204, 290 and 396 are included in this State force scuba report. Element inspection notes relative to this inspection are provided after the heading "DIVE REPORT". Element inspection notes from the previous 4/21/2005 Regular NBI report are provided after the heading "TOPSIDE REPORT".

Inspection Date: 02.23.2004 **Type:** Regular NBI

Inspector: 96

Inspection Notes: This structure will be widen this year under Project no. 86090-3535, and Fin project no. 228038-15201.

Inspection Information

Inspection Date: 12.31.2003 **Type:** UW-State force SCUBA
Inspector: 251
Inspection Notes: Divers report: The scope of this inspection on 12/31/2003 was limited to the areas below the water line at the time of inspection.

Inspection Date: 02.26.2002 **Type:** Regular NBI
Inspector: 92
Inspection Notes: The scope of the 2/26/02 Regular NBI inspection for piling is limited to the areas above the waterline at the time of inspection.
Previous comments > The scope of this inspection (01/24/2002) was limited to the areas below the water line at the time of inspection.

Inspection Date: 01.24.2002 **Type:** UW-State force SCUBA
Inspector: 251
Inspection Notes: The scope of this inspection (01/24/2002) was limited to the areas below the water line at the time of inspection.

Inspection Date: 03.09.2000 **Type:** Regular NBI
Inspector: 95
Inspection Notes:

Inspection Date: 04.01.1998 **Type:** Regular NBI
Inspector: BID
Inspection Notes:

Structure Notes

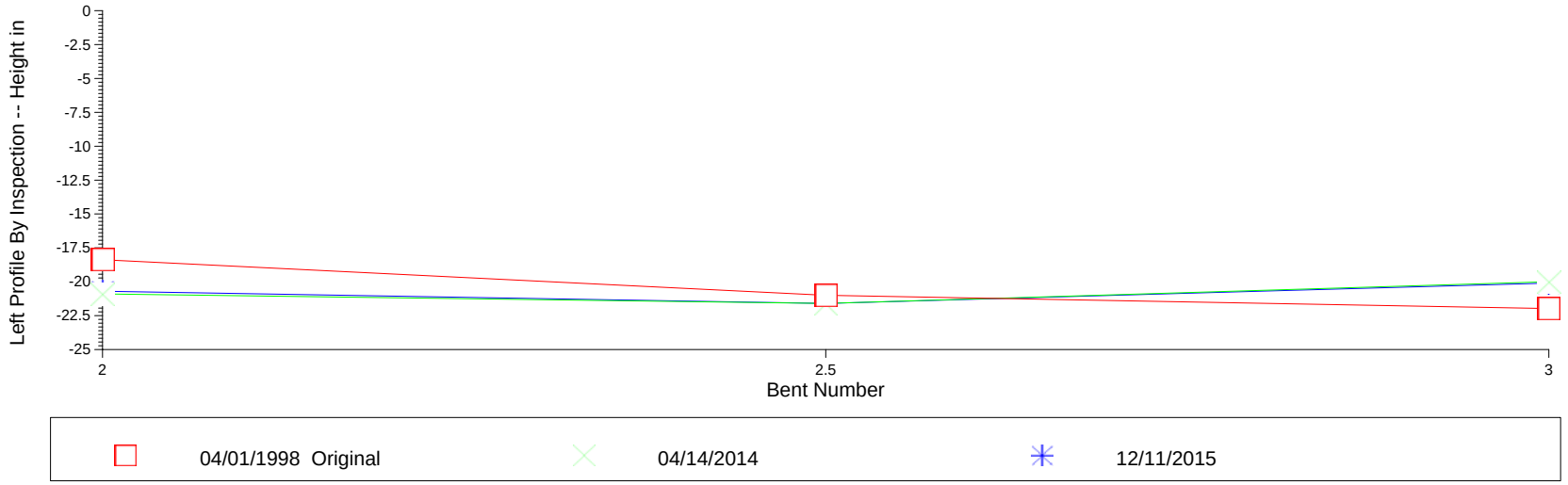
TRAFFIC RESTRICTIONS: According to the load rating analysis dated 3/18/05, this structure does not require posting. This structure is not posted.

LOAD CAPACITY EVALUATION:
Since the current load rating dated 3/18/05, there is no indication that deterioration, geometric changes or additional dead load have occurred that would warrant a new load rating analysis.

This structure is inventoried as per the federal coding manual, the lowest mile point from the strait line diagram is the start of the bridge. The west end is Abutment-1 and east end is Abutment-4.

The following elements were inspected underwater by the divers:
204 P/S Conc Column – Bents 2 and 3 each with nineteen 18in. concrete piles
396 Other Abut Slope Pro
290 Channel (All)

There is a 4-1/2in. steel utility attached to the outside face of the right barrier wall. Anchorage types is unknown.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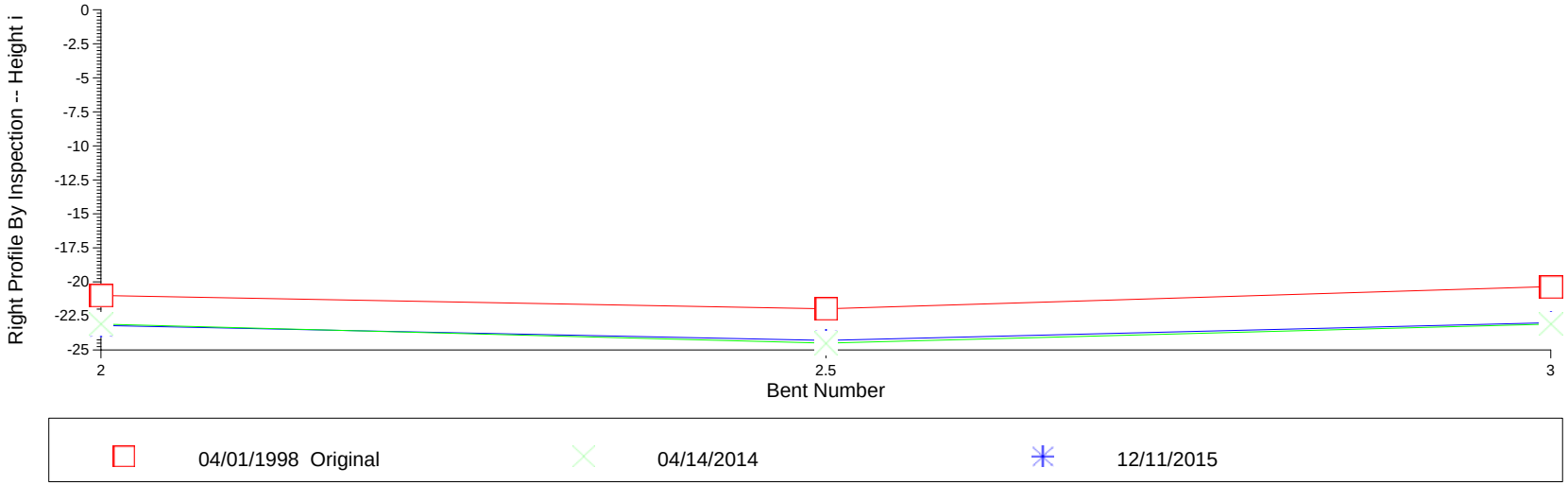
-5
-7.5
-10
-12.5
-15
-17.5
-20
-22.5
-25
2
2.5
3
Bent Number
04/01/1998 Original
04/14/2014
12/11/2015


Right Profile By Inspection -- Height i
0
-2.5
-5
-7.5
-10
-12.5
-15
-17.5
-20
-22.5
-25
2
2.5
3
Bent Number
04/01/1998 Original
04/14/2014
12/11/2015

Profile Data - Numerical Summary

Inspection Date and Key: 12/11/2015 QDCW

Bent #	Left Height	Right Height
2	20.7	23.2
2.5	21.6	24.3
3	20.1	23

(All Heights Are In Feet)

Air Temp:
Profile Notes:
Measurements referenced to the top of the concrete barrier walls.
Waterline taken at Bent 2: Left = 12.5ft. Right = 12.2ft.

Inspection Date and Key: 04/14/2014 FKTX

Bent #	Left Height	Right Height
2	20.9	23.1
2.5	21.6	24.5
3	20	23.1

Air Temp: 84
Profile Notes:
Measurements referenced from the top of the concrete barrier wall.
Waterline at Bent 2 Left = 11.0-feet and at Bent 2 Right = 11.3-feet.

Inspection Date and Key: 04/01/1998 STRT
(Original Inspection)

Bent #	Left Height	Right Height
2	18.37	21
2.5	21	21.98
3	21.98	20.34

Air Temp:
Profile Notes:
Distance to water 4.3m

ADDENDUM TO SCOUR EVALUATION REPORT PHASE 1

PREPARED FOR:

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 4
DISTRICTWIDE SCOUR EVALUATIONS
FAP NO.: N/A; FPID: 427334-1-72-1 (STATE BRIDGE)

BRIAN O'DONOGHUE, P.E. PROJECT MANAGER

BRIDGE NUMBER:	**860139**
OWNER:	**FLORIDA DEPARTMENT OF TRANSPORTATION**
BRIDGE NAME:	**OAKLAND PARK BLVD. OVER C-13 CANAL**
LOCATION:	**SR-816 JUST WEST OF I-95**
COUNTY:	**BROWARD**

SCOUR VULNERABILITY

SCOUR MODE: ☐ Riverine ☒ Tidal ☐ Both

SCOUR CRITICAL: ☐ Yes ☒ No

SCOUR RATING:

Scour Susceptible:	☒ Yes	☐ No
Low Risk:	☐ Yes	☒ No
Foundations:	☐ Known	☒ Unknown

RECOMMENDATION:

The bridge's Scour Vulnerability Rating is Scour Susceptible (Medium Priority). As such, a Phase 2 Analysis is recommended for the bridge due to the insufficient computed embedment depth of 10.2 ft and the bridge's history of scour. Continued measurement of the bed cross-section is recommended as part of the scheduled bridge inspection program.

☒**PHASE 1**	☐**PHASE 2**	☐ **PHASE 3**	☐**PHASE 4**
QUALITATIVE EVALUATION/ ASSESSMENT	HYDRAULIC/HYDROLOGIC ASSESSMENT	STRUCTURAL/GEOTECHNICAL ASSESSMENT	PLAN OF ACTION
DATE: ***09/24/1994***	**DATE:** _____	**DATE:** _____	**DATE:** _____
ADDENDUM: ***12/14/2011***			

CHECKED BY: ***MARK GOSSELIN, P.E., PH.D.***

BACKCHECKED BY: ***MAX SHEPPARD, PH.D.***

CORRECTED BY: ***TOM GLASSER, E.I.***

APPROVED BY: ***MARK GOSSELIN, P.E., PH.D.***

OEA, Inc.
100 SW 75th Street, Suite 107
Gainesville, FL 32607
(352) 332-2823

ENGINEER OF RECORD: ***Mark Gosselin, P.E., Ph.D.***

54594

SIGNATURE **P.E. NUMBER**

1.0 PURPOSE

The purpose of this document is to revise the existing Phase 1 Scour Evaluation Report with the new information about the pile embedments (either located or developed) from the application of procedure for reclassifying bridges with unknown foundations. The recommendations developed in this document will supersede those from the original Phase 1 Scour Evaluation Report.

2.0 SUMMARY OF FINDINGS

The undated (estimated at 1994) Phase 1 Scour Evaluation Report identified Bridge Number 860139 as Scour Susceptible (Medium Priority) due to an erodible bed, an aggressive waterway, undermining of the west abutment, and lightly vegetated channel. As a result of Step 5.2 of the procedure "Reclassifying Bridges with Unknown Foundations", Tierra has computed the minimum embedment depth at the time of construction of 14 ft. Analysis of the bridge's cross-section between 1989 and 2009 in Step 6.1 of the procedure resulted in a -3.8 ft adjustment to the minimum embedment depth at the time of construction. Therefore, the resulting 2011 minimum embedment depth computed is 10.2 ft.

The bridge is supported by two vertical abutments protected with sand-cement riprap. During the 1994 field review, the sand-cement riprap was observed to be in fair condition. The 2010 Bridge Inspection Report (BIR) describes the abutments as showing little or no deterioration. However, the southwest slope and riprap wall has an area that has settled and rotated. Undermining of the abutment cap is also occurring in this area. The east slope riprap has a settled in areas with several missing and displaced riprap bags at the toe of the wall. The underwater inspection revealed that the east slope protection has areas of undermining and settlement. The BIR recommended repairing the all areas where the slope protection has failed. The 2011 Stage 2 Abutment Scour Protection Evaluation Field Review Report documented 4 ft to 5 ft of erosion on the downstream north side. It also noted the protection sloping away from the abutments and recommended minor repair of sand-cement bags with grout.

3.0 CONCLUSIONS AND RECOMMENDATIONS

The Scour Vulnerability Rating for the bridge remains unchanged from Scour Susceptible (Medium Priority) as a result of the procedure for reclassifying bridges with unknown foundations. The bridge is founded in an erodible bed, has been degrading, the abutment protection is in need of minor repairs, and the computed embedment depth is not deemed sufficient. This indicates a Scour Susceptible category bridge. The bridge is rated Medium Priority because while degrading, the observed flows through the bridge are low, the tidal range is low, and the bridge will not be overtopped during a 100-year flood.

Given a Scour Susceptible (Medium Priority) Scour Vulnerability Rating, a Phase 2 Analysis is recommended for the bridge due to the insufficient computed minimum embedment depth and history of degradation. Continued measurement of the bed cross-section is recommended as part of the scheduled bridge inspection program.

4.0 REFERENCES

Undated (estimated at 1994) Scour Evaluation Report – Phase 1
2010 Bridge Inspection Report
2011 Stage 2 Abutment Scour Protection Evaluation Field Review Report

5.0 ATTACHMENTS

ATTACHMENT A STEP 6.1 PILE EMBEDMENT WORKSHEET

ATTACHMENT A STEP 6.1 PILE EMBEDMENT WORKSHEET

Step 6.1 Pile Embedment Worksheet

Are original plans available?	☐Yes	☒ No
Are bed profiles available over time?	☒Yes	☐ No
Were the embedment depths adjusted?	☒Yes	☐ No

1.0 Adjustment Justification

Bridge Number 860139 was built in 1965 and repaired in 1988. The original plans, borings, and the pile driving logs unavailable. The bed cross-section measurement data is available in 1984, 1986, 1988, 1992, 1994, and 2009 for the downstream side of the bridge only. Analysis of the bridge's cross-section from 1989 to 2009 indicates a degrading bed. The bed elevation decreased by up to -3.8 ft at Bent 3 on the downstream face of the bridge. The bed elevation decreased by approximately 2 ft between the 1994 measurements and the 2009 measurements and is at its lowest elevation since the measurements began. As such, the adjustment to the minimum embedment depth provided by Nodarse & Associates, Inc. of 14 ft at the time of construction is -3.8 ft. Therefore, the resulting 2011 minimum embedment depth for the bridge is 10.2 ft.

Table 1 Minimum Embedment Depths for the Interior Bents

Bent	Embedment (ft)	Adjustment (ft)	Adjusted Embedment (ft)
2	14	-3.8	10.2
3	14	-3.8	10.2

Prepared By: Tom Glasser TLG
initials

Checked By: Mark Gosselin P.E., Ph.D. MSG
initials

OEA, Inc.

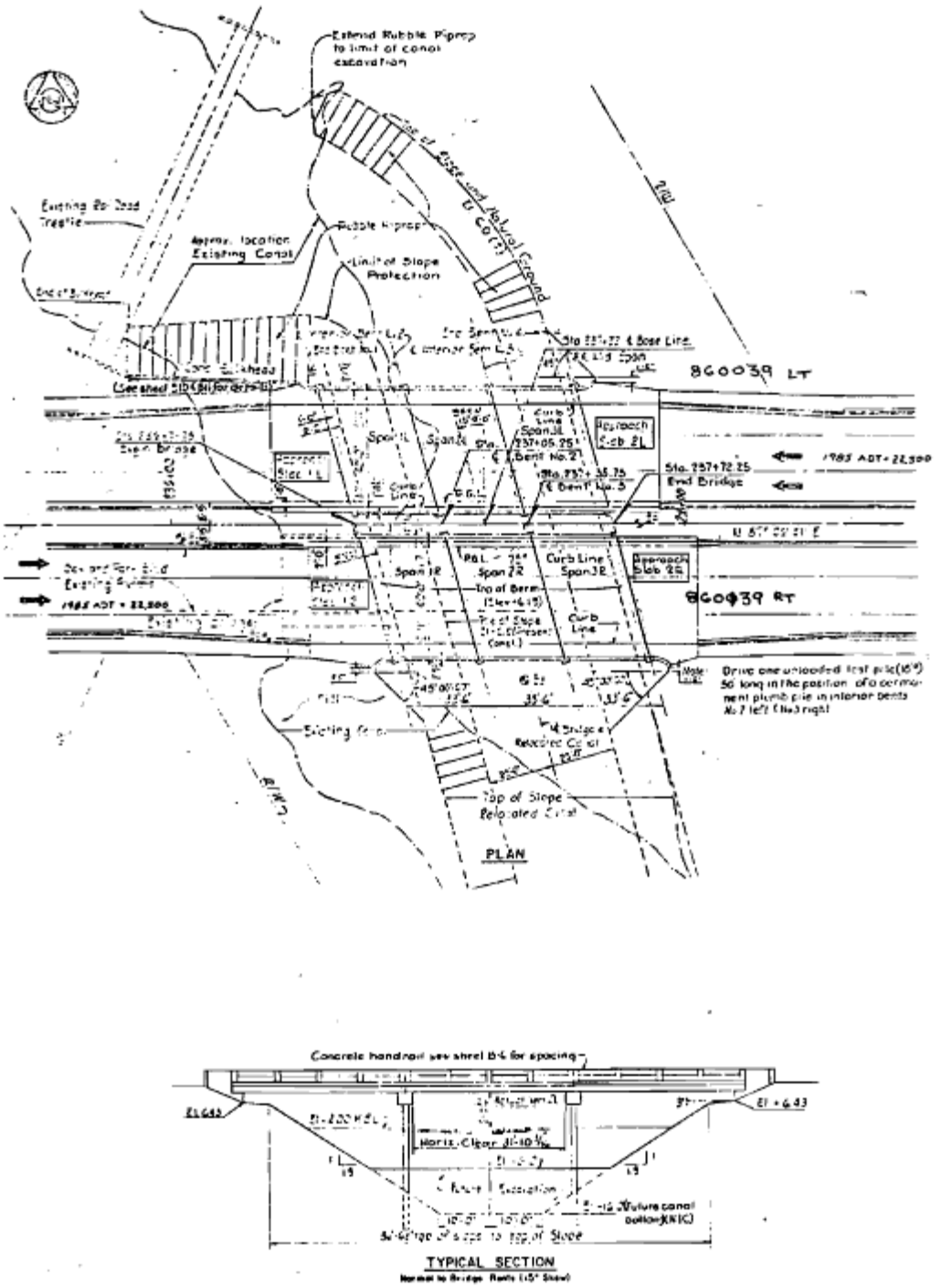


Figure 1 Bridge Plans from the Undated (estimated at 1994) Phase 1 Scour Evaluation Report

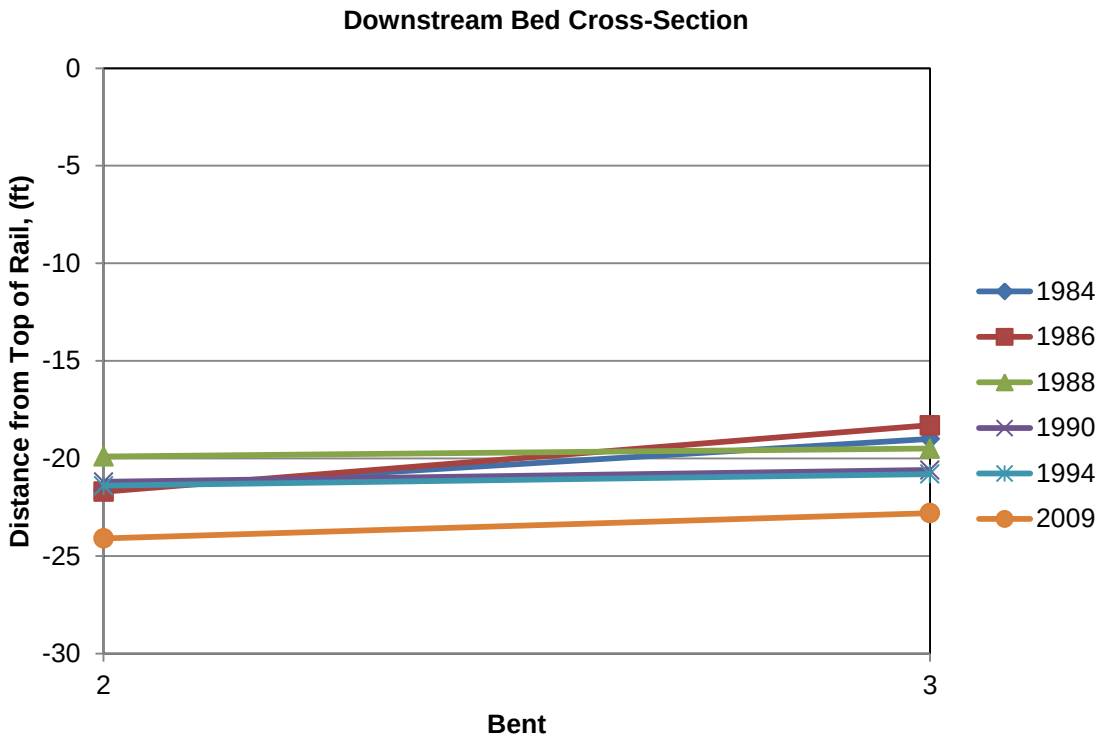


Figure 2 Downstream Bed Cross-Section

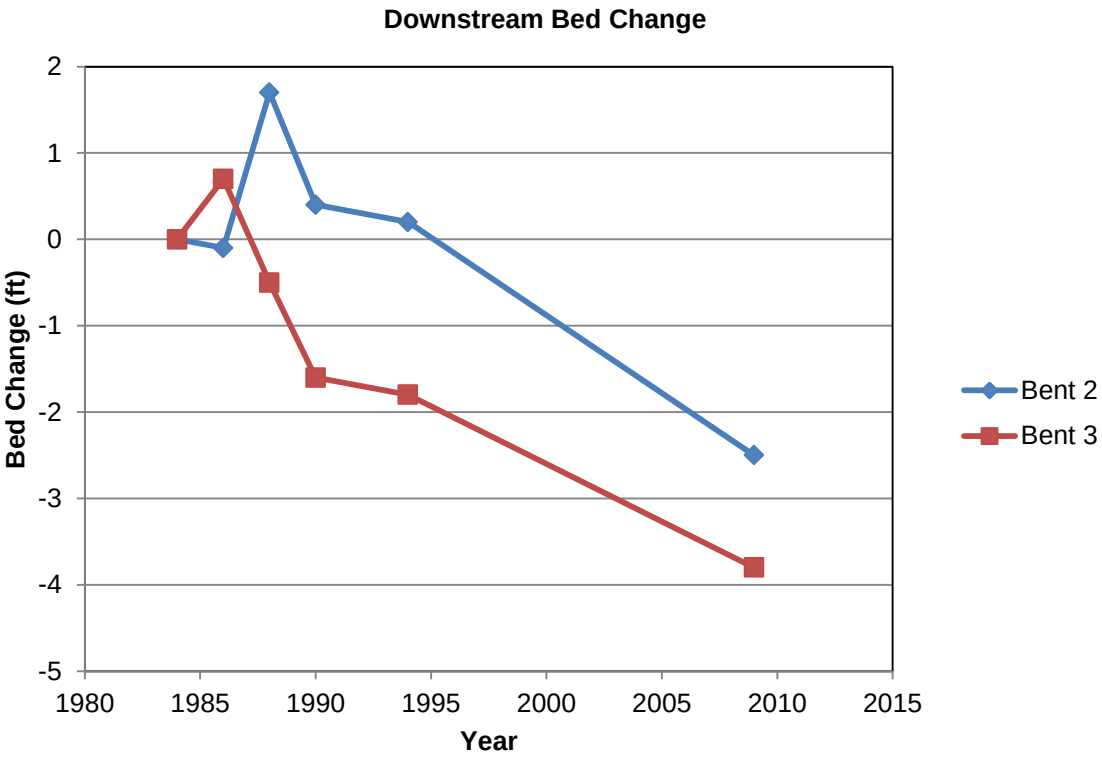


Figure 3 Downstream Bed Change

Table 2 Bed Cross-Section Measurements from the Undated (1994) Phase 1 Scour Evaluation Report and the 2009 Bridge Inspection Report

Downstream Cross-Section, from Top of Rail (ft)						
	1984	1986	1988	1990	1994	2009
Bent 2	-21.6	-21.7	-19.9	-21.2	-21.4	-24.1
Bent 3	-19	-18.3	-19.6	-20.6	-20.8	-22.8

SCOUR EVALUATION REPORT PHASE 2

PREPARED FOR:

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 4
DISTRICTWIDE SCOUR EVALUATIONS
FAP NO.: NBIS 218A/NBIS 219A; FPID: 427334-1-72-1 (STATE BRIDGE)

BRIAN O'DONOGHUE, P.E. PROJECT MANAGER

BRIDGE NUMBER:	**860139**
OWNER:	**FLORIDA DEPARTMENT OF TRANSPORTATION**
BRIDGE NAME:	**OAKLAND PARK BLVD. OVER C-13 CANAL**
LOCATION:	**SR-816 JUST WEST OF I-95**
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SCOUR VULNERABILITY

SCOUR MODE:	☐ Riverine	☒ Tidal	☐ Both
SCOUR CRITICAL:		☒ Yes	☐ No
SCOUR RATING:	**Scour Susceptible:**	☐ Yes	☒ No
	Low Risk:	☐ Yes	☒ No
	Foundations:	☐ Known	☒ Unknown

RECOMMENDATION: *THIS BRIDGE IS RATED SCOUR CRITICAL. A PHASE III ANALYSIS IS RECOMMENDED BASED ON THE PREDICTED UNDERMINING OF PILES RESULTING FROM THE PREDICTED 100-YEAR SCOUR DEPTHS. INSTALLATION OF SCOUR COUNTERMEASURES, AUGMENTATION OF ABUTMENT SCOUR PROTECTION, AND CONTINUED BED MONITORING IS RECOMMENDED.*

☒PHASE 1	☒PHASE 2	☐ PHASE 3	☐PHASE 4
QUALITATIVE EVALUATION/ ASSESSMENT	HYDRAULIC/HYDROLOGIC ASSESSMENT	STRUCTURAL/GEOTECHNICAL ASSESSMENT	PLAN OF ACTION
DATE: *UNDATED*	**DATE: *05/21/2012***	**DATE:**	**DATE:**
ADDENDUM: *12/14/2011*			

PREPARED BY: ***JACOB MCBEE, P.E.***

CHECKED BY: ***MARK GOSSELIN, P.E., PH.D.***

CORRECTED BY: ***JACOB MCBEE, P.E.***

QA/QC BY: ***D. MAX SHEPPARD, PH.D.***

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(352) 332-2323
PROJECT MANAGER: ***JACOB MCBEE, P.E.***

JACOB MCBEE LICENSE 73978 STATE OF FLORIDA PROFESSIONAL ENGINEER

7/11/2012 ***73978***

SIGNATURE **PE. NUMBER**

1. SUMMARY

Based on a complex tidal phase 2 analysis, Bridge Number 860139 is rated as a Scour Critical bridge. The bridge carries the westbound and eastbound traffic of Oakland Park Boulevard over the C-13 Canal. The Florida Department of Transportation constructed the bridge in Broward County in 1965. The bridge was repaired in 1988. The multi-span bridge is supported by two vertical abutments protected by sand-cement riprap. Based on the 1965 Original Design Plans and the 1988 Repair Plans, the substructure consists of two interior bents that are supported by piles of unknown length and embedment. The Broward County soil survey indicates soils in the immediate vicinity are poorly drained and contain fine sand underlain with sand and limestone. According to the 2011 Phase 1 Addendum, the adjusted the minimum embedment depth for this bridge is 10.2 ft.

Hydraulic and Scour Evaluation

Bridge 860139 spans the C-13 Canal in Broward County. The C-13 Canal is a perennially flowing, tidal waterway that flows into the Middle River. Given the bridge's location downstream of the South Florida Water Management District (SFWMD) S-36 flow control structure, analysis of riverine runoff was necessary to determine whether storm surge or runoff produced design hydraulic conditions through the bridge. A two-dimensional, storm-surge driven hydrodynamic model was employed develop the 100- and 500-year surge flow parameters at the bridge. The U.S. Army Corps of Engineers (USACE) supported RMA2 model provides a robust means of simulating storm surges and evaluating the flow parameters in the area of interest. In 2003, Kimley-Horn Associates Inc. and Ocean Engineering Associates Inc. developed calibrated RMA2 models at each inlet within District 4. Bridge 860139 is contained outside the domain of the 2003 Port Everglades Inlet model. To assess 100- and 500-year surge flow parameters through the bridge opening, a new RMA2 model was developed with a domain encompassing Dania Canal and Hollywood Canal. The new RMA2 model was driven by a hydrograph extracted from the 2003 model at the confluence of the ICWW and Dania Cut-Off Canal. For the runoff modeling, hydrology was developed through application of the methodologies described in Bulletin 17B to develop the design flows from the gage data at the SFWMD S-36 structure. A one-dimensional HEC-RAS model simulated the flows through the bridge during the 100- and 500-year flow events. Model results from the 100- and 500-year surge and runoff simulations were compared to determine the most severe hydraulic conditions for scour.

From the simulations, the maximum water surface elevations at the bridge occurred during the surge simulation. However, the maximum velocity conditions occurred during the design runoff events. Since the local scour has a stronger dependence on velocity than depth, the runoff conditions dictated design scour depths. During the 100-year runoff event the water surface elevation is +2.1 ft-NAVD, and during the 500-year runoff event, it is +2.6 ft-NAVD. Neither event will result in overtopping of the structure. The maximum modeled flow velocities through the bridge opening were 6.2 ft/s during the 100-year event and 6.9 ft/s during the 500-year event. The flow rates through the bridge opening are 2,543 cfs for the 100-year simulation and 2,996 cfs for the 500-year simulation.

When employing the extracted model flow parameters as inputs to the HEC-18 and Florida Pier Scour Equations, the result is a total scour of 18.6 ft for the 100-year event and 19.3 ft for the 500-year event. Both values are applicable to bents 2 and 3. The initial embedment provided within the 2011 Embedment Report is 14.0 ft. The 2011 Phase I Evaluation Addendum determined that a downward adjustment of 3.8 ft was necessary after the historical cross sections were analyzed. Table 1 summarizes the scour and estimated pile embedment at this bridge.

Table 1 Scour Calculation and Embedment Summary

	100-year	500-year
Long-term Scour (ft)	4.3	4.3
Contraction Scour (ft)	1.3	1.4
Local Scour (ft)	13.0	13.6
Total Scour (ft)	18.6	19.3
Current Embedment (ft)	10.2	10.2
Post-Scour Embedment (ft)	0	0

Recommendations:

Due to the undermining of piles predicted following the 100- and 500-year events, a Phase III geotechnical evaluation is recommended for this bridge. Additional contributing factors warranting elevation to a Phase III analysis include: a bed surface layer consisting of erodible material, an actively degrading channel, a large angle of attack due to the bridge's location over a waterway bend, high design flow velocities, and abutment scour protection requiring rehabilitation/augmentation.

2. HYDRODYNAMIC SIMULATION

As mentioned previously, given the location of the bridge (10.4 river miles from the open coast through Port Everglades Inlet) the design flows at the bridge location may either be attributed to storm surge propagation or riverine runoff. As such, this analysis required modeling of both types of design events.

Previous modeling efforts in District 4 resulted in 50-, 100-, and 500-year unsteady storm surge simulations driven by FDEP combined storm surge hydrographs applied at the offshore Atlantic Ocean model mesh boundary (Kimley Horn Associates, Inc. and Ocean Engineering Associates Inc., 2003). Bridge 860139 is located outside of the Port Everglades Inlet model, which extends from north of Hillsboro Inlet to south of Bakers Haulover Inlet. The model was updated in 2012 to incorporate additional waterways into the mesh. Model mesh node elevations were interpolated from 2001 and 2012 bathymetric surveys performed in support of the previous modeling study. Additionally, the model was calibrated with gages located near Commercial Blvd. and at John Lloyd State Park. The Commercial Blvd gage was deployed from September 6, 2001-December 4, 2001, and the John Lloyd State Park gage was deployed from September 7, 2001-December 4, 2001. The model tidal simulation had an error of 7.5% when compared to gage measurements at the Commercial Blvd. gage, and the model error was 5.1% when compared to gage measurements at the John Lloyd State Park gage.

In addition to water surface elevation calibration, the model was calibrated to flow rate measurements acquired during a full semi-diurnal tidal cycle. The flow rate measurements were acquired with an Acoustic Doppler Current Profiler (ADCP) mounted to a survey vessel operated by the University of Florida's Coastal Engineering Lab staff. Flow rates were measured at critical waterway transects-the throat of the Port Everglades Inlet, within the ICWW north of the inlet, and within the ICWW south of the inlet. Comparison of the model flow rates to measured flow rate data resulted in an error of 10.2% through the Port Everglades Inlet, 9.1% through the ICWW north of the inlet, and 16.0% through the ICWW south of the inlet. Table 2 summarizes the maximum flow conditions during the 100- and 500-year storm surge simulations at the bridge location.

Since Bridge 860139 is located outside of the existing model mesh, a new RMA2 model mesh was required to develop the design surge flow parameters through the bridge opening. The new model domain includes Dania Canal, Hollywood Canal, and New River. Additionally, land below the peak 500-year storm surge elevation was included within the mesh to account for additional potential storage. Mesh model elevations were developed from available USGS DEMs for the area, profiles from bridge inspection reports, as well as survey data acquired in support of this project in 2012. The model was driven by boundary hydrographs extracted

from the Port Everglades model 100- and 500-year simulations at the confluences of the ICWW and Dania Canal and the ICWW and New River. No calibration data was available, so model parameters were set equal to those developed for the original ICWW modeling effort.

Since the bridge is also subject to runoff flows conveyed through the SFWMD S-36 structure, a HEC-RAS hydraulic model was constructed to evaluate runoff conditions through the bridge. Riverine runoff flow boundary input conditions were developed in accordance with the USGS Bulletin 17B gage data analysis methodology. The USGS supported PeakFQ software was employed to analyze SFWMD gage data from the S-36 structure to develop 100- and 500-year flow rates. Flow records at the structure were available from 1985 to 2009. These design flow rates were applied as upstream inputs for the HEC-RAS model. The downstream boundary condition was set at Mean Low Water (MLW) as extracted from the nearest NOAA tidal benchmark. Holding the downstream water surface elevation to MLW is conservative in terms of flow velocity. The HEC-RAS model extends from 160-ft upstream of the bridge to the confluence of the C-13 with Middle River, approximately 2,400-ft downstream of the bridge.

Table 2 presents the results of both modeling efforts. From the results, the storm surge modeling produced the higher water surface elevations, but lower velocities than the runoff modeling. During storm surge propagation, the flow through the bridge is a function of the storage and the rate of rise of the surge. For the runoff events, the simulations produced higher velocities, yet the flow remained within the banks of the canal. A higher water surface elevation at the bridge would yield much lower velocities because the effective flow area would be larger yet the flow rate would remain the same. As such, the runoff modeling is considered conservative. Since the runoff produced higher flow velocities, the results from the runoff modeling provided the inputs for the scour calculations.

Table 2 Summary of 100- and 500-year Flow Parameters

Flow Parameter	100-Year Storm Surge	500-Year Storm Surge	100-Year Storm Runoff	500-Year Storm Runoff
Maximum Velocity Magnitude (ft/s)	2.0	3.1	6.2	6.9
Maximum Water Surface Elevation (ft-NAVD)	+6.4	+7.5	+2.1	+2.6
Maximum Flow Rate (cfs)	2,753	4,685	2,543	2,996

3. SCOUR ANALYSIS

The scour analysis and related computations were performed in accordance with the HEC-18 procedure for the contraction and general scour conditions. Local scour was computed per the methodologies set forth in the Florida Department of Transportation (FDOT) Scour Manual.

Long term Scour

Long term scour can be divided into two categories: channel migration, and bed aggradation/degradation. Channel migration (lateral motion of the channel banks with respect to time) was evaluated via inspection of historical aerial imagery. Aerial photographs were obtained from the FDOT Aerial Photo lookup System for the years 1958, 1968, 1973, 1976, 1981, 1988, 1992, 2006, and 2008 (Appendix C). During the period between the 1958 and 1968 images, Oakland Park Blvd was widened from two lanes to four lanes with area provided for two additional turn lanes present in the 1973 image. Additionally, the canal widened significantly upstream of the bridge either by natural means or dredging between 1958 and 1968. The alignment of the canal downstream of the bridge became in line with the I-95 onramp constructed in 1973 most likely due to excavation to permitting the alignment of the ramp. Subsequent images reveal fairly stable canal banks in the vicinity of the bridge. An additional exit lane for the southbound onramp was constructed prior to the 2006 image.

Vertical stability (bed aggradation/degradation) of the Dania Canal was evaluated through the examination of historical cross sections. Cross sections were obtained from the 2011 Phase 1 Scour Evaluation Report Addendum. At this bridge, only measurements of the downstream cross section are available. The historic bed measurements reveal an actively degrading bed at both bents. This may be attributable to impounding of sediment at the S-36 control structure upstream of the bridge. The long-term bed degradation for this bridge is calculated with the assumption of a 75-year design life for the structure from the date of original construction (1965). The average rate of bed degradation at the worst bent (Bent 3) is 0.152 ft/year. When this rate is extrapolated for the remaining structure life (28 years) results in 4.3 ft of long-term bed degradation for the structure.

Contraction Scour

For this analysis, the HEC-18 contraction scour methodology was employed to compute the 100- and 500-year contraction scour. The HEC-18 contraction scour methodology requires flow rates through cross sections at the upstream bridge face and through a cross section one bridge length upstream of the bridge as inputs. These flow rates were determined by the hydrologic analysis. The average velocity through the upstream cross section was sufficient to induce live-bed sediment transport. Thus, the Laursen live-bed equation for computing contraction scour was employed. Since the hydraulic modeling predicted that the flow would remain within the banks, the contraction scour becomes a function of the ratio of top widths between the bridge and upstream cross sections. At this bridge, a characteristic sediment diameter of 0.20 mm is assumed for the scour calculations. Employing survey data, the top width of the upstream cross section (at elevation 0 ft) is 93 ft, while the cross section at the upstream bridge face is 81 ft. The HEC-18 methodology predicts 1.3 ft of contraction scour during the 100-year event, and 1.4 ft of scour during the 500-year event. The contraction scour computations are provided in Appendix E.

Local Scour

Calculation of the local scour followed the methodologies outlined in the FDOT Scour Manual and employed the FDOT Scour Calculator version 4.2. The local scour for both simulations was developed for one bent since the supplied embedment depth is based on a per bridge basis. The maximum velocity was determined across the upstream bridge cross section and employed in the scour computations. The 2003 bridge rehabilitation plans were used in conjunction with field notes taken during the site investigation to develop the substructure geometry, pile spacing, and complex pier elevation. Given the bridge's location at the corner of a 90° bend in the C-13, there is an angle of attack of 30° between the alignment of the upstream channel and the direction of the skewed bent. This large angle of attack combined with the long bent exacerbates the local scour. Local scour calculations for the 100- and 500-year return period events resulted in 13.0 ft and 13.6 ft, respectively. Table 3 contains a summary of the scour calculations for both runoff events as well as the remaining embedment calculation. Appendix E contains the scour calculations.

Table 3 Scour Calculation and Embedment Summary

	100-year	500-year
Long-term Scour (ft)	4.3	4.3
Contraction Scour (ft)	1.3	1.4
Local Scour (ft)	13.0	13.6
Total Scour (ft)	18.6	19.3
Current Embedment (ft)	10.2	10.2
Post-Scour Embedment (ft)	0	0

Abutment Scour

The abutments are currently protected by cement sandbags with bedding stone placed at the toe of the cement sandbags, and scattered riprap closer to the edge of the waterway. The cement sandbags exhibited severe undermining (as documented in the 2011 Abutment Inspection Report) and damage. Riprap or some other form of protection is recommended above the existing thin layer of bedding stone at the toe of the cement sandbag protection. Additionally, the riprap should be augmented in deficient areas.

4. RECOMMENDATIONS

The original undated Phase I Scour Evaluation rated the bridge as Scour Susceptible (Medium Priority). Due to the predicted undermining of piles, it is necessary to elevate the scour vulnerability rating to Scour Critical. Additional factors warranting a Phase III Evaluation include: a bed composed of erodible material, a potentially large flow angle of attack, an actively degrading bed, undermining of existing abutment protection, and high flow velocities during riverine runoff events. Repair and augmentation of existing abutment scour protection is recommended. Furthermore, scour protection is recommended for the two intermediate bents given the large predicted scour values and actively degrading channel bed.

5. MATERIALS AND DOCUMENTATION

The following data was used in this evaluation:

- Undated Scour Evaluation Report – Phase 1 (Estimated 1994)
- 2010 Bridge Inspection Report
- 2011 Phase 1 Scour Evaluation Addendum
- Kimley-Horn and Associates, Inc. and Ocean Engineering Associates, Inc. (2003). *Tidal Model Report – Port Everglades Inlet.* Technical Report submitted to Florida Department of Transportation, District 4
- Dean, R. G., Chiu, T. Y., and Wang, S. Y. (1992). *Combined Total Storm Tide Frequency Analysis for Broward County, Florida*. Division of Beaches and Shores Department of Natural Resources. Beaches and Shores Resource Center, Institute of Science and Public Affairs. Tallahassee, Florida.
- Florida Department of Transportation Bridge Scour Manual (May 2011)
- Hydraulic Engineering Circular Number 18 (HEC-18) Federal Highway Administration
- 2012 Phase II field review photographs and site visit
- 2011 Pile Foundation Embedment Report
- 2011 Stage II Abutment Scour Protection Evaluation Field Review Report
- US Department of the Interior, Geologic Survey (1982). *Guidelines for Determining Flood Flow Frequency, Bulletin 17B of the Hydrology Subcommittee.* Reston, Virginia.

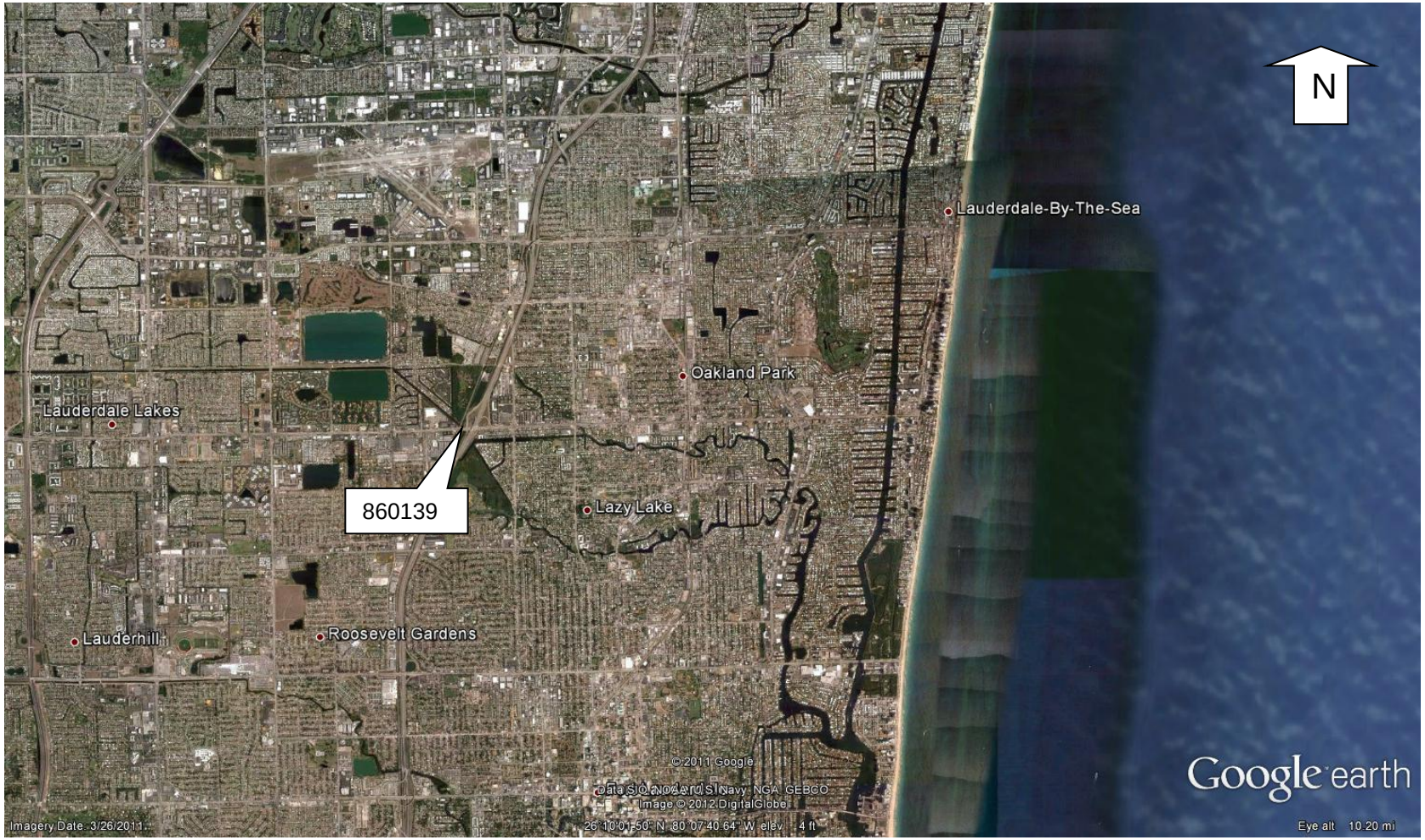

Figure 1 Bridge No. 860139 Location Map

Figure 2 Aerial Photograph of Bridge No.860139

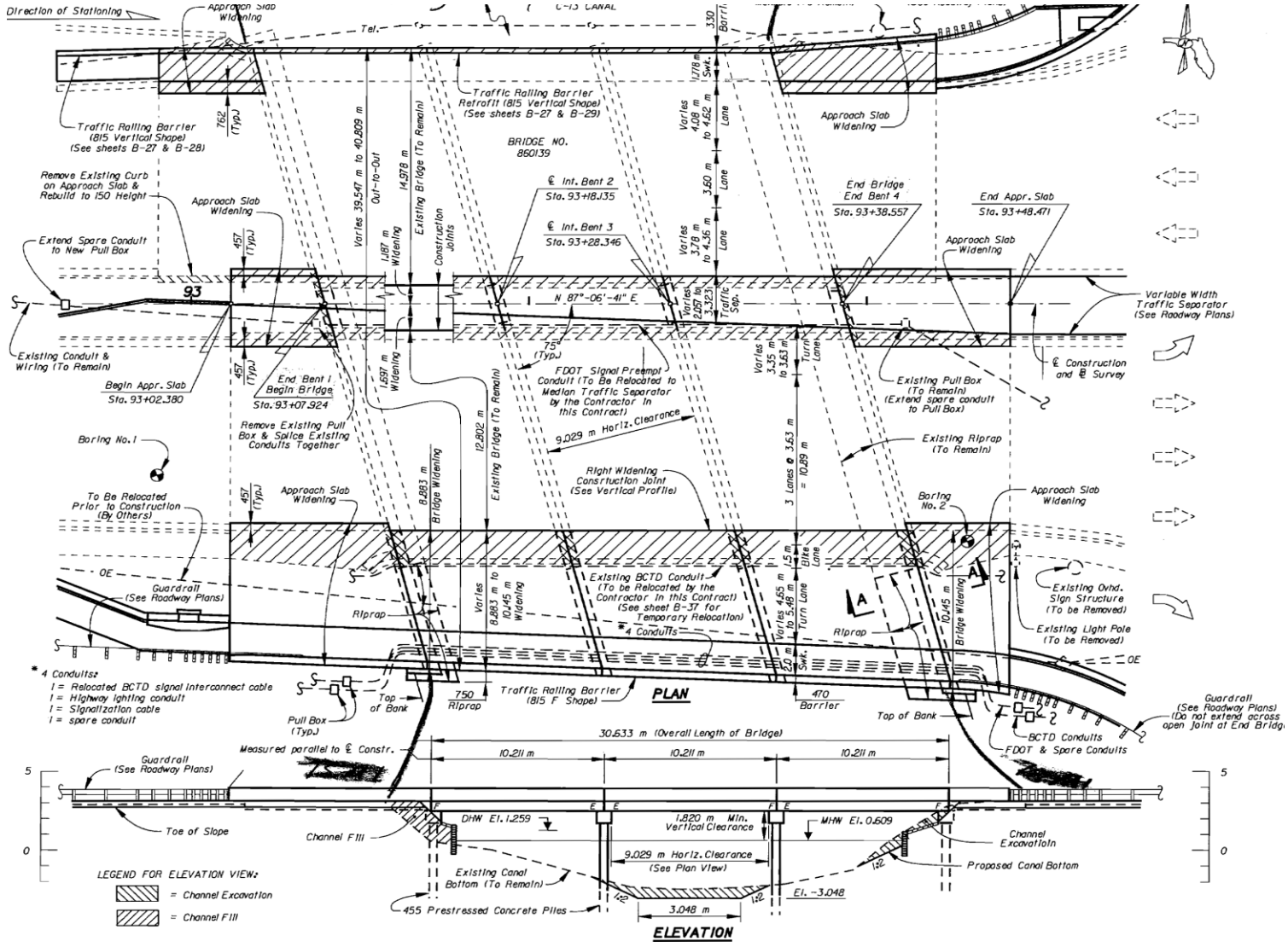

Figure 3 Plan and Elevation of Bridge No. 860139 from 2002 Bridge Widening Plan Set (Page 26 of 52)

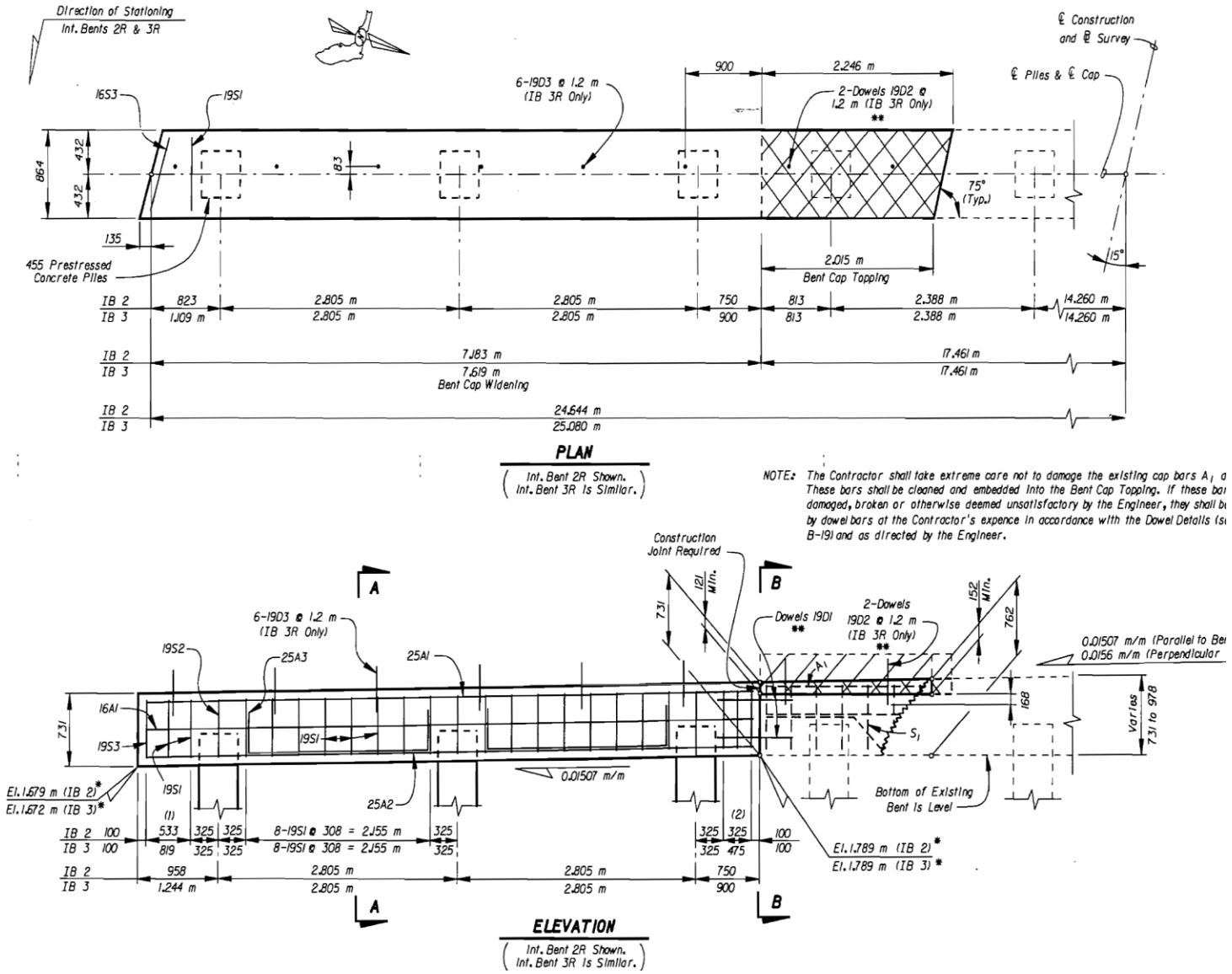

Figure 4 Plan and Elevation of Intermediate Pier of Bridge No. 860139 from 2002 Bridge Widening Plan Set (Page 36 of 52)

SCOUR EVALUATION – PHASE 2 - FIELD / OFFICE REVIEW REPORT

Bridge Number: ***860139***	**County:** ***Broward***	**Route:** ***Oakland Park Blvd***	**Over:** ***C-13 Canal***

1. SCOUR VULNERABILITY RATING (PER FHWA)

A. Scour Critical	☒ Yes	☐ No	
Scour Susceptible	☐ High	☐ Medium	☐ Low
Low Risk	☐ High	☐ Medium	☐ Low
Foundation	☐ Known	☒ Unknown	
B. Method of Analysis:	☐ Simplified	☒ Detailed	

C. Reasons for Phase 2 Rating:

- Undermining of piles during 100- and 500-year events.
- Bed material is erodible.
- Damage to abutment protection.
- High flow velocities and angle of attack.
- Actively degrading bed.

2. RECOMMENDATIONS (See Preceding Narrative)

A. Countermeasures:

☒ Riprap

☒ Scour Monitor — Inspect for scour after major discharges from the S-36 and after hurricanes.

☒ Inspection — Continue monitoring bed cross section elevations as part of the scheduled bridge inspection program

☐ Other

B. Phase 3 Analysis: ☒ Required ☐ Not Required at this time

SCOUR EVALUATION – PHASE 2 - FIELD / OFFICE REVIEW REPORT

3. SUMMARY OF RESULTS

	100 – YEAR FLOOD EVENT				500 – YEAR FLOOD EVENT				OVERTOPPING EVENT **			
	Worst Case *				Worst Case *				Worst Case *			
	Left Abut. (ft)	Main Channel Pier (ft)	Flood-plain Pier (ft)	Right Abut. (ft)	Left Abut. (ft)	Main Channel Pier (ft)	Flood-plain Pier (ft)	Right Abut. (ft)	Left Abut. (ft)	Main Channel Pier (ft)	Flood-plain Pier (ft)	Right Abut. (ft)
a. Reported Design / Constructed Embedment: 1		14.0				14.0						
b. Current Remaining Embedment: 2		10.2				10.2						
c. Maximum Total Scour: 3		18.6				19.3						
d. Estimated Embedment Remaining After Scour:		0				0						

e. Sources for above table:

1. 2011 Pile Embedment Estimate Report
2. 2011 Phase 1 Addendum
3. FDOT and HEC-18 methodologies applied for scour calculation.

* *Worst Case Main Channel Pier:* (**2&3**) *Worst Case Floodplain Pier:* (**NA**)

4. EVALUATION OF METHODS

Method of Analysis:

a. ☐ Simplified

Do results of analysis provide reasonable prediction of scour depths for this structure? [1) or 2)]

1) ☐ Yes — Does the predicted scour suggest instability of the structure, based on existing knowledge of the bridge/bridge culvert?

☐ Yes **RESULT:** Phase 3 is recommended.

☐ No **RESULT:** No further action is required.

2) ☐ No — **RESULT:** Perform a Detailed Analysis.

b. ☒ Detailed

Does the predicted scour suggest instability of the structure, based on existing knowledge of the bridge/bridge culvert? [1) or 2)]

1) ☒ Yes — **RESULT:** Phase 3 is recommended.

2) ☐ No — **RESULT:** No further action is required.

Notes:

SCOUR EVALUATION – PHASE 2 - FIELD / OFFICE REVIEW REPORT

5. FLOOD HISTORY

a. Drainage Area: ☒ Applicable (**39**) Square Miles

( ) Acres

☐ Not applicable due to tidal methodology (see summary)

b. Debris Potential: ☐ High ☐ Medium ☒ Low

c. Scour Mode: ☐ Riverine

☐ Tidal

☒ Tidal and Riverine

d. Flow:

Q_{100} = (**2,543**) cfs $Q_{OVERTOPPING}$ = (**NA**) cfs Q_{500} = (**2,996**) cfs	Riverine	Method: ☒ Gage Analysis ☐ Regression Analysis: ☐ Rational Method ☐ Other:
	Tidal	Method: ☐ HEC 18 Modified Procedure ☐ Historic Data ☐ HEC 18 Procedure ☒ Other: ***RMA2 Simulation***
	Riverine	Method: ☐ Gage Analysis ☐ Iterative WSPRO runs ☐ Other:
	Tidal	Method: ☐ HEC 18 Modified Procedure ☐ Historic Data ☐ HEC 18 Procedure ☐ Other:
	Riverine	Method: ☒ Gage Analysis ☐ Regression Analysis: ☐ Rational Method ☐ Other:
	Tidal	Method: ☐ HEC 18 Modified Procedure ☐ Historic Data ☐ HEC 18 Procedure ☒ Other: ***RMA2 Simulation***

e. Notes: *Storm surge flow rates developed via simulation of 100 and 500-year return period storm surge with RMA2. Runoff flow rates based on USGS Bulletin 17B analysis of S-36 gage data. Riverine runoff flow rates are displayed above and below because the runoff events produce the design scour depths. Storm surge flow rates exceed the runoff flow rates and are detailed within the report text.*

SCOUR EVALUATION – PHASE 2 - FIELD / OFFICE REVIEW REPORT

6. CHANNEL STABILITY CONSIDERATIONS

a. Natural Channel Aggradation Expected Over Remaining Life of Structure = (**0**) *feet*

b. Natural Channel Degradation Expected Over Remaining Life of Structure = (**4.3**) *feet*

c. Channel Migration Anticipated During Life of Structure = Left: (**0**) *feet*
☐ Yes ☒ No Right: (**0**) *feet*

d. Armoring Potential	☐ Yes ☐ No ☒ Possible			
e. Depth to Armoring for Q =	( ) cfs		( ) *feet*	
Notes:				

7. ESTIMATED SCOUR		**100 – YEAR EVENT**	**500- YEAR EVENT**	**OVERTOPPING EVENT**
a. Worst Case Flood Event:	Discharge	(**2,543**) *cfs*	(**2,996**) *cfs*	(**NA**) *cfs*
b. Contraction Scour: (Looking Downstream)	Left Overbank Main Channel Right Overbank	(**0**) *ft* (**1.3**) *ft* (**0**) *ft*	(**0**) *ft* (**1.4**) *ft* (**0**) *ft*	(**NA**) *ft* (**NA**) *ft* (**NA**) *ft*
c. Maximum Pier Scour: Main Channel Pier No.: (**2&3**) Floodplain Pier No.: (**NA**)	Maximum Velocity Froude Number Main Channel Floodplain	(**6.2**) fps (**0.26**) (**13.0**) *ft* (**NA**) *ft*	(**6.9**) fps (**0.28**) (**13.6**) *ft* (**NA**) *ft*	(**NA**) fps (**NA**) (**NA**) *ft* (**NA**) *ft*
d. Abutment Scour: (Looking Downstream) (**X**) Abutments Protected	Max Velocity at Abutments Left Abutment Right Abutment	(**3.2**) fps (**NA**) *ft* (**NA**) *ft*	(**3.7**) fps (**NA**) *ft* (**NA**) *ft*	(**NA**) fps (**NA**) *ft* (**NA**) *ft*
e. Theoretical Total Scour: (Looking Downstream) 6b + 7b + (7c or 7d)	**Left Abutment** **Main Channel Pier** **Floodplain Pier** **Right Abutment**	**(NA) ft** **(18.6) *ft*** **(NA) *ft*** **(NA) *ft***	**(NA) ft** **(19.3) *ft*** **(NA) *ft*** **(NA) *ft***	**(NA) ft** **(NA) *ft*** **(NA) *ft*** **(NA) *ft***

f. Notes:

Some slight channel armoring noted during site investigation.

Abutments are protected as detailed in text, repair and augmentation is required to provide adequate protection during a design event.

Large local scour attributed to long bent (18 piles) and large angle of attack.

APPENDIX A - SITE VISIT PHOTOGRAPHS

Photo 1 Bridge Number

Photo 2 East Approach to Bridge

Photo 3 North Waterway

Photo 4 Substructure of Bridge

Photo 5 South Waterway

Photo 6 West Approach to Bridge

APPENDIX B – HISTORIC AERIAL PHOTOGRAPHS

Figure B - 1 1958 FDOT Aerial Image

Figure B - 2 1968 FDOT Aerial Image

Figure B - 3 1973 FDOT Aerial Image

Figure B - 4 1976 FDOT Aerial Image

Figure B - 5 1981 FDOT Aerial Image

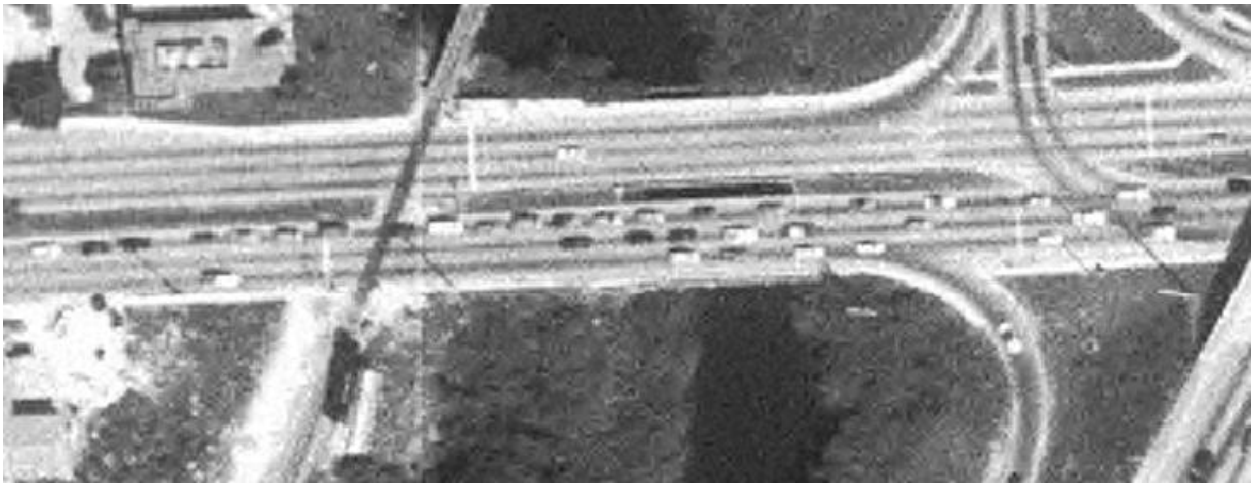

Figure B - 6 1988 FDOT Aerial Image

Figure B - 7 1992 FDOT Aerial Image

Figure B - 8 2006 FDOT Aerial Image

Figure B - 9 2008 FDOT Aerial Image

APPENDIX B – HISTORIC BED CROSS SECTION MEASUREMENTS

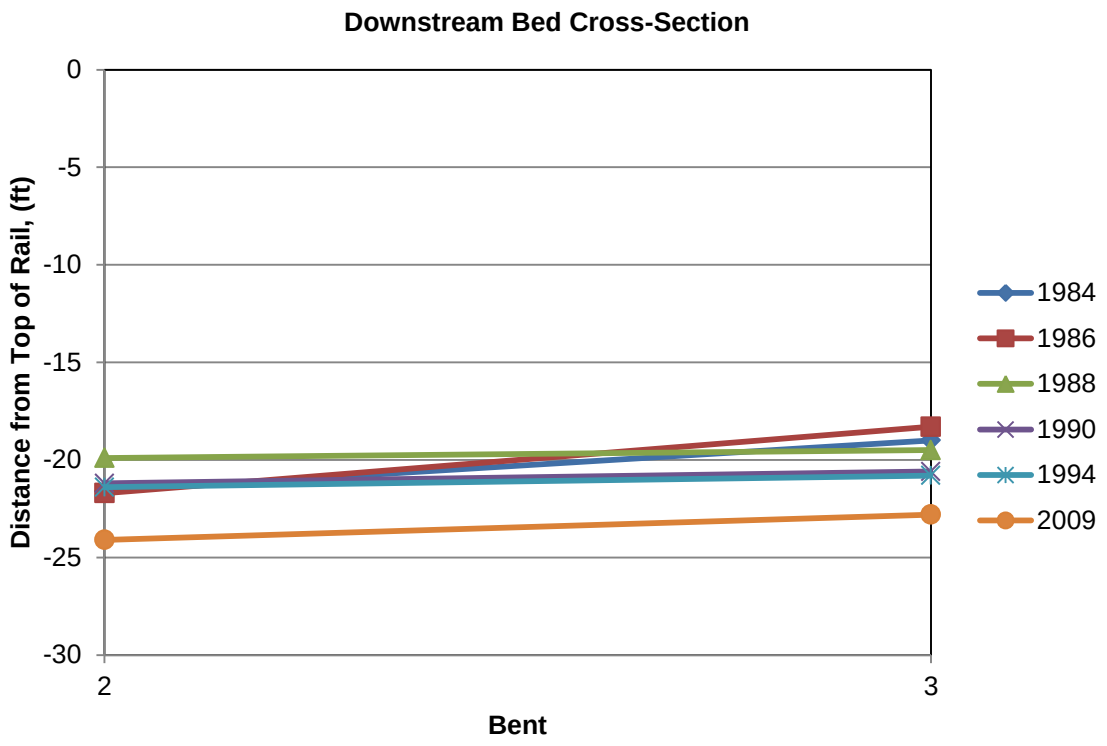

Figure C- 1 Downstream Bed Cross-Section

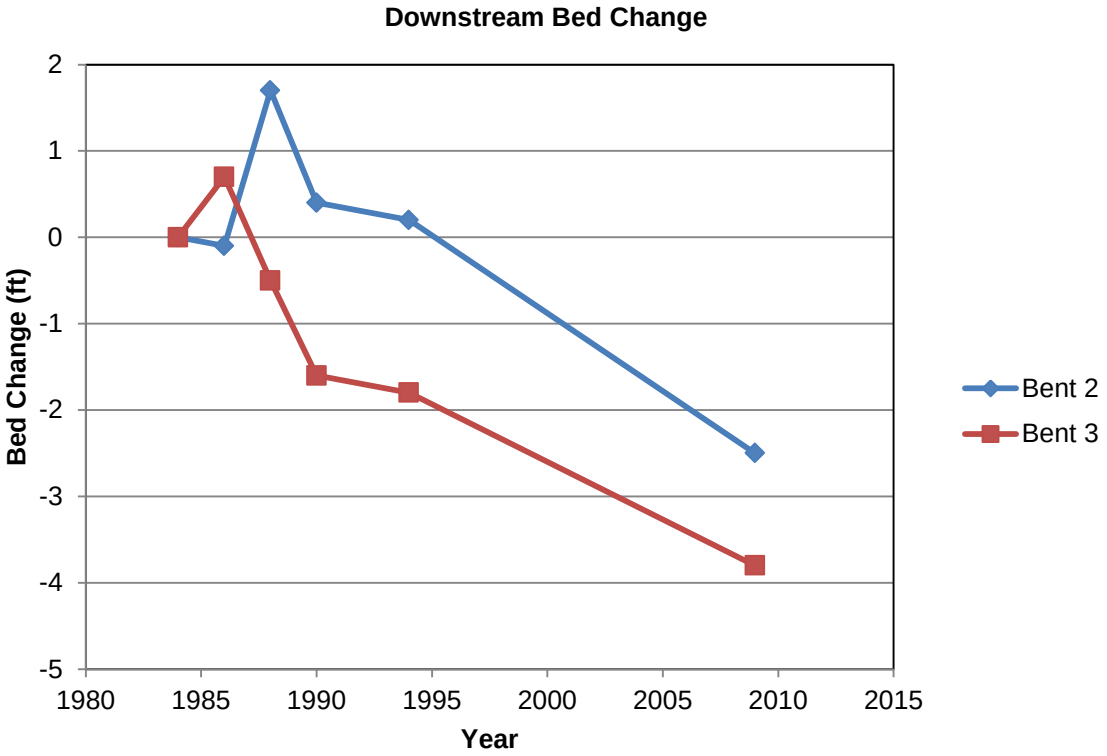

Figure C- 2 Downstream Bed Change

Table C- 1 Bed Cross-Section Measurements from the Undated (1994) Phase 1 Scour Evaluation Report and the 2010 Bridge Inspection Report

Downstream Cross-Section, from Top of Rail (ft)						
	1984	1986	1988	1990	1994	2010
Bent 2	-21.6	-21.7	-19.9	-21.2	-21.4	-24.1
Bent 3	-19.0	-18.3	-19.6	-20.6	-20.8	-22.8

APPENDIX D – MODEL RESULTS

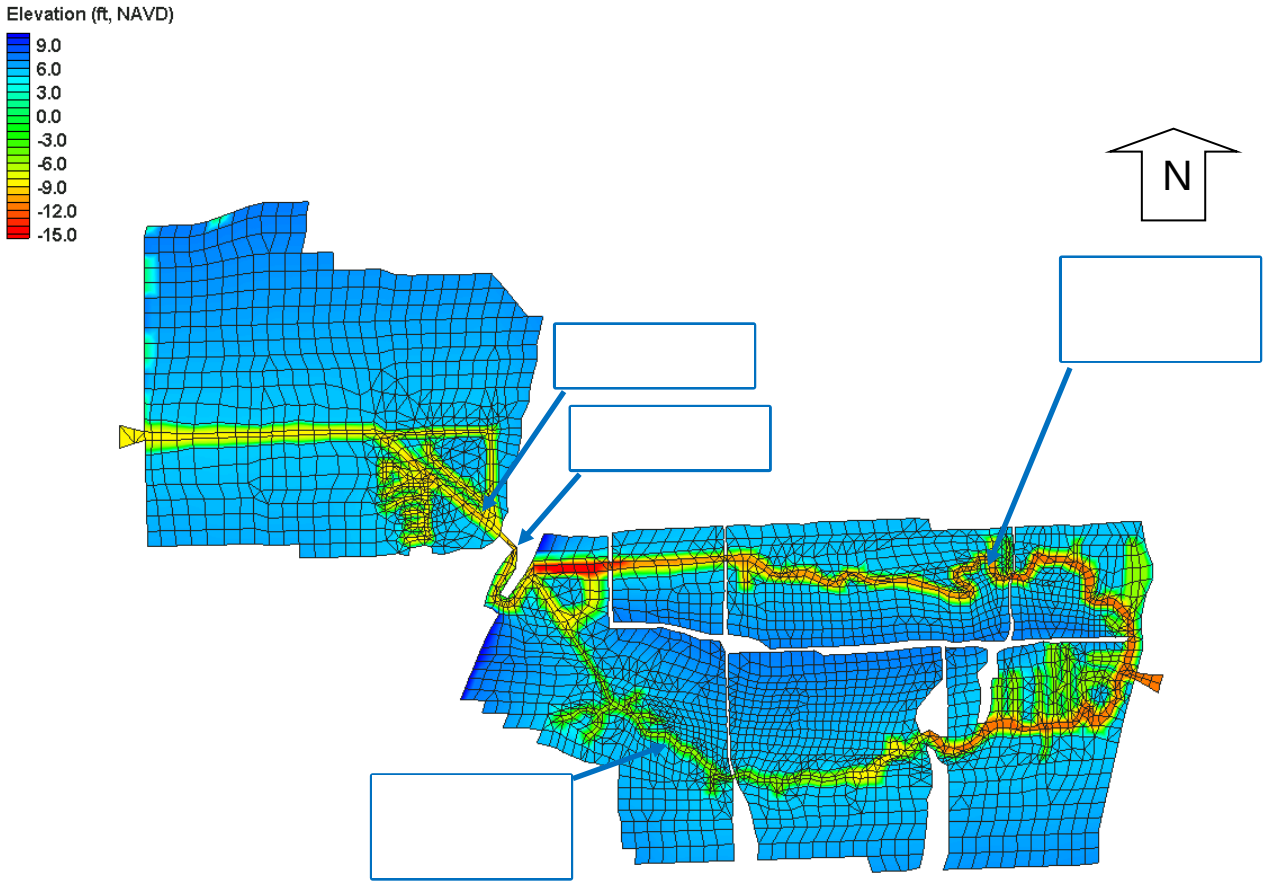

Figure D- 1 Storm Surge Model Mesh

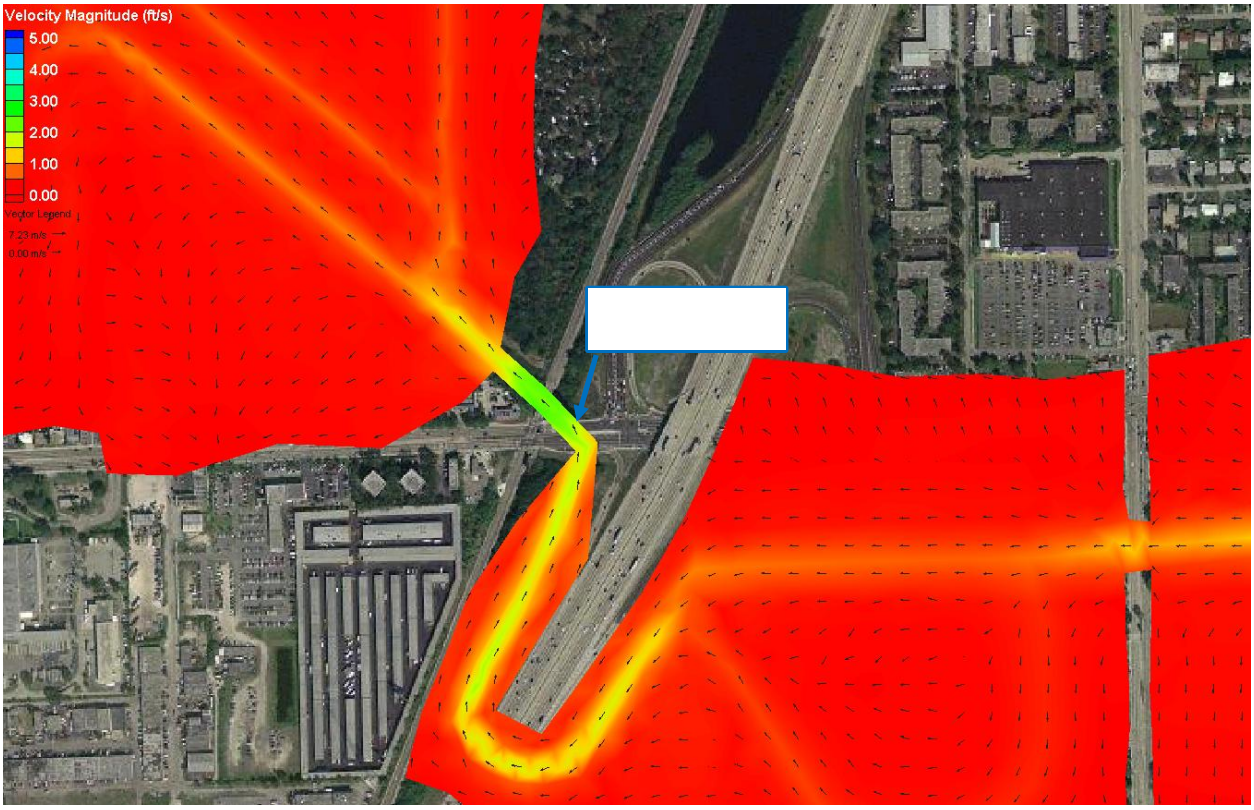

Figure D- 2 100-Year Storm Surge Flow Velocity Magnitude

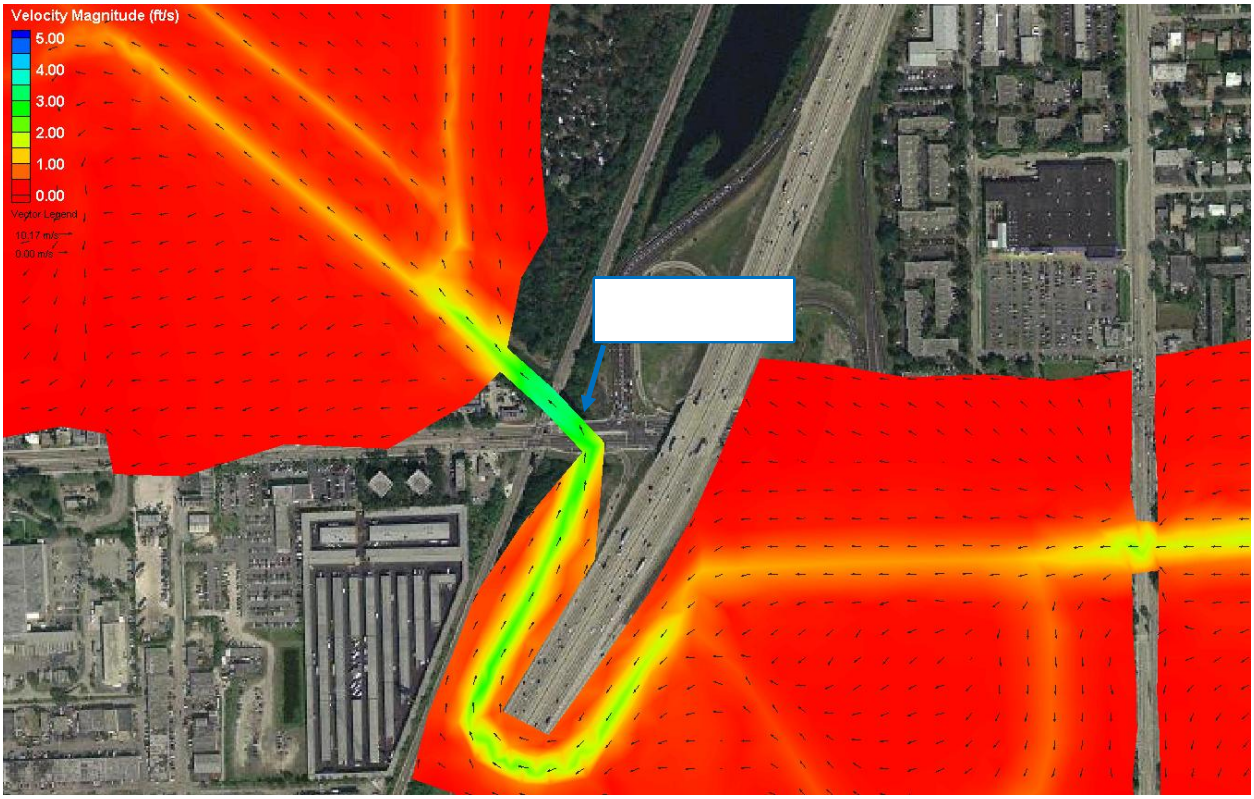

Figure D- 3 500-Year Storm Surge Flow Velocity Magnitude

```
Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.000.000
 Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
 11/01/2007          following Bulletin 17-B Guidelines       05/04/2012 11:52

                        --- PROCESSING OPTIONS ---

                     Plot option         = None
                     Basin char output   = None
                     Print option        = Yes
                     Debug print         = No
                     Input peaks listing = Long
                     Input peaks format  = WATSTORE peak file

                     Input files used:
                        peaks (ascii)  - C:\TEMP\FLOWDATAS36.INP
                        specifications - PKFQWPSF.TMP
                     Output file(s):
                        main - C:\TEMP\FLOWDATAS36.PRT

 Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.001
 Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
 11/01/2007          following Bulletin 17-B Guidelines       05/04/2012 11:52

                          Station - AAAAAAAAA  S-36

                    I N P U T   D A T A   S U M M A R Y

                Number of peaks in record           =       25
                Peaks not used in analysis          =        0
                Systematic peaks in analysis        =       25
                Historic peaks in analysis          =        0
                Years of historic record            =        0
                Generalized skew                    =   -0.189
                     Standard error                 =    0.550
                     Mean Square error              =    0.303
                Skew option                         =   WEIGHTED
                Gage base discharge                 =      0.0
                User supplied high outlier threshold =   --
                User supplied low outlier criterion  =   --
                Plotting position parameter         =     0.00

 *********  NOTICE  --  Preliminary machine computations.        *********
 *********  User responsible for assessment and interpretation.  *********

   WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.                   0.0
   WCF198I-LOW OUTLIERS BELOW FLOOD BASE WERE DROPPED.       1       456.9
   WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.      2713.8

 Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.002
 Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
 11/01/2007          following Bulletin 17-B Guidelines       05/04/2012 11:52

                          Station - AAAAAAAAA  S-36

          ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

                     FLOOD BASE                    LOGARITHMIC
                ----------------------  --------------------------------
                           EXCEEDANCE                 STANDARD
                DISCHARGE PROBABILITY     MEAN     DEVIATION     SKEW
```

SYSTEMATIC RECORD	0.0	1.0000	3.0769	0.1678	-0.862
BULL.17B ESTIMATE	456.9	0.9600	3.0892	0.1401	-0.093

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES LOWER	UPPER
0.9950	--	325.0	--	--	--
0.9900	--	384.6	--	--	--
0.9500	716.4	583.8	692.4	582.9	825.7
0.9000	809.8	711.9	793.0	678.9	919.0
0.8000	937.6	885.4	927.7	811.2	1049.0
0.6667	1073.0	1063.0	1068.0	949.5	1194.0
0.5000	1234.0	1261.0	1234.0	1107.0	1377.0
0.4292	1307.0	1345.0	1309.0	1175.0	1465.0
0.2000	1613.0	1661.0	1630.0	1441.0	1866.0
0.1000	1850.0	1865.0	1887.0	1632.0	2204.0
0.0400	2137.0	2069.0	2213.0	1851.0	2638.0
0.0200	2343.0	2190.0	2460.0	2002.0	2963.0
0.0100	2543.0	2291.0	2713.0	2146.0	3288.0
0.0050	2740.0	2377.0	2974.0	2285.0	3616.0
0.0020	2996.0	2470.0	3336.0	2462.0	4056.0

Program PeakFq U. S. GEOLOGICAL SURVEY Seq.001.003
Ver. 5.2 Annual peak flow frequency analysis Run Date / Time
11/01/2007 following Bulletin 17-B Guidelines 05/04/2012 11:52

Station - AAAAAAAAA S-36

I N P U T D A T A L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1985	2013.0		1998	1223.0	
1986	2324.0		1999	1729.0	
1988	1143.0		2001	1128.0	
1988	2117.0		2001	1211.0	
1989	388.0		2002	1161.0	
1991	762.0		2003	1364.0	
1992	1614.0		2004	1375.0	
1992	1339.0		2005	800.0	
1994	1202.0		2006	624.0	
1995	1203.0		2007	1029.0	
1995	1244.0		2008	1059.0	
1997	1040.0		2009	1718.0	
1997	1052.0				

Explanation of peak discharge qualification codes

PeakFQ CODE	NWIS CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

```
          -  Minus-flagged discharge -- Not used in computation
                -8888.0 -- No discharge value given
          -  Minus-flagged water year -- Historic peak used in computation

  Program PeakFq           U. S. GEOLOGICAL SURVEY             Seq.001.004
  Ver. 5.2            Annual peak flow frequency analysis      Run Date / Time
  11/01/2007          following Bulletin 17-B Guidelines       05/04/2012 11:52

                            Station - AAAAAAAAA  S-36

   EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

      WATER         RANKED       SYSTEMATIC      BULL.17B
       YEAR       DISCHARGE        RECORD        ESTIMATE

       1986         2324.0         0.0385         0.0385
       1988         2117.0         0.0769         0.0769
       1985         2013.0         0.1154         0.1154
       1999         1729.0         0.1538         0.1538
       2009         1718.0         0.1923         0.1923
       1992         1614.0         0.2308         0.2308
       2004         1375.0         0.2692         0.2692
       2003         1364.0         0.3077         0.3077
       1992         1339.0         0.3462         0.3462
       1995         1244.0         0.3846         0.3846
       1998         1223.0         0.4231         0.4231
       2001         1211.0         0.4615         0.4615
       1995         1203.0         0.5000         0.5000
       1994         1202.0         0.5385         0.5385
       2002         1161.0         0.5769         0.5769
       1988         1143.0         0.6154         0.6154
       2001         1128.0         0.6538         0.6538
       2008         1059.0         0.6923         0.6923
       1997         1052.0         0.7308         0.7308
       1997         1040.0         0.7692         0.7692
       2007         1029.0         0.8077         0.8077
       2005          800.0         0.8462         0.8462
       1991          762.0         0.8846         0.8846
       2006          624.0         0.9231         0.9231
       1989          388.0         0.9615         0.9615

 End PeakFQ analysis.
   Stations processed :       1
   Number of errors   :       0
   Stations skipped   :       0
   Station years      :      25

Data records may have been ignored for the stations listed below.
(Card type must be Y, Z, N, H, I, 2, 3, 4,  or *.)
(2, 4, and * records are ignored.)

 For the station below, the following records were ignored:
* WCF2.DATA      5/4/2012 -- BULLETIN 17 ANALYSIS
*---+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8

2 AAAAAAAAA

 FINISHED PROCESSING STATION:  AAAAAAAAA      SFWMDS-36

For the station below, the following records were ignored:
FINISHED PROCESSING STATION:
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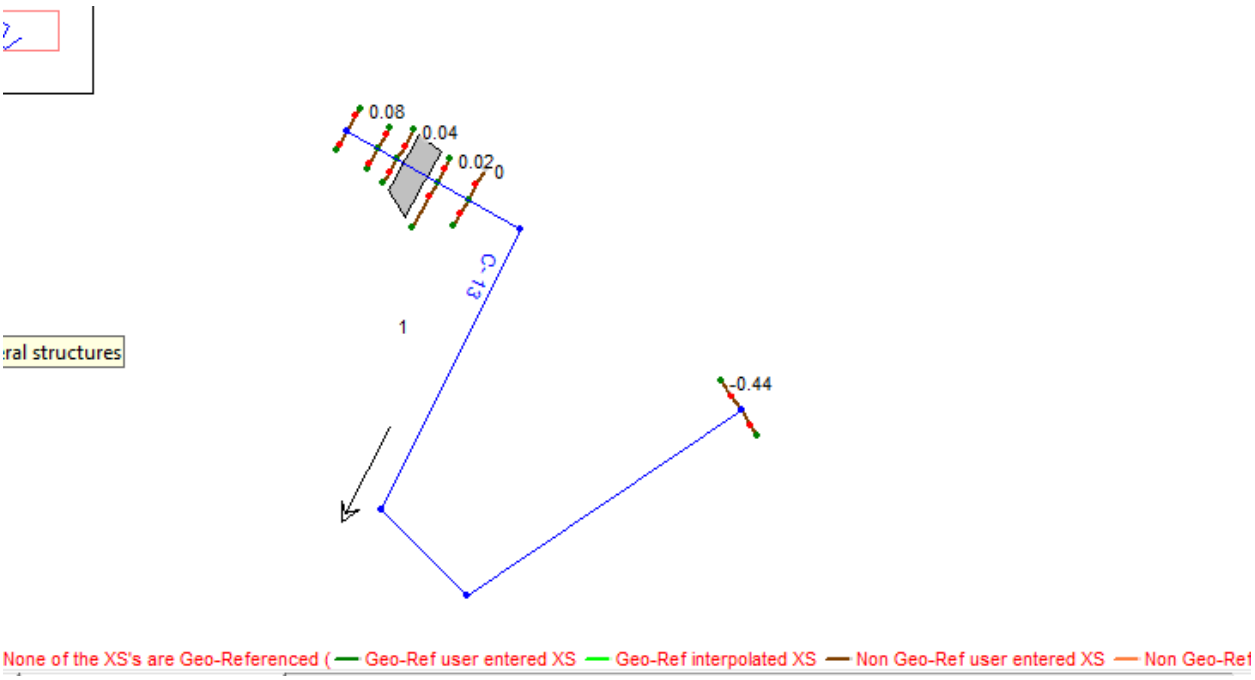


Figure D- 4 HEC-RAS Runoff Model Plan View

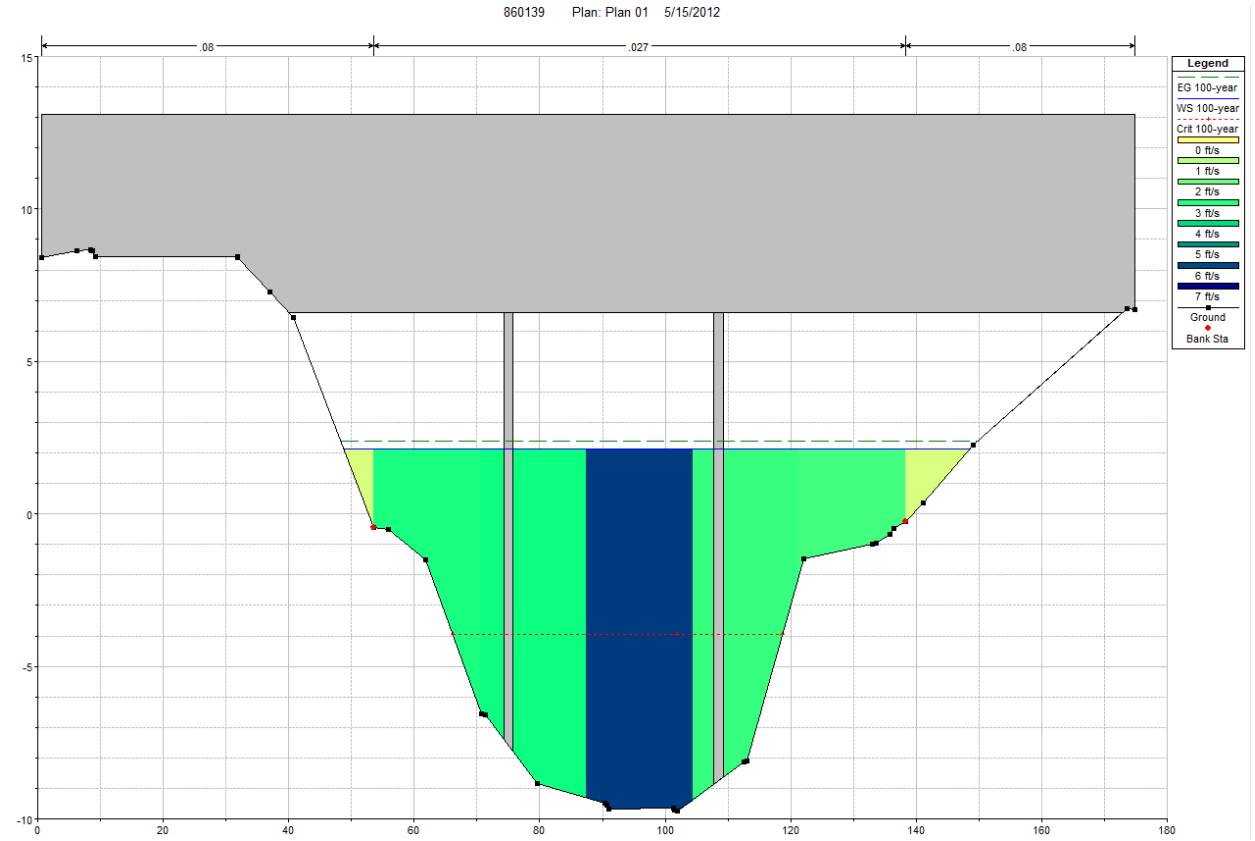


Figure D- 5 Upstream Bridge Cross Section Velocity Magnitude (100-year)

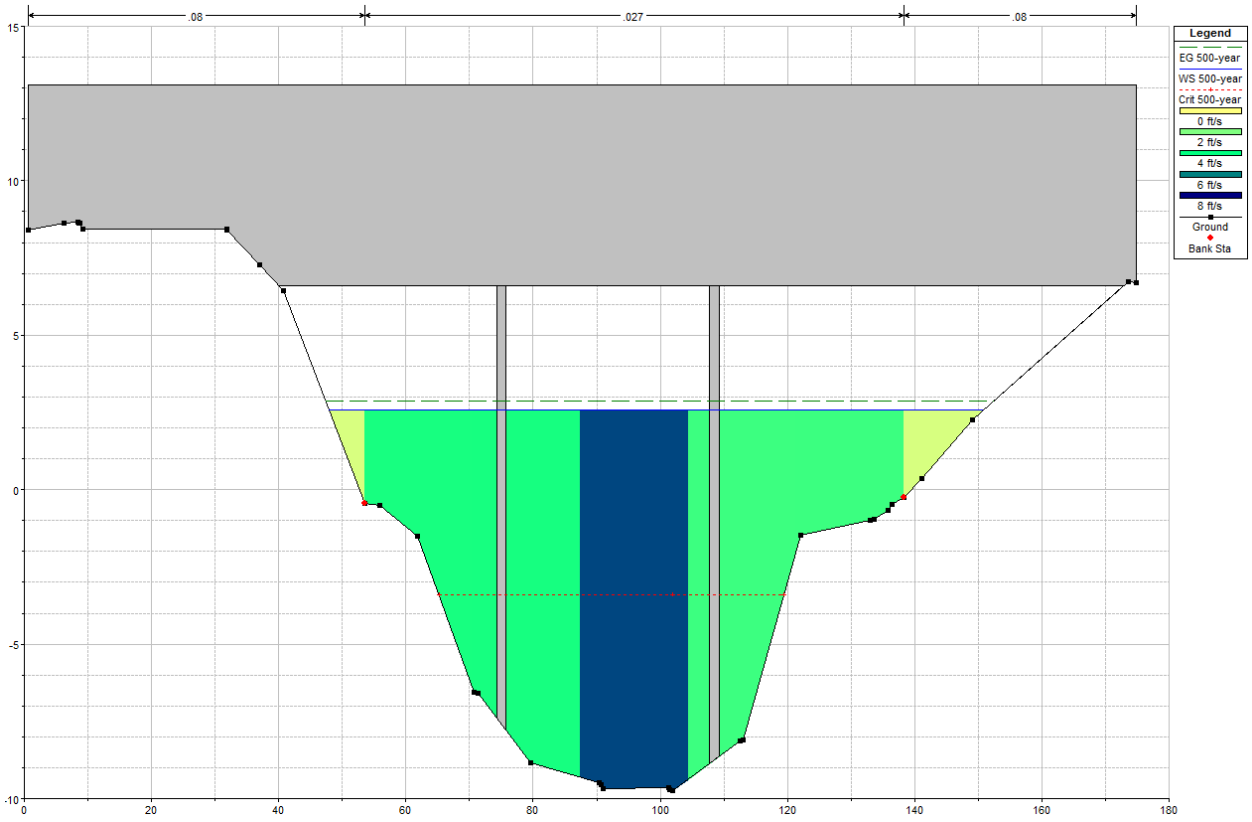


Figure D- 6 Upstream Bridge Cross Section Velocity Magnitude (500-year)

HEC-RAS Plan: Plan 01 River: C-13 Reach: 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
1	0.08	100-year	2543.00	-10.81	2.28		2.46	0.000276	3.48	757.50	121.92	0.22
1	0.08	500-year	2996.00	-10.81	2.74		2.97	0.000314	3.86	813.99	123.07	0.24
1	0.06	100-year	2543.00	-10.81	2.25		2.44	0.000279	3.49	753.93	121.58	0.22
1	0.06	500-year	2996.00	-10.81	2.70		2.94	0.000318	3.88	809.84	122.99	0.24
1	0.04	100-year	2543.00	-9.75	2.19	-4.12	2.41	0.000327	3.81	685.36	100.18	0.24
1	0.04	500-year	2996.00	-9.75	2.63	-3.60	2.91	0.000377	4.24	730.36	103.34	0.26
1	0.03		Bridge									
1	0.02	100-year	2543.00	-12.94	-0.55		-0.31	0.000357	3.90	652.13	84.54	0.25
1	0.02	500-year	2996.00	-12.94	-0.11		0.18	0.000430	4.34	690.16	88.22	0.27
1	0	100-year	2543.00	-12.23	-0.60		-0.35	0.000433	4.04	630.19	92.89	0.27
1	0	500-year	2996.00	-12.23	-0.17		0.14	0.000501	4.47	671.01	96.48	0.29
1	-0.44	100-year	2543.00	-12.23	-2.10	-6.15	-1.70	0.000809	5.09	499.79	82.08	0.36
1	-0.44	500-year	2996.00	-12.23	-2.10	-5.64	-1.54	0.001124	5.99	499.79	82.08	0.43

HEC-RAS Plan: Plan 01 River: C-13 Reach: 1 Reload Data

Reach	River Sta	Profile	E.G. US.	Min El Prs	BR Open Area	Prs O WS	Q Total	Min El Weir Flow	Q Weir	Delta EG
			(ft)	(ft)	(sq ft)	(ft)	(cfs)	(ft)	(cfs)	(ft)
1	0.03	100-year	2.41	6.60	1154.01		2543.00	13.11		2.72
1	0.03	500-year	2.91	6.60	1154.01		2996.00	13.11		2.73

Figure D- 7 HEC-RAS Output

APPENDIX E – SCOUR CALCULATIONS

100-YEAR CONTRACTION SCOUR COMPUTATION

HEC-18 CONTRACTION SCOUR METHODOLOGY

BRIDGE 860139

BROWARD COUNTY – MAY 21, 2012

Inputs	
Median Sediment Diameter - D_{50} (mm)	0.20
Upstream Depth* – y_1 (ft)	8.05
Bridge Depth* – y_0 (ft)	7.80
Upstream Flowrate – Q_1 (cfs)	2543
Bridge Flowrate – Q_2 (cfs)	2543
Upstream Channel Width - W_1(ft)	93
Bridge Channel Width – W_2 (ft)	78
k	0.69
Outputs	
Post-Scour Bridge Depth – y_2 (ft)	9.09
Scour Depth (ft)	1.29

*Depths extracted from model time step coinciding with maximum flow rate.

Calculations By:	Jacob McBee	Date	5/21/2012
Checked By:	Mark Gosselin	Date	5/23/2012

500-YEAR CONTRACTION SCOUR COMPUTATION

HEC-18 CONTRACTION SCOUR METHODOLOGY

BRIDGE 860139

BROWARD COUNTY – MAY 21, 2012

Inputs	
Median Sediment Diameter - D_{50} (mm)	0.20
Upstream Depth* – y_1 (ft)	8.55
Bridge Depth* – y_0 (ft)	9.65
Upstream Flowrate – Q_1 (cfs)	2996
Bridge Flowrate – Q_2 (cfs)	2996
Upstream Channel Width - W_1(ft)	93
Bridge Channel Width – W_2 (ft)	78
k	0.69
Outputs	
Post-Scour Bridge Depth – y_2 (ft)	9.65
Scour Depth (ft)	1.35

*Depths extracted from model time step coinciding with maximum flow rate.

Calculations By:	Jacob McBee	Date	5/21/2012
Checked By:	Mark Gosselin	Date	5/23/2012

100-YEAR LOCAL SCOUR CALCULATION

COMPUTED WITH FLORIDA COMPLEX PIER SCOUR EQUATIONS

This Program was Developed for use with Cohesionless Sediment

Complex Pier

English

The local scour is	12.95 (ft)
The structures D* is	11.07 (ft)

Flow and Sediment	
D_{50} (mm)	0.2
Sediment Density (lb/ft^3)	165.41
Water Temp. (F°)	80
Salinity (ppt)	30
Skew Angle	30
y_o (ft)	18.5
V (ft/s)	6.2

Column Data	
b_{col} (ft)	
l_{col} (ft)	
H_{col} (ft)	
f_1 (ft)	
f_2 (ft)	
Shape	

☑ No Column

Complex Pier data

Pile Cap Data	
b_{pc} (ft)	
l_{pc} (ft)	
T (ft)	
H_{pc} (ft)	
Shape	

☑ No Pile Cap

Pile Group Data	
n	1
m	18
b (ft)	1.5
s_n (ft)	0
s_m (ft)	7.8
Pile	Rectangular
W_p (ft)	36.8
w_{pi} (ft)	2.05

☐ No Pile Group

Reset Defaults

Calculate Case 1 Scour

Calculations By:	Jacob McBee	Date	5/21/2012
Checked By:	Mark Gosselin	Date	5/23/2012

	Critical Velocity and Live Bed Peak Velocity	
	y_o (ft)	18.5
	Water density (lb/ft^3)	63.6
	Kinematic Viscosity (ft^2/s)	9.6897E-06
	D_{50} (mm)	0.2
	u_{*c} (ft/s)	0.04
	V_c (ft/s)	1.14
	V_{lp} (ft/s)	14.64
	V/V_c	5.42
	V_{lp}/V_c	12.79
	Case 1 Column Calculations	
A	Calculate K_s	No column is present
B	Calculate K_α	No column is present
C	Calculate $y_{1(max)}$ (ft)	No column is present
D	Is $H_{col} > y_{1(max)}$	No column is present
E	Calculate the pile cap extention coefficient, K_f	No column is present
	f (ft)	No column is present
	f/b_{col}	No column is present
	K_f	No column is present
F	Calculate D^*_{col} (ft)	No column is present
	$h_{col}/(Y_{1(max)})$ (ft)	No column is present
	D^*_{col} (ft)	0
	Case 1 Pile Cap Calculations	
A	Calculate K_s	No pile cap is present
B	Calculate K_α	No pile cap is present
C	Calculate $y_{2(max)}$ (ft)	No pile cap is present
D	Is $H_{pc} > y_{2(max)}$	No pile cap is present
E	Calculate D^*_{pc}	No pile cap is present
	$H_{col}/(y_{2(max)})$	No pile cap is present
	$H_{pc}/(y_{2(max)})$	No pile cap is present
	D^*_{pc} (ft)	0
	Case 1 Pile Group Calculations	
A	Calculate $y_{s(col+pc)}$	
	$D^*_{(col+pc)}$ (ft)	0.00
	$y_o/D^*_{col(max)}$	0
	D^*/D_{50}	0.00
	$f_1(y_o/D^*)$	0.00
	$f_2(V/V_c)$	0
	$f_3(D^*/D_{50})$	0
	$y_{s(col+pc)}$ (ft)	
B	Calculate and (ft)	
		18.5
		18.5
C	Calculate the shape factor for the pile group, K_s	
	s/b	3.8
	$K_{s(pile)}$	0.91
	$K_{s(pile\ group)}$	1
	K_s	0.97
D	Calculate W_p (ft)	36.8
E	Calculate the pile spacing coefficient, K_{sp}	0.31
F	Calculate K_m	1
G	Calculate (ft)	11.07
H	Calculate K_h	
		1.67
	K_h	1
I	Calculate D^*_{pg} (ft)	11.0658
	Case 1 Complex Pier Scour	
A	Calculate the overall effective diameter, D^*	11.07
B	Calculate $y_{s(col+pc+pg)}$	
	$D^*_{(col+pc+pg)}$ (ft)	11.07
	y_o/D^*	1.67
	D^*/D_{50}	15808.29
	$f_1(y_o/D^*)$	0.84
	$f_2(D^*/D_{50})$	-2.44
	$y_{s(col+pc+pg)}$ (ft)	12.95

500-YEAR LOCAL SCOUR CALCULATION

COMPUTED WITH FLORIDA COMPLEX PIER SCOUR EQUATIONS

This Program was Developed for use with Cohesionless Sediment

Complex Pier

English

The local scour is	13.56 (ft)
The structures D* is	11.07 (ft)

Flow and Sediment	
D_{50} (mm)	0.2
Sediment Density (lb/ft^3)	165.41
Water Temp. (F°)	80
Salinity (ppt)	30
Skew Angle	30
y_o (ft)	19.1
V (ft/s)	6.9

Column Data	
b_{col} (ft)	
l_{col} (ft)	
H_{col} (ft)	
f_1 (ft)	
f_2 (ft)	
Shape	

☑ No Column

Complex Pier data

Pile Cap Data	
b_{pc} (ft)	
l_{pc} (ft)	
T (ft)	
H_{pc} (ft)	
Shape	

☑ No Pile Cap

Pile Group Data	
n	1
m	18
b (ft)	1.5
s_n (ft)	0
s_m (ft)	7.8
Pile	Rectangular
W_p (ft)	36.8
w_{pi} (ft)	2.05

☐ No Pile Group

Reset Defaults

Calculate Case 1 Scour

Calculations By:	Jacob McBee	Date	5/21/2012
Checked By:	Mark Gosselin	Date	5/23/2012

	Critical Velocity and Live Bed Peak Velocity	
	y_o (ft)	19.1
	Water density (lb/ft^3)	63.6
	Kinematic Viscosity (ft^2/s)	9.6897E-06
	D_{50} (mm)	0.2
	u_{*c} (ft/s)	0.04
	V_c (ft/s)	1.15
	V_{lp} (ft/s)	14.87
	V/V_c	6.01
	V_{lp}/V_c	12.96
	Case 1 Column Calculations	
A	Calculate K_s	No column is present
B	Calculate K_α	No column is present
C	Calculate $y_{1(max)}$ (ft)	No column is present
D	Is $H_{col} > y_{1(max)}$	No column is present
E	Calculate the pile cap extention coefficient, K_f	No column is present
	f (ft)	No column is present
	f/b_{col}	No column is present
	K_f	No column is present
F	Calculate D^*_{col} (ft)	No column is present
	$h_{col}/(Y_{1(max)})$ (ft)	No column is present
	D^*_{col} (ft)	0
	Case 1 Pile Cap Calculations	
A	Calculate K_s	No pile cap is present
B	Calculate K_α	No pile cap is present
C	Calculate $y_{2(max)}$ (ft)	No pile cap is present
D	Is $H_{pc} > y_{2(max)}$	No pile cap is present
E	Calculate D^*_{pc}	No pile cap is present
	$H_{col}/(y_{2(max)})$	No pile cap is present
	$H_{pc}/(y_{2(max)})$	No pile cap is present
	D^*_{pc} (ft)	0
	Case 1 Pile Group Calculations	
A	Calculate $y_{s(col+pc)}$	
	$D^*_{(col+pc)}$ (ft)	0.00
	$y_o/D^*_{col(max)}$	0
	D^*/D_{50}	0.00
	$f_1(y_o/D^*)$	0.00
	$f_2(V/V_c)$	0
	$f_3(D^*/D_{50})$	0
	$y_{s(col+pc)}$ (ft)	
B	Calculate and (ft)	
		19.1
		19.1
C	Calculate the shape factor for the pile group, K_s	
	s/b	3.8
	$K_{s(pile)}$	0.91
	$K_{s(pile\ group)}$	1
	K_s	0.97
D	Calculate W_p (ft)	36.8
E	Calculate the pile spacing coefficient, K_{sp}	0.31
F	Calculate K_m	1
G	Calculate (ft)	11.07
H	Calculate K_h	
		1.73
	K_h	1
I	Calculate D^*_{pg} (ft)	11.0658
	Case 1 Complex Pier Scour	
A	Calculate the overall effective diameter, D^*	11.07
B	Calculate $y_{s(col+pc+pg)}$	
	$D^*_{(col+pc+pg)}$ (ft)	11.07
	y_o/D^*	1.73
	D^*/D_{50}	15808.29
	$f_1(y_o/D^*)$	0.85
	$f_2(D^*/D_{50})$	-2.85
	$y_{s(col+pc+pg)}$ (ft)	13.56

PHASE 3 – Structural/Geotechnical Assessment
SCOUR EVALUATION FOR BRIDGES WITH UNKNOWN FOUNDATIONS

PREPARED FOR:

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 4
DISTRICTWIDE SCOUR EVALUATIONS
FPID: 427334 -1-72-1 (STATE BRIDGE)

BRIAN O'DONOGHUE, P.E. PROJECT MANAGER

BRIDGE NUMBER:	860139
OWNER:	FLORIDA DEPARTMENT OF TRANSPORTATION
BRIDGE NAME:	OAKLAND PARK BLVD. OVER C-13 CANAL
LOCATION:	SR-816 JUST WEST OF I-95
COUNTY:	BROWARD

SCOUR VULNERABILITY

SCOUR MODE: ☐ Riverine ☒ Tidal ☐ Both

SCOUR RATING:

Scour Critical:	☒ Yes	☐ No
Low Risk:	☐ Yes	☒ No
Foundation Status:	☐ Known	☒ Unknown

BMS RATING:

	Previous	Current
I 7 (113) Scour Critical	U	3
G3.00 (60) Substructure	7	7
G5.00 (61) Channel & Channel Protection	6	6
I 5 (71) Waterway Adequacy	9	9
G13.00 Substructure Movable Spans	N/A	N/A

RECOMMENDATION: **Conduct a Stage 5 Bridge Priority/Phase 4 Countermeasures Scour Analysis**

☒PHASE 1 QUALITATIVE EVALUATION/ ASSESSMENT	☒PHASE 2 HYDRAULIC/HYDROLOGIC ASSESSMENT	☒ PHASE 3 STRUCTURAL/GEOTECHNICAL ASSESSMENT	☐PHASE 4 PLAN OF ACTION
DATE: *UNDATED* ADDENDUM: *12/14/2011*	DATE: *05/21/2012*	DATE: *06/28/2013*	DATE: ____

PREPARED BY: *JMA, JSV*

CHECKED BY: *TED, EJK, JGH*

CORRECTED BY: *JESSICA M. ALKHUB, P.E.*

APPROVED BY: *THOMAS E. DAVIDSON, P.E.*

PARSONS
1555 Palm Beach Lakes Blvd, Suite 1405
West Palm Beach, FL 33467
(561) 656-6370

PROJECT MANAGER: *EDWARD J. KENT, Ph.D, P.E.*

SIGNATURE 6/28/13

35676 PE. NUMBER

EDWARD J. KENT LICENSE No 35676 STATE OF FLORIDA PROFESSIONAL ENGINEER

1 SUMMARY OF FINDINGS

Bridge Number 860139 in Broward County (see Figure 1), Oakland Park Boulevard over C-13 Canal, has been rated scour critical, based on the results of the geotechnical and structural assessments.

This bridge was built in 1965 and was repaired in 2004. It is 30.6 m long and has 3 spans (see Figure 2). The multi-span bridge is supported by two vertical abutments protected by sand-cement riprap. Based on the 2002 widening plans, the substructure consists of two interior bents that are supported by piles of unknown length and embedment (see Figure 3). C-13 Canal is tidal scour mode.

Subsurface conditions were evaluated using two (2) Standard Penetration Test (SPT) borings available from the 2002 widening plans (see Figure 4). Boring B-2 near Bent 4 encountered very loose to medium dense fine sand and fine sand with limestone fragments from elevation +9.5 feet to an elevation of -17.4 feet. The boring then encountered medium dense to dense fine sand with limestone fragments from elevation -17.4 feet to -51.9 feet. The boring results of Boring B-2 are summarized in Table 1.

The 2011 pile embedment evaluation report and the adjustments made in Phase 2 Scour Evaluation Report were used to determine the pile tip elevations. The piles at pile bent 3 were chosen for the analysis because its piles have the least amount of embedment and the largest unsupported length. Pile Bent No. 3 has approximately 10.2 ft of pile embedment depth (correction factor of 0.8 has been included). Pile Bent No. 3 has a predicted 100-year scour of 18.6 ft resulting in a post 100-year scour event embedment of 0 ft, and the full pile length is unsupported.

Pile Bent No. 3 was concluded to be unstable because there is no embedment left after the 100-year scour event.

Recommendations

A Stage 5/Phase 4 scour analysis is recommended based on the results of the geotechnical/structural assessment.

2 GEOTECHNICAL ASSESSMENT

A geotechnical assessment was conducted to provide information for evaluation of scourability of waterway bed materials and to support the evaluation of bridge foundation capacity and structural stability based on the scour depths calculated in Phase 2. Table 2 presents the elevations that were used in the geotechnical and structural assessment for the worst case pier.

Material Scourability

Boring No. B-2 (performed in 2002 with automatic hammer) encountered very loose to dense fine sand and fine sand with limestone fragments within the pile embedment depths. The material encountered above the 100-year scour elevation is considered to be scourable based on FDOT criteria.

Table 1 Subsurface Conditions of Boring B-2

Elevation of Layer (feet)	Approximate Layer Thickness (feet)	Soil/ Material Description	N Value Standard Penetration Resistance (blows per foot)
+9.5 to -17.4	26.9	sand with limerock fragments	1-12
-17.4 to -51.9	34.5	fine sand with limestone fragments	11-108

Table 2 Scour Evaluation Elevations	
Worst Case Pier No.	Pile Bent No. 3
Deck El. – 2002 (ft.) (1)	+10.0
Approx. Channel Bottom El. - 2012 (ft.) (2)	-10.6
Pile Cut-off El. (1)	+6.8
Exist. Pile Unsupported Length - 2012 (ft.) (3)	17.4
Exist. Pile Embedment (ft.) (4)	10.2
100-Year Scour Depth (ft.) (5)	18.6
100-Year Scour Elevation (ft.)	-29.2
Estimated Pile Embedment after Scour (ft.) (6) (7)	0
Pile Unsupported Length after Scour (ft.) (7)	27.6

(1) This information was obtained from the 2002 Bridge widening plans by Calvin, Giodano & Associates, Inc.
(2) This information was obtained from the 2012 survey by Manuel G. Vera & Associates, Inc.
(3) Existing pile unsupported length determined from pile cut-off to channel bottom elevation (2012 survey)
(4) Estimated existing pile embedment in accordance with the "Procedural Manual: Reclassify Unknown Foundation Bridges." It was estimated based on the approximate current channel bottom elevation.
(5) 100-year scour depths obtained from the Phase 2 Scour Evaluation Report, dated 12/14/2011, by OEA, Inc.
(6) Estimated pile embedment after scour in accordance with the "Procedural Manual: Reclassify Unknown Foundation Bridges."
(7) Pile unsupported length after scour determined using the existing pile unsupported length from pile cut-off to the pile tip. For this bridge the 100-year scour depth is below the pile tip.
Note: All elevations are in NGVD 29.

Pile Compression Capacity

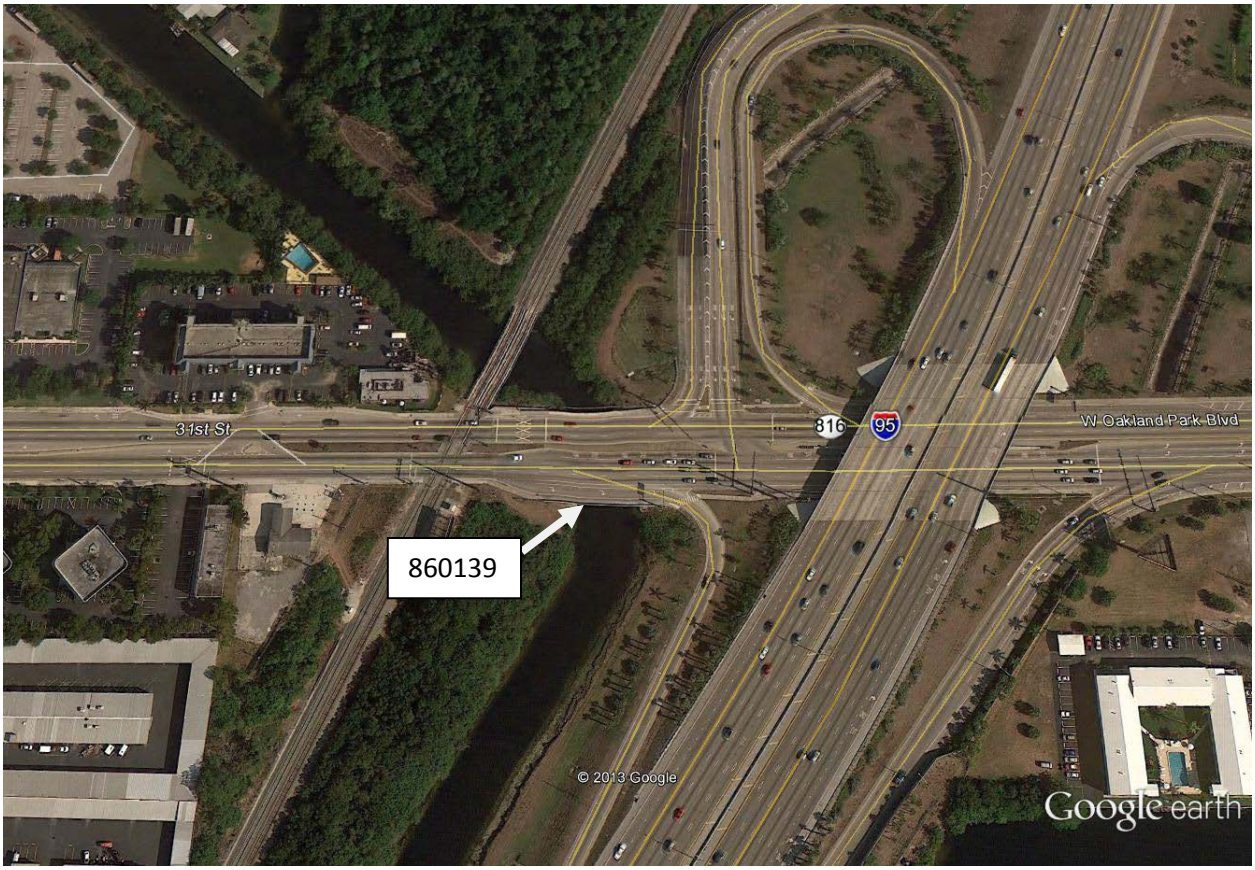
No additional soil borings were performed at this bridge under the current contract. The soil data are based on existing plans. The piles would have no remaining embedment after the 100-year scour event. Therefore by observation the piles have no compression capacity.

3 STRUCTURAL ASSESSMENT

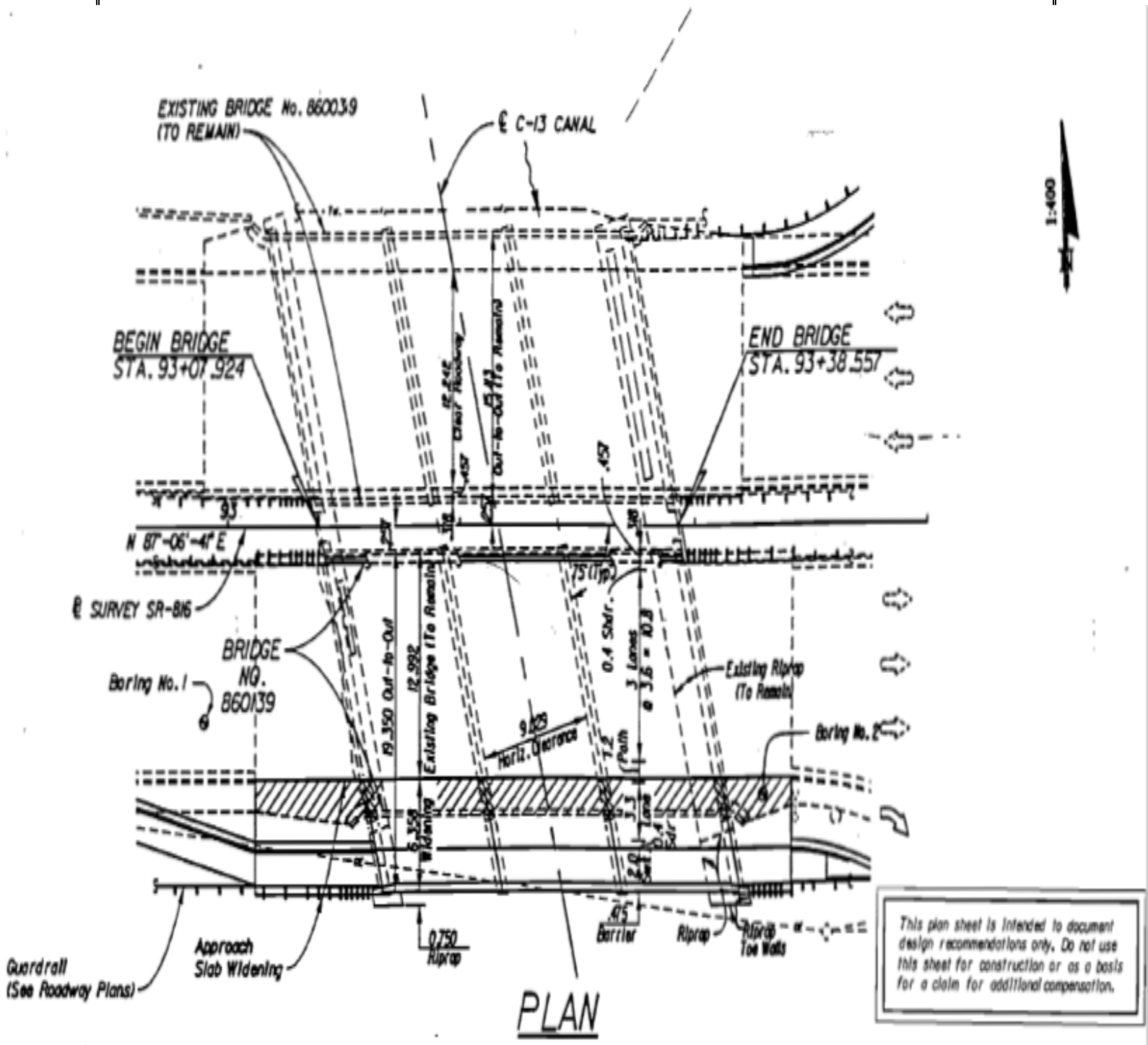
The piles at pile bent 3 were chosen for the analysis because its piles have the least amount of embedment and the largest unsupported length. Pile Bent No. 3 has approximately 10.2 ft pile embedment depth (correction factor of 0.8 has been included). Pile Bent No. 3 would have a predicted 100-year scour of 18.6 ft. Post 100-year scour event the piles would have no remaining embedment and the full length of the pile would be unsupported length. Therefore by observation the Pile Bent is unstable. The bridge is rated scour critical.

4 MATERIALS AND DOCUMENTATION

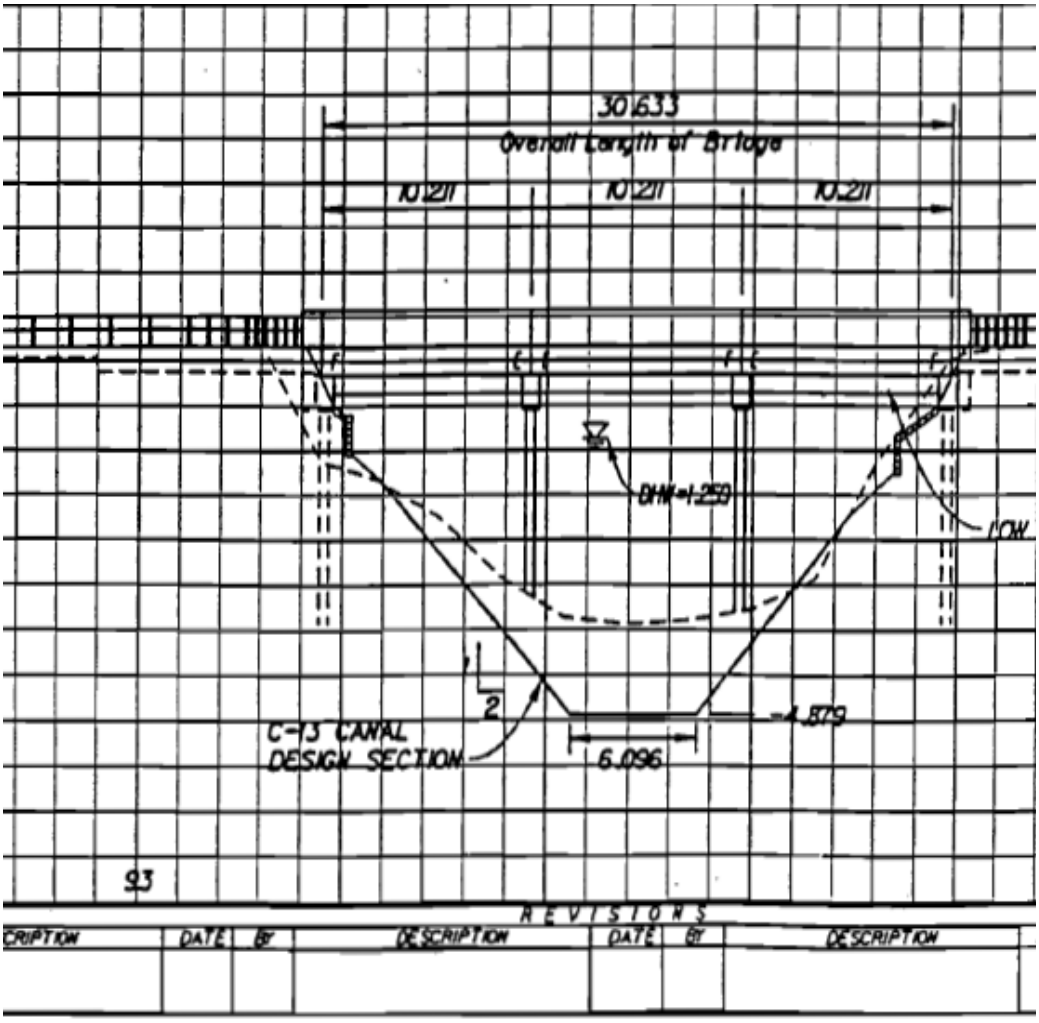
- Undated Scour Evaluation Report, Phase 1 (Kimley-Horn and Associates, Inc.)
- 2002 Bridge Rehabilitation Plans
- 2010 Bridge Inspection Report
- 2011 Scour Evaluation Report, Phase 1 Addendum (OEA, Inc)
- 2012 Scour Evaluation Report, Phase 2 (OEA, Inc.)
- 2013 Google Earth Pro Map



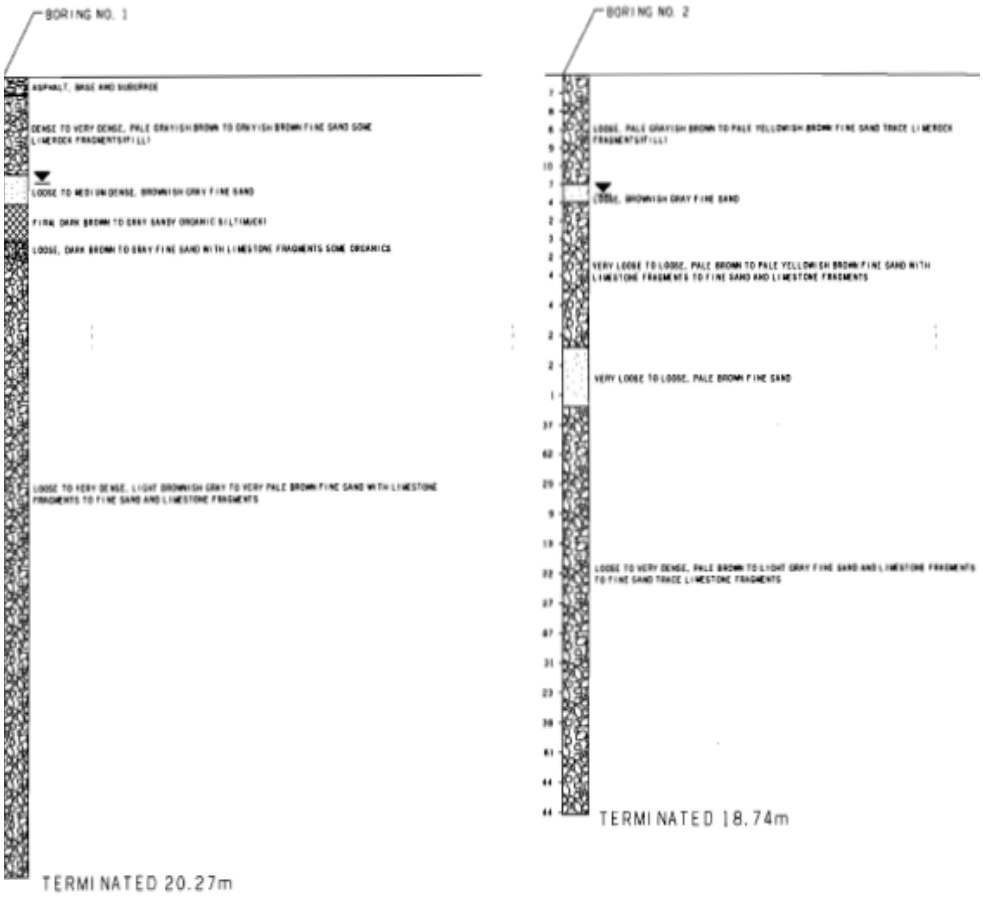
Bridge 860139
Figure 1 - Location Map
Oakland Park Blvd. over C-13 Canal
Broward County, Florida
Source: 2013 Google Earth Pro



Bridge 860139
Figure 2 - Plan View
Oakland Park Blvd. over C-13 Canal
Broward County, Florida
Source: 2002 Bridge Rehabilitation Plans



Bridge 860139
Figure 3 - Profile View
Oakland Park Blvd. over C-13 Canal
Broward County, Florida
Source: 2002 Bridge Rehabilitation Plans



Bridge 860139
Figure 4 - Design Soil Boring Logs
Oakland Park Blvd. over C-13 Canal
Broward County, Florida

SCOUR EVALUATION – PHASE 3 - FIELD / OFFICE REVIEW REPORT

Bridge Number: 860139	**County:** Broward	**Route:** Oakland Park Blvd.	**Over:** C-13 Canal

1. SCOUR VULNERABILITY RATING (PER FHWA)

A. Scour Critical: (X) Yes ( ) No

Low Risk ( ) Yes (X) No

Foundations ( ) Known (X) Unknown

B. Reasons for Rating:

The structure is Not Stable at the 100-year Scour Elevation of -29.2 ft (NGVD).

2. PHASE 2 RATING Scour Critical

3. RECOMMENDATIONS

A. Interim Countermeasures:

- ☐ Riprap
- ☐ Scour Monitor
- ☐ Inspection
- ☐ Other

Phase 4 Analysis Recommended: ☒ Required ☐ Not Required

Remarks

4. CIDR CODING REMARKS

RATING SCOUR EVALUATION: Scour Critical
SCOUR RECOMMENDATION III: PHASE IV RECOMMENDED
SCOUR ELEVATION: -29.2 ft (NGVD)
ACTION ELEVATION: 999
STORM FREQUENCY: 100-YEAR

SCOUR EVALUATION – PHASE 3 - FIELD / OFFICE REVIEW REPORT

5. SCOUR IMPACT ASSESSMENT FOR STRUCTURAL STABILITY

A. Foundation Type *	PILE BENT – [12] 455mm SQUARE PRESTRESSED CONCRETE PILES
B. Current Reported Embedment *	10.2 FT
C. Estimated Embedment After Scour *	0 FT

* Condition(s) reported for Pile Bent No. 3

6. ITEMS EVALUATED

A. ☒ Material Scourability	Based on Boring log, Geotechnical assessment and Phase 2 Scour Evaluation Report
B. ☒ Pile Compression Capacity	Based on observation
C. ☒ Pile Response to Lateral Load	Based on observation

D. Do results of analysis indicate foundation instability?

☒ Yes (Phase 4 Recommended) ☐ No

STAGE 5 - Bridge Priority and Phase 4 Countermeasures
SCOUR EVALUATION FOR BRIDGES WITH UNKNOWN FOUNDATIONS

PREPARED FOR:

FLORIDA DEPARTMENT OF TRANSPORTATION, DISTRICT 4
DISTRICTWIDE SCOUR EVALUATIONS
FAP NO.: NBIS 218A/ NBIS 219A
FPID: 427334-1-72-1 (STATE BRIDGE)

BRIAN O'DONOGHUE, P.E. PROJECT MANAGER

BRIDGE NUMBER:	**860139**
OWNER:	**FLORIDA DEPARTMENT OF TRANSPORTATION**
BRIDGE NAME:	**OAKLAND PARK BOULEVARD OVER C-13 CANAL**
LOCATION:	**SR-816 JUST WEST OF I-95**
COUNTY:	**BROWARD**
SCOUR MODE:	**TIDAL**
SCOUR CRITICAL (113):	**3**
RECOMMENDATION:	**INSTALL MARINE MATTRESS SCOUR COUNTERMEASURES ACROSS THE ENTIRE BRIDGE OPENING FROM ABUTMENT TO ABUTMENT AND EXTENDING 25 FT UPSTREAM AND DOWNSTREAM OF BRIDGE. CONTINUE TO MONITOR THE BRIDGE AFTER MAJOR STORM EVENTS.**

☒PHASE 1 QUALITATIVE EVALUATION/ ASSESSMENT	☒STAGE 3/PHASE 2 HYDRAULIC/HYDROLOGIC ASSESSMENT	☒ STAGE 4/PHASE 3 STRUCTURAL/GEOTECHNICAL ASSESSMENT	☒ STAGE 5/PHASE 4 BRIDGE PRORITY AND PHASE 4 COUNTERMEASURES
DATE: UNDATED **ADDENDUM: 12/14/2011**	**DATE: 05/21/2012**	**DATE: 06/28/2013**	**DATE: 02/28/2014**

PREPARED BY: *AMBER FUXAN, P.E.*

CHECKED BY: *JIE G. HOUSE, P.E.*

CORRECTED BY: *AMBER FUXAN, P.E.*

QA/QC BY: *EDWARD J. KENT, PH.D., P.E.*

PARSONS
1555 Palm Beach Lakes Blvd, Suite 1105
West Palm Beach, FL 33401
(561) 656-6370

PROJECT MANAGER: *EDWARD J. KENT, PH.D., P.E.*

EDWARD J. KENT LICENSE No 35676 3/14/14
STATE OF FLORIDA PROFESSIONAL ENGINEER

Edward J. Kent STATE OF *35676*
SIGNATURE PE. NUMBER

SUMMARY OF FINDINGS

The Florida Department of Transportation constructed Bridge No. 860139 in 1965. According to the 1994 Phase 1 Report, the bridge was repaired in 1988 and according to the 2004 Final As-Built Plans, it was widened in 2004. The bridge carries the eastbound and westbound traffic of Oakland Park Blvd over C-13 Canal. The channel is a tidally controlled waterway that flows into the Middle River. According to the 2012 Bridge Inspection Report (BIR), this section of roadway carried 54,000 vehicles per day in 2012 and its functional classification is Urban Other Principal Arterial.

The bridge is comprised of three spans and no approach spans. It has a total length of 100.5 ft. The substructure consists of two interior bents that are supported by 18" square pre-stressed concrete piles. The embedment of the original interior bridge piles is unknown and was estimated to be 10.2 ft; the embedment of the interior bent piles added in 2004 is a minimum of 14.4 ft.

The multi-span bridge is supported by two vertical abutments protected by grouted sand-cement riprap. The 2012 BIR noted west slope protection below the eastbound traffic lanes have missing and displaced rip-rap 139'L X 4'W X 1'D (556sf) and settlement under abutment-4 (139'L X up to 6' Penetration X 10"H) exposing 6 piles. Deterioration of abutment protection increased between the 2010 and 2012 BIRs.

According to the 2013 Phase 3 Report, the waterway soil consists of very loose to medium dense fine sand and fine sand with limestone fragments from elevation +9.5 feet to an elevation -17.4 feet, medium dense to dense fine sand with limestone fragments from elevation -17.4 feet to -51.9 feet..

Previous Investigations

The original 1994 Phase 1 evaluation rated the bridge scour susceptible (medium priority) due to a foundation of unknown embedment, evidence of scour, vertically unstable channel, aggressive waterway due to the channel's geomorphology, tidal waterway, erodible bed material, relatively high extreme flow angles of attack, and countermeasures in fair to poor condition at the abutments. The 2012 Phase 2 evaluation recommended a Phase 3 based on the predicted 100-year scour depths. The Phase 2 report indicated that the design criteria for countermeasures included a 100-year flow velocity of up to 6.2 fps, a flow rate of 2,543 cfs, a maximum water surface elevation of +2.1' NAVD, and a 30 degree angle of attack. The Phase 3 report indicated that Pile Bent No. 3 is unstable for the 100-year scour event.

Stage 5 Investigation

Due to insufficient pile embedment for Bent No. 3 for the 100-year scour event, degradation of the channel, and damaged abutment protection, scour countermeasure protection is recommended for the entire channel bottom (from left abutment to right abutment and 25 feet upstream and downstream of bridge deck.

SUMMARY OF RECOMMENDATIONS

A Plan of Action (POA) has been prepared as summarized in this Phase 4 report. The POA recommends installation of marine mattress scour countermeasures across the entire channel bottom under bridge 860139, extending 25 ft upstream and downstream of the bridge and from abutment to abutment. Continue to monitor the bridge at the regularly scheduled interval and after major storm events.

MATERIALS AND DOCUMENTATION

- 1994 Scour Evaluation Report, Phase 1 (Kimley-Horn & Associates, Inc)
- 2004 As-Built Plans
- 2010 Bridge Inspection Report (FDOT)
- 2012 Bridge Inspection Report (FDOT)
- 2012 M. G. Vera Survey
- 2012 Scour Evaluation Report, Phase 2 (OEA, Inc)
- 2013 Scour Evaluation Report, Phase 3 (Parsons)

Step 6.5: Check the Warrant of Automated Monitoring

1. Check High Priority and Minimum Performance Level

☒ High Priority Bridge, Proceed to Step 6.6

☒ Does Not Meet Minimum Performance Level, Proceed to Step 6.6

2. Calculate the Lifetime Risk of Death

$R_{death} = K_1K_2P_LCost_{death}$ = $

Where K_1 = K_2 = P_L = $Cost_{death}$ =

3. Cost Comparison

☐ AM cost calculations are shown in the Appendix

Cost of AM = $ ☐ > R_{death} ☐ < R_{death}

4. Check the Warrant of Automated Monitoring

☐ Yes (R_{death}> Cost of AM), Reduce the Lifetime Risk of Failure*, Proceed to Step 6.6

☐ No (R_{death}< Cost of AM), Proceed to Step 6.6

*Reduced Lifetime Risk of Failure= (Stage 1 LRF)-(R_{death})= Stage 5 LRF

Stage 1 LRF = $

Stage 5 LRF = $

5. Evaluation Comments:

Step 6.6: Evaluation of Scour Countermeasures (Phase 4)

1. A total of 2 countermeasure alternatives were evaluated for this bridge:

☒ Countermeasure typical sketches and cost calculations for the countermeasure options evaluated are shown in the Attachment F

Alternative 1
Type: Marine Mattress
Cost: $525,844
Description:
Marine mattress, a rock-filled container constructed of high-strength geogrid, is proposed to be installed across the entire channel bottom under bridge 860139, extending 25 ft upstream and downstream of the bridge and from abutment to abutment to provide scour protection for pile bents 2 and 3, the channel bottom, and both abutments. The marine mattress will be placed with a 1' clearance from piles; the space between the mattress and piles will be filled with ditch lining riprap, underlain by filter fabric. The filter fabric shall terminate 2/3 of toe down distance. The mattress system toe on the upstream and downstream channel ends shall be buried from grade to 5.6 feet with a slope of no more than 2:1. Proper anchors will be used at the termination of marine mattress at the abutment pile caps and any gap between the mattress and abutment will be filled with ditch lining. Placement limits and conceptual details of the marine mattress (1' thick), its costs, and calculations are presented in Appendix F.

Alternative 2
Type: Bank and Shore Riprap
Cost: $524,430
Description:
Bank and Shore Riprap with filter fabric and bedding stone per FDOT standard specification 530 is proposed to be placed across the entire channel bottom under bridge 860139, extending 25 ft upstream and downstream of the bridge and from abutment to abutment and underlain with filter fabric. The filter fabric shall terminate 2/3 of toe down distance. The riprap toe on the upstream and downstream channel ends shall be buried from grade to 5.6 feet with a slope of no more than 2:1. The Riprap shall have a d_{50} of 15 inches and a thickness of 2.5 feet. The proposed placement limits are similar to Alternative 1 as shown in Figure F-1.

2. Table 1 ranks the favorability of each countermeasure alternative based on selected criteria. Scoring is from 1 to 5 with 1 being least favorable and 5 being most favorable.

Table 1. Countermeasure Evaluation Matrix

Criterion	Alternative 1	Alternative 2
Cost	3	3
Constructability	3	2
Traffic Impacts	5	5
Temporary Bridge Closure Required	5	5
Regulatory Feasibility	3	3
Maintenance	3	4
Effectiveness/Reliability	4	3
TOTAL SCORE	26	25

3. Selected Countermeasure

☒ Alternative 1 ☐ Alternative 2

4. Evaluation Comments (Describe key aspects of the evaluation matrix for the alternatives):
Bridge 860139 is located on a 90 degree bend on canal C-13. The channel has experienced degradation over the monitoring period from 1987-present. Marine mattress was selected because it has several advantages over the Bank and Shore Riprap alternative. Marine mattress has a low profile of 1' that allows it to be utilized without significantly reducing the depth of the water and constricting flow through the bridge opening. The riprap alternative will create more turbulence and have a greater impact on flow constriction. The marine mattress alternative's estimated construction cost is approximately the same as the riprap alternative.

Step 6.7: Check the Warrant of Countermeasures

1. Check High Priority, Minimum Performance Level, and Lifetime Risk of Failure

☒ High Priority Bridge, Proceed to Step 6.8

☒ Does Not Meet Minimum Performance Level, Proceed to Step 6.8

☐ LRF > $100,000, Proceed to Step 6.8

2. Check the Warrant of Countermeasures

☐ Countermeasure Cost < LRF*, Proceed to Step 6.8

☐ Countermeasure Cost > LRF*

- ☐ If AM is not warranted: Prepare of Plan of Action and Item 113 remain coded as “U”
- ☐ If AM is warranted: Prepare a Plan of Action and Item 113 coded as “8”

*Use Lifetime Risk of Failure from Step 6.5, Item 4.

3. Evaluation Comments:

Step 6.8: Check the Warrant of Non-Destructive Testing

1. A total of 2 NDT methods were evaluated for this bridge:

☒ NDT costs and applicability are shown in the Attachment H

Method 1
Type: Low Strain Integrity Test (Sonic Echo)
Cost: $23,070
Description:
This method is the quickest, simplest, least expensive, and in most cases is conclusive. Multiple tests can be performed in a single day. It is recommended to conduct the low strain integrity testing on a minimum of 5% of piles to obtain an optimized result. Thus, two (2) piles are selected for testing with one test each at bents #2 and 3.

Method 2
Type: Parallel Seismic Test
Cost: $47,223
Description:
This method is used typically on piles. A cased borehole needs to be within 3 feet next to the testing pile and needs to extend approximately 15 feet below the estimated bottom of the pile. 2004 Bridge Plans indicate piles for interior bents were driven a minimum of 15 ft feet and their pile tips are estimated to be at an elevation of -27 feet. Thus, it is recommended to drive the cased borehole down to -47 feet with one test each at bents #2 and 3.

2. Selection of the Appropriate NDT Method based on foundation type & materials, access limitations and applicability guidelines as presented in the Procedural Manual.

Selected NDT Method
☒ Alternative 1
☐ Alternative 2

3. Comparison of NDT and Countermeasure

☐ Bridge is equally likely to be stable vs. unstable
- ☐ NDT Cost < ½ Countermeasure Cost, Proceed to Stage 6
- ☐ NDT Cost > ½ Countermeasure Cost, Reclassify the Bridge and Prepare a POA Including Installation of Scour Countermeasures

☐ Bridge is more likely to be shown stable
- ☐ Even if NDT Cost > ½ Countermeasure Cost, Proceed to Stage 6
- ☐ If NDT Costs Approach or Exceed Countermeasure Cost, Reclassify the Bridge and Prepare a POA Including Installation of Scour Countermeasures

☒ Bridge is more likely to be shown unstable
- ☒ Even if NDT Cost is somewhat < ½ Countermeasure Cost, Reclassify the Bridge and Prepare a POA Including Installation of Scour Countermeasures
- ☐ If NDT Cost is only a small fraction of the Countermeasure Cost, Proceed to Stage 6

4. Evaluation Comments:
Both NDT alternatives are less than 10% of the cost of the selected countermeasure; however, the embedment of the piles installed in 2004 is 14.4 ft and the piles are not of sufficient embedment to withstand the 100-year predicted scour depth of 18.6 feet. For that reason, NDT testing is not recommended.

SCOUR CRITICAL BRIDGE - PLAN OF ACTION

1. GENERAL INFORMATION

Structure number: 860139	**City, County, State:** Oakland Park, Broward, Florida	**Waterway:** C-13 Canal
Structure name: Not Recorded	**State highway or facility carried:** Oakland Park Blvd	**Owner:** Florida Department of Transportation
Year built: 1965	**Year rebuilt:** 2004	**Bridge replacement plans (if scheduled):** No **Anticipated opening date:** N/A

Structure type: ☒ Bridge ☐ Culvert
Structure size and description: 100.5 feet long, three span bridge.

Foundations: ☒ Known, type: 18"SQ Depth: -27.3 ft (for widened portion) ☒ Unknown (for original portion)

Subsurface soil information (*check all that apply*): ☒ Non-cohesive ☐ Cohesive ☒ Rock

Bridge ADT: 54,500	**Year/ADT:** 2012	**% Trucks:** 4

Does the bridge provide service to emergency facilities and/or an evacuation route (Y/N)? N
If so, describe:

2. RESPONSIBILITY FOR POA

Author(s) of POA (name, title, agency/organization, telephone, pager, email Jie House, P.E., Parsons, 561-656-6379, jane.house@parsons.com Date: 02/28/2014 Date of last update: N/A

Concurrences on POA (name, title, agency/organization, telephone, pager, email): Cleo Marsh, D4 Maintenance Engineer, FDOT, 954-777-4202, cleo.marsh@dot.state.fl.us

POA to be updated every 24 **months** Date of next update: 02/28/2016

3. SCOUR VULNERABILITY

a. Current Item 113 Rating: ☒ 3 ☐ 2 ☐ 1 Other: _____

b. Source of Scour Critical Rating: ☐ Observed ☐ Assessment ☐ Calculated Other: Phase 3/BMS

c. Scour Evaluation Summary: Phase 3 evaluation identified as Scour Critical for 100-year event

d. Scour History: Phase 1 evaluation identified undermining at west abutment; bed material is highly erodible; aggressive waterway due to geomorphology; tidal waterway; extreme flow angle of attack = 15 degrees; possible reduction in sediment supply due to floodgate upstream; channel lightly vegetated.

4. RECOMMENDED ACTION(S) (see Sections 6 and 7)

	Recommended		Implemented	
a. Increased Inspection Frequency	☐ Yes	☒ No	☐ Yes	☐ No
b. Fixed Monitoring Device(s)	☐ Yes	☒ No	☐ Yes	☐ No
c. Flood Monitoring Program	☒ Yes	☐ No	☐ Yes	☒ No
d. Hydraulic/Structural Countermeasures	☒ Yes	☐ No	☐ Yes	☒ No

5. NBIS CODING INFORMATION

		Current	Previous
Inspection date		04/23/2012	04/19/2010
Item 113	Scour Critical	3	U
Item 60	Substructure	5	7
Item 61	Channel & Channel Protection	7	6
Item 71	Waterway Adequacy	9	9
Comments: (drift, scour holes, etc. - depict in sketches in Section 10)		_____	_____

6. MONITORING PROGRAM

☒ **Regular Inspection Program** ☐w/surveyed cross sections
Items to Watch: Signs of movement or settlement, channel bed elevation changes, and countermeasure damage.
☐ **Increased Inspection Frequency of __ mo.** ☐w/surveyed cross sections
Items to Watch: _____

☒ **Underwater Inspection Required**
Items to Watch: Signs of movement or settlement, channel bed elevation changes, and countermeasure damage.
☐ **Increased Underwater Inspection Frequency of __ mo.**
Items to Watch: _____

☐ **Fixed Monitoring Device(s)**
Type of Instrument: _____
Installation location(s): _____
Sample Interval: ☐ 30 min. ☐ 1 hr. ☐ 6 hrs. ☐ 12 hrs. ☐ Other: _____
Frequency of data download and review: ☐ Daily ☐ Weekly ☐ Monthly ☐ Other _____
Scour watch elevation(s) for each pier/abutment: _____
Scour critical elevations(s) for each pier/abutment:_____
Survey ties: _____

☒ **Flood Monitoring Program**
Type: ☒ Visual inspection
☒ Instrument (*check all that apply*):
☐ Portable ☐ Geophysical ☐ Sonar ☒ Other: Dropline readings
Flood monitoring required: ☐ Yes ☒ No
Flood monitoring event defined by (*check all that apply*):
☐ Discharge _____ ☒ Stage All major storm events
☐ Elev. measured from _____ ☐ Rainfall _____ (in/mm) per _____ (hour)
☐ Flood forecasting information: _____ ☐ Flood warning system: _____
Frequency of flood monitoring: ☐1 hr. ☐3 hrs. ☐6 hrs. ☐ Other: _____
Post-flood monitoring required: ☐ No ☒Yes, within 1 days
Frequency of post-flood monitoring: ☐Daily ☐Weekly ☐Monthly ☒Other: Once
Criteria for termination of flood monitoring: NA
Criteria for termination of post-flood monitoring: NA
Scour watch elevation(s) for each pier/abutment: If dropline measurements indicate countermeasure movement that creates an imminent threat of structural instability
Scour critical elevation(s) for each pier/abutment: NA
Note: Additional details for action(s) required may be included in Section 8.
Action(s) required if scour watch elevation detected (*include notification and closure procedures*): Perform immediately necessary repairs of the countermeasure
Action(s) required if scour critical elevation detected (*include notification and closure procedures*): NA

Agency and department responsible for monitoring: FDOT District 4 Structures and Facilities

Contact person (*include name, title, telephone, pager, e-mail*): Brian O'Donoghue, P.E. Structures Repair Design Engineer, (954) 777-4169, brian.odonoghue@dot.state.fl.us

7. COUNTERMEASURE RECOMMENDATIONS

Prioritize alternatives below. Include information on any hydraulic, structural or monitoring countermeasures.

☐ **Only monitoring required (see Section 6)**
☒ **Scour countermeasures considered (see Section 10, Attachment F):**

Priority Ranking	**Estimated cost**
(1) Marine Mattress	$ 525,844
(2) Bank and Shore Riprap	$ 524,430
(3) _____	$ _____
(4) _____	$ _____
(5) _____	$ _____

Basis for the selection of the preferred scour countermeasure: Refer to the Phase 4 Report

Countermeasure implementation project type:
☐ Proposed Construction Project ☒ Maintenance Project
☐ Programmed Construction - Project Lead Agency:
☐ Bridge Bureau ☐ Road Design ☐ Other _____

Agency and department responsible for countermeasure program (if different from Section 6 contact for monitoring): _____

Contact person (*include name, title, telephone, pager, e-mail*): _____

Target design completion date: Currently unscheduled

Target construction completion date: Currently unscheduled

Countermeasures already completed: NA

8. BRIDGE CLOSURE PLAN

Scour monitoring criteria for consideration of bridge closure:

☐ Water surface elevation reaches _____ at _____
☐ Overtopping road or structure
☐ Scour measurement results / Monitoring device (See Section 6)
☒ Observed structure movement / Settlement
☐ Discharge: _____ cfs/cms
☐ Flood forecast: _____
☒ Other: ☐ Debris accumulation ☐ Loss of road embankment
☒ Movement of riprap/other armor protection that creates an imminent threat of structural instability

Emergency repair plans (*include source(s), contact(s), cost, installation directions*): FDOT

Agency and department responsible for closure: FDOT

Contact persons (name, title, agency/organization, telephone, pager, email): Cleo Marsh, See Item 2

Criteria for re-opening the bridge: Reopen only after the bridge has been inspected and determined to be structurally sound and/or any immediately necessary repairs have been made to riprap/other armor protection.

Agency and person responsible for re-opening the bridge after inspection: Cleo Marsh

9. DETOUR ROUTE

Detour route description (route number, from/to, distance from bridge, etc.) - Include map in Section 10, Attachment E.

Bridges on Detour Route:

Bridge Number	Waterway	Sufficiency Rating/ Load Limitations	Item 113 Code
860095	S. Fork Middle River	44.86 ton	8
860096	Canal C-13	40.57 ton	5

Traffic control equipment (detour signing and barriers) and location(s): Meet 600 MUTCD

Additional considerations or critical issues (susceptibility to overtopping, limited waterway adequacy, lane restrictions, etc.) : _____

News release, other public notice (include authorized person(s), information to be provided and limitations): _____

10. ATTACHMENTS

Please indicate which materials are being submitted with this POA:

☒ **Attachment A: Boring logs and/or other subsurface information**

☒ **Attachment B: Cross sections from current and previous inspection reports**

☐ **Attachment C: Bridge elevation showing existing streambed, foundation depth(s) and observed and/or calculated scour depths**

☐ **Attachment D: Plan view showing location of scour holes, debris, etc.**

☒ **Attachment E: Map showing detour route(s)**

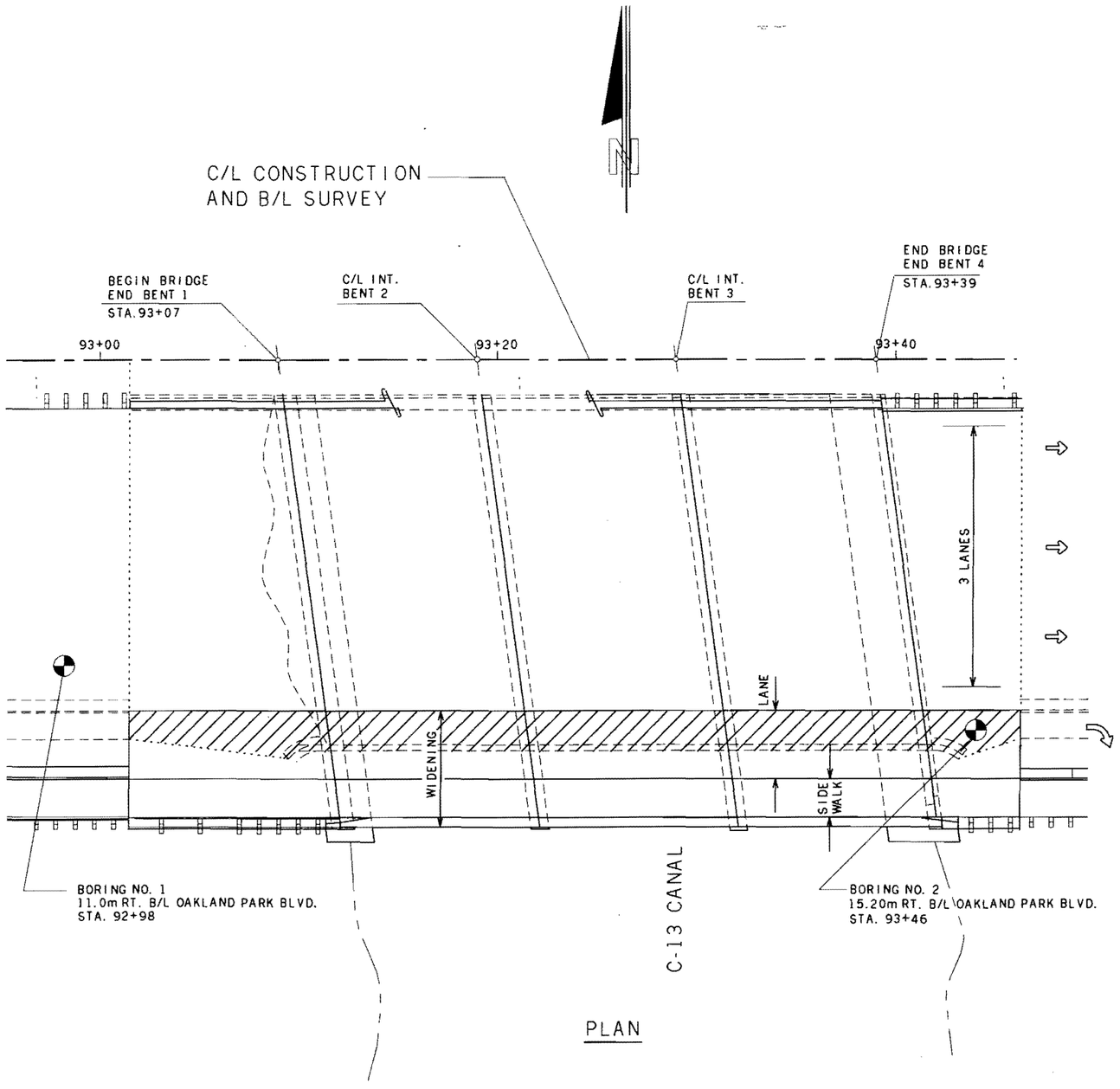
☒ **Attachment F: Supporting documentation, calculations, estimates and conceptual designs for scour countermeasures.**

☒ **Attachment G: Photos**

☒ **Attachment H: Other information:** NDT Cost Estimates

Attachment A

FINANCIAL PROJECT ID:	SHEET NO.
228038-1-52-01	B-16



PLAN

BORING LOCATION

NOT TO SCALE

GENERAL NOTES

- ALL DEPTHS GIVEN IN DISTANCE BELOW EXISTING GROUND AT BORING LOCATIONS.
- BORINGS WERE DONE AS PER A.S.T.M. TEST PROCEDURES D-1586-67
- SPOON:
  INSIDE DIAMETER: 35 MILLIMETERS
  OUTSIDE DIAMETER: 51 MILLIMETERS
- HAMMER:
  WEIGHT: 63.5 KILOGRAMS (+/- 0.5 Kg)
  DROP: 760 MILLIMETERS (+/- 20 mm)
- BORINGS WERE DONE WITH A CME AUTOMATIC HAMMER.
- THE SOIL STRATIFICATION IS REPRESENTATIVE OF THE CONDITIONS AT THE LOCATION WHERE THE BORING WAS MADE BUT CONDITIONS MAY VARY AT ADJACENT LOCATIONS.
- ENVIRONMENT:
  a). SUBSTRUCTURE: NON CORROSIVE (MODERATELY AGGRESSIVE)
  b). SUPERSTRUCTURE: NON CORROSIVE (SLIGHTLY AGGRESSIVE)

LEGEND:

- ASPHALT, BASE AND SUBGRADE
- FINE SAND
- SANDY ORGANIC SILT(MUCK)
- WATER TABLE
- FINE SAND WITH LIMESTONE FRAGMENTS, SOME ORGANIC
- FINE SAND AND LIMESTONE FRAGMENTS

David C. Miro 3-11-03

DAVID C. MIRO, P. E. — DATE
REGISTRATION NO. 16689

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
REPORT OF CORE BORING FOR STRUCTURES

OAKLAND PARK BLVD. OVER C-13 CANAL

PROJ. NO.: 86090-3535
ROAD NO.: SR 816
COUNTY: BROWARD

BORINGS DATE: 4-27/5-5-98
BORINGS BY: B.SWIDARSKI
SUBMITTED BY: D. C. MIRO

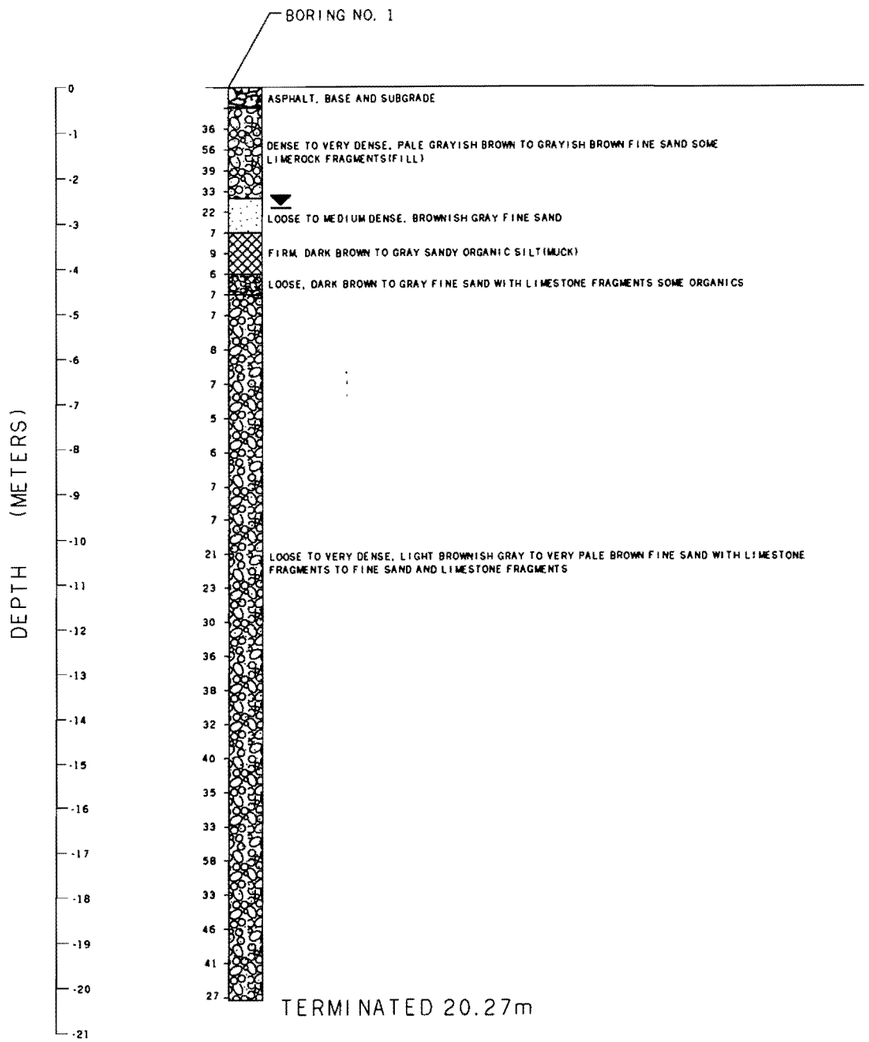
APPROVED BY: DC Miro

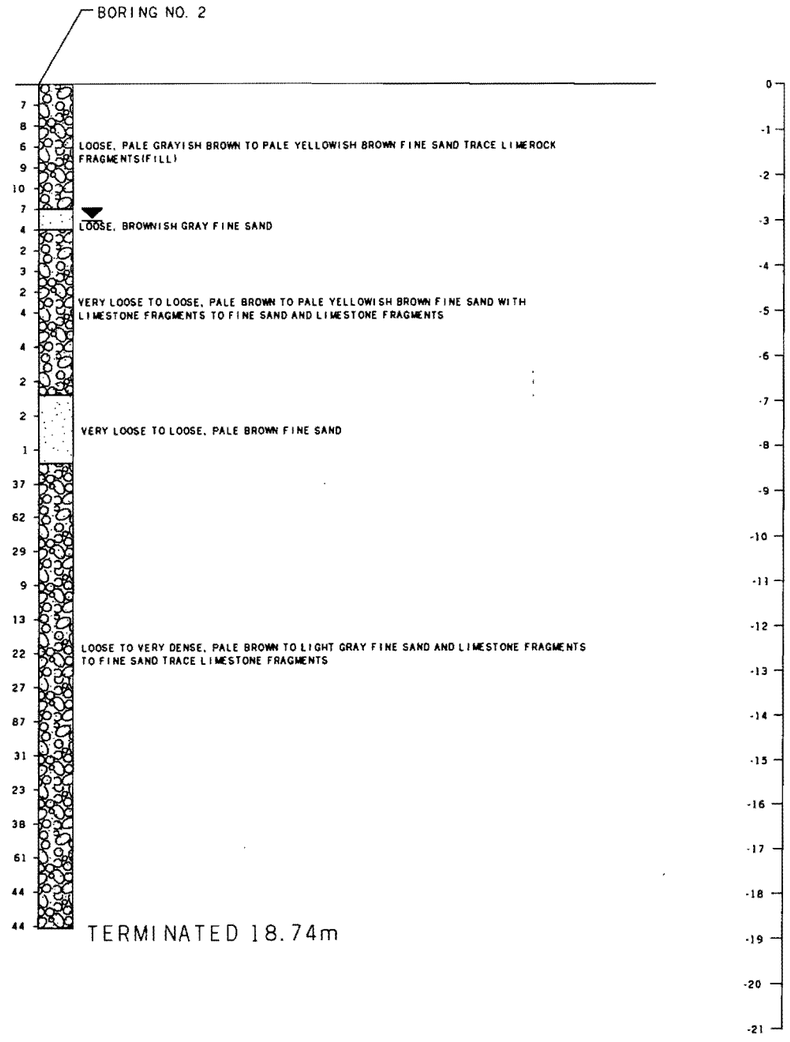
DRAWING NO.: 1 OF 2

INDEX NO.:

DESIGNED BY: T.WALTERS

FINANCIAL PROJECT ID:	SHEET NO.
228038-1-52-01	B-16A





DAVID C. MIRO, P. E.
REGISTRATION NO. 16689

3-11-03
DATE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
REPORT OF CORE BORING FOR STRUCTURES

OAKLAND PARK BLVD. OVER C-13 CANAL

PROJ. NO.: 86090-3535
ROAD NO.: SR 816
COUNTY: BROWARD

BORINGS DATE: 4-27/5-5-98
BORINGS BY: B.SWIDARSKI
SUBMITTED BY: D. C. MIRO

APPROVED BY:

DRAWING NO.: 2 OF 2

INDEX NO.:

DESIGNED BY: T.WALTERS

R.J. Behar & Company, Inc.
Engineers • Planners

18140 Crown Quay Lane
Jupiter, FL 33458
Tel. & Fax: (561) 743-3030

October 31, 2003

Florida Department of Transportation
5548 N.W. 9th Ave
Ft. Lauderdale, FL 33309

Attn: Mr. Don Little PE, Sr. Project Engineer

Re: Oakland Park Blvd. / I-95 Interchange Improvements; Broward County;
FPN 228038-1-52-01; Oakland Park Blvd. Bridge over C-13 Canal; Bridge # 860039 & 139
PILE DRIVING

Dear Mr. Little;

The following information is provided in response to discussions during the preconstruction meeting of October 15, 2003 and the follow-up field meeting of October 20, 2003;

1. The test pile at Intermediate Bent 2M may be moved to End Bent 1R, or may remain at Bent 2M, at the Contractor's option.
2. The production pile driving in the median can be sequenced before the existing concrete bridge handrails are removed in the median. In this way, there will be no need for temporary barrier wall. Crane placement will require lane closures, which must be done at night.
3. There is sufficient space to locate a crane to drive the piling at Bents 3R and 4R.
4. The required ultimate bearing capacity for the intermediate bent piles is 1835kN (207 tons), which is very achievable.

Please phone me if I can be of further assistance in this matter.

Sincerely yours,

Jerry Piccolo

Jerry Piccolo, P.E.
Structures Department Manager

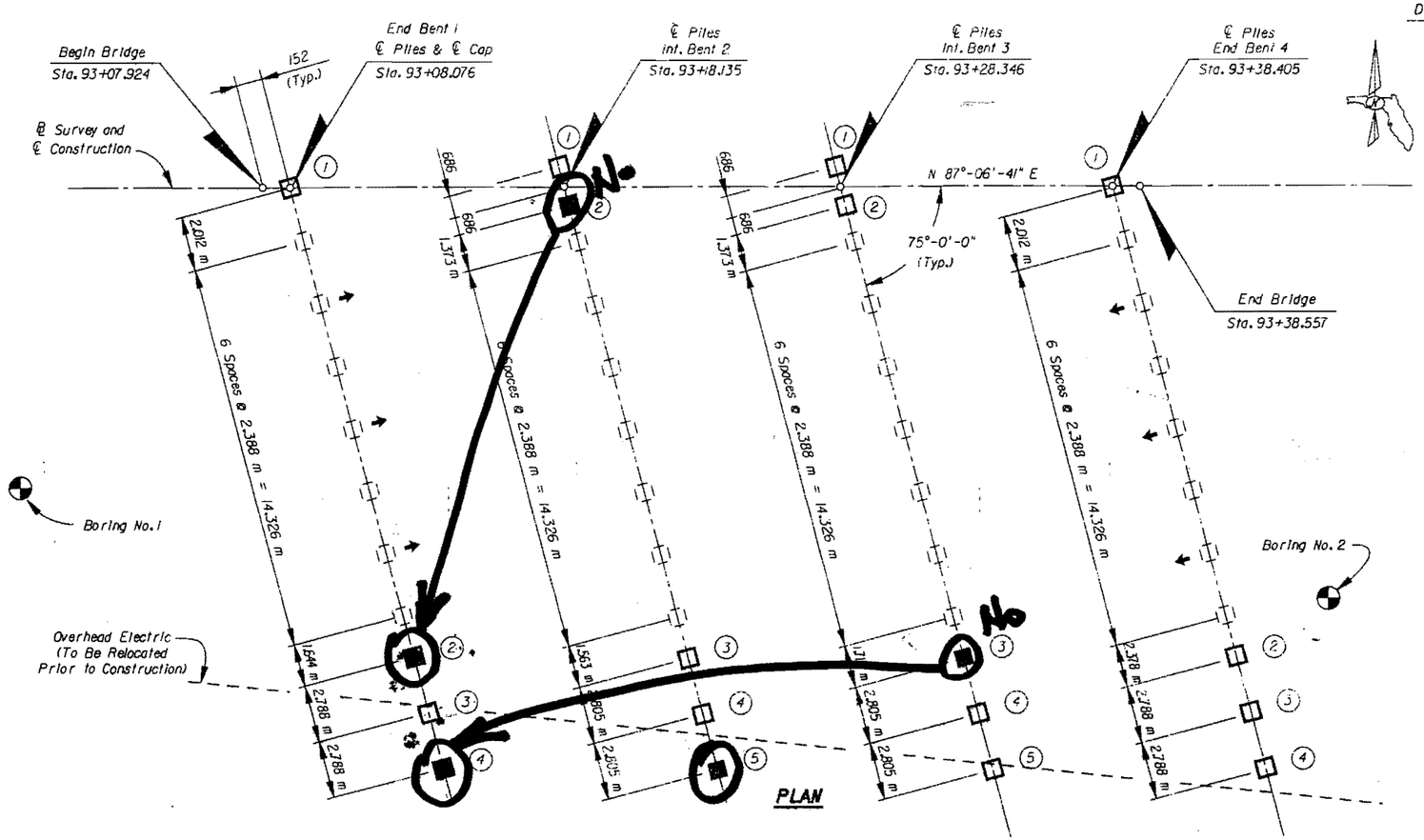
cc: Mr. Ray Pippitt PE (Calvin, Giordano & Associates, Inc.)

Corporate Headquarters:
6861 SW 196 th Ave, Suite 302; Pembroke Pines, FL 33332
Tel.: (954) 680-7771; Fax: (954) 680-7781

PS B-17

B-17A

NOTE: The existing piles are symmetrical about the ℄ Survey & ℄ Construction.
See sheets EB-4 & EB-5.



PILE CUT-OFF ELEVATIONS

LOCATION	①	②	③	④	⑤
End Bent 1R	—	2.08	2.04	2.00	—
Int. Bent 2R	—	—	2.08	2.04	2.00
Int. Bent 3R	—	—	2.08	2.04	2.00
End Bent 4R	—	2.07	2.03	1.99	—
End Bent 1M & 4M	2.10	—	—	—	—
Int. Bent 2M & 3M	2.09	2.09	—	—	—

NOTES

1. All proposed piles are 455 Sq. Prestressed Concrete Piles.
2. All proposed piles shall be plumb.
3. All proposed piles shall be driven to the capacities shown in the Pile Data Table.
4. The ① numbers adjacent to piles represent the Pile Identification Numbers.

LEGEND: = Existing Piles (To Remain)
= Unloaded Test Piles, 20 m long.
= Proposed Piles

PILE DATA TABLE

INSTALLATION CRITERIA								DESIGN CRITERIA						
Pier or Bent	Pile Size (mm)	Ultimate Bearing Capacity (kN)	Tension Capacity (kN)	Min. Tip Elev. (m)	Test Pile Length (m)	Reqd. Jet Elev. (m)	Reqd. Preform Elev. (m)	Factored Design Load (kN)	Down Drag (kN)	Total Scour Resist. (kN)	Net Scour Resist. (kN)	100 Yr. Scour Elev. (m)	Long Term Scour Elev. (m)	ϕ
End Bent 1	455	1295	N.A.	-6.0	N.A.	N.A.	N.A.	842 kN	N.A.	N.A.	N.A.	N.A.	N.A.	0.65
End Bent 4	455	1295	N.A.	-6.0	N.A.	N.A.	N.A.	842 kN	N.A.	N.A.	N.A.	N.A.	N.A.	0.65
Int. Bents 2 & 3	455	1835	N.A.	-8.8	20	N.A.	N.A.	1193 kN	N.A.	50	50	-3.6	-2.6	0.65

PILE DATA TABLE NOTES: Ultimate Bearing Capacity = $\frac{\text{(Factored Design Load)} + \text{(Net Scour)} + \text{(Downdrag)}}{\phi}$

Total Scour Resistance is an estimate of the ultimate static side friction resistance provided by the scourable soil.

Net Scour Resistance is an estimate of the ultimate static side friction resistance provided by the soil from the required preformed or jetting elevation to the scour elevation.

Tension Capacity is the ultimate static side friction capacity that must be obtained below the 100 year scour elevation to resist pullout of the pile.

PILE INSTALLATION NOTES:

1. The minimum tip elevation for the intermediate Bents is required for lateral stability. The minimum tip elevation specified for End Bents is required to prevent the piles from being tipped on very loose material and prevent the potential for excessive settlements.
2. The natural ground surface for End Bent 1 is at elevation -2.0 m. Predrill the piles at this bent to this elevation in accordance with Standard Specification 455-5JJ. The natural ground surface for End Bent 4 is at elevation +1.6 m. Predrill the piles at this bent to this elevation in accordance with Standard Specification 455-5JJ.
3. In order to achieve the required minimum tip elevation, it is estimated that a driving resistance value higher than that required for load capacity may be encountered in some locations.
4. No jetting, except that shown in the Pile Installation Table (and only to that depth) or to the 100-year scour elevation, will be allowed without the approval of the Engineer. The Contractor should not anticipate being allowed to jet piles below this elevation.

BRIDGE NO. 860139

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JP	8/02
CHECKED BY	EJ	9/02
DESIGNED BY	JP	8/02
CHECKED BY	EJ	9/02
APPROVED BY	Jerry Piccolo PE	

ENGINEER OF RECORD:
R.J. Behar & Company, Inc.
1840 CROWN QUAY LANE
JUPITER, FL 33458
(561)743-3030
ENG. LICENSE # EB-0000B365

FLORIDA DEPARTMENT OF TRANSPORTATION

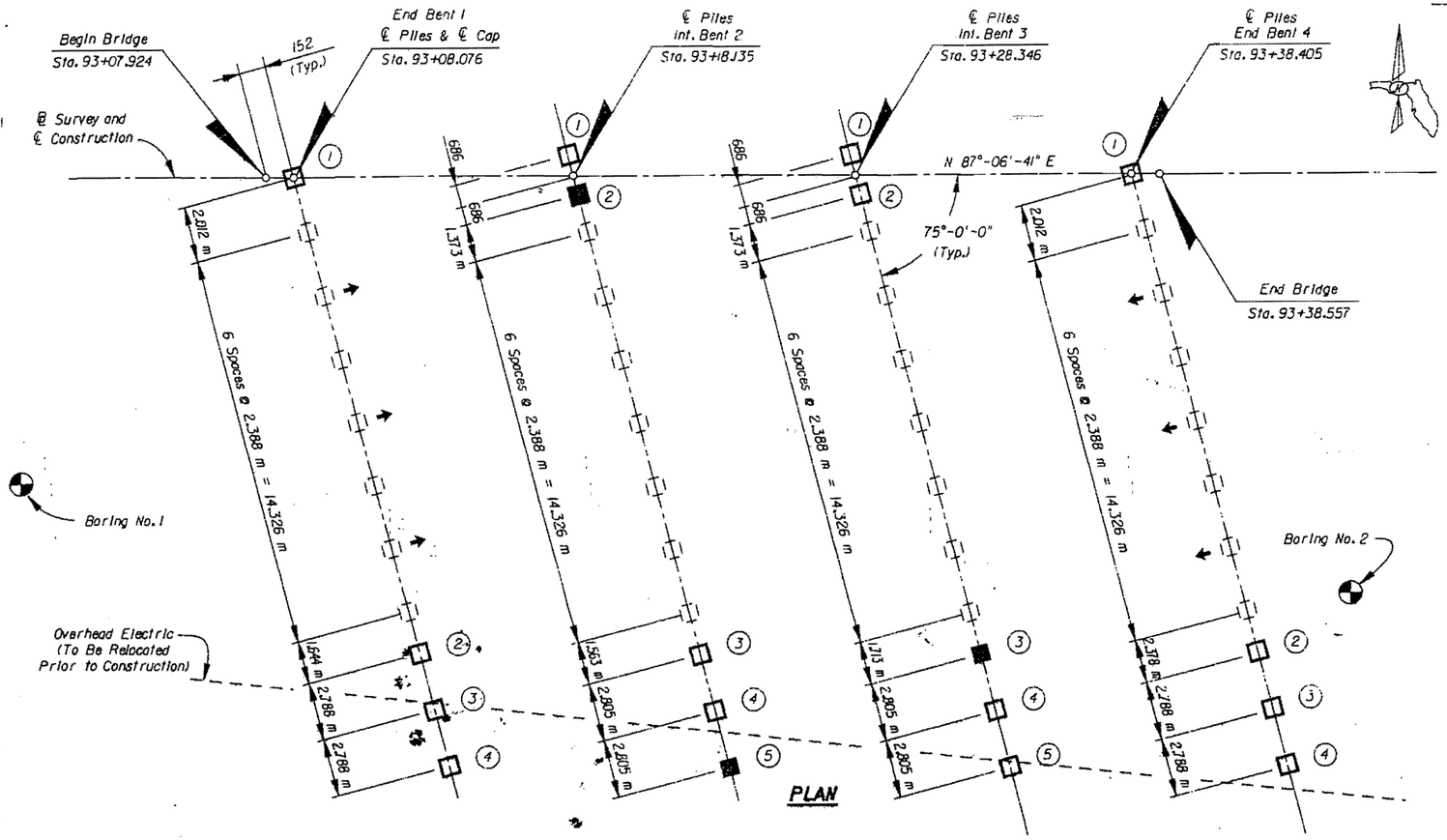
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
816	BROWARD	228038-1-52-01

SHEET TITLE: FOUNDATION LAYOUT

PROJECT NAME: OAKLAND PARK BLVD. BRIDGE OVER C-13 CANAL

SHEET NO. B-17

01/26/2005 09:33:21 PM C:\My Documents\PROJECTS\US1\Section Calvin_Giordano\Oakland\Plans_Bridge\PILELAY.DGN



PILE CUT-OFF ELEVATIONS

LOCATION	①	②	③	④	⑤
End Bent 1R	—	2.08	2.04	2.00	—
Int. Bent 2R	—	—	2.08	2.04	2.00
Int. Bent 3R	—	—	2.08	2.04	2.00
End Bent 4R	—	2.07	2.03	1.99	—
End Bent 1M & 4M	2.10	—	—	—	—
Int. Bent 2M & 3M	2.09	2.09	—	—	—

NOTES

1. All proposed piles are 455 Sq. Prestressed Concrete Piles.
2. All proposed piles shall be plumb.
3. All proposed piles shall be driven to the capacities shown in the Pile Data Table.
4. The ① numbers adjacent to piles represent the Pile Identification Numbers.

LEGEND: ① = Existing Piles (To Remain)
■ = Unloaded Test Piles, 20 m long.
□ = Proposed Piles

PILE DATA TABLE

Pier or Bent	Pile Size (mm)	Ultimate Bearing Capacity (kN)	Tension Capacity (kN)	Min. Tip Elev. (m)	Test Pile Length (m)	Reqd. Jet Elev. (m)	Reqd. Preform Elev. (m)	Factored Design Load (kN)	Down Drag (kN)	Total Scour Resist. (kN)	Net Scour Resist. (kN)	100 Yr. Scour Elev. (m)	Long Term Scour Elev. (m)	ϕ
	INSTALLATION CRITERIA							DESIGN CRITERIA						
End Bent 1	455	1295	N.A.	-6.0	N.A.	N.A.	N.A.	842 kN	N.A.	N.A.	N.A.	N.A.	N.A.	0.65
End Bent 4	455	1295	N.A.	-6.0	N.A.	N.A.	N.A.	842 kN	N.A.	N.A.	N.A.	N.A.	N.A.	0.65
Int. Bents 2 & 3	455	1835	N.A.	-8.8	20	N.A.	N.A.	1193 kN	N.A.	50	50	-3.6	-2.6	0.65

PILE DATA TABLE NOTES: Ultimate Bearing Capacity = $\frac{\text{(Factored Design Load)} + \text{(Net Scour)} + \text{(Downdrag)}}{\phi}$

Total Scour Resistance is an estimate of the ultimate static side friction resistance provided by the scourable soil.

Net Scour Resistance is an estimate of the ultimate static side friction resistance provided by the soil from the required preformed or jetting elevation to the scour elevation.

Tension Capacity is the ultimate static side friction capacity that must be obtained below the 100 year scour elevation to resist pullout of the pile.

PILE INSTALLATION NOTES:

1. The minimum tip elevation for the intermediate Bents is required for lateral stability. The minimum tip elevation specified for End Bents is required to prevent the piles from being tipped on very loose material and prevent the potential for excessive settlements.
2. The natural ground surface for End Bent 1 is at elevation -2.0 m. Predrill the piles at this bent to this elevation in accordance with Standard Specification 455-5.3.3. The natural ground surface for End Bent 4 is at elevation +1.6 m. Predrill the piles at this bent to this elevation in accordance with Standard Specification 455-5.3.3.
3. In order to achieve the required minimum tip elevation, it is estimated that a driving resistance value higher than that required for load capacity may be encountered in some locations.
4. No jetting, except that shown in the Pile Installation Table (and only to that depth) or to the 100-year scour elevation, will be allowed without the approval of the Engineer. The Contractor should not anticipate being allowed to jet piles below this elevation.

BRIDGE NO. 860139

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAMES	DATES
DRAWN BY	JP	8/02
CHECKED BY	EJ	9/02
DESIGNED BY	JP	8/02
CHECKED BY	EJ	9/02
APPROVED BY	Jerry Piccolo PE	

ENGINEER OF RECORD:
R.J. Behar & Company, Inc.
1940 CROWN QUAY LANE
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(561) 743-3030
ENG. LICENSE # EB-0000B365

FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
816	BROWARD	228038-1-52-01

SHEET TITLE: FOUNDATION LAYOUT

PROJECT NAME: OAKLAND PARK BLVD. BRIDGE OVER C-13 CANAL

SHEET NO. B-17

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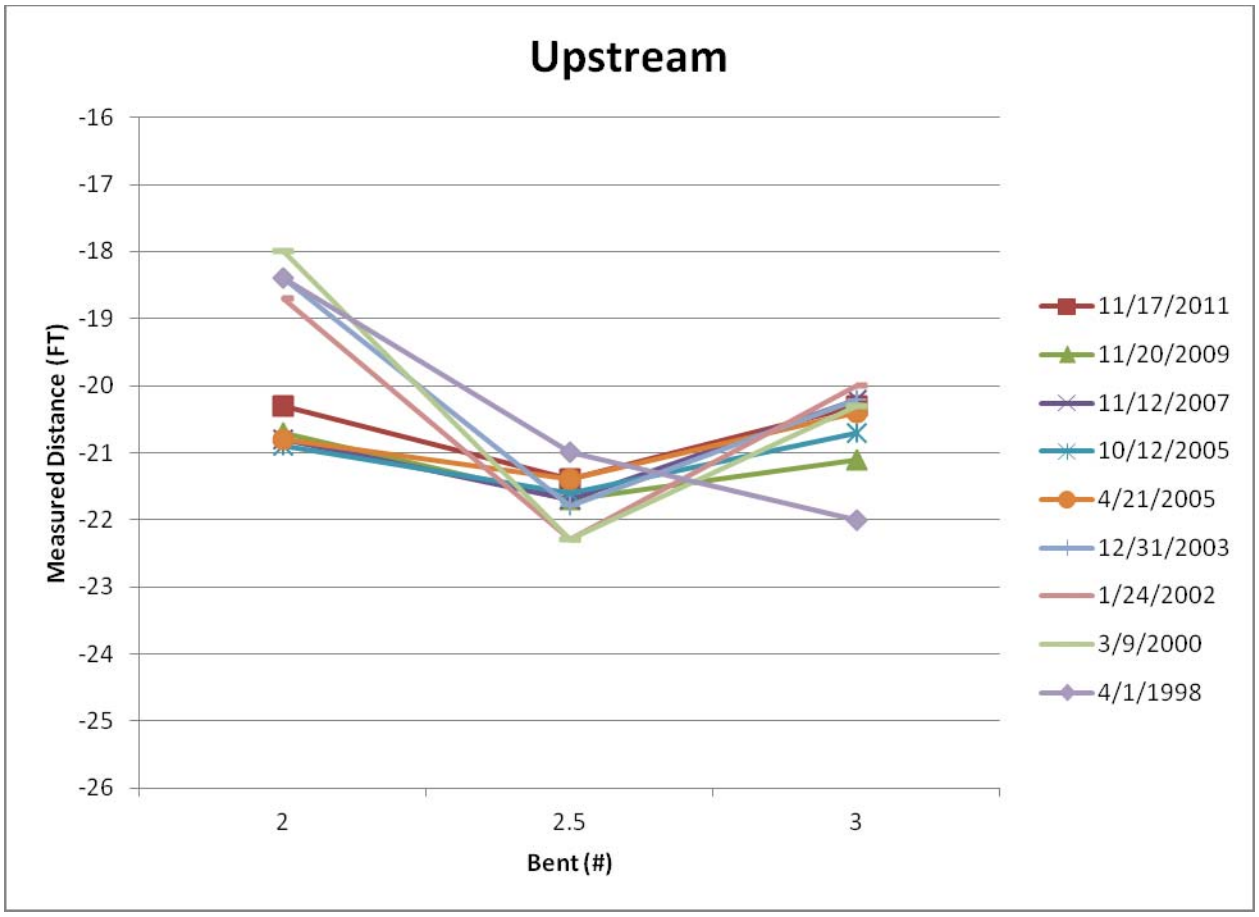
Attachment B

UPSTREAM HISTORICAL CROSS-SECTIONS

Upstream			
Bent	**2**	**2.5**	**3**
11/17/2011	-20.3	-21.4	-20.3
11/20/2009	-20.7	-21.7	-21.1
11/12/2007	-20.8	-21.7	-20.2
10/12/2005	-20.9	-21.6	-20.7
4/21/2005	-20.8	-21.4	-20.4
12/31/2003	-18.4	-21.8	-20.2
1/24/2002	-18.7	-22.3	-20.0
3/9/2000	-18.0	-22.3	-20.3
4/1/1998	-18.4	-21.0	-22.0

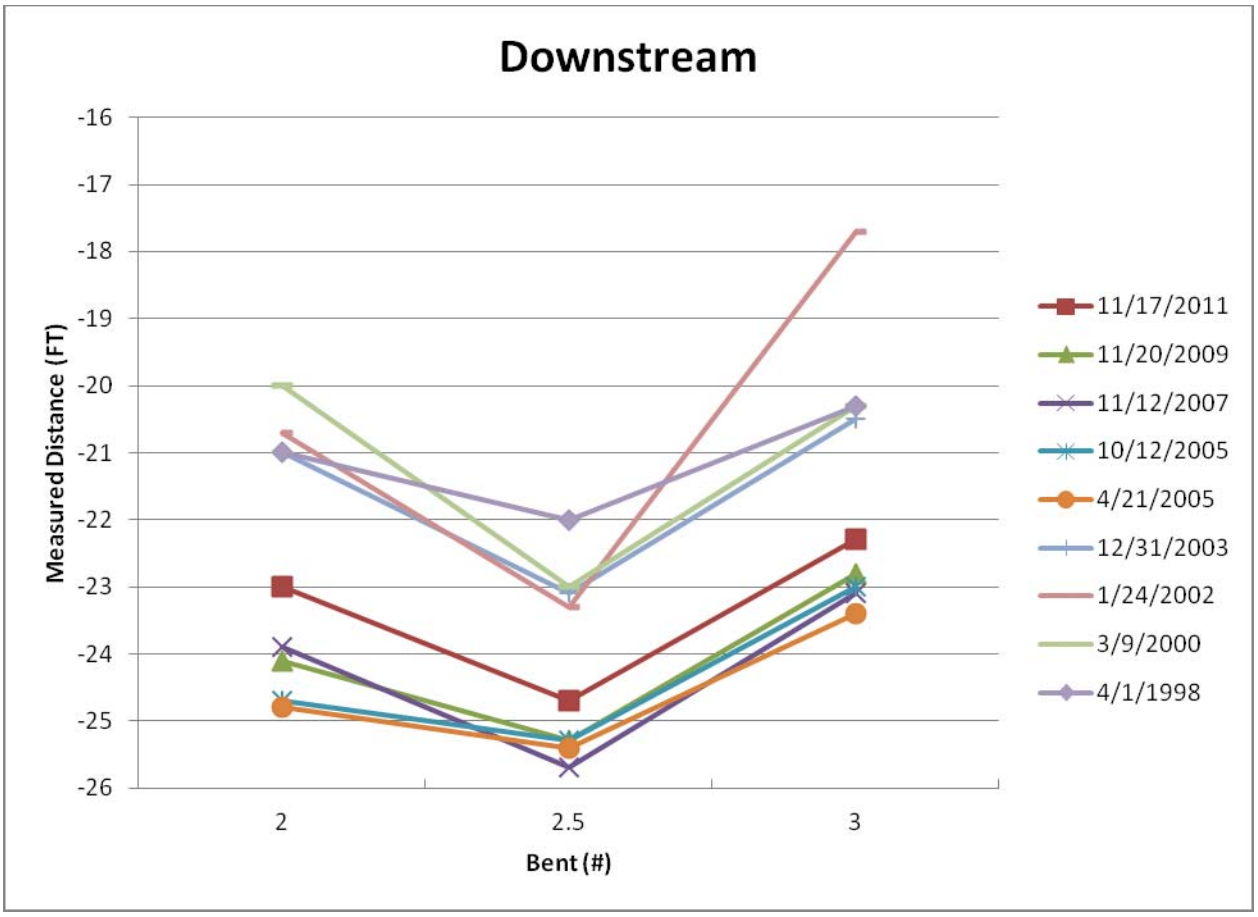


SOURCE: TAKEN FROM 2012 BRIDGE INSPECTION REPORT

PARSONS	BRIDGE NUMBER 860139	Scale: NTS

DOWNSTREAM HISTORICAL CROSS-SECTIONS

Downstream			
Bent	**2**	**2.5**	**3**
11/17/2011	-23.0	-24.7	-22.3
11/20/2009	-24.1	-25.3	-22.8
11/12/2007	-23.9	-25.7	-23.1
10/12/2005	-24.7	-25.3	-23.0
4/21/2005	-24.8	-25.4	-23.4
12/31/2003	-21.0	-23.1	-20.5
1/24/2002	-20.7	-23.3	-17.7
3/9/2000	-20.0	-23.0	-20.3
4/1/1998	-21.0	-22.0	-20.3



SOURCE: TAKEN FROM 2012 BRIDGE INSPECTION REPORT

PARSONS	BRIDGE NUMBER 860139	Scale: NTS

Attachment E

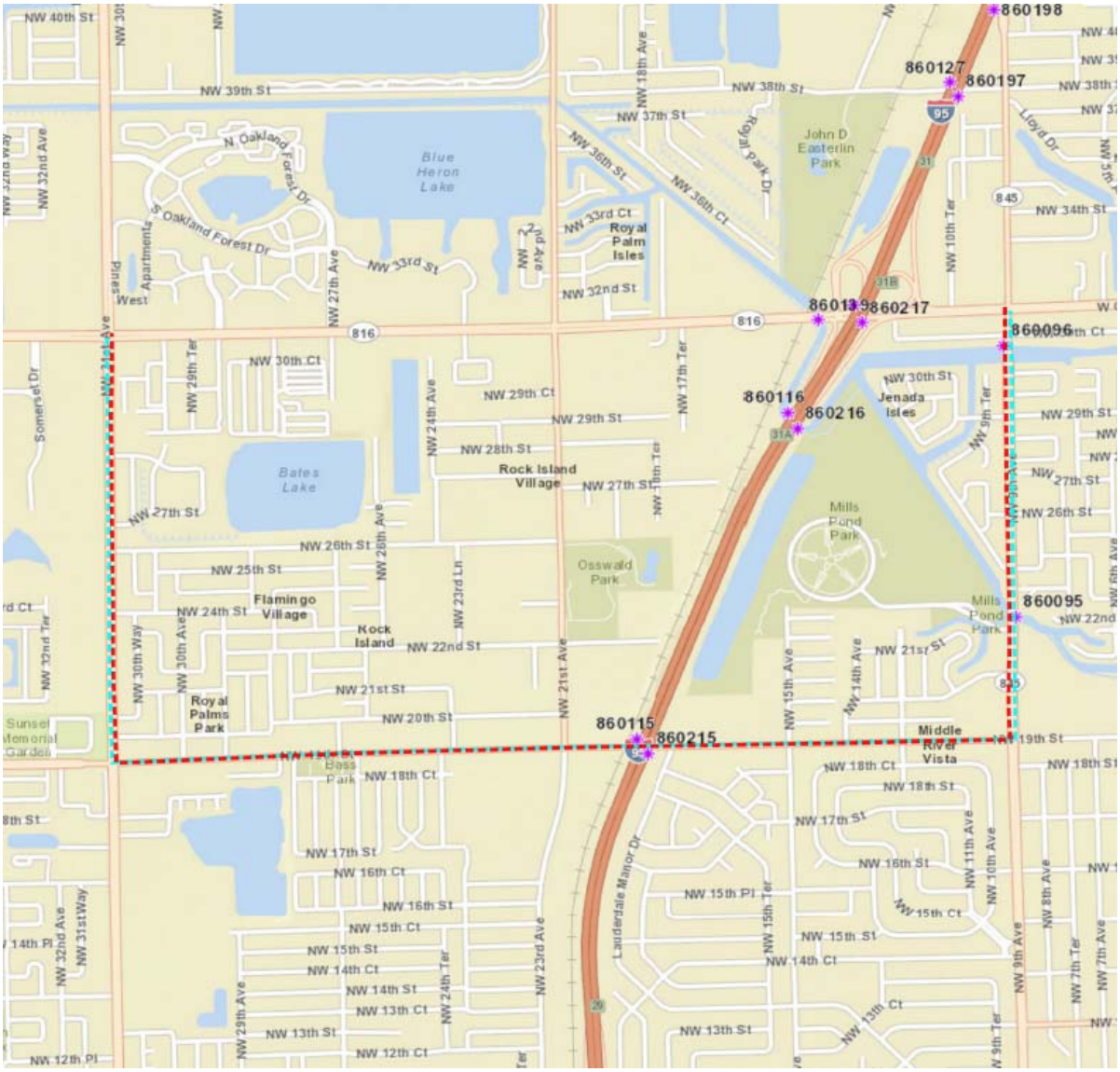
PARSONS	1555 Palm Beach Lakes Blvd. Suite 1105 West Palm Beach, FL 33401	DETOUR ROUTE - ATTACHMENT E

Bridge No.: 860139 Detour Route Total Length: 2.0 Miles LEGEND

Bridge Route Name: Oakland Park Blvd. 4.0 Kilometers Detour route:

Bridge Nos. along Detour Route: 860095, 860096

Detour Route Description: Eastbound: Southbound NW 31st Ave to NW 19th St. Eastbound NW 19th St to SR-845/Powerline Rd. Northbound SR-845 / Powerline Rd to Oakland Park.
Westbound: Southbound on SR-845 / Powerline Rd to NW 19th St. Westbound NW 19th St to NW 31 Ave. Northbound NW 31 Ave to Oakland Blvd.



SOURCE: 2013 FDOT D4 GIS

Attachment F

PARSONS		By	Date	Job No.	647325
	Prepared	ARF	10/25/13	Bridge No.	860139
Client	FDOT District 4	Checked	JGH	11/14/13	FPID:	427334-1 72-1
Subject	Phase 4 Scour Evaluation	Reviewed	ARG	11/16/13	Page No.	1 of 2
	Marine Mattress Pier Calculations	Approved	JGH	11/20/13	Rev. No.	0

Purpose

A marine mattress system is proposed to provide scour countermeasure protection for intermediate piles and channel bottom of Bridge 860139.

Legend

X user input parameter X constant [X] calculated value

Reference

National Highway Institute, Hydraulic Engineering Circular No. 23, Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance - Third Edition, 2009

Step 1. Determine a target factor of safety for this project

Base Safety Factor	SF_B	1.7	for Bridge Pier
Multiplier Based on Consequence of Failure	X_C	1.6	for High failure
Multiplier Based on Model Uncertainty	X_M	1.1	for one-dimensional HEC-RAS model

Target Safety factor DG10, Fig 10.3

$SF_T = (SF_B)(X_C)(X_M) =$ [2.992]

Step 2. Calculate design shear stress

Flow Rate at Bridge	Q	2543	cfs	Phase 2 report
Flow Depth at Pier	y	11	ft	Phase 2 report @ Bent 3, worst case
Bridge Channel Width	W	96.85	ft	Phase 2 report
Average Flow Depth at Bridge	y_0	7.71	ft	Phase 2 report
Average Flow velocity	V	[3.40]	ft/s	V=Q/(W x y_0)
Maximum flow velocity	V_{max}	6.18	ft/s	Phase 2 report @ channel, worst case
Pier Shape Correction Factor	K_1	1.7	unitless	Square-nose Bascule Piers
Velocity Adjustment Factor	K_2	1.7	unitless	Bent 3 in main current of flow around 90 deg bend
Manning's n	n	0.038	unitless	Marine Mattress
Manning's Constant	K_u	1.486	unitless	
Unit Weight of Water	γ_w	62.4	lb/cf	fresh water

Design Velocity

$V_{des} = K_1K_2V =$ [9.837] ft/s (EQ 10.5)

or

$V_{des} = K_1V_{max} =$ [10.51] ft/s (EQ 10.6)

use Vdes = 10.5 ft/s since 1-D model flow distribution results were used

Design Shear Stress

$$\tau_{des} = \frac{\gamma_W}{y^{1/3}}\left(\frac{nV_{des}}{K_u}\right)^2 =$$ [2.026] lb/sf (local pier shear stress, EQ 10.7)

Step 3. Calculate permissible shear stress

Assume a d_{50} stone size of 6 in → Class I stone

Median diameter of rockfill in mattress	d_{50}	0.5	ft
Stability coefficient of rock-filled mattress	C_s	0.1	unitless
Unit weight of water	γ_w	62.4	lb/cf
Unit weight of stone	γs	188.2	lb/cf

Permissible Shear Stress

$\tau_p = C_s(\gamma_s - \gamma_w)d_{50} =$ 6.292 lb/sf (EQ 10.3)

Step 4. Calculate safety factor

$$F.S. = \frac{\tau_p}{\tau_{des}} = 3.106 > 2.992$$

Thus, stone size d_{50} of 6 in. is appropriate. Mattress thickness ($2d_{50}$) is 12 in.

Layout Dimensions for Piers

Mattresses should be extended a distance of at least two times the pier width in all directions around the pier.

Mattresses should be sloped away from the pier in all directions such that the depth at its periphery is greater than the maximum scour (contraction + long-term degradation), or the depth of bedform troughs.

Filter should be terminated 2/3 of the toe down distance.

For cases where the pile bents consists of multiple columns and the structure is skewed to the flow direction, the lateral extent of the protection should be increased in proportion to the additional scour potential caused by the skew.

$$K_\alpha = \left(\frac{a\cos\alpha + L\sin\alpha}{a}\right)^{0.65}$$

where L/a <= 12, L = pile dia when spacing > 5 x dia, L=sum of pile dia when pile spacing is < 5 x dia.

Skew angle of flow to pier group	α_{skew}	30	deg	2012 Hydraulic Report
bed forms = 0.2 x depth of flow =		2.20	ft	Bedform toe down depth
contraction + long term scour =		5.60	ft	Phase 2 report

	Pier 2	Pier 3
Pier/Pile width, a (ft)	1.50	1.50
Length parallel to flow, L (ft)	1.50	1.50
K_α	1.22	1.22
MM extent max of 2a x K_α, 2 x bedform, 2 x scour (ft)	11.20	11.20
Proposed MM width (ft)	23.90	23.90
Toe down depth (ft)	5.60	5.60
Filter extent (ft)	**	**

** Filter fabric extends to 2/3 of the toe down plan length.

PARSONS		By	Date	Job No.	647325
	Prepared	ARF	10/25/13	Bridge No.	860139
Client	FDOT District 4	Checked	JGH	11/14/13	FPID:	427334-1 72-1
Subject	Phase 4 Scour Evaluation	Reviewed	ARF	11/16/13	Page No.	1 of 3
	B&S Riprap Pier Calculation	Approved	JGH	11/20/13	Rev. No.	0

Purpose

Bank and Shore Riprap is proposed to provide scour countermeasure protection for intermediate piles and channel bottom of Bridge 860139.

Legend

X user input parameter X constant [X] calculated value

Reference

National Highway Institute, Hydraulic Engineering Circular No. 23, Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance - Third Edition, 2009.

Step 1. Select the appropriate shape coefficient K

Pier Shape Correction Factor	K_1	1.7	unitless	Square-nose pile

Step 2. Determine the appropriate design velocity

Flow Rate at Bridge	Q	2543	cfs	Phase 2 report
Bridge Channel Width	W	96.85	ft	Phase 2 report
Flow Depth at Bridge	y_0	11.90	ft	Phase 2 report
Avg Flow velocity	V_{avg}	2.206	ft/s	V=Q/(W x y_0)
Maximum flow velocity	V_{max}	6.2	ft/s	Phase 2 report @ Bent 3, worst case
Velocity Adjustment Factor	K_2	1.7	unitless	Bent 3 in main current of flow around 90 deg bend
Specific Gravity	S_g	2.65	unitless	

Design Velocity

$V_{des} = K_1K_2V =$ [6.377] ft/s (EQ 11.2)

or

$V_{des} = K_1V_{max} =$ [10.54] ft/s (EQ 11.3)

use V_{des} = 10.54 ft/s since 1-D model flow distribution results were used

Step 3. Determine d_{50} from Equation 11.1:

$$d_{50} = \frac{0.692\,(V_{des})^2}{(S_g - 1)2g} = [0.723]\ \text{ft} = [8.682]\ \text{in} \qquad \text{(EQ 11.1)}$$

Step 4. Select Riprap Size

Assume a d_{50} stone size of 9 in → Class [II] stone

Per FDOT Specification Section 530 Riprap, Bank and Shore Riprap should be 15 in stone.

= Thus, d_{50} 15 in

Step 5. Determine the depth of riprap at the pier

The riprap is proposed to be placed above the existing channel bed with appropriate toe down. The toe down of riprap is 3 x d50, the contraction scour and long-term degradation depth, the depth of bedform troughs, or per FDOT Bank and Shore Riprap Standard thickness, whichever is the greatest. The thickness of the riprap is per FDOT standards.

= $3d_{50}$ 3.75 ft

contraction scour = 4.3 ft Phase 2 report

long term degradation = 1.3 ft Phase 2 report

bed forms = 0.2 x depth of flow = 2.38 ft

FDOT Bank and Shore Riprap Minimum Blanket Thickness = 2.5 ft

Thus, Riprap toe down is 5.60 ft or max. scour depth. Use riprap thickness of 2.50 ft

Step 6. Layout Dimensions for Piers

Riprap should be extended a distance of at least two times the pier width in all directions around the pier

Filter should be terminated 2/3 of the toe down distance

For cases where the pile bents consists of multiple columns and the structure is skewed to the flow direction, the lateral extent of the protection should be increased in proportion to the additional scour potential caused by the skew.

$$K_\alpha = \left(\frac{a\cos\alpha + L\sin\alpha}{a}\right)^{0.65}$$ where L/a <= 12

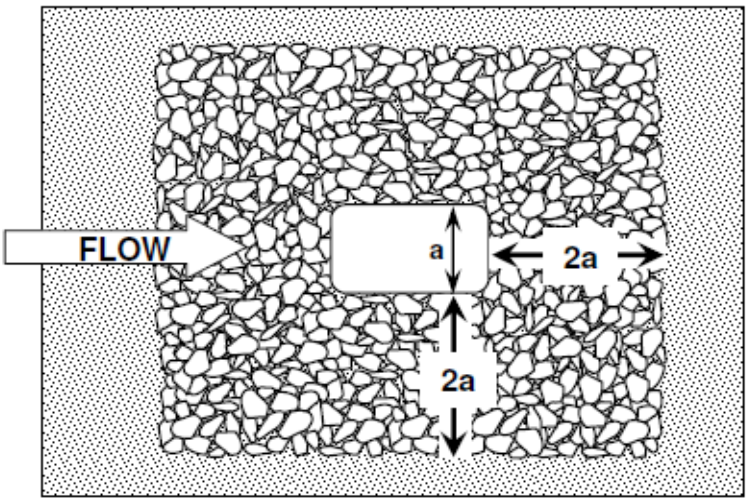
Skew angle of flow to pier group α_{skew} 30 deg Phase 2 report

bed forms = 0.2 x depth of flow = 2.38 ft Bedform toe down depth

contraction + long term scour = 5.6 ft Phase 2 report

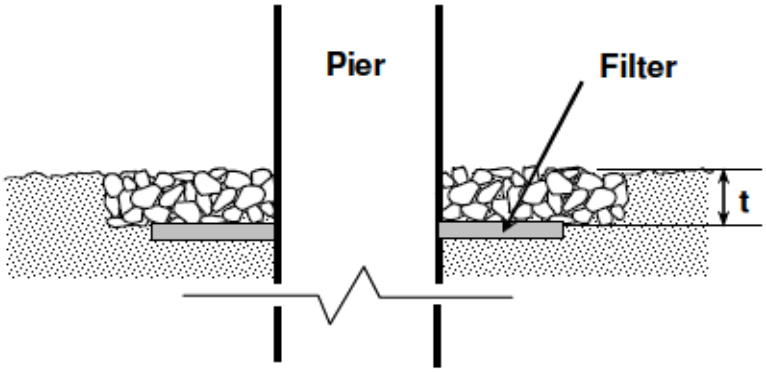
	Pier 2	Pier 3
Pier width (ft)	1.50	1.50
Length of pile bents parallel to flow, L (ft)	1.50	1.50
K_α	1.22	1.22
Riprap extent max of 2a x K_α, 2 x bedform, 2 x scour (ft)	11.20	11.20
Proposed min riprap width (ft)	23.90	23.90
Toe down depth (ft)	5.60	5.60
Min. filter fabric extent (ft)	**	**

** Filter fabric extends to 2/3 of the toe down plan length.



Pier width = "a" (normal to flow)
Riprap placement = 2(a) from pier (all around)

a. Plan View



Minimum riprap thickness t = $3d_{50}$, depth of contraction scour and long-term degradation, or depth of bedform trough, whichever is greatest

Filter placement = 4/3(a) from pier (all around)

b. Profile

Figure 11.15. Riprap layout diagram for pier scour protection.

Extracted from HEC-23, page DG11.17

PARSONS

	By	Date
Prepared	ARF	11/18/13
Checked	JGH	11/20/13
Reviewed		
Approved		

Client: FDOT District 4
Subject: Phase 4 Scour Evaluation
Riprap Abutment Calculation

Job No. 647325
Bridge No. 860139
FPID: 427334-1-72-1
Page No. 1 of 2
Rev. No.

Purpose

Riprap is proposed to provide scour countermeasures for abutment slopes of Bridge 860139.

Legend

X user input parameter X constant [X] calculated value

Reference

National Highway Institute, Hydraulic Engineering Circular No. 23, Bridge Scour and Stream Instability Countermeasures: Experience, Selection, and Design Guidance - Third Edition, 2009

Step 1. Determine the SBR (Set-back distance divided by the average channel depth)

Left Abutment Setback	SB_L	15	ft	Stage 2 Abutment Report
Right Abutment Setback	SB_R	8	ft	Stage 2 Abutment Report
Flow Depth at Bridge	y_0	7.7	ft	Phase 2 Report
Flow Depth at Left Abutment	y_L	3.7	ft	From HEC-RAS model
Flow Depth at Right Abutment	y_R	3.7	ft	From HEC-RAS model

$SBR_L = SB_L/y_0 =$ [1.9] < 5, therefore use average velocity for entire contracted area.

$SBR_R = SB_R/y_0 =$ [1.0] < 5, therefore use average velocity for entire contracted area.

Step 2. Determine Average Velocity

Flow Rate at Bridge	Q	2543	cfs	Phase 2 Report
Bridge Channel Width	W	96.85	ft	Phase 2 Report
Average Channel Flow Velocity	V_{avg}	[3.4]	ft/s	$V = Q/(W \times y_o)$

Step 3. Determine the Froude Number of the flow

Flow depth at left and right abutments is the same; therefore calculations for the right abutment will be the same as for the left.

$Fr = V_{avg}/(g*y_L)^{1/2} =$ [0.3]

Step 4. Determine the D50

Specific Gravity of Rock Rip Rap	S_s	2.896	unitless	
Coefficient (Fr, abutment type)	K	0.89	unitless	Fr<0.8 and spill through abutment

$D_{50} = y_{0*}(K/(S_s-1))*(V_{avg}^2/g*y_0) =$ [10.0] in

Step 5. Select Riprap Size

Assume a d_{50} stone size of 12 in → Class III stone

Per FDOT Specification Section 530 Riprap, Bank and Shore Riprap should have d_{50} = 15"

= Thus, d_{50} 15.0 in

Step 6. Determine Thickness of Riprap

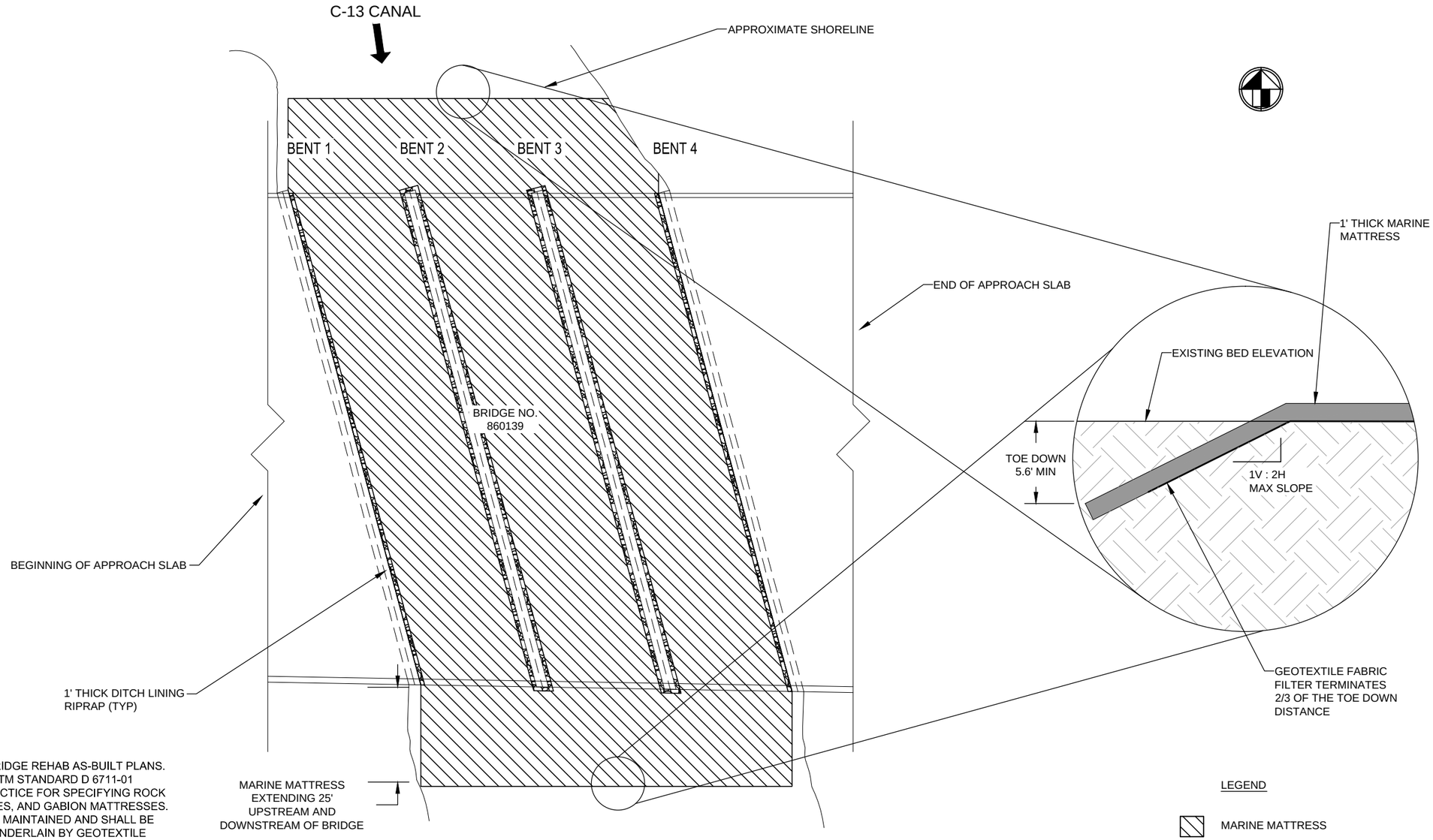
Thickness is based on FDOT standard Bank and Shore Riprap minimum thickness of 2.5 ft, $1.5d_{50}$, or d_{100}; whichever is greater.

FDOT Bank and Shore = 2.5 ft

$1.5d_{50}$ = 1.5*15in = 1.9 ft

D100 = 20 in = 1.7 ft

Therefore, riprap thickness is 2.5 ft



NOTES

1. DRAWING DEVELOPED FROM 2004 BRIDGE REHAB AS-BUILT PLANS.
2. PROVIDE MARINE MATTRESS PER ASTM STANDARD D 6711-01 (REAPPROVED 2008), STANDARD PRACTICE FOR SPECIFYING ROCK TO FILL GABIONS, REVET MATTRESSES, AND GABION MATTRESSES.
3. 1' CLEARANCE FROM PILES SHALL BE MAINTAINED AND SHALL BE FILLED WITH DITCH LINING RIPRAP, UNDERLAIN BY GEOTEXTILE FILTER FABRIC.
4. AT ABUTMENT TERMINATION, SECURE MARINE MATTRESS WITH PLATYPUS ANCHORS AND FILL GAPS BETWEEN THE MATTRESS AND ABUTMENTS WITH DITCH LINING RIPRAP.
5. EACH UNIT OF MARINE MATTRESS SHALL BE PROPERLY SEAMED UNDERWATER AND THE MATTRESS SHALL HAVE TOE DOWN TO 5.6' WITH A SLOPE OF NO MORE THAN 2:1 AT UPSTREAM AND DOWNSTREAM ENDS OF THE BRIDGE.

LEGEND

MARINE MATTRESS

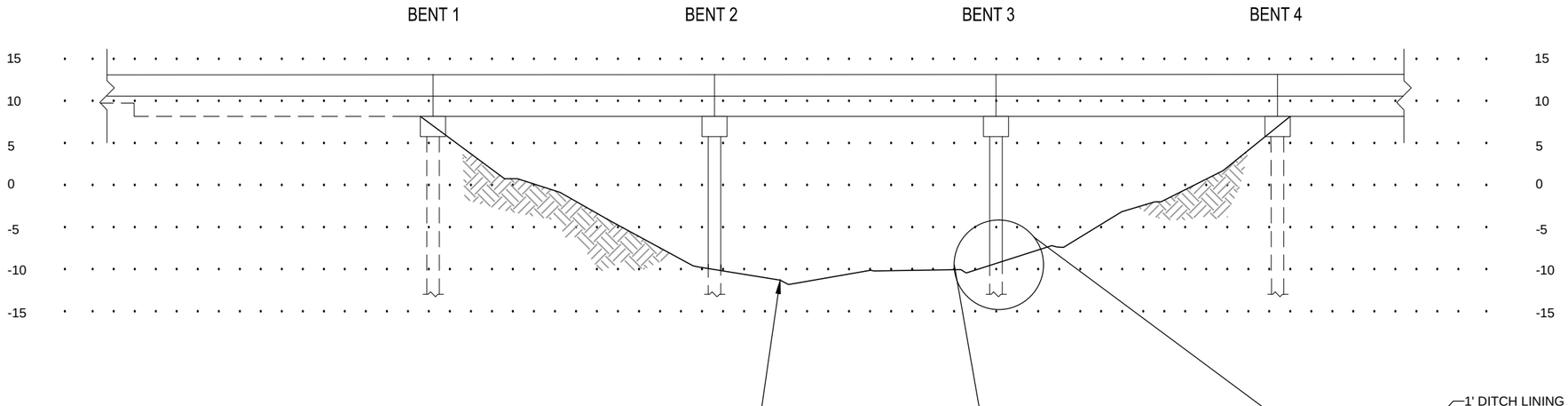
DITCH LINING RIPRAP

PLAN VIEW

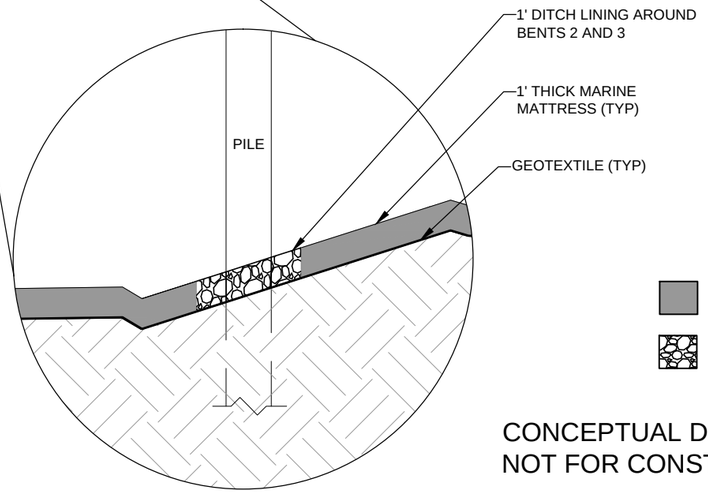
NOT TO SCALE

CONCEPTUAL DESIGN ONLY
NOT FOR CONSTRUCTION

PARSONS	FIGURE F-1 CONCEPTUAL COUNTERMEASURE INSTALLATION ALTERNATIVE 1	OAKLAND PARK BLVD. OVER C-13 CANAL BROWARD COUNTY, BRIDGE NO. 860139	SCALE NTS



ELEVATION VIEW
NOT TO SCALE



LEGEND

MARINE MATTRESS

DITCH LINING RIPRAP

NOTES
1. DRAWING DEVELOPED FROM 2004 BRIDGE REHAB AS-BUILT PLANS AND M.G. VERA SURVEY.
2. PROVIDE MARINE MATTRESS PER ASTM STANDARD D 6711-01 (REAPPROVED 2008), STANDARD PRACTICE FOR SPECIFYING ROCK TO FILL GABIONS, REVET MATTRESSES, AND GABION MATTRESSES.
3. 1' CLEARANCE FROM PILES SHALL BE MAINTAINED AND SHALL BE FILLED WITH DITCH LINING RIPRAP, UNDERLAIN BY GEOTEXTILE FILTER FABRIC.
4. AT ABUTMENT TERMINATION, SECURE MARINE MATTRESS WITH PROPER ANCHORS AND FILL GAPS BETWEEN THE MATTRESS AND ABUTMENTS WITH DITCH LINING RIPRAP.
5. EACH UNIT OF MARINE MATTRESS SHALL BE PROPERLY SEAMED UNDERWATER AND THE MATTRESS SHALL HAVE TOE DOWN TO 5.6 FT A SLOPE OF NO MORE THAN 2:1 AT UPSTREAM AND DOWNSTREAM ENDS OF THE BRIDGE.

CONCEPTUAL DESIGN ONLY
NOT FOR CONSTRUCTION

PARSONS	FIGURE F-2 CONCEPTUAL COUNTERMEASURE INSTALLATION ALTERNATIVE 1	OAKLAND PARK BLVD. OVER C-13 CANAL BROWARD COUNTY, BRIDGE NO. 860139	SCALE NTS

TABLE F-1
STAGE 5 BRIDGE SCOUR EVALUATION
ESTIMATED SCOUR COUNTERMEASURE COSTS

Bridge Number 860139

Bid No.	Description	Unit Cost	Unit	ALTERNATIVE 1 Est. Qnty	ALTERNATIVE 1 Total Est Cost	ALTERNATIVE 2 Est. Qnty	ALTERNATIVE 2 Total Est Cost
GENERAL							
0101 1	Mobilization	$ 30,000.00	LS	1	$ 30,000.00	1	$ 30,000.00
ARMORING COUNTERMEASURES							
0514 71 1	Plastic Filter Fabric - Subsurface (1)	$ 7.07	SY	1859	$ 13,143.13	1859	$ 13,143.13
0530 3 4	Riprap, Rubble, F&I, Ditch Lining (2)	$ 78.36	TN	79	$ 6,190.44		$ -
0530 3 3	Riprap, Rubble, Bank and Shore (3)	$ 81.10	TN		$ -	3779	$ 306,476.90
	Marine Mattress (4)	$ 18.95	SF	15896	$ 301,229.20		$ -
CONTINGENCY							
	SUBTOTAL				$ 350,562.77		$ 349,620.03
	15% ENGINEERING	NA	LS		$ 52,584.42		$ 52,443.00
	5% PERMITTING	NA	LS		$ 17,528.14		$ 17,481.00
	30% CONTINGENCY	NA	LS		$ 105,168.83		$ 104,886.01
TOTAL COST					**$ 525,844.16**		**$ 524,430.05**

Notes

(1) Assume filter fabric covers entire countermeasure extent (15,896 + 833) = (16,729 sf) = 1,859 sy

(2) Ditch Lining Riprap Assumption

(a) Install 833 sf riprap at avg 1 ft thick. Estimated volume is 833 cf

(b) Install ditch lining riprap with a density of 188 lb/cf. Thus estimated weight is 833 cf x 188 lb/cf = 79 ton

(3) Bank and Shore Riprap Assumption

(a) Install 16,729 sf riprap at avg 2.5 ft thick. Estimated volume is 41,823 cf

b) Install bank and shore riprap with a density of 180.7 lb/cf. Thus estimated weight is 41,823 cf x 180.7 lb/cf = 3,779 ton

(4) Marine mattress cost includes material and installation of 1' thick stone filled mattresses on site, and seaming mattresses underwater.

Attachment G

Photo 1 Bridge Number

Photo 2 East Approach to Bridge

Photo 3 North Waterway

Photo 4 Substructure of Bridge

Photo 5 South Waterway

Photo 6 West Approach to Bridge

Attachment H

TABLE H-1
STAGE 5 BRIDGE SCOUR EVALUATION
ESTIMATED NDT COSTS[1]

Bridge Number 860139

Bid No.	Description	Unit Cost	Unit	ALTERNATIVE 1		ALTERNATIVE 2	
				Est. Qnty	Total Cost	Est. Qnty	Total Cost
LOW STRAIN INTEGRITY TEST (SONIC ECHO) [2]							
	Mobilization	$ 1,500.00	LS	1	$ 1,500.00		
	Maintenance of Traffic	$ 1,000.00	LS	2	$ 2,000.00		
	Testing Equipment	$ 900.00	EA	2	$ 1,800.00		
	Testing Personnel	$ 3,000.00	EA	2	$ 6,000.00		
	Laboratory and Engineering	$ 5,000.00	EA	2	$ 10,000.00		
PARALLEL SEISMIC TEST [2]							
	Mobilization	$ 2,000.00	LS			1	$ 2,000.00
	Maintenance of Traffic	$ 2,500.00	LS			2	$ 5,000.00
	Testing Equipment	$ 1,300.00	EA			2	$ 2,600.00
	Testing Personnel	$ 3,000.00	EA			2	$ 6,000.00
	Soil Boring and/or Probes	$ 4,000.00	EA			2	$ 8,000.00
	Laboratory and Engineering	$ 10,000.00	EA			2	$ 20,000.00
TOTAL COST					**$ 21,300.00**		**$ 43,600.00**
INFLATED COST 2013 [3]					**$ 23,070.03**		**$ 47,223.16**

Notes

(1)The 2009 Procedural Manual states a secondary test to check results should be considered for these NDT methods. The additional costs of a secondary test are not included in this cost estimate

(2) Estimated cost of NDT methods were obtained from Table 1.6 of 2009 Procedural Manual: Reclassify Unknown Foundation Bridges, FDOT

(3) 8.31% Consumer Price Index increasefrom 2009 through 2013 (www.bls.gov/cpi)

Attachment C

FDEP Sovereign Submerged Lands Title Determination

FLORIDA DEPARTMENT OF Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, FL 32399

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

May 2, 2019

Katie Castor, M.S.
SCALAR Consulting Group, Inc.
13337 North 56th Street
Tampa, Florida 33617

Dear Ms. Castor:

Re: Oakland Park Boulevard Bridge across the C-13 Canal; Broward County

Thank you for your inquiry requesting a determination of ownership of the submerged lands of the C-13 Canal at the Oakland Park Boulevard Bridge crossing. The area of interest is located near the section line between Sections 21 and 28, Township 49 South, Range 42 East.

Our records indicate the submerged lands at this site were dredged and altered. Currently, there is insufficient information to determine the location of the mean/ordinary high water line at this site prior to alterations. Therefore, we recommend that the proprietary requirements normally applied to state owned lands not apply to this site. However, other regulatory requirements may still apply. For further information regarding permitting regulations at this site you may contact Jeffrey L. Meyer, Environmental Consultant, at the Department's Southeast District office at Jeffrey.L.Meyer@FloridaDEP.gov or at (561)681-6645.

If this office can be of any further assistance regarding this determination, please address your questions to Melanie Knapp, Program Consultant, mail station No. 108 at the above letterhead address, by email at Melanie.Knapp@FloridaDEP.gov, or by telephone at (850) 245-2801

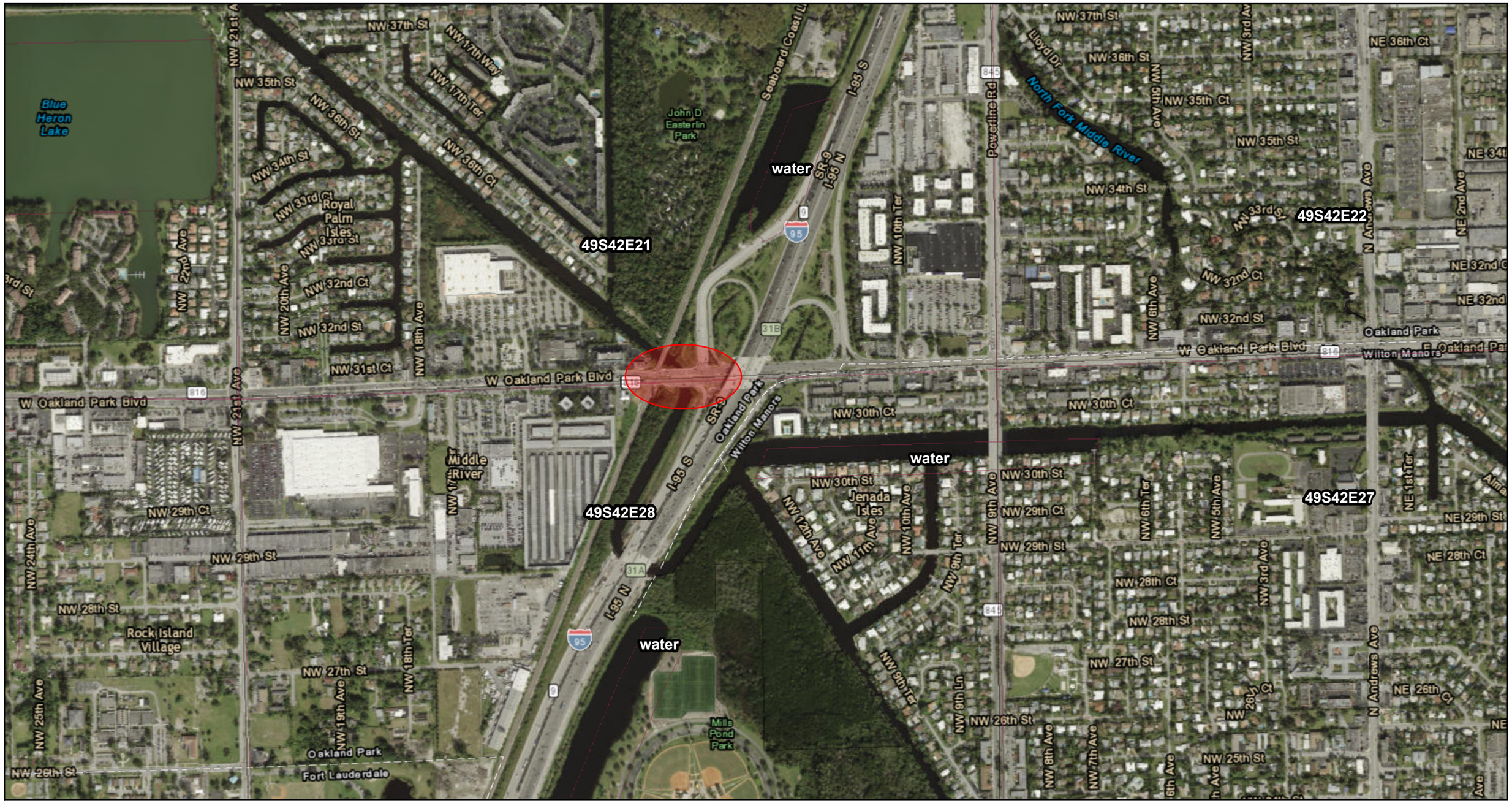
Sincerely,

Marcus J. Ashman, PSM, Program Manager
Bureau of Survey and Mapping
Division of State Lands

MJA/mjk
cc: Jeffrey L. Meyer, SLERP/SE

F:\TITLE\MELANIE\1819-4\OAKLAND PARK BLVD AT C-13.docx

Oakland Park Blvd Bridge at C-13 Canal; No TIITF encumbrances



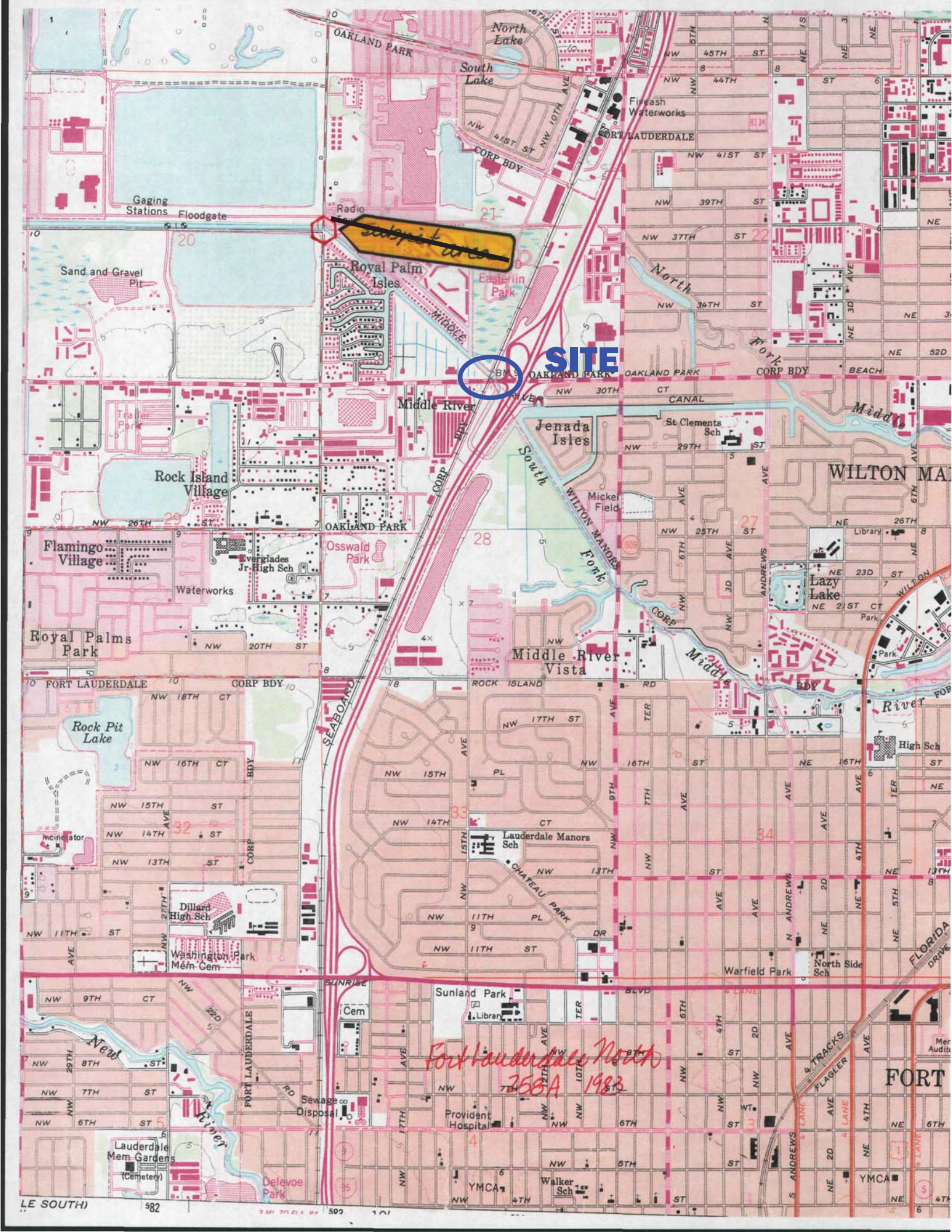
May 2, 2019

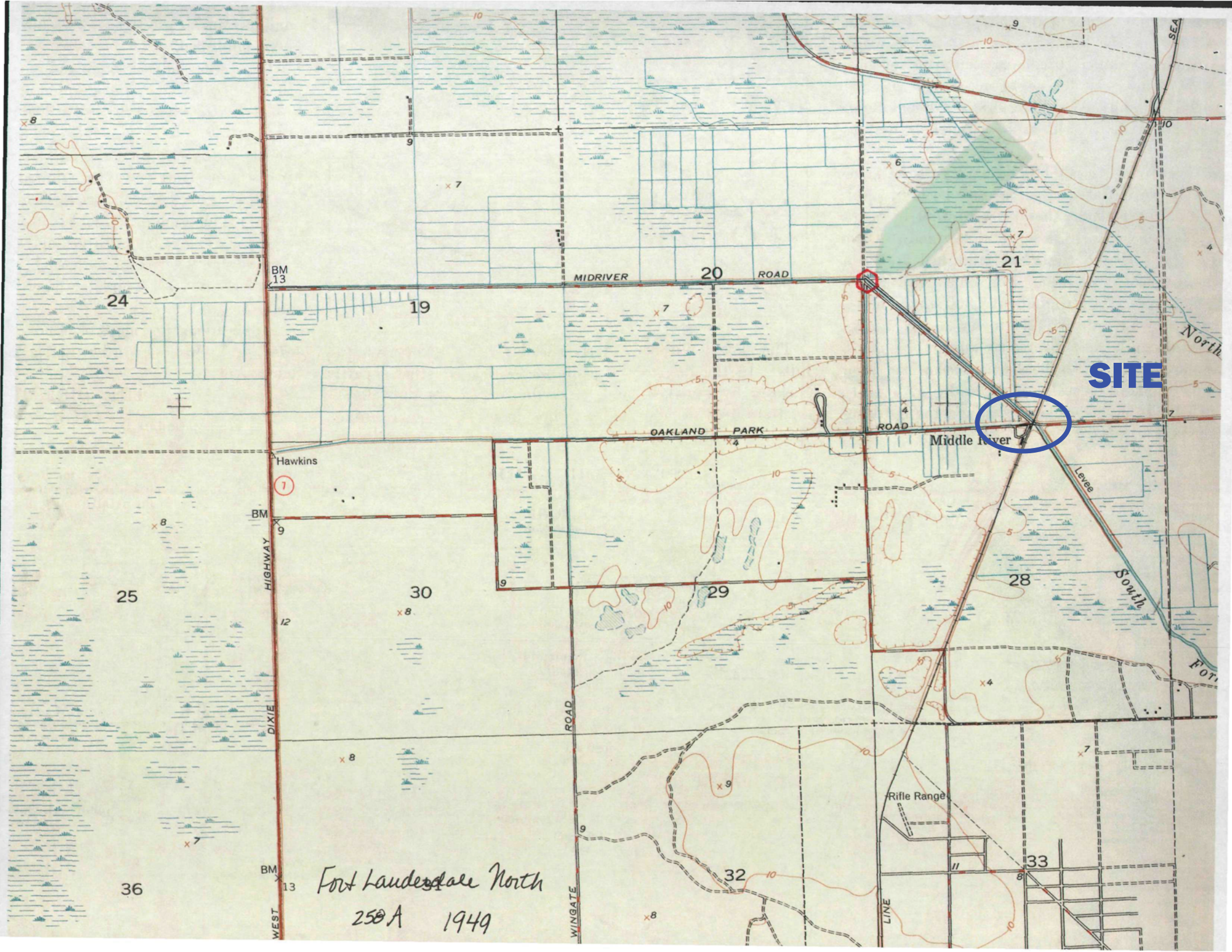
1:9,028

0 0.1 0.2 0.4 mi

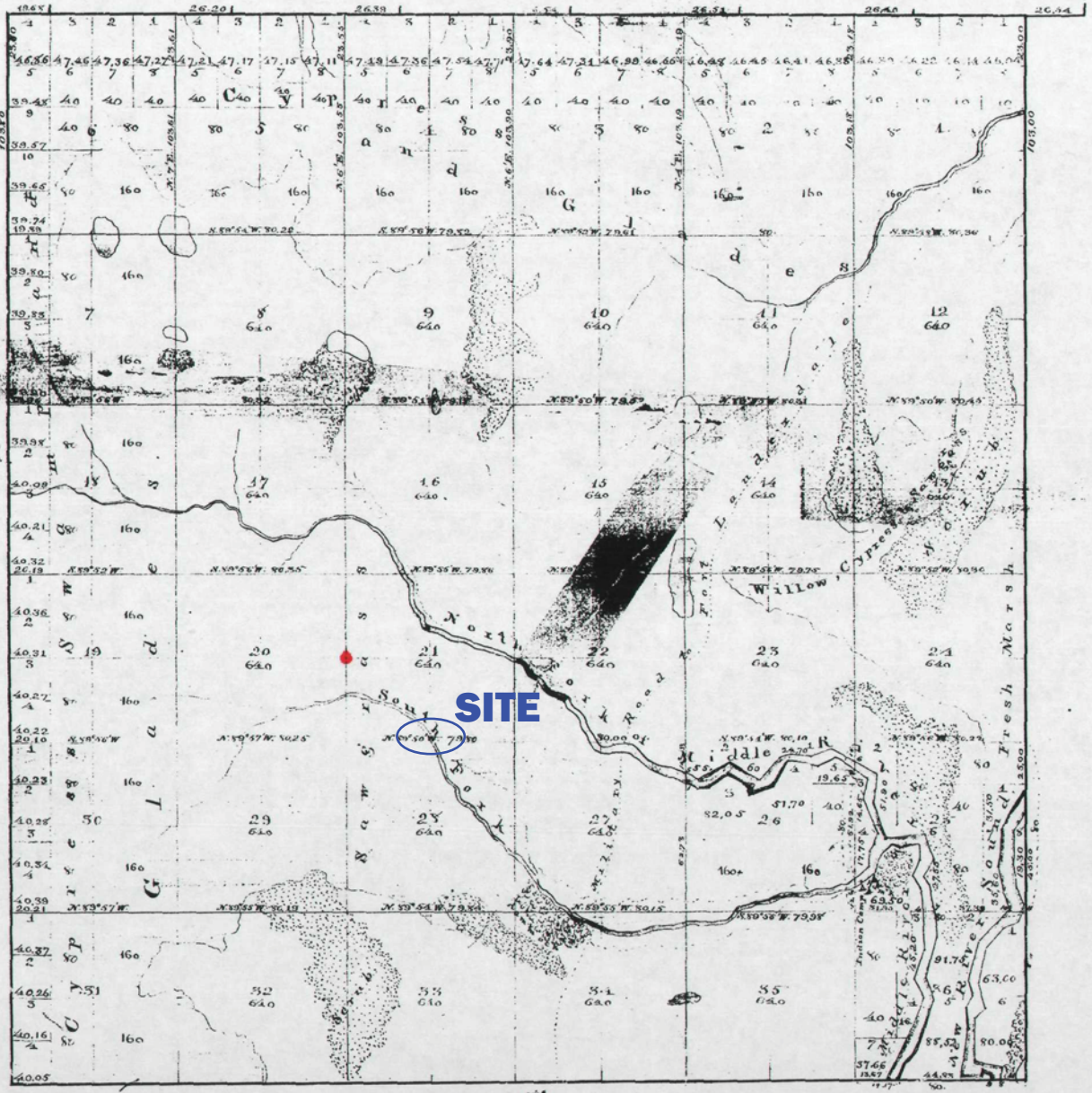
0 0.15 0.3 0.6 km

- [ ] State Land Records (BTLDSR)
- [ ] Public Land Survey System 2006


SITE
OAKLAND PARK
North Lake
South Lake
Fiveash Waterworks
FORT LAUDERDALE
CORP BDY
Gaging Stations
Floodgate
Radio
Sand and Gravel Pit
Royal Palm Isles
Eastern Park
Middle River
North Fork
OAKLAND PARK
CORP BDY
BEACH
CANAL
Jenada Isles
St Clements Sch
South Fork
WILTON MANORS
Micker Field
WILTON MA
Rock Island Village
Trailer Park
Flamingo Village
Everglades Jr High Sch
Waterworks
Osswald Park
Royal Palms Park
Middle River Vista
ROCK ISLAND
Lazy Lake
Library
Park
High Sch
Rock Pit Lake
Incinerator
SEABOARD
Lauderdale Manors Sch
CHATEAU PARK
Dillard High Sch
Washington Park Mem Cem
Warfield Park
North Side Sch
SUNRISE
BLVD
Sunland Park
Library
Cem
Fort Lauderdale North
758A
1983
New River
Sewage Disposal
Provident Hospital
Lauderdale Mem Gardens
(Cemetery)
Delevoe Park
YMCA
Walker Sch
4 TRACKS
FLAGLER
FLORIDA
FORT
LE SOUTH)
582


SITE
MIDRIVER ROAD
OAKLAND PARK ROAD
Middle River
Hawkins
HIGHWAY
DIXIE
WEST
ROAD
WINGATE
LINE
Levee
South
Rifle Range
BM
13
20
21
24
19
25
30
29
28
36
32
33
Fort Lauderdale North
25B A 1949

T. 49 S. R. 42 E.



Meanders of Middle River

Back Courses	Dist.	Back Courses	Dist.	Back Courses	Dist.
1 S 57° E	9.00	N 25° E	3.00	N 65° E	10.00
East	3.00	N 43° E	9.00	N 56° E	14.07
N 81° E	19.00	N 66° E	5.00	6 N 62° E	11.00
N 89° E	10.00	N 76° E	10.00	N 89° W	10.00
N 10° E	6.00	N 11° E	6.00	N 25° E	15.00
N 50° E	12.00	N 24° E	9.00	N 64° E	17.00
N 30° E	14.00	N 25° E	9.00	N 14° E	12.00
N 6° E	13.00	N 2° E	9.00	S 25° 30' W	9.00
N 62° E	10.00	N 15° E	15.00	S 30° E	3.00
N 60° E	13.00	N 28° W	15.00	S 15° E	14.50
2 N 61° E	5.00	N 22° E	10.00	7 S 2° W	13.00
N 10° W	10.00	N 20° W	15.00	S 15° 30' W	24.00
N 86° E	17.00	N 56° E	9.00	S 15° E	11.00
N 11° W	5.00	N 59° E	17.00	S 21° W	23.00
N 35° W	6.00	N 35° E	16.00	S 40° W	5.00
South	7.00	N 42° E	5.00	S 25° 30' W	10.00
S 47° W	9.96	N 76° E	4.00		
3 N 51° W	9.00	S 82° E	18.00		
	172.96		223.00		206.66
Total traverse Middle R.					602.17

Meanders of New River Sound

P.	C.	D.	C.	D.	P.	C.	D.
8	N 3° E	8.00	N 70° W	5.00	10	N 32° W	10.00
	N 75° E	13.00	S 9° W	5.00		N 6° W	10.00
	North	19.00	West	9.50		N 9° E	10.00
	N 47° E	9.00	N 11° E	12.00		North	7.00
	N 13° W	13.00	N 9° E	10.00		N 26° E	22.47
	N 11° E	15.00	North	10.00	11	North	5.00
	N 41° E	12.00	N 32° E	6.00		N 33° W	5.00
	N 66° E	9.00	N 11° W	15.00		N 6° W	10.00
	N 71° E	9.00	N 14° E	18.00		North	26.00
9	North	5.66	N 54° E	13.55		N 34° E	18.88
		102.56		107.05			196.77
Total traverse New R Sound							396.33
Total traverse in Township							998.50

GLO 11-30-1870
M.A. Williams

Scale: 40 Chains to an Inch.
Magnetic Variation 4°45' East.

Total Area 23930.00 Acres

Surveys Designated	By whom Surveyed	Date of Contract	Amt. of Surveys	When Surveyed
S. & E. Boundaries.	George McKay	15th Feby. 1845	12 Ch. 00 L. 00	April [illegible]
South Boundary.	M.A. Williams.	28th Feb'y 1870	6 00 00	June 22nd 1870
East Boundary.	Do.	Do.	6 23 00	July 14th 1870
West Boundary.	Do.	Do.	6 23 80	July 24th 1870
Subdivisions.	Do.	Do.	61 37 67	July 6th to 25 1870
Meanders.	Do.	Do	11 38 20	Aug. 6th 1870

Note: McKay ran the E. Boundary by offset on beach.

The above Map of Township No. 49 South of Range No. 42 East of the Principal Meridian is strictly conformable to the field notes of the survey thereof on file in this Office, which have been examined and approved.

Surveyor General's Office
Tallahassee, Florida.
November 3rd 1870

Sur. Gen.

Attachment D
Benthic Survey Technical Memorandum

AUGUST 2018 BENTHIC SURVEY TECHNICAL MEMORANDUM

Florida Department of Transportation

District 4

Project Title

Limits of Project: Oakland Park Blvd. over the C-13 Canal

Broward County, Florida

Financial Management Number: 441474-1-C2-70

ETDM Number: NA

The environmental review, consultation, and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated December 14, 2016 and executed by FHWA and FDOT.

Florida Department of Transportation

RICK SCOTT
GOVERNOR

3400 West Commercial Blvd.
Fort Lauderdale, FL 33309

MIKE DEW
SECRETARY

BENTHIC SURVEY TECHNICAL MEMORANDUM

DATE: August 24, 2018

TO: Fernando Ascanio, Senior Environmental Specialist
Florida Department of Transportation (FDOT) District IV

FROM: George Burke, Environmental Scientist
David Lestino, Environmental Scientist
Scott McLeay, Environmental Scientist
Stantec Consulting Services Inc.

SUBJECT: Benthic Survey
FM No. 441474-1-C2-70
SR-816/Oakland Park Blvd. Bridge (ID # 860139)
Over the C-13 Canal
Broward County

Attachments: Figure 1: Project Location Map
Figure 2: Benthic Survey Results Map
Representative Photographs

BACKGROUND

The purpose of this memorandum is to provide the results of the benthic survey and shoreline vegetation characterization performed on August 24, 2018 to determine the presence, absence, and general limits of any benthic resources and/or mangroves located adjacent to and underneath SR-848/Stirling Rd Bridge No. 860139 over the C-13 Canal in Broward County, FL (**See Figure 1: Project Location Map**). The Florida Department of Transportation (FDOT) District IV is proposing to install scour countermeasures underneath the project bridge. This scope will likely require in-water work and/or the use of an in-water work barge to construct. Therefore, as there exists potential to impact protected marine resources, FDOT has tasked Stantec to perform a benthic resource survey underneath and adjacent to the project bridge to determine if any natural resources are located in the area. This information will be used to develop avoidance and minimization measures associated

with project design and potential barge use and/or apply for any necessary environmental permits if impacts are unavoidable. While the project is not within the critical habitat for the threatened Johnson's seagrass (*Halophila johnsonii*), it is located within the species range. Therefore, there is potential for this species to be present within the survey area. The benthic survey limits and identified resources are presented in **Figure 2: Benthic Survey Results Map.**

METHODS

The area of potential effect (APE) was determined to be the existing bridge footprint (pilings and seawall/shoreline) based on anticipated in-water work for scour protection measures. Survey efforts focused on the bridge footprint and included an additional 90-100-foot buffer area on the north and south sides of the bridge to account for any potential indirect impacts (i.e. downstream turbidity). A desktop review of the project area was performed prior to the survey using both the Efficient Transportation Decision Making (ETDM) Environmental Screening Tool (EST) and the National Oceanographic and Atmospheric Administration (NOAA) National Marine Fisheries Services' (NMFS) Essential Fish Habitat (EFH) Mapper to determine potential listed species and/or habitats that are within the project area. This preliminary review did not identify any Habitat Areas of Particular Concern (HAPC) or Critical Habitat for any managed fisheries or listed species within the project area. According to the EFH Mapper, the project area does have the potential to contain EFH for the following fisheries managed by the South Atlantic Fisheries Management Council (SAFMC):

- Snapper-Grouper Complex
- Spiny Lobster

The survey was performed by two biologists utilizing SCUBA equipment and swimming four (4) evenly spaced transects on both the north and south sides of the project bridge. Two (2) transects were run perpendicular to the bridge, and two (2) transects were run parallel to the bridge from shoreline to shoreline. For the survey area on the north side of the bridge, the parallel transects were performed from the eastern shoreline to the railroad bridge edge. In addition, the area around each piling under the bridge was also surveyed. Observations and data were recorded on underwater datasheets and the locations of any natural resources were located using a Trimble R1 GNSS Receiver, Global Positioning System (GPS). The survey area and data recordings were divided into the north side and south side of the bridge.

Underwater photographs of the area were taken to document the shoreline vegetation and benthic resources observed. All observed resources were mapped and overlaid onto a project aerial using ESRI ArcGIS (**See Figure 2: Benthic Survey Results Map**).

RESULTS

The survey revealed that the water depth ranges from around eight (8) to ten (10) feet near the center of the bridge and gradually decreases toward the eastern and western shorelines where depths ranged from one (1) to four (4) feet. The benthic substrate throughout the entire survey area was consistent sandy bottom with scattered detrital debris. No protected benthic resources, including seagrasses, corals or any other listed species, were observed within the entire survey area. The shoreline vegetation at the four (4) bridge corners consisted primarily of Brazilian pepper (*Schinus terebinthifolia*) and coin vine (*Dalbergia ecastaphyllum*); however, a few individual white mangroves (*Laguncularia racemosa*) were observed within the shoreline vegetation in the northeast corner of the project bridge (**See Figure 2: Benthic Survey Results Map**).

SUMMARY

No protected benthic resources, including seagrass and corals, or any other listed species were observed within the survey area around the project bridge. This area of the C-13 canal appeared to be more of a freshwater system than a marine system as the fish observed were strictly freshwater species (various cichlids, **See Photo 1 in the attached Representative Photographs**). Hence, the conditions within the survey area do not favor establishment of seagrasses or other marine resources. In addition, shading occurs beneath the bridge where the scour protection measures are likely to be installed. The only protected resources within the project area were the white mangroves (*L. racemosa*) within the dense, exotic-dominated shoreline vegetation on the northeast corner of the bridge. Impacts to these mangroves should be avoided. If impacts to these mangroves (even minor trimming) are unavoidable, environmental permits will be required.

The Florida Department of Environmental Protection (FDEP) has recommended that the clearance distance for a work barge over potential seagrass areas to be one foot off the bottom at all times. The shallow depths, ranging from 2-4 ft deep, near the shorelines of the bridge may limit the size of any proposed work barge. The use of Best Management

Practices (BMPs), such as turbidity control measures, will further reduce any potential for any project related impacts.

Although the EFH mapper identified the project area as providing possible spawning, breeding, feeding areas for species in the Spiny Lobster and Snapper-Grouper Complex, no impacts to EFH for either of these fisheries would be anticipated from the construction of this project. Therefore, formal consultation with NMFS would not be anticipated for this project. Project impacts and the need for any subsequent NMFS coordination will be further determined during the design phase of the project.

The West Indian manatee (*Trichechus manatus*) is known to utilize this waterway and informal consultation with the U.S. Fish and Wildlife Service (USFWS) would be required with the commitment to implement the *Standard Manatee Conditions for In-water Work* during construction. No threatened, endangered (T/E) or otherwise protected species were observed within the project area. Please refer to the attached **Representative Photographs** for further details on the survey conditions observed along the shorelines and below the water.

Figure 1: Project Location Map

Florida Department of Transportation
District IV
3400 W Commercial Blvd
Ft Lauderdale, FL

Project Location Map

FM 441474-1 Oakland Park Blvd
Bridge 860139 Over Canal C-13
Broward County, Fl
Section: 21, Township: 49S, Range: 42E

Legend

Project Location

Feet
0 40 80 160

Figure 2: Benthic Survey Results Map

Note: The shoreline vegetation consisted primarily of thick Brazilian pepper (*S. terebinthifolia*) and coin vine (*D. ecastaphyllum*). However, a few individual white mangroves (*L. racemosa*) were observed along the northeastern shoreline. No benthic resources were observed and the substrate is primarily silty-sand with deterital debris, shell fragments and litter.

N
W
E
S

C-13 Canal

95

Oakland Park Blvd

C-13 Canal

Florida Department of Transportation
District IV
3400 W Commercial Blvd
Ft Lauderdale, FL

Benthic Survey Results Map

FM 441474-1 Oakland Park Blvd
Bridge 860139 Over Canal C-13
Broward County, Fl
Section: 21, Township: 49S, Range: 42E

Legend

Transects
Survey Area
Mixed Shoreline Vegetation

Feet
0 20 40 80

Representative Photographs

Representative Photographs

Photograph No.: 1

Date: August 24, 2018

Location: Oakland Park Blvd Bridge 860139, Broward County, FL

Notes: The photograph shows some freshwater fish species observed adjacent to the study area. The presence of these fish indicate low salinity in this location, therefore it appears that this area is more of a freshwater system, making it unlikely that benthic marine resources would be found in this survey area.

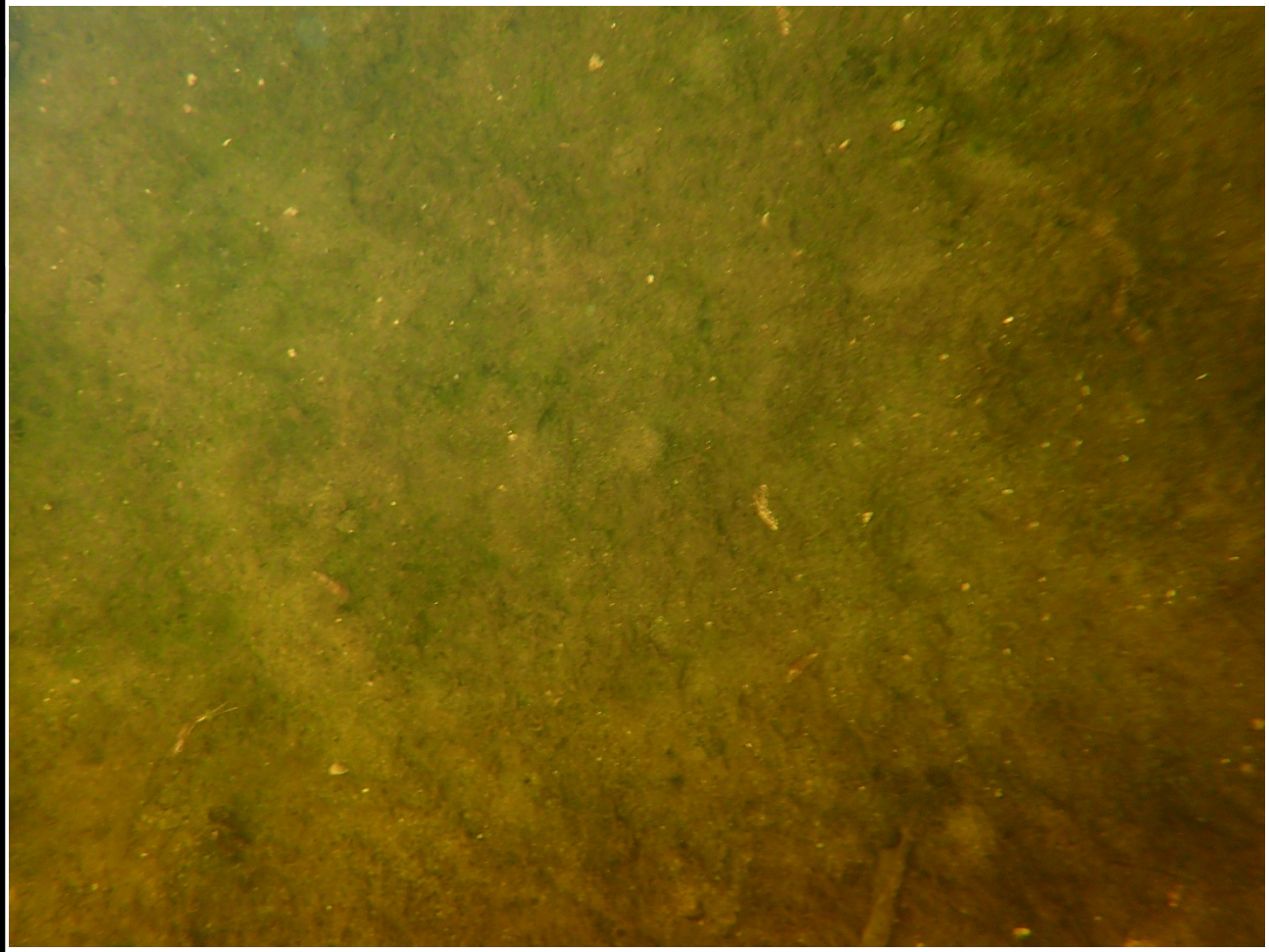
Representative Photographs

Photograph No.: 2

Date: August 24, 2018

Location: Oakland Park Blvd Bridge 860139, Broward County, FL

Notes: The photograph shows a view of the benthic substrate that was observed throughout the survey area. This substrate consisted of silty sand with scattered detritus and algal coverage. No submerged aquatic vegetation (SAV) including seagrasses, were documented on this survey.



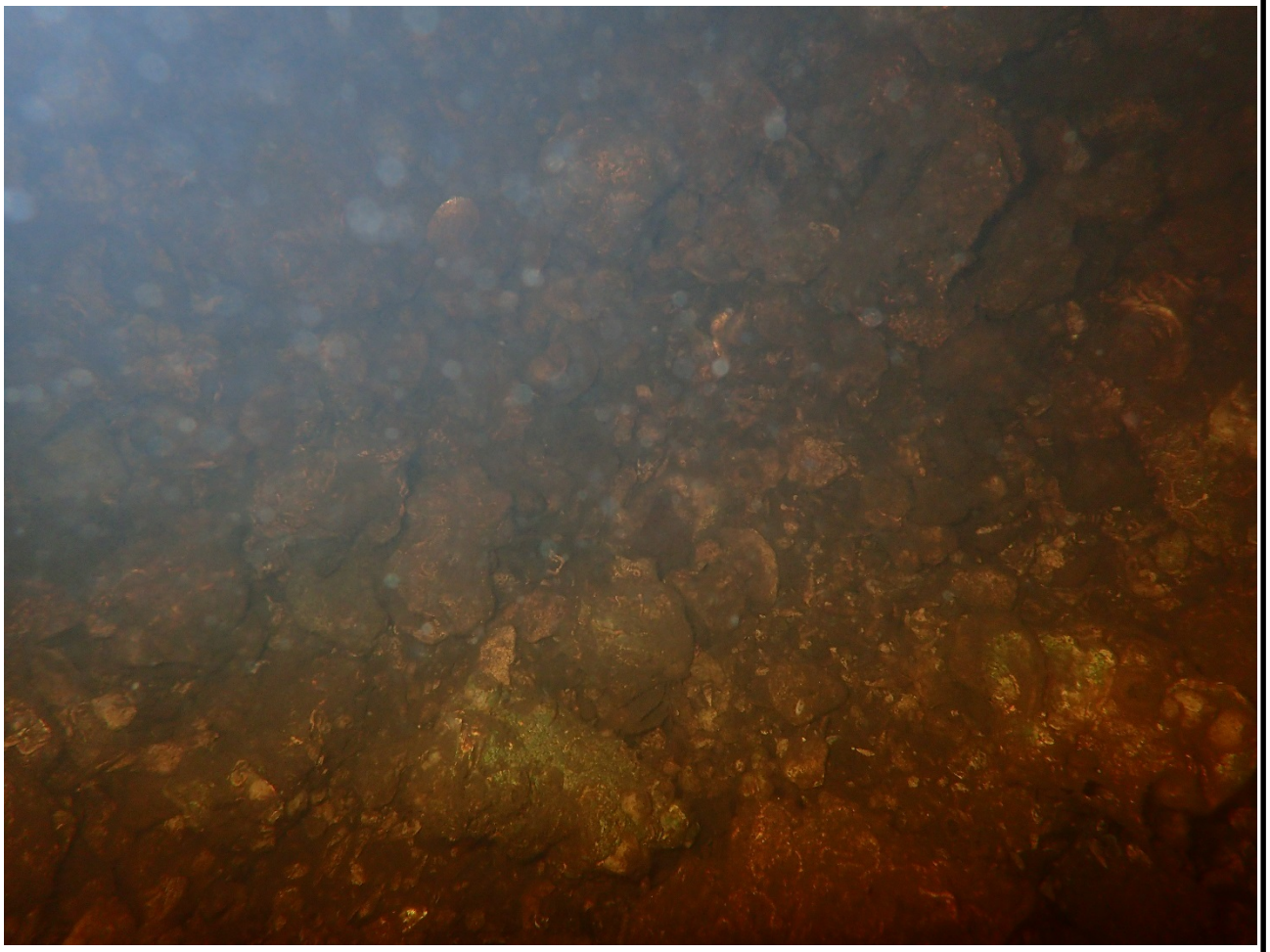
Representative Photographs

Photograph No.: 3

Date: August 24, 2018

Location: Oakland Park Blvd Bridge 860139, Broward County, FL

Notes: The photograph shows the rockier benthic substrate that was observed directly underneath the bridge towards the shoreline. Again, no benthic resources were observed in this area. Light penetration is severely limited and the substrate is not conducive for seagrass establishment.



Representative Photographs

Photograph No.: 4

Date: August 24, 2018

Location: Oakland Park Blvd Bridge 860139, Broward County, FL

Notes: The photograph shows the dense, mainly exotic, shoreline vegetation along the northeast corner of the bridge. There were some individual white mangroves (*L. racemose*) observed within this shoreline vegetation and impacts to these mangroves should be avoided.

Attachment E

Standard Manatee Construction Conditions for In-Water Work

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

2011

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or in Vero Beach (1-772-562-3909) for south Florida, and emailed to FWC at ImperiledSpecies@myFWC.com.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8½ " by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at http://www.myfwc.com/WILDLIFEHABITATS/manatee_sign_vendors.htm. Questions concerning these signs can be forwarded to the email address listed above.

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:

Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

Attachment F

USACE Effect Determination Key for the Manatee in Florida

THE CORPS OF ENGINEERS, JACKSONVILLE DISTRICT, AND THE STATE OF FLORIDA EFFECT DETERMINATION KEY FOR THE MANATEE IN FLORIDA
April 2013

Purpose and background of the key

The purpose of this document is to provide guidance to improve the review of permit applications by U.S. Army Corps of Engineers' (Corps) Project Managers in the Regulatory Division regarding the potential effects of proposed projects on the endangered West Indian manatee (*Trichechus manatus*) in Florida, and by the Florida Department of Environmental Protection or its authorized designee or Water Management District, for evaluating projects under the State Programmatic General Permit (SPGP) or any other Programmatic General Permits that the Corps may issue for administration by the above agencies. Such guidance is contained in the following dichotomous key. The key applies to permit applications for in-water activities such as, but not limited to: (1) dredging [new or maintenance dredging of not more than 50,000 cubic yards], placement of fill material for shoreline stabilization, and construction/placement of other in-water structures as well as (2) construction of docks, marinas, boat ramps and associated trailer parking spaces, boat slips, dry storage or any other watercraft access structures or facilities.

At a certain step in the key, the user is referred to graphics depicting important manatee areas or areas with inadequate protection. The maps can be downloaded from the Corps' web page at http://www.saj.usace.army.mil/Missions/Regulatory/SourceBook.aspx. We intend to utilize the most recent depiction of these areas, so should these areas be modified by statute, rule, ordinance and/or other legal mandate or authorization, we will modify the graphical depictions accordingly. These areas may be shaded or otherwise differentiated for identification on the maps.

Explanatory footnotes are provided in the key and must be closely followed whenever encountered.

Scope of the key

This key should only be used in the review of permit applications for effect determinations on manatees and should not be used for other listed species or for other aquatic resources such as Essential Fish Habitat (EFH). Corps Project Managers should ensure that consideration of the project's effects on any other listed species and/or on EFH is performed independently. This key may be used to evaluate applications for all types of State of Florida (State Programmatic General Permits, noticed general permits, standard general permits, submerged lands leases, conceptual and individual permits) and Department of the Army (standard permits, letters of permission, nationwide permits, and regional general permits) permits and authorizations. The final effect determination will be based on the project location and description; the potential effects to manatees, manatee habitat, and/or manatee critical habitat; and any measures (such as project components, standard construction precautions, or special conditions included in the authorization) to avoid or minimize effects to manatees or manatee critical habitat. Projects that key to a "may affect" determination equate to "likely to adversely affect" situations, and those projects should not be processed under the SPGP or any other programmatic general permit. For

all “may affect” determinations, Corps Project Managers shall refer to the Manatee Programmatic Biological Opinion, dated March 21, 2011, for guidance on eliminating or minimizing potential adverse effects resulting from the proposed project. If unable to resolve the adverse effects, the Corps may refer the applicant to the U.S. Fish and Wildlife Service (Service) for further assistance in attempting to revise the proposed project to a “may affect, not likely to adversely affect” level. The Service will coordinate with the Florida Fish and Wildlife Conservation Commission (FWC) and the counties, as appropriate. Projects that provide new access for watercraft and key to “may affect, not likely to adversely affect” may or may not need to be reviewed individually by the Service.

MANATEE KEY
Florida[1]
April 2013

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

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

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

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

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

2. installation of structures which could restrict or act as a barrier to manatees;

3. new or changes to existing warm or fresh water discharges from industrial sites, power plants, or natural springs or artesian wells (but only if the new or proposed change in discharge requires a Corps permit to accomplish the work);

4. installation of new culverts and/or maintenance or modification of existing culverts (where the culverts are 8 inches to 8 feet in diameter, ungrated and in waters accessible, or potentially accessible, to manatees)[2];

5. mechanical dredging from a floating platform, barge or structure[3] that restricts manatee access to less than half the width of the waterway;

6. creation of new slips or change in use of existing slips, even those located in a county with a State-approved Manatee Protection Plan (MPP) in place and the number of slips is less than the MPP threshold, to accommodate docking for repeat use vessels, (*e.g.*, water taxis, tour boats, gambling boats, etc; or slips or structures that are not civil works projects, but are frequently used to moor large vessels (>100') for shipping and/or freight purposes; does not include slips used for docking at boat sales or repair facilities or loading/unloading at dry stack storage facilities and boat ramps); [Note: For projects within Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County, the reviewer should proceed to Couplet C.]

7. any type of in-water activity in a Warm Water Aggregation Area (WWAA) or No Entry Area (see Glossary and accompanying Maps[4]); [Note: For residential docking facilities in a Warm Water Aggregation Area that is not a Federal manatee sanctuary or No Entry Area, the reviewer should proceed to couplet C.]

8. creation or expansion of canals, basins or other artificial shoreline and/or the connection of such features to navigable waters of the U.S.; [Note: For projects proposing a single residential dock, the reviewer should proceed to couplet C; otherwise, project is a *May Affect*.]

9. installation of temporary structures (docks, buoys, etc.) utilized for special events such as boat races, boat shows, military shows, etc., but only when consultation with the U.S. Coast Guard and FWS has not occurred; [Note: See programmatic consultation with the U.S. Coast Guard on manatees dated May 10, 2010.].

Project is other than the activities listed above C

C. Project is located in an Important Manatee Area (IMA) (see Glossary and accompanying Maps[4]) ..... D

Project is not located in an Important Manatee Area (IMA) (see Glossary and accompanying Maps[4]) ..... G

D. Project includes dredging of less than 50,000 cubic yards ..... E

Project does not include dredging ..... G

E. Project is for dredging a residential dock facility or is a land-based dredging operation ..... N

Project not as above ..... F

F. Project proponent **does not elect** to follow all dredging protocols described on the maps for the respective IMA in which the project is proposed ..... *May affect*

Project proponent **elects** to follow all dredging protocols described on the maps for the respective IMA in which the project is proposed ..... G

G. Project provides new[5] access for watercraft, *e.g.*, docks or piers, marinas, boat ramps and associated trailer parking spaces, new dredging, boat lifts, pilings, floats, floating docks, floating vessel platforms, boat slips, dry storage, mooring buoys, or other watercraft access (residential boat lifts, pilings, floating docks, and floating vessel platforms installed in existing slips are not considered new access) or improvements allowing increased watercraft usage ..... H

Project does not provide new[5] access for watercraft, *e.g.*, bulkheads, seawalls, riprap, maintenance dredging, boardwalks and/or the maintenance (repair or rehabilitation) of currently serviceable watercraft access structures provided all of the following are met: (1) the number of slips is not increased; (2) the number of existing slips is not in question; and (3) the improvements do not allow increased watercraft usage ..... N

H. Project is located in the Braden River Area of Inadequate Protection (Manatee County) (see Glossary and accompanying AIP Map[4])
..... *May affect*

Project is not located in the Braden River Area of Inadequate Protection (Manatee County) (see Glossary and accompanying AIP Map[4]) I

I. Project is for a multi-slip facility (see Glossary) ..... J

Project is for a residential dock facility or is for dredging (see Glossary) ..... N

J. Project is located in a county that currently has a State-approved MPP in place (BREVARD, BROWARD, CITRUS, CLAY, COLLIER, DUVAL, INDIAN RIVER, LEE, MARTIN, MIAMI-DADE, PALM BEACH, ST. LUCIE, SARASOTA, VOLUSIA) or shares contiguous waters with a county having a State-approved MPP in place (LAKE, MARION, SEMINOLE)[6] ..... K

Project is located in a county not required to have a State-approved MPP L

K. Project has been developed or modified to be consistent with the county's State-approved MPP **and** has been verified by a FWC review (or FWS review if project is exempt from State permitting) **or** the number of slips is below the MPP threshold ..... N

Project has not been reviewed by the FWC or FWS **or** has been reviewed by the FWC or FWS **and** determined that the project is not consistent with the county's State-approved MPP ..... *May affect*

L. Project is located in one of the following counties: CHARLOTTE, DESOTO[7], FLAGLER, GLADES, HENDRY, HILLSBOROUGH, LEVY, MANATEE, MONROE[7], PASCO[7], PINELLAS ..... M

Project is located in one of the following counties: BAY, DIXIE, ESCAMBIA, FRANKLIN, GILCHRIST, GULF, HERNANDO, JEFFERSON, LAFAYETTE, MONROE (south of Craig Key), NASSAU, OKALOOSA, OKEECHOBEE, PUTNAM, SANTA ROSA, ST. JOHNS, SUWANNEE, TAYLOR, WAKULLA, WALTON ..... N

M. The number of slips does not exceed the residential dock density threshold (see Glossary) ..... N

The number of slips exceeds the residential dock density threshold (see Glossary) ..... *May affect*

N. Project impacts to submerged aquatic vegetation[8], emergent vegetation or mangrove will have beneficial, insignificant, discountable[9] or no effects on the manatee[10] ..... O

Project impacts to submerged aquatic vegetation[8], emergent vegetation or mangrove may adversely affect the manatee[10] ..... *May affect*

O. Project proponent **elects** to follow standard manatee conditions for in-water work[11] and requirements, as appropriate for the proposed activity, prescribed on the maps[4] ..... P

Project proponent **does not elect** to follow standard manatee conditions for in-water work[11] and appropriate requirements prescribed on the maps[4] ..... *May affect*

P. If project is for a new or expanding[5] multi-slip facility and is located in a county with a State-approved MPP in place **or** in Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Putnam, St. Johns, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary.

If project is for a new or expanding[5] multi-slip facility and is located in Charlotte, Desoto, Flagler, Glades, Hendry, Hillsborough, Levy, Manatee, Monroe (north of Craig Key), Pasco, or Pinellas County, further consultation with the Service is necessary for "*May affect, not likely to adversely affect*" determinations.

If project is for repair or rehabilitation of a multi-slip facility and is located in an Important Manatee Area, further consultation with the Service is necessary for "*May affect, not likely to adversely affect*" determinations. If project is for repair or rehabilitation of a multi-slip facility and: (1) is not located in an Important Manatee Area; (2) the number of slips is not increased; (3) the number of existing slips is not in question; and (4) the improvements to the existing watercraft access structures do not allow increased watercraft usage, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary.

If project is a residential dock facility, shoreline stabilization, or dredging, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary. Note: For residential dock facilities located in a Warm Water Aggregation Area or in a No Entry area, seasonal restrictions may apply. See footnote 4 below for maps showing restrictions.

If project is other than repair or rehabilitation of a multi-slip facility, a new[5] multi-slip facility, residential dock facility, shoreline stabilization, or dredging, and does not provide new[5] access for watercraft or

improve an existing access to allow increased watercraft usage, the determination of "*May affect, not likely to adversely affect*" is appropriate[12] and no further consultation with the Service is necessary.

[1] On the St. Mary's River, this key is only applicable to those areas that are within the geographical limits of the State of Florida.

[2] All culverts 8 inches to 8 feet in diameter must be grated to prevent manatee entrapment. To effectively prevent manatee access, grates must be permanently fixed, spaced a maximum of 8 inches apart (may be less for culverts smaller than 16 inches in diameter) and may be installed diagonally, horizontally or vertically. For new culverts, grates must be attached prior to installation of the culverts. Culverts less than 8 inches or greater than 8 feet in diameter are exempt from this requirement. If new culverts and/or the maintenance or modification of existing culverts are grated as described above, the determination of "*May affect, not likely to adversely affect*" is appropriate[11] and no further consultation with the Service is necessary.

[3] If the project proponent agrees to follow the standard manatee conditions for in-water work as well as any special conditions appropriate for the proposed activity, further consultation with the Service is necessary for "*May affect, not likely to adversely affect*" determinations. These special conditions may include, but are not limited to, the use of dedicated observers (see Glossary for definition of dedicated observers), dredging during specific months (warm weather months vs cold weather months), dredging during daylight hours only, adjusting the number of dredging days, does not preclude or discourage manatee egress/ingress with turbidity curtains or other barriers that span the width of the waterway, etc.

[4] Areas of Inadequate Protection (AIPs), Important Manatee Areas (IMAs), Warm Water Aggregation Areas (WWAAs) and No Entry Areas are identified on these maps and defined in the Glossary for the purposes of this key. These maps can be viewed on the Corps' web page. If projects are located in a No Entry Area, special permits may be required from FWC in order to access these areas (please refer to Chapter 68C-22 F.A.C. for boundaries; maps are also available at FWC's web page).

[5] New access for watercraft is the addition or improvement of structures such as, but not limited to, docks or piers, marinas, boat ramps and associated trailer parking spaces, boat lifts, pilings, floats, floating docks, floating vessel platforms, (maintenance dredging, residential boat lifts, pilings, floating docks, and floating vessel platforms installed in existing slips are not considered new access), boat slips, dry storage, mooring buoys, new dredging, etc., that facilitates the addition of watercraft to, and/or increases watercraft usage in, waters accessible to manatees. The repair or rehabilitation of any type of currently serviceable watercraft access structure is not considered new access provided all of the following are met: (1) the number of slips is not increased; (2) the number of existing slips is not in question; and (3) the improvements to the existing watercraft access structures do not result in increased watercraft usage.

[6] Projects proposed within the St. Johns River portion of Lake, Marion, and Seminole counties and contiguous with Volusia County shall be evaluated using the Volusia County MPP.

[7] For projects proposed within the following areas: the Peace River in DeSoto County; all areas north of Craig Key in Monroe County, and the Anclote and Pithlachascotee Rivers in Pasco County, proceed to Couplet M. For all other locations in DeSoto, Monroe (south of Craig Key) and Pasco Counties, proceed to couplet N.

[8] Where the presence of the referenced vegetation is confirmed within the area affected by docks and other piling-supported minor structures and the reviewer has concluded that the impacts to SAV, marsh or mangroves would not adversely affect the manatee or its critical habitat, proceed to couplet O.

Where the presence of the referenced vegetation is confirmed within the area affected by docks and other piling-supported minor structures and the reviewer has concluded that the impacts to SAV, marsh or mangroves would adversely affect the manatee or its critical habitat, the applicant can elect to avoid/minimize impacts to that vegetation. In that instance, where impacts are unavoidable and the applicant elects to abide by or employ construction techniques that exceed the criteria in the following documents, the reviewer should conclude that the impacts to SAV, marsh or mangroves would not adversely affect the manatee or its critical habitat and proceed to couplet O.

- "Construction Guidelines in Florida for Minor Piling-Supported Structures Constructed in or over Submerged Aquatic Vegetation (SAV), Marsh or Mangrove Habitat," prepared jointly by the U.S. Army Corps of Engineers and the National Marine Fisheries Service (August 2001) [refer to the Corps' web page], and

- "Key for Construction Conditions for Docks or Other Minor Structures Constructed in or over Johnson's seagrass (*Halophila johnsonii*)," prepared jointly by the National Marine Fisheries Service and U.S. Army Corps of Engineers (October 2002), for those projects within the known range of Johnson's seagrass occurrence (Sebastian Inlet to central Biscayne Bay in the lagoon systems on the east coast of Florida) [refer to the Corps' web page],

Where the presence of the referenced vegetation is confirmed within the area affected by docks and other piling-supported minor structures and the reviewer has concluded that the impacts to SAV, marsh or mangroves would adversely affect the manatee or its critical habitat, and the applicant does not elect to follow the above Guidelines, the Corps will need to request formal consultation on the manatee with the Service as *May affect*.

For activities other than docks and other piling-supported minor structures proposed in SAV, marsh, or mangroves (*e.g.*, new dredging, placement of riprap, bulkheads, etc.), if the reviewer determines the impacts to the SAV, marsh or mangroves will not adversely affect the manatee or its critical habitat, proceed to couplet O, otherwise the Corps will need to request formal consultation on the manatee with the Service as *May affect*.

[9] See Glossary, under "is not likely to adversely affect."

[10] Federal reviewers, when making your effects determination, consider effects to manatee designated critical habitat pursuant to section 7(a)(2) of the Endangered Species Act. State reviewers, when making your effects determination, consider effects to manatee habitat within the entire State of Florida, pursuant to Chapter 370.12(2)(b) Florida Statutes.

[11] See the Corps' web page for manatee construction conditions. At this time, manatee construction precautions c and f are not required in the following Florida counties: Bay, Escambia, Franklin, Gilchrist, Gulf, Jefferson, Lafayette, Okaloosa, Santa Rosa, Suwannee, and Walton.

[12] By letter dated April 25, 2013, the Corps received the Service's concurrence with "*May affect, not likely to adversely affect*" determinations made pursuant to this key for the following activities: (1) selected non-watercraft access projects; (2) watercraft-access projects that are residential dock facilities, excluding those located in the Braden River AIP; (3) launching facilities solely for kayaks and canoes, and (4) new or expanding multi-slip facilities located in Bay, Dixie, Escambia, Franklin, Gilchrist, Gulf, Hernando, Jefferson, Lafayette, Monroe (south of Craig Key), Nassau, Okaloosa, Okeechobee, Santa Rosa, Suwannee, Taylor, Wakulla or Walton County.

Additionally, in the same letter dated April 25, 2013, the Corps received the Service's concurrence for "*May affect, not likely to adversely affect*" determinations specifically made pursuant to Couplet G of the key for the repair or rehabilitation of currently serviceable multi-slip watercraft access structures provided all of the following are met: (1) the project is not located in an IMA, (2) the number of slips is not increased; (3) the number of existing slips is not in question; and (4) the improvements to the existing watercraft access structures do not allow increased watercraft usage. Upon receipt of such a programmatic concurrence, no further consultation with the Service for these projects is required.

GLOSSARY

Areas of inadequate protection (AIP) – Areas within counties as shown on the maps where the Service has determined that measures intended to protect manatees from the reasonable certainty of watercraft-related take are inadequate. Inadequate protection may be the result of the absence of manatee or other watercraft speed zones, insufficiency of existing speed zones, deficient speed zone signage, or the absence or insufficiency of speed zone enforcement.

Boat slip – A space on land or in or over the water, other than on residential land, that is intended and/or actively used to hold a stationary watercraft or its trailer, and for which intention and/or use is confirmed by legal authorization or other documentary evidence. Examples of boat slips include, but are not limited to, docks or piers, marinas, boat ramps and associated trailer parking spaces, boat lifts, floats, floating docks, pilings, boat davits, dry storage, etc.

Critical habitat – For listed species, this consists of: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the Endangered Species Act (ESA), on which are found those physical or biological features (constituent elements) (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the ESA, upon a determination by the Secretary that such areas are essential for the conservation of the species. Designated critical habitats are described in 50 CFR 17 and 50 CFR 226.

Currently serviceable – Currently, serviceable means usable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects – The direct or immediate effects of the project on the species or its habitat.

Dredging – For the purposes of this key, the term dredging refers to all in-water work associated with dredging operations, including mobilization and demobilization activities that occur in water or require vessels.

Emergent vegetation – Rooted emergent vascular macrophytes such as, but not limited to, cordgrass (*Spartina alterniflora and S. patens*), needle rush (J*uncus roemerianus*), swamp sawgrass (*Cladium mariscoides*), saltwort (*Batis maritima*), saltgrass (*Distichlis spicata*), and glasswort (*Salicornia virginica*) found in coastal salt marsh-related habitats (tidal marsh, salt marsh, brackish marsh, coastal marsh, coastal wetlands, tidal wetlands).

Formal consultation – A process between the Services and a Federal agency or applicant that: (1) determines whether a proposed Federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) begins with a Federal agency's written request and submittal of a complete initiation package; and (3) concludes with the issuance of a biological opinion and incidental take statement by either of the Services. If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Services concur, in writing, that a proposed

action “is not likely to adversely affect” listed species or designated critical habitat). [50 CFR 402.02, 50 CFR 402.14]

Important manatee areas (IMA) – Areas within certain counties where increased densities of manatees occur due to the proximity of warm water discharges, freshwater discharges, natural springs and other habitat features that are attractive to manatees. These areas are heavily utilized for feeding, transiting, mating, calving, nursing or resting as indicated by aerial survey data, mortality data and telemetry data. Some of these areas may be federally-designated sanctuaries or state-designated “seasonal no entry” zones. Maps depicting important manatee areas and any accompanying text may contain a reference to these areas and their special requirements. Projects proposed within these areas must address their special requirements.

Indirect effects – Those effects that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. Examples of indirect effects include, but are not limited to, changes in water flow, water temperature, water quality (*e.g.*, salinity, pH, turbidity, nutrients, chemistry), prop dredging of seagrasses, and manatee watercraft injury and mortality. Indirect effects also include watercraft access developments in waters not currently accessible to manatees, but watercraft access can, is, or may be planned to waters accessible to manatees by the addition of a boat lift or the removal of a dike or plug.

Informal consultation – A process that includes all discussions and correspondence between the Services and a Federal agency or designated non-Federal representative, prior to formal consultation, to determine whether a proposed Federal action may affect listed species or critical habitat. This process allows the Federal agency to utilize the Services’ expertise to evaluate the agency’s assessment of potential effects or to suggest possible modifications to the proposed action which could avoid potentially adverse effects. If a proposed Federal action may affect a listed species or designated critical habitat, formal consultation is required (except when the Services concur, in writing, that a proposed action “is not likely to adversely affect” listed species or designated critical habitat). [50 CFR 402.02, 50 CFR 402.13]

In-water activity – Any type of activity used to construct/repair/replace any type of in-water structure or fill; the act of dredging.

In-water structures – watercraft access structures – Docks or piers, marinas, boat ramps, boat slips, boat lifts, floats, floating docks, pilings (depending on use), boat davits, etc.

In-water structures – other than watercraft access structures – Bulkheads, seawalls, riprap, groins, boardwalks, pilings (depending on use), etc.

Is likely to adversely affect – The appropriate finding in a biological assessment (or conclusion during informal consultation) if any adverse effect to listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions and the effect is not: discountable, insignificant, or beneficial (see definition of “is not likely to adversely affect”). An “is likely to adversely affect” determination requires the initiation of formal consultation under section 7 of the ESA.

Is not likely to adversely affect – The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. **Discountable effects** are those extremely unlikely to occur. **Insignificant effects** relate to the size of the impact and should never reach the scale where take occurs. **Beneficial effects** are contemporaneous positive effects without any adverse effects to the species. Based on best judgment, a person would not (1) be able to meaningfully measure, detect, or evaluate insignificant effects or (2) expect discountable effects to occur.

Manatee Protection Plan (MPP) – A manatee protection plan (MPP) is a comprehensive planning document that addresses the long-term protection of the Florida manatee through law enforcement, education, boat facility siting, and habitat protection initiatives. Although MPPs are primarily developed by the counties, the plans are the product of extensive coordination and cooperation between the local governments, the FWC, the Service, and other interested parties.

Manatee Protection Plan thresholds – The smallest size of a multi-slip facility addressed under the purview of a Manatee Protection Plan (MPP). For most MPPs, this threshold is five slips or more. For Brevard, Clay, Citrus, and Volusia County MPPs, this threshold is three slips or more.

Mangroves – Rooted emergent trees along a shoreline that, for the purposes of this key, include red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*) and white mangrove (*Laguncularia racemosa*).

May affect – The appropriate conclusion when a proposed action may pose <u>any</u> effects on listed species or designated critical habitat. When the Federal agency proposing the action determines that a "may affect" situation exists, then they must either request the Services to initiate formal consultation or seek written concurrence from the Services that the action "is not likely to adversely affect" listed species. For the purpose of this key, all "may affect" determinations equate to "likely to adversely affect" and Corps Project Managers should request the Service to initiate formal consultation on the manatee or designated critical habitat. **No effect** – the appropriate conclusion when the action agency determines its proposed action will not affect a listed species or designated critical habitat.

Multi-slip facility – Multi-slip facilities include commercial marinas, private multi-family docks, boat ramps and associated trailer parking spaces, dry storage facilities and any other similar structures or activities that provide access to the water for multiple (five slips or more, except in Brevard, Clay, Citrus, and Volusia counties where it is three slips or more) watercraft. In some instances, the Corps and the Service may elect to review multiple residential dock facilities as a multi-slip facility.

New access for watercraft – New dredging and the addition, expansion or improvement of structures such as, but not limited to, docks or piers, marinas, boat ramps and associated trailer parking spaces, boat lifts, pilings, floats, floating docks, floating vessel platforms, (residential boat lifts, pilings, floats, and floating vessel platforms installed in existing slips are not considered new access), boat slips, dry storage, mooring buoys, etc., that facilitates the addition of watercraft to, and/or increases watercraft usage in, waters accessible to manatees.

Observers – During dredging and other in-water operations within manatee accessible waters, the standard manatee construction conditions require all on-site project personnel to watch for manatees to ensure that those standard manatee construction conditions are met. Within important manatee areas (IMA) and under special circumstances, heightened observation is needed. **Dedicated Observers** are those having some prior experience in manatee observation, are dedicated only for this task, and must be someone other than the dredge and equipment operators/mechanics. **Approved Observers** are dedicated observers who also must be approved by the Service (if Federal permits are involved) and the FWC (if state permits are involved), prior to work commencement. Approved observers typically have significant and often project-specific observational experience. Documentation on prior experience must be submitted to these agencies for approval and must be submitted a minimum of 30 days prior to work commencement. When dedicated or approved observers are required, observers must be on site during all in-water activities, and be equipped with polarized sunglasses to aid in manatee observation. For prolonged in-water operations, multiple observers may be needed to perform observation in shifts to reduce fatigue (recommended shift length is no longer than six hours). Additional information concerning observer approval can be found at FWC's web page.

Residential boat lift – A boat lift installed on a residential dock facility.

Residential dock density ratio threshold – The residential dock density ratio threshold is used in the evaluation of multi-slip projects in some counties without a State-approved Manatee Protection Plan and is consistent with 1 boat slip per 100 linear feet of shoreline (1:100) owned by the applicant.

Residential dock facility – A residential dock facility means a private residential dock which is used for private, recreational or leisure purposes for single-family or multi-family residences designed to moor no more than four vessels (except in Brevard, Clay, Citrus, and Volusia counties which allow only two vessels). This also includes normal appurtenances such as residential boat lifts, boat shelters with open sides, stairways, walkways, mooring pilings, dolphins, etc. In some instances, the Corps and the Service may elect to review multiple residential dock facilities as a multi-slip facility.

Submerged aquatic vegetation (SAV) – Rooted, submerged, aquatic plants such as, but not limited to, shoal grass (*Halodule wrightii*), paddle grass (*Halophila decipiens*), star grass (*Halophila engelmanni*), Johnson's seagrass (*Halophila johnsonii*), sago pondweed (*Potamogeton pectinatus*), clasping-leaved pondweed (*Potamogeton perfoliatus*), widgeon grass (*Ruppia maritima*), manatee grass (*Syringodium filiforme*), turtle grass (*Thalassia testudinum*), tapegrass (*Vallisneria americana*), and horned pondweed (*Zannichellia palustris*).

Warm Water Aggregation Areas (WWAAs) and **No Entry Areas** – Areas within certain counties where increased densities of manatees occur due to the proximity of artificial or natural warm water discharges or springs and are considered necessary for survival. Some of these areas may be federally-designated manatee sanctuaries or state-designated seasonal "no entry" manatee protection zones. Projects proposed within these areas may require consultation in order to offset expected adverse impacts. In addition, special permits may be required from the FWC in order to access these areas.

Watercraft access structures – Docks or piers, marinas, boat ramps and associated trailer parking spaces, boat slips, boat lifts, floats, floating docks, pilings, boat davits, dry storage, etc.

Waters accessible to manatees – Although most waters of the State of Florida are accessible to the manatee, there are some areas such as landlocked lakes that are not. There are also some weirs, salinity control structures and locks that may preclude manatees from accessing water bodies. If there is any question about accessibility, contact the Service or the FWC.

Attachment G

USACE Effect Determination Key for the Wood Stork

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

May 18, 2010

Donnie Kinard
Chief, Regulatory Division
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service Federal Activity Code: 41420-2007-FA-1494
Service Consultation Code: 41420-2007-I-0964
Subject: South Florida Programmatic Concurrence
Species: Wood Stork

Dear Mr. Kinard:

This letter addresses minor errors identified in our January 25, 2010, wood stork key and as such, supplants the previous key. The key criteria and wood stork biomass foraging assessment methodology have not been affected by these minor revisions.

The Fish and Wildlife Service's (Service) South Florida Ecological Services Office (SFESO) and the U.S. Army Corps of Engineers Jacksonville District (Corps) have been working together to streamline the consultation process for federally listed species associated with the Corps' wetland permitting program. The Service provided letters to the Corps dated March 23, 2007, and October 18, 2007, in response to a request for a multi-county programmatic concurrence with a criteria-based determination of "may affect, not likely to adversely affect" (NLAA) for the threatened eastern indigo snake (*Drymarchon corais couperi*) and the endangered wood stork (*Mycteria americana*) for projects involving freshwater wetland impacts within specified Florida counties. In our letters, we provided effect determination keys for these two federally listed species, with specific criteria for the Service to concur with a determination of NLAA.

The Service has revisited these keys recently and believes new information provides cause to revise these keys. Specifically, the new information relates to foraging efficiencies and prey base assessments for the wood stork and permitting requirements for the eastern indigo snake. This letter addresses the wood stork key and is submitted in accordance with section 7 of the Endangered Species Act of 1973, as amended (Act) (87 Stat. 884; 16 U.S.C. 1531 *et seq.*). The eastern indigo snake key will be provided in a separate letter.

Wood stork

Habitat

The wood stork is primarily associated with freshwater and estuarine habitats that are used for nesting, roosting, and foraging. Wood storks typically construct their nests in medium to tall

trees that occur in stands located either in swamps or on islands surrounded by relatively broad expanses of open water (Ogden 1991, 1996; Rodgers et al. 1996). Successful colonies are those that have limited human disturbance and low exposure to land-based predators. Nesting colonies protected from land-based predators are characterized as those surrounded by large expanses of open water or where the nest trees are inundated at the onset of nesting and remain inundated throughout most of the breeding cycle. These colonies have water depths between 0.9 and 1.5 meters (3 and 5 feet) during the breeding season.

Successful nesting generally involves combinations of average or above-average rainfall during the summer rainy season and an absence of unusually rainy or cold weather during the winter-spring breeding season (Kahl 1964; Rodgers et al. 1987). This pattern produces widespread and prolonged flooding of summer marshes, which maximize production of freshwater fishes, followed by steady drying that concentrate fish during the season when storks nest (Kahl 1964). Successful nesting colonies are those that have a large number of foraging sites. To maintain a wide range of foraging sites, a variety of wetland types should be present, with both short and long hydroperiods. The Service (1999) describes a short hydroperiod as a 1 to 5-month wet/dry cycle, and a long hydroperiod as greater than 5 months. During the wet season, wood storks generally feed in the shallow water of the short-hydroperiod wetlands and in coastal habitats during low tide. During the dry season, foraging shifts to longer hydroperiod interior wetlands as they progressively dry-down (though usually retaining some surface water throughout the dry season).

Wood storks occur in a wide variety of wetland habitats. Typical foraging sites for the wood stork include freshwater marshes and stock ponds, shallow, seasonally flooded roadside and agricultural ditches, narrow tidal creeks and shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs. Because of their specialized feeding behavior, wood storks forage most effectively in shallow-water areas with highly concentrated prey. Through tactolocation, or grope feeding, wood storks in south Florida feed almost exclusively on fish between 2 and 25 centimeters [cm] (1 and 10 inches) in length (Ogden et al. 1976). Good foraging conditions are characterized by water that is relatively calm, uncluttered by dense thickets of aquatic vegetation, and having a water depth between 5 and 38 cm (5 and 15 inches) deep, although wood storks may forage in other wetlands. Ideally, preferred foraging wetlands would include a mosaic of emergent and shallow open-water areas. The emergent component provides nursery habitat for small fish, frogs, and other aquatic prey and the shallow, open-water areas provide sites for concentration of the prey during seasonal dry-down of the wetland.

Conservation Measures

The Service routinely concurs with the Corps' "may affect, not likely to adversely affect" determination for individual project effects to the wood stork when project effects are insignificant due to scope or location, or if assurances are given that wetland impacts have been avoided, minimized, and adequately compensated such that there is no net loss in foraging potential. We utilize our *Habitat Management Guidelines for the Wood Stork in the Southeast Region* (Service 1990) (Enclosure 1) (HMG) in project evaluation. The HMG is currently under review and once final will replace the enclosed HMG. There is no designated critical habitat for the wood stork.

The SFESO recognizes a 29.9 kilometer [km] (18.6-mile) core foraging area (CFA) around all known wood stork colonies in south Florida. Enclosure 2 (to be updated as necessary) provides locations of colonies and their CFAs in south Florida that have been documented as active within the last 10 years. The Service believes loss of suitable wetlands within these CFAs may reduce foraging opportunities for the wood stork. To minimize adverse effects to the wood stork, we recommend compensation be provided for impacts to foraging habitat. The compensation should consider wetland type, location, function, and value (hydrology, vegetation, prey utilization) to ensure that wetland functions lost due to the project are adequately offset. Wetlands offered as compensation should be of the same hydroperiod and located within the CFAs of the affected wood stork colonies. The Service may accept, under special circumstances, wetland compensation located outside the CFAs of the affected wood stork nesting colonies. On occasion, wetland credits purchased from a "Service Approved" mitigation bank located outside the CFAs could be acceptable to the Service, depending on location of impacted wetlands relative to the permitted service area of the bank, and whether or not the bank has wetlands having the same hydroperiod as the impacted wetland.

In an effort to reduce correspondence in effect determinations and responses, the Service is providing the Wood Stork Effect Determination Key below. If the use of this key results in a Corps determination of "no effect" for a particular project, the Service supports this determination. If the use of this Key results in a determination of NLAA, the Service concurs with this determination[1]. This Key is subject to revisitation as the Corps and Service deem necessary.

The Key is as follows:

A. Project within 0.76 km (0.47 mile)[2] of an active colony site[3] ..... "*may affect*[4]"

Project impacts Suitable Foraging Habitat (SFH)[5] at a location greater than 0.76 km (0.47 mile) from a colony site..... ....."*go to* B"

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[1] With an outcome of "no effect" or "NLAA" as outlined in this key, and the project has less than 20.2 hectares (50 acres) of wetland impacts, the requirements of section 7 of the Act are fulfilled for the wood stork and no further action is required. For projects with greater than 20.2 hectares (50 acres) of wetland impacts, written concurrence of NLAA from the Service is necessary.

[2] Within the secondary zone (the average distance from the border of a colony to the limits of the secondary zone is 0.76 km (2,500 feet, or 0.47 mi).

[3] An active colony is defined as a colony that is currently being used for nesting by wood storks or has historically over the last 10 years been used for nesting by wood storks.

[4] Consultation may be concluded informally or formally depending on project impacts.

[5] Suitable foraging habitat (SFH) includes wetlands that typically have shallow-open water areas that are relatively calm and have a permanent or seasonal water depth between 5 to 38 cm (2 to 15 inches) deep. Other shallow non-wetland water bodies are also SFH. SFH supports and concentrates, or is capable of supporting and concentrating small fish, frogs, and other aquatic prey. Examples of SFH include, but are not limited to freshwater marshes, small ponds, shallow, seasonally flooded roadside or agricultural ditches, seasonally flooded pastures, narrow tidal creeks or shallow tidal pools, managed impoundments, and depressions in cypress heads and swamp sloughs.

Project does not affect SFH……..…..*"no effect[1]"*.

B. Project impact to SFH is less than 0.20 hectare (one-half acre)[6]……..……*NLAA[1]"*

Project impact to SFH is greater in scope than 0.20 hectare (one-half acre)....……*go to* C

C. Project impacts to SFH not within the CFA (29.9 km, 18.6 miles) of a colony site ……..…….…….…..……*go to* D

Project impacts to SFH within the CFA of a colony site …….…..…...…….*go to* E

D. Project impacts to SFH have been avoided and minimized to the extent practicable; compensation (Service approved mitigation bank or as provided in accordance with Mitigation Rule 33 CFR Part 332) for unavoidable impacts is proposed in accordance with the CWA section 404(b)(1) guidelines; and habitat compensation replaces the foraging value matching the hydroperiod[7] of the wetlands affected and provides foraging value similar to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance[8]…….. *NLAA[1]"*

Project not as above.……... *"may affect[4]"*

E. Project provides SFH compensation in accordance with the CWA section 404(b)(1) guidelines and is not contrary to the HMG; habitat compensation is within the appropriate CFA or within the service area of a Service-approved mitigation bank; and habitat compensation replaces foraging value, consisting of wetland enhancement or restoration matching the hydroperiod[7] of the wetlands affected, and provides foraging value similar

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[6] On an individual basis, SFH impacts to wetlands less than 0.20 hectare (one-half acre) generally will not have a measurable effect on wood storks, although we request that the Corps require mitigation for these losses when appropriate. Wood storks are a wide ranging species, and individually, habitat change from impacts to SFH less than one-half acre are not likely to adversely affect wood storks. However, collectively they may have an effect and therefore regular monitoring and reporting of these effects are important.

[7] Several researchers (Flemming et al. 1994; Ceilley and Bortone 2000) believe that the short hydroperiod wetlands provide a more important pre-nesting foraging food source and a greater early nestling survivor value for wood storks than the foraging base (grams of fish per square meter) than long hydroperiod wetlands provide. Although the short hydroperiod wetlands may provide less fish, these prey bases historically were more extensive and met the foraging needs of the pre-nesting storks and the early-age nestlings. Nest productivity may suffer as a result of the loss of short hydroperiod wetlands. We believe that most wetland fill and excavation impacts permitted in south Florida are in short hydroperiod wetlands. Therefore, we believe that it is especially important that impacts to these short hydroperiod wetlands within CFAs are avoided, minimized, and compensated for by enhancement/restoration of short hydroperiod wetlands.

[8] For this Key, the Service requires an analysis of foraging prey base losses and enhancements from the proposed action as shown in the examples in Enclosure 3 for projects with greater than 2.02 hectares (5 acres) of wetland impacts. For projects with less than 2.02 hectares (5 acres) of wetland impacts, an individual foraging prey base analysis is not necessary although type for type wetland compensation is still a requirement of the Key.

to, or higher than, that of impacted wetlands. See Enclosure 3 for a detailed discussion of the hydroperiod foraging values, an example, and further guidance[8]..... *"NLAA[1]"*

Project does not satisfy these elements ..... *"may affect[4]"*

This Key does not apply to Comprehensive Everglades Restoration Plan projects, as they will require project-specific consultations with the Service.

Monitoring and Reporting Effects

For the Service to monitor cumulative effects, it is important for the Corps to monitor the number of permits and provide information to the Service regarding the number of permits issued where the effect determination was: "may affect, not likely to adversely affect." We request that the Corps send us an annual summary consisting of: project dates, Corps identification numbers, project acreages, project wetland acreages, and project locations in latitude and longitude in decimal degrees.

Thank you for your cooperation and effort in protecting federally listed species. If you have any questions, please contact Allen Webb at extension 246.

Sincerely yours,

Paul Souza
Field Supervisor
South Florida Ecological Services Office

Enclosures

cc: w/enclosures (electronic only)
Corps, Jacksonville, Florida (Stu Santos)
EPA, West Palm Beach, Florida (Richard Harvey)
FWC, Vero Beach, Florida (Joe Walsh)
Service, Jacksonville, Florida (Billy Brooks)

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

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HABITAT MANAGEMENT GUIDELINES FOR THE WOOD STORK IN THE SOUTHEAST REGION

Introduction

A number of Federal and state laws and/or regulations prohibit, cumulatively, such acts as harrassing, disturbing, harming, molesting, pursuing, etc., wood storks, or destroying their nests (see Section VII). Although advisory in nature, these guidelines represent a biological interpretation of what would constitute violations of one or more of such prohibited acts. Their purpose is to mainain and/or improve the environmental conditions that are required for the survival and well-being of wood storks in the southeastern United States, and are designed essentially for application in wood stork/human activity conflicts (principally land development and human intrusion into stork use sites). The emphasis is to avoid or minimize detrimental human-related impacts on wood storks. These guidelines were prepared in consultations with state wildlife agencies and wood stork experts in the four southeastern states where the wood stork is listed as Endangered (Alabama, Florida, Georgia, South Carolina).

General

The wood stork is a gregarious species, which nests in colonies (rookeries), and roosts and feeds in flocks, often in association with other species of long-legged water birds. Storks that nest in the southeastern United States appear to represent a distinct population, separate from the nearest breeding population in Mexico. Storks in the southeastern U.S. population have recently (since 1980) nested in colonies scattered throughout Florida, and at several central-southern Georgia and coastal South Carolina sites. Banded and color-marked storks from central and southern Florida colonies have dispersed during non-breeding seasons as far north as southern Georgia, and the coastal counties in South Carolina and southeastern North Carolina, and as far west as central Alabama and northeastern Mississippi. Storks from a colony in south-central Georgia have wintered between southern Georgia and southern Florida. This U.S. nesting population of wood storks was listed as endangered by the U.S. Fish and Wildlife Service on February 28, 1984 (*Federal Register* 49(4):7332-7335).

Wood storks use freshwater and estuarine wetlands as feeding, nesting, and roosting sites. Although storks are not habitat specialists, their needs are exacting enough, and available habitat is limited enough, so that nesting success and the size of regional populations are closely regulated by year-to-year differences in the quality and quantity of suitable habitat. Storks are especially sensitive to environmental conditions at feeding sites; thus, birds may fly relatively long distances either daily or between regions annually, seeking adequate food resources.

All available evidence suggests that regional declines in wood stork numbers have been largely due to the loss or degradation of essential wetland habitat. An understanding of the qualities of good stork habitat should help to focus protection efforts on those sites

that are seasonally important to regional populations of wood storks. Characteristics of feeding, nesting, and roosting habitat, and management guidelines for each, are presented here by habitat type.

I. Feeding habitat.

A major reason for the wood stork decline has been the loss and degredation of feeding habitat. Storks are especially sensitive to any manipulation of a wetland site that results in either reduced amounts or changes in the timing of food availability.

Storks feed primarily (often almost exclusively) on small fish between 1 and 8 inches in length. Successful foraging sites are those where the water is between 2 and 15 inches deep. Good feeding conditions usually occur where water is relatively calm and uncluttered by dense thickets of aquatic vegetation. Often a dropping water level is necessary to concentrate fish at suitable densities. Conversely, a rise in water, especially when it occurs abruptly, disperses fish and reduces the value of a site as feeding habitat.

The types of wetland sites that provide good feeding conditions for storks include: drying marshes or stock ponds, shallow roadside or agricultural ditches, narrow tidal creeks or shallow tidal pools, and depressions in cypress heads or swamp sloughs. In fact, almost any shallow wetland depression where fish tend to become concentrated, either through local reproduction or the consequences of area drying, may be used by storks.

Nesting wood storks do most of their feeding in wetlands between 5 and 40 miles from the colony, and occasionally at distances as great as 75 miles. Within this colony foraging range and for the 110-150 day life of the colony, and depending on the size of the colony and the nature of the surrounding wetlands, anywhere from 50 to 200 different feeding sites may be used during the breeding season.

Non-breeding storks are free to travel much greater distances and remain in a region only for as long as sufficient food is available. Whether used by breeders or non-breeders, any single feeding site may at one time have small or large numbers of storks (1 to 100+), and be used for one to many days, depending on the quality and quantity of available food. Obviously, feeding sites used by relatively large numbers of storks, and/or frequently used areas, potentially are the more important sites necessary for the maintenance of a regional population of birds.

Differences between years in the seasonal distribution and amount of rainfall usually mean that storks will differ between years in where and when they feed. Successful nesting colonies are those that have a large number of feeding site options, including sites that may be suitable only in years of rainfall extremes. To maintain the wide range of feeding site options requires that many different wetlands, with both relatively short and long annual hydroperiods, be preserved. For example, protecting only the larger wetlands, or those with longer annual hydroperiods, will result in the eventual loss of smaller, seemingly less important wetlands. However, these small scale wetlands are crucial as the only available feeding sites during the wetter periods when the larger habitats are too deeply flooded to be used by storks.

II. Nesting habitat.

Wood storks nest in colonies, and will return to the same colony site for many years so long as that site and surrounding feeding habitat continue to supply the needs of the birds. Storks require between 110 and 150 days for the annual nesting cycle, from the period of courtship until the nestlings become independent. Nesting activity may begin as early as December or as late as March in southern Florida colonies, and between late February and April in colonies located between central Florida and South Carolina. Thus, full term colonies may be active until June-July in south Florida, and as late as July-August at more northern sites. Colony sites may also be used for roosting by storks during other times of the year.

Almost all recent nesting colonies in the southeastern U.S. have been located either in woody vegetation over standing water, or on islands surrounded by broad expanses of open water. The most dominant vegetation in swamp colonies has been cypress, although storks also nest in swamp hardwoods and willows. Nests in island colonies may be in more diverse vegetation, including mangroves (coastal), exotic species such as Australian pine (*Casuarina*) and Brazilian Pepper (*Schinus*), or in low thickets of cactus (*Opuntia*). Nests are usually located 15-75 feet above ground, but may be much lower, especially on island sites when vegetation is low.

Since at least the early 1970's, many colonies in the southeastern U.S. have been located in swamps where water has been impounded due to the construction of levees or roadways. Storks have also nested in dead and dying trees in flooded phosphate surface mines, or in low, woody vegetation on mounded, dredge islands. The use of these altered wetlands or completely "artificial" sites suggests that in some regions or years storks are unable to locate natural nesting habitat that is adequately flooded during the normal breeding season. The readiness with which storks will utilize water impoundments for nesting also suggests that colony sites could be intentionally created and maintained through long-term site management plans. Almost all impoundment sites used by storks become suitable for nesting only fortuitously, and therefore, these sites often do not remain available to storks for many years.

In addition to the irreversible impacts of drainage and destruction of nesting habitat, the greatest threats to colony sites are from human disturbance and predation. Nesting storks show some variation in the levels of human activity they will tolerate near a colony. In general, nesting storks are more tolerant of low levels of human activity near a colony when nests are high in trees than when they are low, and when nests contain partially or completely feathered young than during the period between nest construction and the early nestling period (adults still brooding). When adult storks are forced to leave their nests, eggs or downy young may die quickly (<20 minutes) when exposed to direct sun or rain.

Colonies located in flooded environments must remain flooded if they are to be successful. Often water is between 3 and 5 feet deep in successful colonies during the nesting season. Storks rarely form colonies, even in traditional nesting sites, when they are dry, and may abandon nests if sites become dry during the nesting period. Flooding in colonies may be most important as a defense against mammalian predators. Studies of stork colonies in Georgia and

Florida have shown high rates of raccoon predation when sites dried during the nesting period. A reasonably high water level in an active colony is also a deterrent against both human and domestic animal intrusions.

Although nesting wood storks usually do most feeding away from the colony site (>5 miles), considerable stork activity does occur close to the colony during two periods in the nesting cycle. Adult storks collect almost all nesting material in and near the colony, usually within 2500 feet. Newly fledged storks, near the end of the nesting cycle, spend from 1-4 weeks during the fledging process flying locally in the colony area, and perched in nearby trees or marshy spots on the ground. These birds return daily to their nests to be fed. It is essential that these fledging birds have little or no disturbance as far our as one-half mile within at least one or two quadrants from the colony. Both the adults, while collecting nesting material, and the inexperienced fledglings, do much low, flapping flight within this radius of the colony. At these times, storks potentially are much more likely to strike nearby towers or utility lines.

Colony sites are not necessarily used annually. Regional populations of storks shift nesting locations between years, in response to year-to-year differences in food resources. Thus, regional populations require a range of options for nesting sites, in order to successfully respond to food availability. Protection of colony sites should continue, therefore, for sites that are not used in a given year.

III. Roosting habitat.

Although wood storks tend to roost at sites that are similar to those used for nesting, they also use a wider range of site types for roosting than for nesting. Non-breeding storks, for example, may frequently change roosting sites in response to changing feeding locations, and in the process, are inclined to accept a broad range of relatively temporary roosting sites. Included in the list of frequently used roosting locations are cypress "heads" or swamps (not necessarily flooded if trees are tall), mangrove islands, expansive willow thickets or small, isolated willow "islands" in broad marshes, and on the ground either on levees or in open marshes.

Daily activity patterns at a roost vary depending on the status of the storks using the site. Non-breeding adults or immature birds may remain in roosts during major portions of some days. When storks are feeding close to a roost, they may remain on the feeding grounds until almost dark before making the short flight. Nesting storks traveling long distances (>40 miles) to feeding sites may roost at or near the latter, and return to the colony the next morning. Storks leaving roosts, especially when going long distances, tend to wait for mid-morning thermals to develop before departing.

IV. Management zones and guidelines for feeding sites.

To the maximum extent possible, feeding sites should be protected by adherence to the following protection zones and guidelines:

A. There should be no human intrusion into feeding sites when storks are present. Depending upon the amount of screening vegetation, human activity should be no closer than between 300 feet (where solid vegetation screens exist) and 750 feet (no vegetation screen).

B. Feeding sites should not be subjected to water management practices that alter traditional water levels or the seasonally normal drying patterns and rates. Sharp rises in water levels are especially disruptive to feeding storks.

C. The introduction of contaminants, fertilizers, or herbicides into wetlands that contain stork feeding sites should be avoided, especially those compounds that could adversely alter the diversity and numbers of native fishes, or that could substantially change the characteristics of aquatic vegetation. Increase in the density and height of emergent vegetation can degrade or destroy sites as feeding habitat.

D. Construction of tall towers (especially with guy wires) within three miles, or high power lines (especially across long stretches of open country) within one mile of major feeding sites should be avoided.

V. Management zones and guidelines for nesting colonies.

A. Primary zone: This is the most critical area, and must be managed according to recommended guidelines to insure that a colony site survives.

1. Size: The primary zone must extend between 1000 and 1500 feet in all directions from the actual colony boundaries when there are no visual or broad aquatic barriers, and never less than 500 feet even when there are strong visual or aquatic barriers. The exact width of the primary zone in each direction from the colony can vary within this range, depending on the amount of visual screen (tall trees) surrounding the colony, the amount of relatively deep, open water between the colony and the nearest human activity, and the nature of the nearest human activity. In general, storks forming new colonies are more tolerant of existing human activity, than they will be of new human activity that begins after the colony has formed.

2. Recommended Restrictions:

a. Any of the following activities within the primary zone, at any time of the year, are likely to be detrimental to the colony:

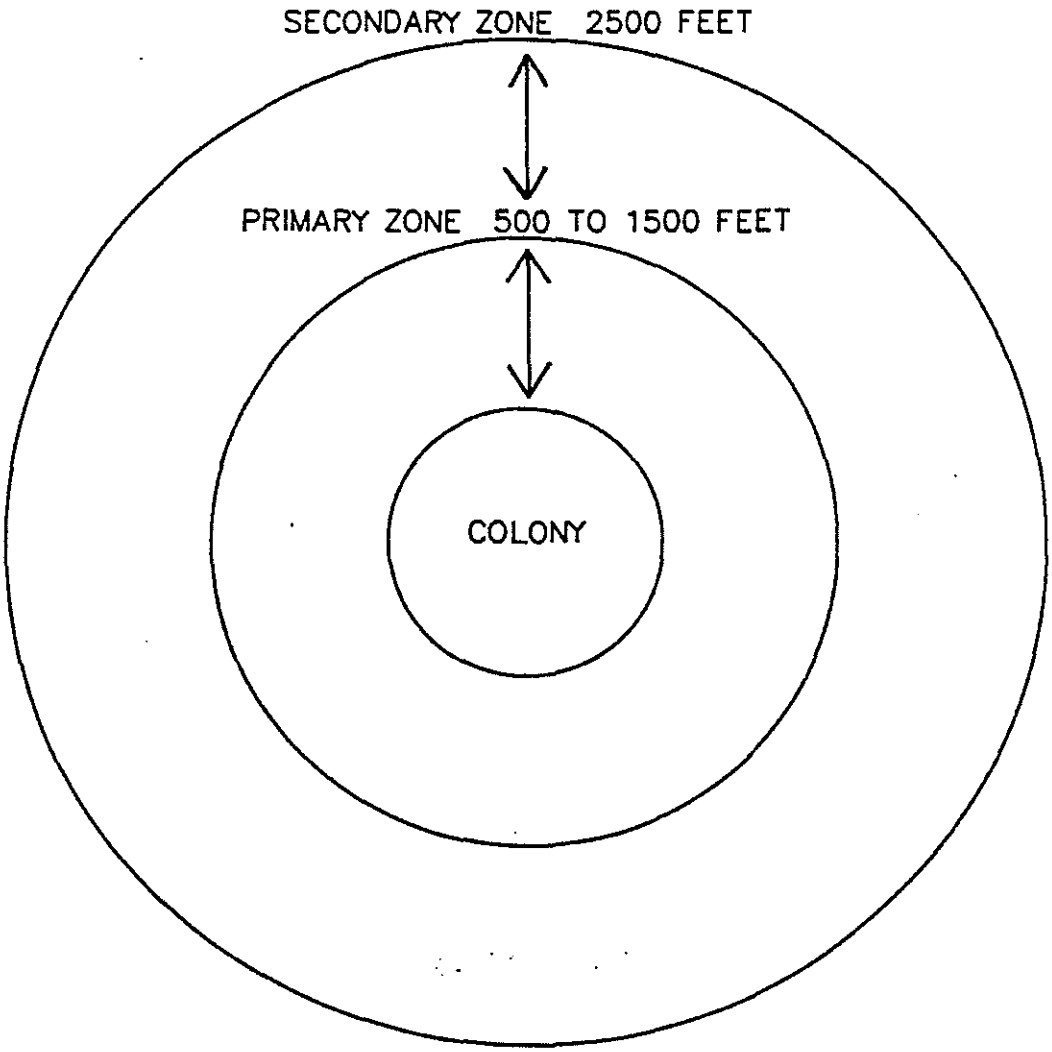
(1) Any lumbering or other removal of vegetation, and

(2) Any activity that reduces the area, depth, or length of flooding in wetlands under and surrounding the colony, except where periodic (less than annual) water control may be required to maintain the health of the aquatic, woody vegetation, and

(3) The construction of any building, roadway, tower, power line, canal, etc.

b. The following activities within the primary zone are likely to be detrimental to a colony if they occur when the colony is active:

(1) Any unauthorized human entry closer than 300 feet of the colony, and


SECONDARY ZONE 2500 FEET
PRIMARY ZONE 500 TO 1500 FEET
COLONY

(2) Any increase or irregular pattern in human activity anywhere in the primary zone, and

(3) Any increase or irregular pattern in activity by animals, including livestock or pets, in the colony, and

(4) Any aircraft operation closer than 500 feet of the colony.

B. Secondary Zone: Restrictions in this zone are needed to minimize disturbances that might impact the primary zone, and to protect essential areas outside of the primary zone. The secondary zone may be used by storks for collecting nesting material, for roosting, loafing, and feeding (especially important to newly fledged young), and may be important as a screen between the colony and areas of relatively intense human activities.

1. Size: The secondary zone should range outward from the primary zone 1000-2000 feet, or to a radius of 2500 feet of the outer edge of the colony.

2. Recommended Restrictions:

a. Activities in the secondary zone which may be detrimental to nesting wood storks include:

(1) Any increase in human activities above the level that existed in the year when the colony first formed, especially when visual screens are lacking, and

(2) Any alteration in the area's hydrology that might cause changes in the primary zone, and

(3) Any substantial (>20 percent) decrease in the area of wetlands and woods of potential value to storks for roosting and feeding.

b. In addition, the probability that low flying storks, or inexperienced, newly-fledged young will strike tall obstructions, requires that high-tension power lines be no closer than one mile (especially across open country or in wetlands) and tall trans-mission towers no closer than 3 miles from active colonies. Other activities, including busy highways and commercial and residential buildings may be present in limited portions of the secondary zone at the time that a new colony first forms. Although storks may tolerate existing levels of human activities, it is important that these human activities not expand substantially.

VI. Roosting site guidelines.

The general characteristics and temporary use-patterns of many stork roosting sites limit the number of specific management recommendations that are possible:

A. Avoid human activities within 500-1000 feet of roost sites during seasons of the year and times of the day when storks may be present. Nocturnal activities in active roosts may be especially disruptive.

B. Protect the vegetative and hydrological characteristics of the more important roosting sites--those used annually and/or used by flocks of 25 or more storks. Potentially, roosting sites may, some day, become nesting sites.

VII. Legal Considerations.

A. Federal Statutes

The U.S. breeding population of the wood stork is protected by the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)(Act). The population was listed as endangered on February 28, 1984 (49 Federal *Register* 7332); wood storks breeding in Alabama, Florida, Georgia, and South Carolina are protected by the Act.

Section 9 of the Endangered Species Act of 1973, as amended, states that it is unlawful for any person subject to the jurisdiction of the United States to take (defined as "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct.") any listed species anywhere within the United States.

The wood stork is also federally protected by its listing (50 CFR 10.13) under the Migratory Bird Treaty Act (167 U.S.C. 703-711), which prohibits the taking, killing or possession of migratory birds except as permitted.

B. State Statutes

1. State of Alabama

Section 9-11-232 of Alabama's Fish, Game, and Wildlife regulations curtails the possession, sale, and purchase of wild birds. "Any person, firm, association, or corporation who takes, catches, kills or has in possession at any time, living or dead, any protected wild bird not a game bird or who sells or offers for sale, buys, purchases or offers to buy or purchase any such bird or exchange same for anything of value or who shall sell or expose for sale or buy any part of the plumage, skin, or body of any bird protected by the laws of this state or who shall take or willfully destroy the nests of any wild bird or who shall have such nests or eggs of such birds in his possession, except as otherwise provided by law, shall be guilty of a misdemeanor...

Section 1 of the Alabama Nongame Species Regulation (Regulation 87-GF-7) includes the wood stork in the list of nongame species covered by paragraph (4). " It shall be unlawful to take, capture, kill, possess, sell, trade for anything of monetary value, or offer to sell or trade for anything of monetary value, the following nongame wildlife species (or any parts or reproductive products of such species) without a scientific collection permit and written permission from the Commissioner, Department of Conservation and Natural Resources,..."

2. State of Florida

Rule 39-4.001 of the Florida Wildlife Code prohibits "taking, attempting to take, pursuing, hunting, molesting, capturing, or killing (collectively defined as "taking"), transporting, storing, serving, buying, selling,

possessing, or wantonly or willingly wasting any wildlife or freshwater fish or their nests, eggs, young, homes, or dens except as specifically provided for in other rules of Chapter 39, Florida Administrative Code.

Rule 39-27.011 of the Florida Wildlife Code prohibits "killing, attempting to kill, or wounding any endangered species." The "Official Lists of Endangered and Potentially Endangered Fauna and Flora in Florida" dated 1 July 1988, includes the wood stork, listed as "endangered" by the Florida Game and Fresh Water Fish Commission.

3. State of Georgia

Section 27-1-28 of the Conservation and Natural Resources Code states that "Except as otherwise provided by law, rule, or regulation, it shall be unlawful to hunt, trap, fish, take, possess, or transport any nongame species of wildlife..."

Section 27-1-30 states that, "Except as otherwise provided by law or regulation, it shall be unlawful to disturb, mutilate, or destroy the dens, holes, or homes of any wildlife; "

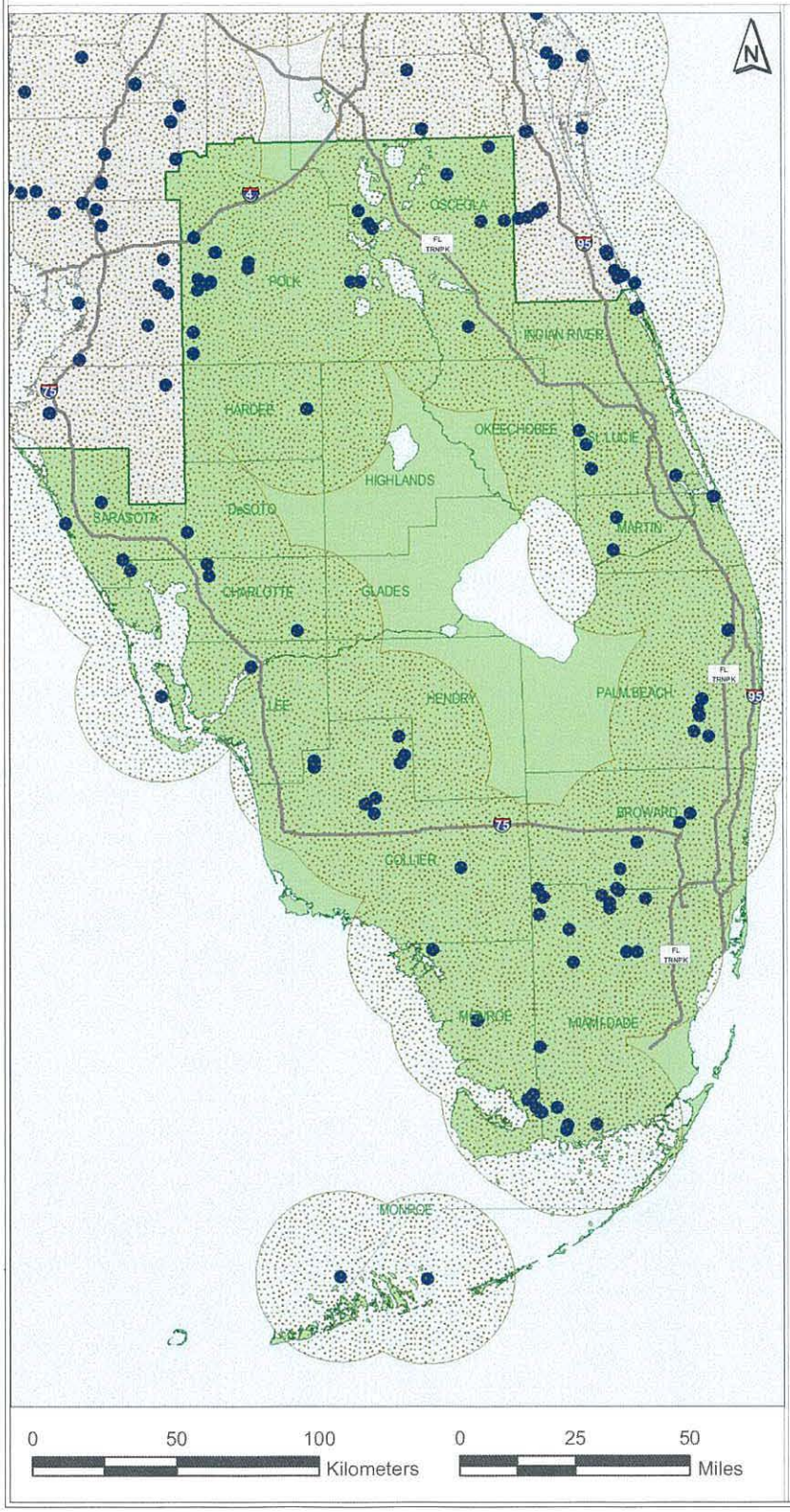
Section 27-3-22 states, in part, "It shall be unlawful for any person to hunt, trap, take, possess, sell, purchase, ship, or transport any hawk, eagle, owl, or any other bird or any part, nest, or egg thereof...".

The wood stork is listed as endangered pursuant to the Endangered Wildlife Act of 1973 (Section 27-3-130 of the Code). Section 391-4-13-.06 of the Rules and Regulations of the Georgia Department of Natural Resources prohibits harassment, capture, sale, killing, or other actions which directly cause the death of animal species protected under the Endangered Wildlife Act. The destruction of habitat of protected species on public lands is also prohibited.

4. State of South Carolina

Section 50-15-40 of the South Carolina Nongame and Endangered Species Conservation Act states, "Except as otherwise provided in this chapter, it shall be unlawful for any person to take, possess, transport, export, process, sell, or offer of sale or ship, and for any common or contract carrier knowingly to transport or receive for shipment any species or subspecies of wildlife appearing on any of the following lists: (1) the list of wildlife indigenous to the State, determined to be endangered within the State...(2) the United States' List of Endangered Native Fish and Wildlife... (3) the United States' List of Endangered Foreign Fish and Wildlife ..."

Wood Stock



Nesting Colonies
Core Foraging Areas

1999 to 2005

- Colony Location
- Core Foraging Area
- South Florida Service Area

U.S. FISH & WILDLIFE SERVICE

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South Florida Ecological Services Office
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Enclosure 3

Wood Stork Foraging Analysis: Excerpts of concepts and procedure as presented by the Service in this appendix may be viewed in detail in any one of our recent Biological Opinions for project related impacts to the wood stork. These documents can be found at the internet website address http://www.fws.gov/filedownloads/ftp%5verobeach.

Foraging Habitat

Researchers have shown that wood storks forage most efficiently and effectively in habitats where prey densities are high and the water shallow and canopy open enough to hunt successfully (Ogden et al. 1978, Browder 1984, Coulter 1987). Prey availability to wood storks is dependent on a composite variable consisting of density (number or biomass/m^2) and the vulnerability of the prey items to capture (Gawlik 2002). For wood storks, prey vulnerability appears to be largely controlled by physical access to the foraging site, water depth, the density of submerged vegetation, and the species-specific characteristics of the prey. For example, fish populations may be very dense, but not available (vulnerable) because the water depth is too deep (greater than 30 cm) for storks or the tree canopy at the site is too dense for storks to land. Calm water, about 5-40 cm (2-16 in) in depth, and free of dense aquatic vegetation is ideal (Coulter and Bryan 1993).

Coulter and Bryan's (1993) study suggested that wood storks preferred ponds and marshes, and visited areas with little or no canopy more frequently. Even in foraging sites in swamps, the canopy tended to be sparse. They suggested that open canopies may have contributed to detection of the sites and more importantly may have allowed the storks to negotiate landing more easily than at closed-canopy sites. In their study, the median amount of canopy cover where wood stork foraging was observed was 32 percent. Other researchers (P.C. Frederick, University of Florida, personal communication 2006; J.A. Rodgers, FWC, personal communication 2006) also confirm that wood storks will forage in woodlands, though the woodlands have to be fairly open and vegetation not very dense. Furthermore, the canopies must be open enough for wood storks to take flight quickly to avoid predators.

Melaleuca-infested Wetlands: As discussed previously, wetland suitability for wood stork foraging is partially dependent on vegetation density. Melaleuca is a dense-stand growth plant species, effectively producing a closed canopy and dense understory growth pattern that generally limits a site's accessibility to foraging by wading birds. However, O'Hare and Dalrymple (1997) suggest moderate infestations of melaleuca may have little effect on some species' productivity (*i.e.*, amphibians and reptiles) as long as critical abiotic factors such as hydrology remain. They also note as the levels of infestation increase, usage by wetland dependent species decreases. Their studies also showed that the number of fish species present in a wetland system remain stable at certain levels of melaleuca. However, the availability of the prey base for wood storks and other foraging wading birds is reduced by the restriction of access caused from dense and thick exotic vegetation. Wood storks and other wading birds can forage in these systems in open area pockets (*e.g.*, wind blow-downs), provided multiple conditions are optimal (*e.g.*, water depth, prey density). In O'Hare and Dalrmyple's study (1997), they identify five cover types (Table 1) and

provide information on the number of wetland dependent bird species and the number of individuals observed within each of these vegetation classes (Table 2).

Table 1: Vegetation classes

DMM	75-100 percent mature dense melaleuca coverage
DMS or (SDM)	75-100 percent sapling dense melaleuca coverage
P75	50-75 percent melaleuca coverage
P50	0-50 percent melaleuca coverage
MAR (Marsh)	0-10 percent melaleuca coverage

The number of wetland-dependent species and individuals observed per cover type is shown below in columns 1, 2, and 3 (Table 2). To develop an estimate of the importance a particular wetland type may have (based on density and aerial coverage by exotic species) to wetland dependent species, we developed a foraging suitability value using observational data from O'Hare and Dalrymple (1997). The Foraging Suitability Value as shown in column 5 (Table 2) is calculated by multiplying the number of species by the number of individuals and dividing this value by the maximum number of species and individuals combined (12*132=1584). The results are shown below for each of the cover types in O'Hare and Dalrymple (1997) study (Table 1). As an example, for the P50 cover type, the foraging suitability is calculated by multiplying 11 species times 92 individuals for a total of 1,012. Divide this value by 1,584, which is the maximum number of species times the maximum number of individuals (12*132 = 1,584). The resultant is 0.6389 or 64 percent 11*92=1012/1584*100=63.89).

Table 2: Habitat Foraging Suitability

Cover Type	# of Species (S)	# of Individuals (I)	S*I	Foraging Suitability
DMM	1	2	2	0.001
DMS	4	10	40	0.025
P75	10	59	590	0.372
P50	11	92	1,012	0.639
MAR	12	132	1,584	1.000

This approach was developed to provide us with a method of assessing wetland acreages and their relationship to prey densities and prey availability. We consider wetland dependent bird use to be a general index of food availability. Based on this assessment we developed an exotic foraging suitability index (Table 3):

Table 3. Foraging Suitability Percentages

Exotic Percentage	Foraging Suitability (percent)
Between 0 and 25 percent exotics	100
Between 25 and 50 percent exotics	64
Between 50 and 75 percent exotics	37
Between 75 and 90 percent exotics	3
Between 90 and 100 percent exotics	0

In our assessment however, we consider DMM to represent all exotic species densities between 90 and 100 percent and DMS to represent all exotic species densities between 75 and 90 percent. In our evaluation of a habitat's suitability, the field distinction between an exotic coverage of

90 percent and 100 percent in many situations is not definable, therefore unless otherwise noted in the field reports and in our analysis; we consider a suitability value of 3 percent to represent both densities.

Hydroperiod: The hydroperiod of a wetland can affect the prey densities in a wetland. For instance, research on Everglades fish populations using a variety of quantitative sampling techniques (pull traps, throw traps, block nets) have shown that the density of small forage fish increases with hydroperiod. Marshes inundated for less than120 days of the year average ± 4 fish/m^2; whereas, those flooded for more than 340 days of the year average ± 25 fish/m^2 (Loftus and Eklund 1994, Trexler et al. 2002).

The Service (1999) described a short hydroperiod wetland as wetlands with between 0 and 180-day inundation, and long hydroperiod wetlands as those with greater than 180-day inundation. However, Trexler et al. (2002) defined short hydroperiod wetlands as systems with less than 300 days per year inundation. In our discussion of hydroperiods, we are considering short hydroperiod wetlands to be those that have an inundation of 180 days or fewer.

The most current information on hydroperiods in south Florida was developed by the SFWMD for evaluation of various restoration projects throughout the Everglades Protection Area. In their modeling efforts, they identified the following seven hydroperiods:

Table 4. SFWMD Hydroperiod Classes – Everglades Protection Area

Hydroperiod Class	Days Inundated
Class 1	0-60
Class 2	60-120
Class 3	120-180
Class 4	180-240
Class 5	240-300
Class 6	300-330
Class 7	330-365

Fish Density per Hydroperiod: In the Service's assessment of project related impacts to wood storks, the importance of fish data specific to individual hydroperiods is the principle basis of our assessment. In order to determine the fish density per individual hydroperiod, the Service relied on the number of fish per hydroperiod developed from throw-trap data in Trexler et al.'s (2002) study and did not use the electrofishing data also presented in Trexler et al.'s study that defined fish densities in catch per unit effort, which is not hydroperiod specific. Although the throw-trap sampling generally only samples fish 8 cm or less, the Service believes the data can be used as a surrogate representation of all fish, including those larger than 8 cm, which are typically sampled by either electrofishing or block net sampling.

We base this evaluation on the following assessment. Trexler et al.'s (2002) study included electrofishing data targeting fish greater than 8 cm, the data is recorded in catch per unit effort and in general is not hydroperiod specific. However, Trexler et al. (2002) notes in their assessment of the electrofishing data that in general there is a correlation with the number of fish per unit effort per changes in water depth. In literature reviews of electrofishing data by Chick et

al. (1999 and 2004), they note that electrofishing data provides a useful index of the abundance of larger fish in shallow, vegetated habitat, but length, frequency, and species compositional data should be interpreted with caution. Chick et al. (2004) also noted that electrofishing data for large fish (> 8cm) provided a positive correlation of the number of fish per unit effort (abundance) per changes in hydropeiod. The data in general show that as the hydroperiod decreases, the abundance of larger fishes also decreases.

Studies by Turner et al. (1999), Turner and Trexler (1997), and Carlson and Duever (1979) also noted this abundance trend for fish species sampled. We also noted in our assessment of prey consumption by wood storks in the Ogden et al. (1976) study (Figure 4) (discussed below), that the wood stork's general preference is for fish measuring 1.5 cm to 9 cm, although we also acknowledged that wood storks consume fish larger than the limits discussed in the Ogden et al. (1976) study. A similar assessment is reference by Trexler and Goss (2009) noting a diversity of size ranges of prey available for wading birds to consume, with fish ranging from 6 to 8 cm being the preferred prey for larger species of wading birds, particularly wood storks (Kushlan et al. 1975).

Therefore, since data were not available to quantify densities (biomass) of fish larger than 8 cm to a specific hydroperiod, and Ogden et al.'s (1976) study notes that the wood stork's general preference is for fish measuring 1.5 cm to 9 cm, and that empirical data on fish densities per unit effort correlated positively with changes in water depth, we believe that the Trexler et al. (2002) throw-trap data represents a surrogate assessment tool to predict the changes in total fish density and the corresponding biomass per hydroperiod for our wood stork assessment.

In consideration of this assessment, the Service used the data presented in Trexler et al.'s (2002) study on the number of fish per square-meter per hydroperiod for fish 8 cm or less to be applicable for estimating the total biomass per square-meter per hydroperiod for all fish. In determining the biomass of fish per square-meter per hydroperiod, the Service relied on the summary data provided by Turner et al. (1999), which provides an estimated fish biomass of 6.5 g/m^2 for a Class 7 hydroperiod for all fish and used the number of fish per square-meter per hydroperiod from Trexler et al.'s data to extrapolate biomass values per individual hydroperiods.

Trexler et al.'s (2002) studies in the Everglades provided densities, calculated as the square-root of the number of fish per square meter, for only six hydroperiods; although these cover the same range of hydroperiods developed by the SFWMD. Based on the throw-trap data and Trexler et al.'s (2002) hydroperiods, the square-root fish densities are:

Table 5. Fish Densities per Hydroperiod from Trexler et al. (2002)

Hydroperiod Class	Days Inundated	Fish Density
Class 1	0-120	2.0
Class 2	120-180	3.0
Class 3	180-240	4.0
Class 4	240-300	4.5
Class 5	300-330	4.8
Class 6	330-365	5.0

Trexler et al.'s (2002) fish densities are provided as the square root of the number of fish per square meter. For our assessment, we squared these numbers to provide fish per square meter, a simpler calculation when other prey density factors are included in our evaluation of adverse effects to listed species from the proposed action. We also extrapolated the densities over seven hydroperiods, which is the same number of hydroperiods characterized by the SFWMD. For example, Trexler et al.'s (2002) square-root density of a Class 2 wetland with three fish would equate to a SFWMD Model Class 3 wetland with nine fish. Based on the above discussion, the following mean annual fish densities were extrapolated to the seven SFWMD Model hydroperiods:

Table 6. Extrapolated Fish Densities for SFWMD Hydroperiods

Hydroperiod Class	Days Inundated	Extrapolated Fish Density
Class 1	0-60	2 fish/m^2
Class 2	60-120	4 fish/m^2
Class 3	120-180	9 fish/m^2
Class 4	180-240	16 fish/m^2
Class 5	240-300	20 fish/m^2
Class 6	300-330	23 fish/m^2
Class 7	330-365	25 fish/m^2

Fish Biomass per Hydroperiod: A more important parameter than fish per square-meter in defining fish densities is the biomass these fish provide. In the ENP and WCA-3, based on studies by Turner et al. (1999), Turner and Trexler (1997), and Carlson and Duever (1979), the standing stock (biomass) of large and small fishes combined in unenriched Class 5 and 6 hydroperiod wetlands averaged between 5.5 to 6.5 grams-wet-mass/m^2. In these studies, the data was provided in g/m^2 dry-weight and was converted to g/m^2 wet-weight following the procedures referenced in Kushlan et al. (1986) and also referenced in Turner et al. (1999). The fish density data provided in Turner et al. (1999) included both data from samples representing fish 8 cm or smaller and fish larger than 8 cm and included summaries of Turner and Trexler (1997) data, Carlson and Duever (1979) data, and Loftus and Eklund (1994) data. These data sets also reflected a 0.6 g/m^2 dry-weight correction estimate for fish greater than 8 cm based on Turner et al.'s (1999) block-net rotenone samples.

Relating this information to the hydroperiod classes developed by the SFWMD, we estimated the mean annual biomass densities per hydroperiod. For our assessment, we considered Class 7 hydroperiod wetlands based on Turner et al. (1999) and Trexler et al. (2002) studies to have a mean annual biomass of 6.5 grams-wet-mass/m^2 and to be composed of 25 fish/m^2. The remaining biomass weights per hydroperiod were determined as a direct proportion of the number of fish per total weight of fish for a Class 7 hydroperiod (6.5 grams divided by 25 fish equals 0.26 grams per fish).

For example, given that a Class 3 hydroperiod has a mean annual fish density of 9 fish/m^2, with an average weight of 0.26 grams per fish, the biomass of a Class 3 hydroperiod would be 2.3 grams/m^2 (9*0.26 = 2.3). Based on the above discussion, the biomass per hydroperiod class is:

Table 7. Extrapolated Mean Annual Fish Biomass for SFWMD Hydroperiods

Hydroperiod Class	Days Inundated	Extrapolated Fish Biomass
Class 1	0-60	0.5 gram/m^2
Class 2	60-120	1.0 gram/m^2
Class 3	120-180	2.3 grams/m^2
Class 4	180-240	4.2 grams/m^2
Class 5	240-300	5.2 grams/m^2
Class 6	300-330	6.0 grams/m^2
Class 7	330-365	6.5 grams/m^2

Wood stork suitable prey size: Wood storks are highly selective in their feeding habits and in studies on fish consumed by wood storks, five species of fish comprised over 85 percent of the number and 84 percent of the biomass of over 3,000 prey items collected from adult and nestling wood storks (Ogden et al. 1976). Table 8 lists the fish species consumed by wood storks in Ogden et al. (1976).

Table 8. Primary Fish Species consumed by Wood Storks from Ogden et al. (1976)

Common name	Scientific name	Percent Individuals	Percent Biomass
Sunfishes	*Centrarchidae*	14	44
Yellow bullhead	*Italurus natalis*	2	12
Marsh killifish	*Fundulus confluentus*	18	11
Flagfish	*Jordenella floridae*	32	7
Sailfin molly	*Poecilia latipinna*	20	11

These species were also observed to be consumed in much greater proportions than they occur at feeding sites, and abundant smaller species [*e.g.*, mosquitofish (*Gambusia affinis*), least killifish (*Heterandria formosa*), bluefin killifish (*Lucania goodei*)] are under-represented, which the researchers believed was probably because their small size did not elicit a bill-snapping reflex in these tactile feeders (Coulter et al. 1999). Their studies also showed that, in addition to selecting larger species of fish, wood storks consumed individuals that are significantly larger (>3.5 cm) than the mean size available (2.5 cm), and many were greater than 1-year old (Ogden et al. 1976, Coulter et al. 1999). However, Ogden et al. (1976) also found that wood storks most likely consumed fish that were between 1.5 and 9.0 cm in length (Figure 4 in Ogden et al. 1976).

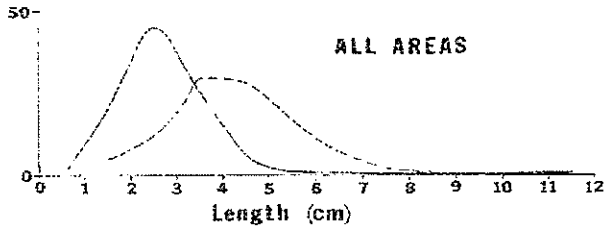

FIGURE 4. Length frequency distribution of fish available to and consumed by Wood Storks in different habitats.

In Ogden et al.'s (1976) Figure 4, the dotted line is the distribution of fish consumed and the solid line is the available fish. Straight interpretation of the area under the dotted line curve

represents the size classes of fish most likely consumed by wood storks and is the basis of our determination of the amount of biomass that is within the size range of fish most likely consumed by wood storks, which in this example is a range size of 1.5 to 9.0 cm in length.

Wood stork suitable prey base (biomass per hydroperiod): To estimate that fraction of the available fish biomass that might be consumed by wood storks, the following analysis was conducted. Trexler et al.'s (2002) 2-year throw trap data of absolute and relative fish abundance per hydroperiod distributed across 20 study sites in the ENP and the WCAs was considered to be representative of the Everglades fish assemblage available to wood storks (n = 37,718 specimens of 33 species). Although Trexler et al.'s (2002) data was based on throw-trap data and representative of fish 8 cm or smaller, the Service believes the data set can be used to predict the biomass/m^2 for total fish (those both smaller and larger than 8 cm). This approach is also supported, based on our assessment of prey consumption by wood storks in Ogden et al.'s (1976) study (Figure 4), that the wood storks general preference is for fish measuring 1.5 cm to 9 cm and is generally inclusive of Trexler et al.'s (2002) throw-trap data of fish 8 cm or smaller.

To estimate the fraction of the fish biomass that might be consumed by wood storks, the Service, using Trexler et al.'s (2002) throw-trap data set, determined the mean biomass of each fish species that fell within the wood stork prey size limits of 1.5 to 9.0 cm. The mean biomass of each fish species was estimated from the length and wet mass relationships for Everglades' icthyofauna developed by Kushlan et al. (1986). The proportion of each species that was outside of this prey length and biomass range was estimated using the species mean and variance provided in Table 1 in Kushlan et al. (1986). These biomass estimates assumed the length and mass distributions of each species was normally distributed and the fish biomass could be estimated by eliminating that portion of each species outside of this size range. These biomass estimates of available fish prey were then standardized to a sum of 6.5 g/m^2 for Class 7 hydroperiod wetlands (Service 2009).

For example, Kushlan et al. (1986) lists the warmouth (*Lepomis gulosus*) with a mean average biomass of 36.76 g. In fish samples collected by Trexler et al. (2002), this species accounted for 0.048 percent (18/37,715=0.000477) of the Everglades freshwater ichthyofauna. Based on an average biomass of 36.76 g (Kushlan et al. 1986), the 0.048 percent representation from Trexler et al. (2002) is equivalent to an average biomass of 1.75 g (36.76*0.048) or 6.57 percent (1.75/26.715) of the estimated average biomass (26.715 g) of Trexler et al.'s (2002) samples (Service 2009).

Standardizing these data to a sample size of 6.5 g/m^2, the warmouth biomass for long hydroperiod wetlands would be about 0.427 g (Service 2009). However, the size frequency distribution (assumed normal) for warmouth (Kushlan et al. 1986) indicate 48 percent are too large for wood storks and 0.6 percent are too small (outside the 1.5 cm to 9 cm size range most likely consumed), so the warmouth biomass within the wood stork's most likely consumed size range is only 0.208 g (0.427*(0.48+0.006)=0.2075) in a 6.5 g/m^2 sample. Using this approach summed over all species in long hydroperiod wetlands, only 3.685 g/m^2 of the 6.5 g/m^2 sample consists of fish within the size range likely consumed by wood storks or about 57 percent (3.685/6.5*100=56.7) of the total biomass available.

An alternative approach to estimate the available biomass is based on Ogden et al. (1976). In their study (Table 8), the sunfishes and four other species that accounted for 84 percent of the biomass eaten by wood storks totaled 2.522 g of the 6.5 g/m^2 sample (Service 2009). Adding the remaining 16 percent from other species in the sample, the total biomass would suggest that 2.97 g of a 6.5 g/m^2 sample are most likely to be consumed by wood storks or about 45.7 percent (2.97/6.5=0.4569)

The mean of these two estimates is 3.33g/m^2 for long hydroperiod wetlands (3.685 + 2.97 = 6.655/ 2 = 3.33). This proportion of available fish prey of a suitable size (3.33 g/m^2 / 6.5 g/m^2 = 0.51 or 51 percent) was then multiplied by the total fish biomass in each hydroperiod class to provide an estimate of the total biomass of a hydroperiod that is the appropriate size and species composition most likely consumed by wood storks.

As an example, a Class 3 SFWMD model hydroperiod wetland with a biomass of 2.3 grams/m^2, adjusted by 51 percent for appropriate size and species composition, provides an available biomass of 1.196 grams/m^2. Following this approach, the biomass per hydroperiod potentially available to predation by wood storks based on size and species composition is:

Table 9. Wood Stork Suitable Prey Base (fish biomass per hydroperiod)

Hydroperiod Class	Days Inundated	Fish Biomass
Class 1	0-60	0.26 gram/m^2
Class 2	60-120	0.52 gram/m^2
Class 3	120-180	1.196 grams/m^2
Class 4	180-240	2.184 grams/m^2
Class 5	240-300	2.704 grams/m^2
Class 6	300-330	3.12 grams/m^2
Class 7	330-365	3.38 grams/m^2

Wood Stork-Wading Bird Prey Consumption Competition: In 2006, (Service 2006), the Service developed an assessment approach that provided a foraging efficiency estimate that 55 percent of the available biomass was actually consumed by wood storks. Since the implementation of this assessment approach, the Service has received comments from various sources concerning the Service's understanding of Fleming et al.'s (1994) assessment of prey base consumed by wood storks versus prey base assumed available to wood stork and the factors included in the 90 percent prey reduction value.

In our original assessment, we noted that, "*Fleming et al. (1994) provided an estimate of 10 percent of the total biomass in their studies of wood stork foraging as the amount that is actually consumed by the storks. However, the Fleming et al. (1994) estimate also includes a second factor, the suitability of the foraging site for wood storks, a factor that we have calculated separately. In their assessment, these two factors accounted for a 90 percent reduction in the biomass actually consumed by the storks. We consider these two factors as equally important and are treated as equal components in the 90 percent reduction; therefore, we consider each factor to represent 45 percent of the reduction. In consideration of this approach, Fleming et al.'s (1994) estimate that 10 percent of the biomass would actually be consumed by the storks would be added to the 45 percent value for an estimate that 55 percent (10 percent plus the remaining 45 percent) of the available biomass would actually be consumed by the storks and is the factor we believe represents the amount of the prey base that is actually consumed by the stork.*"

In a follow-up review of Fleming et al.'s (1994) report, we noted that the 10 percent reference is to prey available to wood storks, not prey consumed by wood storks. We also noted the 90 percent reduction also includes an assessment of prey size, an assessment of prey available by water level (hydroperiod), an assessment of suitability of habitat for foraging (openness), and an assessment for competition with other species, not just the two factors considered originally by the Service (suitability and competition). Therefore, in re-evaluating of our approach, we identified four factors in the 90 percent biomass reduction and not two as we previously considered. We believe these four factors are represented as equal proportions of the 90 percent reduction, which corresponds to an equal split of 22.5 percent for each factor. Since we have accounted previously for three of these factors in our approach (prey size, habitat suitability, and hydroperiod) and they are treated separately in our assessment, we consider a more appropriate foraging efficiency to represent the original 10 percent and the remaining 22.5 percent from the 90 percent reduction discussed above. Following this revised assessment, our competition factor would be 32.5 percent, not the initial estimate of 55 percent.

Other comments reference the methodology's lack of sensitivity to limiting factors, i.e., is there sufficient habitat available across all hydroperiods during critical life stages of wood stork nesting and does this approach over emphasize the foraging biomass of long hydroperiod wetlands with a corresponding under valuation of short hydroperid wetlands. The Service is aware of these questions and is examining alternative ways to assess these concerns. However, until futher research is generated to refine our approach, we continue to support the assessment tool as outlined.

Following this approach, Table 10 has been adjusted to reflect the competition factor and represents the amount of biomass consumed by wood storks and is the basis of our effects assessments (Class 1 hydroperiod with a biomass 0.26 g, multiplied by 0.325, results in a value of 0.08 g [0.25*.325=0.08]) (Table 10).

Table 10 Actual Biomass Consumed by Wood Storks

Hydroperiod Class	Days Inundated	Fish Biomass
Class 1	0-60	0.08 gram/m^2
Class 2	60-120	0.17 gram/m^2
Class 3	120-180	0.39 grams/m^2
Class 4	180-240	0.71 grams/m^2
Class 5	240-300	0.88 grams/m^2
Class 6	300-330	1.01 grams/m^2
Class 7	330-365	1.10 grams/m^2

Sample Project of Biomass Calculations and Corresponding Concurrence Determination

Example 1:

An applicant is proposing to construct a residential development with unavoidable impacts to 5 acres of wetlands and is proposing to restore and preserve 3 acres of wetlands onsite. Data on the onsite wetlands classified these systems as exotic impacted wetlands with greater than 50

percent but less than 75 percent exotics (Table 3) with an average hydroperiod of 120-180 days of inundation.

The equation to calculate the biomass lost is: The number of acres, converted to square-meters, times the amount of actual biomass consumed by the wood stork (Table 10), times the exotic foraging suitability index (Table 3), equals the amount of grams lost, which is converted to kg.

Biomass lost (5*4,047*0.39 (Table 10)*0.37 (Table 3)=2,919.9 grams or 2.92 kg)

In the example provided, the 5 acres of wetlands, converted to square-meters (1 acre= 4,047 m^2) would provide 2.9 kg of biomass (5*4,047*0.39 (Table 10)*0.37 (Table 3)= 2,919.9 grams or 2.9 kg), which would be lost from development.

The equation to calculate the biomass from the preserve is the same, except two calculations are needed, one for the existing biomass available and one for the biomass available after restoration.

Biomass Pre: (3*4,047*0.39(Table 10)*0.37 (Table 3)=1,751.95grams or 1.75 kg)

Biomass Post: (3*4,047*0.39 (Table 10)*1(Table 3)=4,734.99 grams or 4.74 kg)

Net increase: 4.74 kg-1.75 kg = 2.98 kg Compensation Site

Project Site Balance 2.98 kg- 2.92 kg = 0.07kg

The compensation proposed is 3 acres, which is within the same hydroperiod and has the same level of exotics. Following the calculations for the 5 acres, the 3 acres in its current habitat state, provides 1.75 kg (3*4,047*0.39 (Table 10)*0.37 (Table 3)=1,751.95grams or 1.75 kg) and following restoration provides 4.74 kg (3*4,047*0.39 (Table 10)*1(Table 3)=4,734.99 grams or 4.74 kg), a net increase in biomass of 2.98 kg (4.74-1.75=2.98).

Example 1: 5 acre wetland loss, 3 acre wetland enhanced – same hydroperiod - NLAA

Hydroperiod	Existing Footprint		On-site Preserve Area				Net Change*	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1 - 0 to 60 Days								
Class 2 - 60 to 120 Days								
Class 3 - 120 to 180 Days	5	2.92	3	1.75	3	4.74	(5)	0.07
Class 4 - 180 to 240 Days								
Class 5 - 240 to 300 Days								
Class 6 - 300 to 330 Days								
Class 7 - 330 to 365 days								
TOTAL	**5**	**2.92**	**3**	**1.75**	**3**	**4.74**	**(5)**	**0.07**

*Since the net increase in biomass from the restoration provides 2.98 kg and the loss is 2.92 kg, there is a positive outcome (4.74-1.75-2.92=0.07) in the same hydroperiod and Service concurrence with a NLAA is appropriate.

Example 2:

In the above example, if the onsite preserve wetlands were a class 4 hydroperiod, which has a value of 0.71. grams/m^2 instead of a class 3 hydroperiod with a 0.39 grams/m^2 [Table 10]), there would be a loss of 2.92 kg of short hydroperiod wetlands (as above) and a net gain of 8.62 kg of long-hydroperiod wetlands.

Biomass lost: (5*4,047*0.39 (Table 10)*0.37 (Table 3)=2,919.9 grams or 2.92 kg)

The current habitat state of the preserve provides 3.19 kg (3*4,047*0.71 (Table 10)*0.37 (Table 3)=3,189.44 grams or 3.19 kg) and following restoration the preserve provides 8.62 kg (3*4,047*0.71 (Table 10)*1(Table 3)= 8,620.11 grams or 8.62 kg, thus providing a net increase in class 4 hydroperiod biomass of 5.43 kg (8.62-3.19=5.43).

Biomass Pre: (3*4,047*0.71(Table 10)*0.37 (Table 3) = 3,189.44 grams or 3.19 kg)

Biomass Post: (3*4,047*0.71 (Table 10)*1(Table 3)=8,620.11 grams or 8.62 kg)

Net increase: 8.62 kg-3.19 kg = 5.43 kg

Project Site Balance 5.43 kg- 2.92 kg = 2.51 kg

Example 2: 5 acre wetland loss, 3 acre wetland enhanced – different hydroperiod – May Affect

Hydroperiod	Existing Footprint		On-site Preserve Area				Net Change*	
			Pre Enhancement		Post Enhancement			
	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams	Acres	Kgrams
Class 1 - 0 to 60 Days								
Class 2 - 60 to 120 Days								
Class 3 - 120 to 180 Days	5	2.92					(5)	-2.92
Class 4 - 180 to 240 Days			3	3.19	3	8.62	0	5.43
Class 5 - 240 to 300 Days								
Class 6 - 300 to 330 Days								
Class 7 - 330 to 365 days								
TOTAL	**5**	**2.92**	**3**	**3.19**	**3**	**8.62**	**(5)**	**2.51**

In this second example, even though there is an overall increase in biomass, the biomass loss is a different hydroperiod than the biomass gain from restoration, therefore, the Service could not concur with a NLAA and further coordination with the Service is appropriate.

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Attachment H

Sea Turtle and Smalltooth Sawfish Construction Conditions

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
O:\forms\Sea Turtle and Smalltooth Sawfish Construction Conditions.doc

Attachment I
Full Plan Set

CONTRACT PLANS COMPONENTS

STRUCTURE PLANS

STATE OF FLORIDA

DEPARTMENT OF TRANSPORTATION

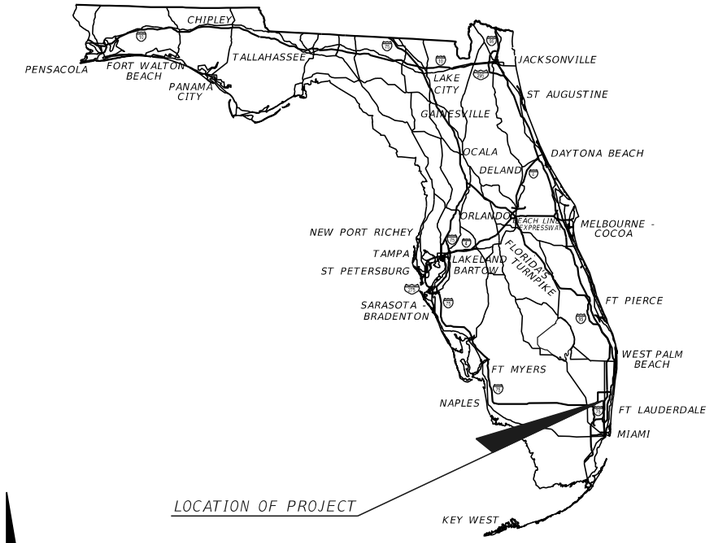
CONTRACT PLANS

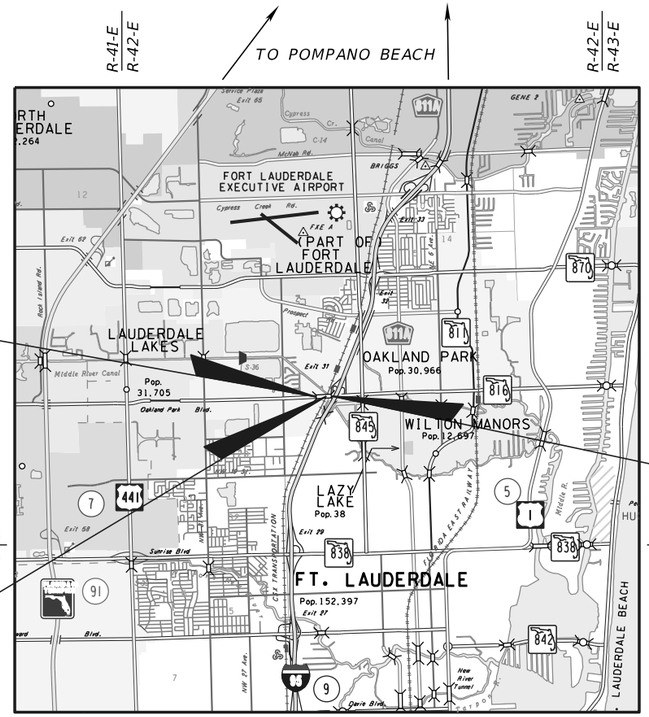
FINANCIAL PROJECT ID 441474-1-52-01

BROWARD COUNTY (86090)

STATE ROAD NO. 816

OAKLAND PARK BLVD. OVER THE C-13 CANAL
BRIDGE NO. 860139 SCOUR COUNTERMEASURE





BEGIN PROJECT
BEGIN BRIDGE #860139
STA. 236+72.73
MP 5.919

END PROJECT
END BRIDGE #860139
STA. 237+73.05
MP 5.938

T-49-S / T-50-S

T-49-S / T-50-S

DOT/ATK/CSXT AT GRADE CROSSING, NO. 628191B
RR MP SX1009.01
SOUTH FLORIDA RAIL CORRIDOR
(SFRC)/CSX RAILROAD
STA. 235+34.57

INDEX OF STRUCTURE PLAN

* These sheets are included in the Index of Structure Plans only to indicate that they are part of the Structure Plans. These sheets are contained in separate digitally signed and sealed documents.

** These pages will be included in a later submittal.

GOVERNING STANDARD PLANS:

Florida Department of Transportation, FY2020-21 Standard Plans for Road and Bridge Construction and applicable Interim Revisions (IRs).

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

GOVERNING STANDARD SPECIFICATIONS:

Florida Department of Transportation, January 2021 Standard Specifications for Road and Bridge Construction at the following website: http://www.fdot.gov/programmanagement/implementedSpecBooks

INITIAL SUBMITTAL

DATE: 07/2019

STRUCTURE PLANS ENGINEER OF RECORD:

LUIS P. RAMOS, P.E.
P.E. NO.: 78122
HNTB CORPORATION
5900 N. ANDREWS AVENUE, SUITE 400
FORT LAUDERDALE, FL 33309
CONTRACT NO.: C9W31
VENDOR NO.: F431623092
CERTIFICATE OF AUTHORIZATION NO.: 6500

FDOT PROJECT MANAGER:

BING WANG, P.E.

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
	21	1

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

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

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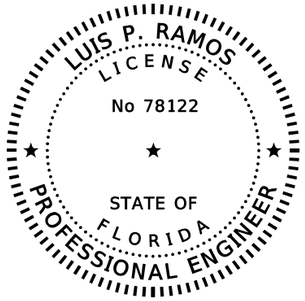

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ON THE DATE ADJACENT TO THE SEAL.

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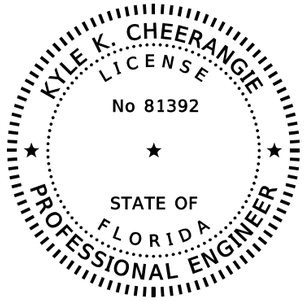
LUIS P. RAMOS P.E. LIC. NO. 78122

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

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2	SIGNATURE SHEET
3	SUMMARY OF PAY ITEMS
4	GENERAL NOTES
12	PLAN AND ELEVATION (1 OF 2)
13	PLAN AND ELEVATION (2 OF 2)
14	GABION MATTRESS DETAILS
15	SUMMARY OF QUANTITIES



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

SHEET NO.	SHEET DESCRIPTION
2	SIGNATURE SHEET
7	TEMPORARY TRAFFIC CONTROL PLAN (1 OF 3)
8	TEMPORARY TRAFFIC CONTROL PLAN (2 OF 3)
9	TEMPORARY TRAFFIC CONTROL PLAN (3 OF 3)
10	SELECTIVE CLEARING AND GRUBBING (1 OF 2)
11	SELECTIVE CLEARING AND GRUBBING (2 OF 2)

BRIDGE NO. 860139

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
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LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY:	JGL
CHECKED BY:	LPR
DESIGNED BY:	DPV
CHECKED BY:	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: SIGNATURE SHEET

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 2

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GENERAL NOTES:

A. DESIGN SPECIFICATIONS:
1. FDOT STRUCTURES MANUAL DATED JANUARY 2019 AND ALL SUBSEQUENT FDOT STRUCTURES DESIGN BULLETINS.
2. FDOT DRAINAGE MANUAL DATED JANUARY 2019 AND ALL SUBSEQUENT FDOT DRAINAGE DESIGN BULLETINS.
3. FEDERAL HIGHWAY ADMINISTRATION (FHWA) BRIDGE SCOUR AND STREAM INSTABILITY COUNTERMEASURES: EXPERIENCE, SELECTION, AND DESIGN GUIDANCE, THIRD EDITION, VOLUMES 1 & 2.
4. FDOT DESIGN MANUAL DATED JANUARY 2019 AND ALL SUBSEQUENT FDOT ROADWAY DESIGN BULLETINS.

B. VERTICAL DATUM:
BENCHMARK ELEVATIONS SHOWN IN THE PLANS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).

C. ENVIRONMENT:
SUPERSTRUCTURE – SLIGHTLY AGGRESSIVE
SUBSTRUCTURE – CONCRETE: SLIGHTLY AGGRESSIVE
STEEL: SLIGHTLY AGGRESSIVE

D. DESIGN METHODOLOGY:
DESIGN GUIDELINE 10 – GABION MATTRESS FOR BED ARMOR AND PIER PROTECTION, FEDERAL HIGHWAY ADMINISTRATION (FHWA) BRIDGE SCOUR AND STREAM INSTABILITY COUNTERMEASURES: EXPERIENCE, SELECTION, AND DESIGN GUIDANCE, THIRD EDITION, VOLUMES 2.

E. MATERIALS:
1. GABIONS:
GABIONS SHALL BE IN ACCORDANCE WITH MODIFIED SPECIAL PROVISION SECTION 530 OF THE FDOT STANDARD SPECIFICATIONS.
2. GEOTEXTILE FILTER FABRIC:
GEOTEXTILE FILTER FABRIC SHALL BE IN ACCORDANCE WITH SECTION 514, 530, AND 985 OF THE FDOT STANDARD SPECIFICATIONS.

F. PLAN DIMENSIONS:
ALL DIMENSIONS IN THESE PLANS ARE MEASURED IN FEET EITHER HORIZONTALLY OR VERTICALLY UNLESS OTHERWISE NOTED.

G. UTILITIES:
1. FOR PLAN LOCATIONS OF EXISTING UTILITIES, SEE PLAN AND ELEVATION SHEET(S). THE LOCATIONS OF THE UTILITIES SHOWN IN THE PLANS (INCLUDING THOSE DESIGNATED Vv, Vh, AND Vvh) ARE BASED ON LIMITED INVESTIGATION TECHNIQUES AND SHOULD BE CONSIDERED APPROXIMATE ONLY. THE VERIFIED LOCATIONS/ELEVATIONS APPLY ONLY AT THE POINTS SHOWN. INTERPOLATIONS BETWEEN THESE POINTS HAVE NOT BEEN VERIFIED.

2. UTILITY/AGENCY OWNERS:

COMPANY	CONTACT	PHONE NUMBER
AT&T DISTRIBUTION	OTIS KEEVE	(954) 723-2540
BROWARD COUNTY TRAFFIC ENGINEERING	ROBERT BLOUNT	(954) 847-2600
COMCAST	LEONARD MAXWELL-NEWBOLD	(954) 447-8405
CROWNE CASTLE	DANNY HASKETT	(305) 552-2931
FDOT ITS – ARTERIAL	CHRIS BEAUDRY	(954) 847-1995
FPL DISTRIBUTION	BYRON SAMPLE	(954) 321-2056
FPL TRANSMISSION	JAMES JOSEPH	(561) 904-3634
MCI (VERIZON)	DEAN BOYERS	(469) 886-4238

H. EXISTING BRIDGE CONSTRUCTION CONSIDERATIONS:
1. DIMENSION VERIFICATION
UNLESS OTHERWISE NOTED, THE DIMENSIONS, ELEVATIONS, AND INTERSECTING ANGLES SHOWN ARE BASED ON THE INFORMATION AS DETAILED IN THE ORIGINAL CONSTRUCTION PLANS OF THE EXISTING BRIDGES AND MAY NOT REPRESENT AS-BUILT CONDITIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THIS DATA BEFORE BEGINNING CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

I. TRAFFIC CONTROL PLANS:
SEE TRAFFIC CONTROL PLAN GENERAL NOTES, SHEET 7.

J. NAVIGABLE WATERWAY:
AT NO TIME DURING CONSTRUCTION WILL THE WATERWAY BE CLOSED TO NAVIGATION WITHOUT PRIOR NOTIFICATION AND APPROVAL OF THE SEVENTH COAST GUARD MARINE SAFETY OFFICE IN MIAMI (MSO, MIAMI). ALL CONSTRUCTION EQUIPMENT MUST BE MARKED IN ACCORDANCE WITH THE U.S. COAST GUARD "NAVIGATION RULES (CG-169)" AND BE WELL REMOVED FROM THE CHANNEL WHEN NOT ENGAGED IN CONSTRUCTION ACTIVITIES. A COPY OF THE CONTRACTOR'S PLAN, SCHEDULE, AND SEQUENCE OF OPERATIONS SHALL BE SUBMITTED TO THE U.S. COAST GUARD MSO, MIAMI AND THE CONSTRUCTION RESIDENT ENGINEER FOR APPROVAL 30 DAYS PRIOR TO STARTING. ANY WORK THAT WOULD POTENTIALLY REDUCE THE HORIZONTAL AND/OR VERTICAL CLEARANCE OF THE WATERWAY SHALL BE INCLUDED WITH THE ABOVE. IMMEDIATELY NOTIFY THE COAST GUARD MARINE SAFETY OFFICE, MIAMI, MICHAEL LIEBERUM AT (305) 415-6744 TO SCHEDULE THE PLACEMENT OF BARGES OR FLOATING EQUIPMENT IN THE WATERWAY AND ANY CHANNEL CLOSURES REQUIRED FOR THIS CONSTRUCTION. USCG HAS AUTHORIZED A MAXIMUM HORIZONTAL CHANNEL RESTRICTION OF XX FEET. FLOATING BARRIERS AND EQUIPMENT NEED TO BE USED WITH CAUTION DUE TO TIDAL CURRENTS AND BOAT TRAFFIC. THERE ARE MANATEES PRESENT IN THE VICINITY OF THE PROJECT THAT MUST NOT BE DISTURBED.

K. PAY ITEM NOTES:

L. ENVIRONMENTAL NOTES:
1. THE CONTRACTOR WILL BE REQUIRED TO USE BEST MANAGEMENT PRACTICES AND COMPLY WITH THE FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION (SECTION 104) TO ENSURE THAT NO ADVERSE IMPACTS WILL OCCUR TO THE WATER QUALITY FROM CONSTRUCTION ACTIVITIES. ALL ACTIVITIES ASSOCIATED WITH CONSTRUCTION MUST BE IN COMPLIANCE WITH THE CURRENT NPDES REQUIREMENTS. REFER TO THE CONTRACTOR'S ENVIRONMENTAL CONTROL PLAN FOR ASSURANCE OF THE WATER QUALITY DURING IN-WATER WORKS OR CHANNEL BASE TRENCHING.

2. THE ADJACENT MARINE AREAS ARE HABITAT FOR MANATEES. PLEASE CONTACT THE DISTRICT CONSTRUCTION ENVIRONMENTAL COORDINATOR (DCEC) IN ORDER TO INSURE ALL POSTING AND PROTECTION REQUIREMENTS ARE FULFILLED. THE DCEC CAN BE REACHED IN THE DISTRICT OFFICE BY CALLING (954) 448-2880.

3. THE CONTRACTOR IS CAUTIONED REGARDING THE PRESENCE OF SEAGRASSES AND MANGROVES WITHIN THE VICINITY OF THE PROJECT. NOTE THAT, AT A MINIMUM, SEAGRASSES ARE KNOWN TO OCCUR IN AREAS WITH DEPTH SHALLOWER THAN 6 FEET FROM MEAN HIGH WATER LEVEL. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO STAGE, STORE, AND MOVE BARGES AND VESSELS IN A MANNER THAT DOES NOT IMPACT SEAGRASS AND MANGROVE BEDS OR DISPLACE BOTTOM MATERIALS. THE CONTRACTOR SHALL BE HELD RESPONSIBLE FOR ANY DAMAGE TO SEAGRASS AND MANGROVE BEDS OR UNAUTHORIZED DISPLACEMENT OF BOTTOM MATERIAL.

BRIDGE NO. 860139

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY: JGL
CHECKED BY: LPR
DESIGNED BY: DPV
CHECKED BY: LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: GENERAL NOTES
REF. DWG. NO.:
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL
SHEET NO.: 4

TRAFFIC CONTROL PLAN GENERAL NOTES

1. THE TRAFFIC CONTROL PLANS SHALL BE IN ACCORDANCE WITH THE PROJECT PLANS, THE FDOT STANDARD PLANS 102-600 SERIES, AND THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES 2009 (MUTCD) AS MINIMUM CRITERIA.

2. THE REGULATORY SPEED DURING CONSTRUCTION FOR ALL PHASES OF WORK SHALL BE THE EXISTING POSTED SPEED FOR INTERSTATE, FREEWAYS, RAMPS AND ARTERIAL ROADWAYS WITHIN THE PROJECT LIMITS UNLESS OTHERWISE APPROVED BY THE PROJECT ENGINEER.
   I-95 POSTED SPEED = 65 MPH.
   OAKLAND PARK BLVD POSTED SPEED = 45 MPH.

3. ON OAKLAND PARK BLVD, LANE CLOSURES ARE ONLY PERMITTED BETWEEN THE FOLLOWING TIME PERIODS:
   A. OAKLAND PARK BOULEVARD
      i. ONE LANE CLOSURE 9:00 PM TO 5:00 AM

4. MAINTAIN SINGLE LANES CLOSURES AND SIDEWALK CLOSURES IN ACCORDANCE WITH FDOT STANDARD PLANS INDEXES 102-613, 102-616 & 102-660.

5. CONSTRUCTION VEHICLES SHALL NOT BE PARKED/STAGED OR STOPPED WITHIN THE RAILROAD RIGHT-OF-WAY AT ANY TIME.

BRIDGE NO. 860139

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
KYLE K. CHEERANGIE P.E. LIC. NO. 81392

DRAWN BY:	DPV
CHECKED BY:	LPG
DESIGNED BY:	KKC
CHECKED BY:	LPG

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: TEMPORARY TRAFFIC CONTROL PLAN

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 7

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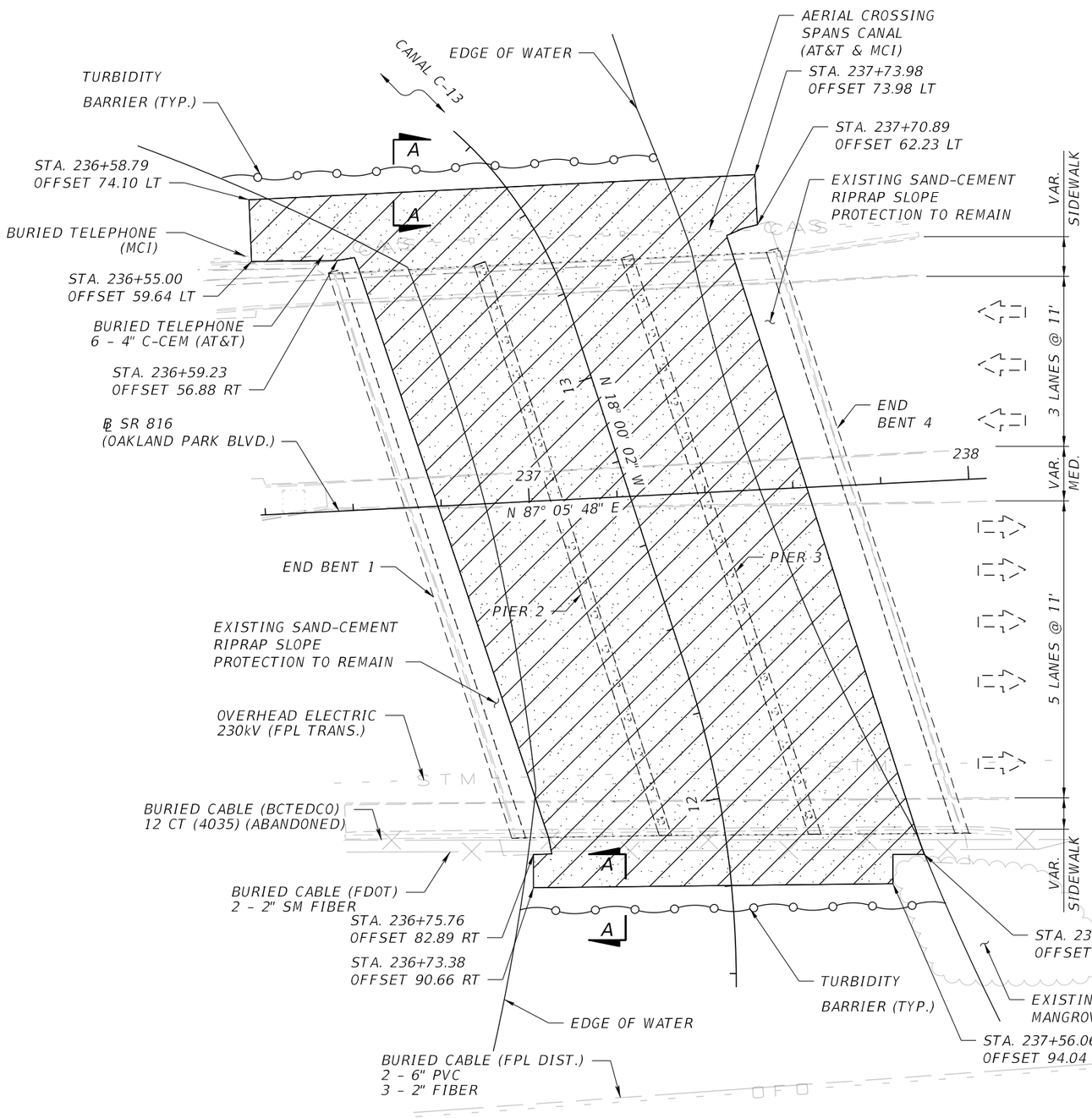
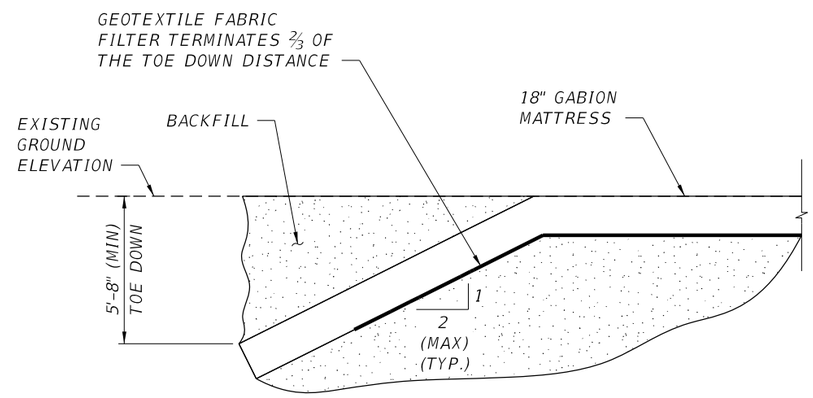


PLAN
SCALE 1'=30'



SECTION A-A

LEGEND

EXCAVATION

FILL

NOTES:

1. EACH GABION MARINE MATTRESS SHALL BE PROPERLY SEAMED UNDERWATER, AND THE MATTRESS SHALL HAVE A TOE DOWN TO 5'-8" WITH A MAXIMUM SLOPE OF 2:1 AT UPSTREAM AND DOWNSTREAM END OF THE BRIDGE.
2. MARINE MATTRESS SHALL BE PLACED DIRECTLY INTO FINAL POSITION. DRAGGING OF MARINE MATTRESS ON CHANNEL BOTTOM WILL NOT BE PERMITTED.
3. SEAL INTERFACE BETWEEN GABION MATTRESS AND PILES/ABUTMENTS WITH GROUT.

BRIDGE NO. 860139

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.
NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
JGL	LPR	DPV	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: PLAN AND ELEVATION (1 OF 2)

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 12

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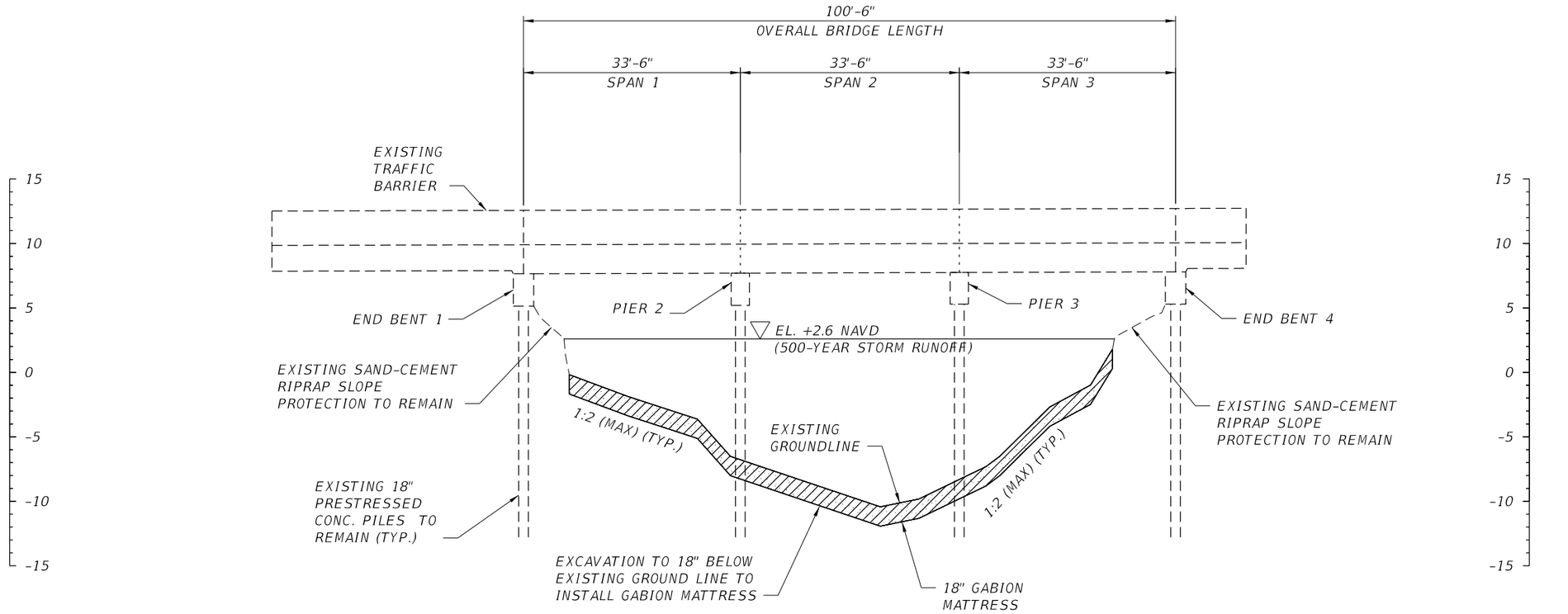


ELEVATION
SCALE

1" = 20' Horizontal
1" = 10' Vertical

LEGEND

EXCAVATION

FILL

BRIDGE NO. 860139

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY:	JGL
CHECKED BY:	LPR
DESIGNED BY:	DPV
CHECKED BY:	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

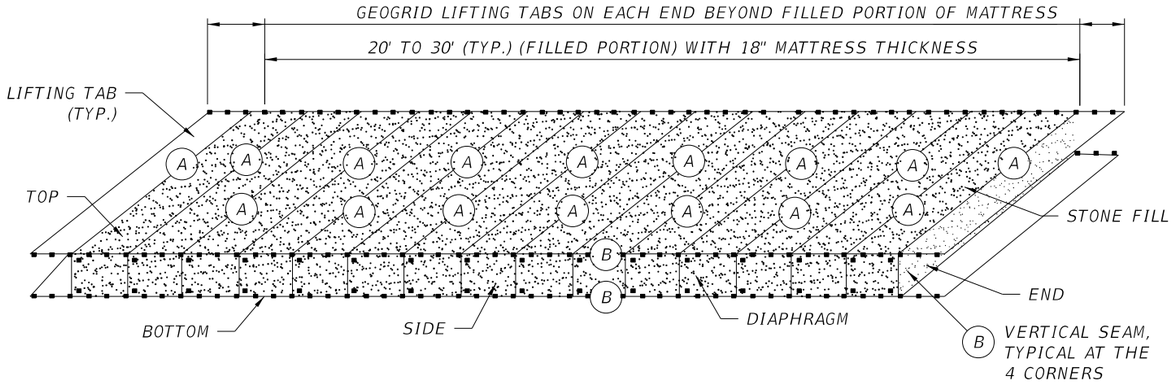
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: PLAN AND ELEVATION (2 OF 2)

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 13



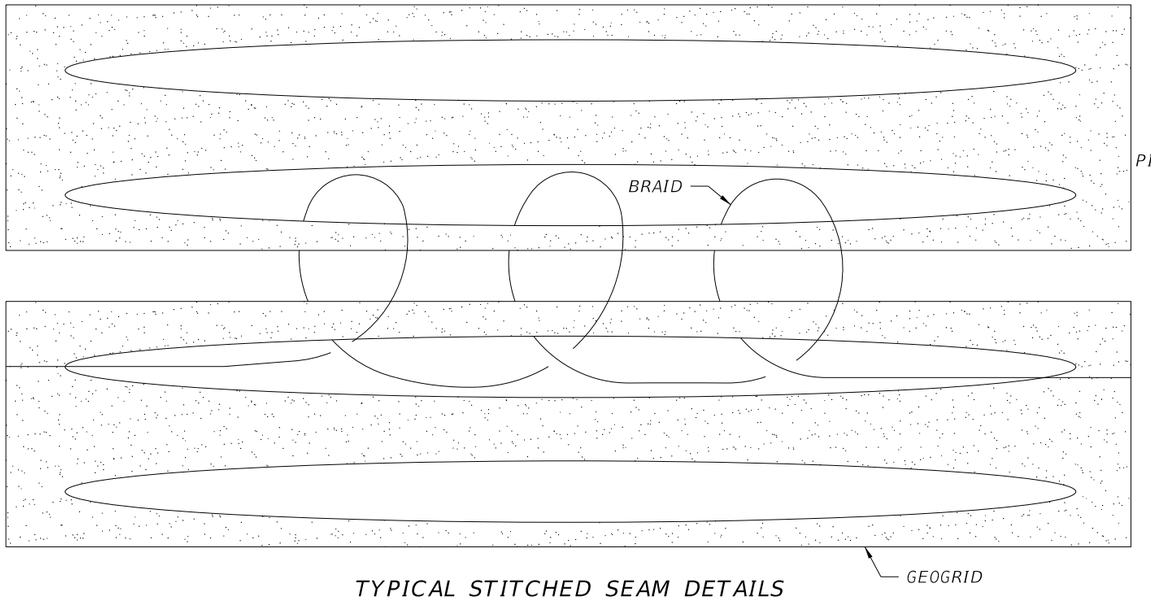
TYPICAL CONFIGURATION OF FILLED MATTRESS UNITS

(A) INDICATES BODKIN CONNECTION USING ⅜" DIAMETER HDPE BODKIN ROD

(B) INDICATES BRAIDED SEAM USING 1/16" DIAMETER HIGH UV HDPE BRAID

NOTES:

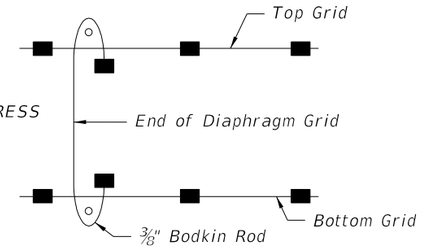
1. ENDS, TOP, BOTTOM, SIDES AND ANY EXTRA LENGTH USED FOR LIFTING OR ANCHORING PURPOSES SHALL BE COMPOSED OF AN ADEQUATE GEOGRID.
2. INTERNAL DIAPHRAGMS SHALL BE COMPOSED OF AN ADEQUATE GEOGRID.
3. NOMINAL WIDTH OF UNITS: 5 FT (FILLED), 4.3 FT (UNFILLED).
4. TYPICAL THICKNESS (FILLED): 18 INCHES.
5. PLASTIC CABLES TIES MAY BE USED TO SECURE BODKIN CONNECTORS IN POSITION PRIOR TO TENSIONING OR FILLING OF MATTRESS UNITS.



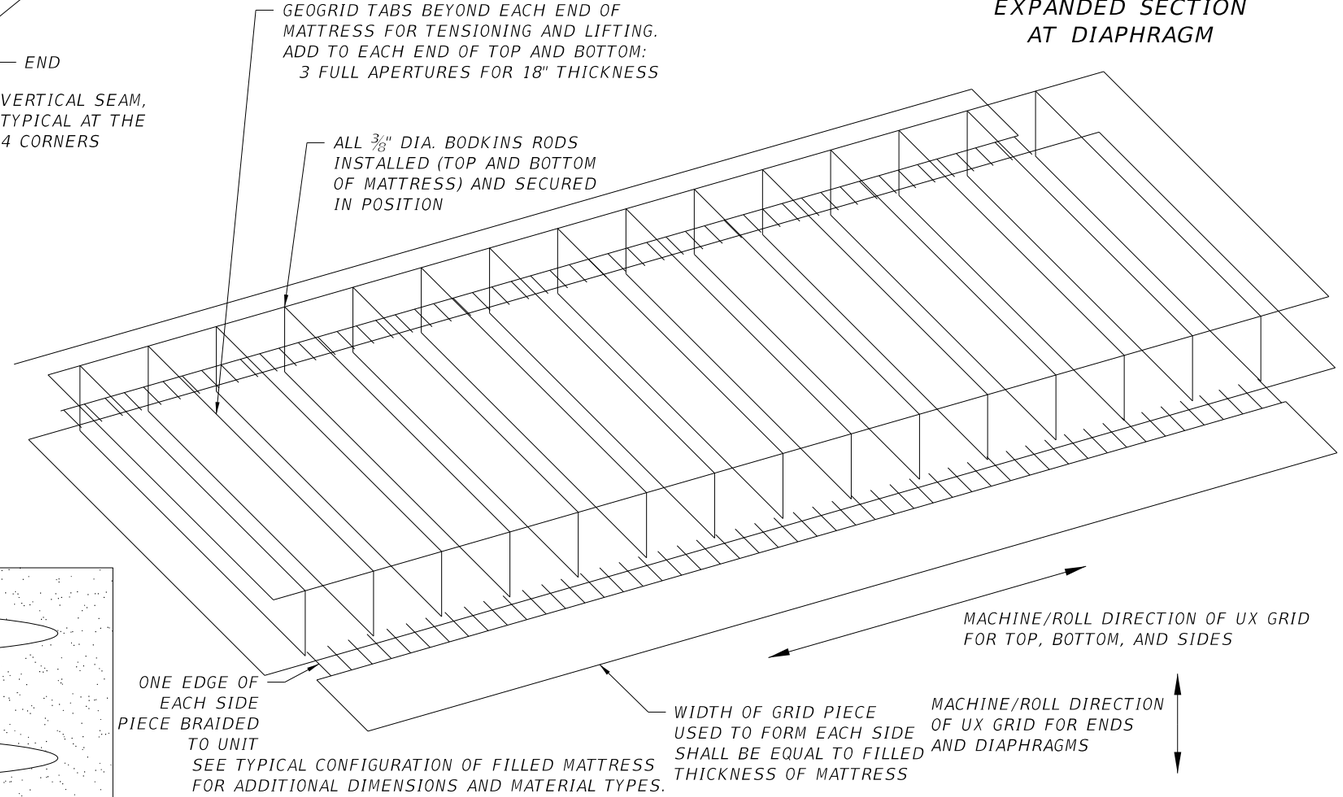
TYPICAL STITCHED SEAM DETAILS

NOTES:

TYPICAL SPACING OF DIAPHRAGMS IS EVERY THREE APERTURE LENGTHS. A SHORTER SPACING MAY BE USED IN ORDER TO MATCH THE REQUIRED MATTRESS LENGTH.
LENGTH OF END PIECES AND INTERNAL DIAPHRAGMS PIECES SHALL BE:
FOR 18" (FILLED) MATTRESS THICKNESS: 3 GRID APERTURES LONG;



EXPANDED SECTION AT DIAPHRAGM



TYPICAL CONFIGURATION OF FABRICATED MATTRESS

NOTES:

ALL CUT ENDS OF BRAID MATERIAL SHALL BE KNOTTED WITHIN ½" TO 2" OF THE END TO PREVENT RAVELING OF BRAID.

AT ALL ENDS OF ALL BRAIDED SEAMS THE BRAID SHALL BE SECURELY KNOTTED TO THE GEOGRID.

AT ALL ENDS OF ALL PIECES OF BRAID MATERIAL USED, THE BRAID SHALL BE KNOTTED TO SPLICE IT TO THE NEXT PIECE OF BRAID, OR TO SECURE IT TO THE GEOGRID. EACH BRAIDED SEAM SHALL BE CONTINUOUS, WITH SECURELY KNOTTED SPLICES ALLOWED. THE BRAID SHALL BE SECURELY KNOTTED TO THE GEOGRID AT A SPACING NOT TO EXCEED 6 FT ALONG ANY SEAM.

THE BRAID SHALL BE STITCHED THROUGH EACH PAIR OF APERTURES ALONG THE SEAM AT LEAST ONCE, AND THE MINIMUM NUMBER OF STITCHES PER FOOT ALONG THE SEAM SHALL BE SIX (6). THE SPACING OF STITCHES ALONG EACH SEAM SHALL BE REASONABLY UNIFORM.

ALL KNOTS SHALL BE TIED IN A MANNER TO PREVENT SLIPPING AND CINCHING.

THE WRAPS ALONG THE SEAM SHALL BE SUFFICIENTLY TIGHT TO CLOSE THE GAP BETWEEN THE ADJACENT PIECES OF GEOGRID, BUT SHALL NOT BE OVER-TIGHTENED SUCH THAT THE GEOGRID BINDS ALONG THE SEAM.

BRIDGE NO. 860139

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NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY: JGL
CHECKED BY: LPR
DESIGNED BY: DV
CHECKED BY: LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: GABION MATTRESS DETAILS
REF. DWG. NO.:
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL
SHEET NO.: 14

djonas 7/12/2019 4:44:01 PM \\ftlw00\PMwork\Jobs\69358_D4_DW_Design\WorkTasks\TWO_6_Oakland Pk Blvd Bridge Sc

FDOT

Florida Department of Transportation

RON DESANTIS
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

KEVIN J. THIBAULT, P.E.
SECRETARY

November 1, 2019

Katie Castor, M.S.
Environmental Scientist
Scalar Consulting Group
13337 North 56th Street
Tampa, Florida 33617

SUBJECT: SR/816/Oakland Park Blvd Over Canal C-13 Bridge Scour Countermeasure
(Bridge # 860139 FPID 441474-1-52-01)
Broward County

Dear Ms. Castor,

This letter is being written as formal documentation that the Florida Department of Transportation (FDOT) District 4 authorizes the firm of Scalar Consulting Group, Inc. to act as our agent to obtain all necessary Environmental Permits for the scour countermeasure improvements under Oakland Park Blvd (Bridge No. 860139) in Broward County.

As a reminder, it is your firm's responsibility to ensure all applications are reviewed and approved by the FDOT District 4 Drainage Office prior to submittal to the permitting agencies. Please also ensure copies of all written correspondence between your firm and the permitting agencies, specifically pertaining to this project, are provided to the FDOT District 4 Drainage Office within one week of receipt or mailing of said correspondence.

If you have any questions or need additional information, please call me at 954-777-4467 or email me at Wilord.Metellus@dot.state.fl.us. Thank you for your cooperation.

Sincerely,

Wilord Metellus
FDOT D-4 Drainage Designer

cc: James Poole, P.E. – FDOT District Drainage Engineer;
Bing Wang, P.E. – FDOT Project Manager; Project File
Luis P. Ramos, PhD PE, Project Manager, HNTB
Dominic Vanchure, PE, Roadway Engineer III, HNTB
Stephen Williams, PE, Project Manager, Scalar Consulting Group
James Ford, PE, Roadway Dept. Manager, HNTB

RECEIVED
24 Feb 2020
SAJ-2020-00675
JACKSONVILLE DISTRICT
PANAMA CITY REGULATORY

U.S. Army Corps of Engineers (USACE)

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

33 CFR 325. The proponent agency is CECW-CO-R.

Form Approved - OMB No. 0710-0003 Expires: 01-08-2018

den for this collection of information, OMB Control Number 0710-0003, is estimated to average 11 hours per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or burden reduction suggestions to the Department of Defense, Washington Headquarters Services, at whs.mc-alex.esd.mbx.dd-dod-information-collections@mail.mil. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR APPLICATION TO THE ABOVE EMAIL.

PRIVACY ACT STATEMENT

Authorities: Rivers and Harbors Act, Section 10, 33 USC 403; Clean Water Act, Section 404, 33 USC 1344; Marine Protection, Research, and Sanctuaries Act, Section 103, 33 USC 1413; Regulatory Programs of the Corps of Engineers; Final Rule 33 CFR 320-332. Principal Purpose: Information provided on this form will be used in evaluating the application for a permit. Routine Uses: This information may be shared with the Department of Justice and other federal, state, and local government agencies, and the public and may be made available as part of a public notice as required by Federal law. Submission of requested information is voluntary, however, if information is not provided the permit application cannot be evaluated nor can a permit be issued. One set of original drawings or good reproducible copies which show the location and character of the proposed activity must be attached to this application (see sample drawings and/or instructions) and be submitted to the District Engineer having jurisdiction over the location of the proposed activity. An application that is not completed in full will be returned. System of Record Notice (SORN). The information received is entered into our permit tracking database and a SORN has been completed (SORN #A1145b) and may be accessed at the following website: http://dpcld.defense.gov/Privacy/SORNsIndex/DOD-wide-SORN-Article-View/Article/570115/a1145b-ce.aspx

(ITEMS 1 THRU 4 TO BE FILLED BY THE CORPS)

1. APPLICATION NO.	2. FIELD OFFICE CODE	3. DATE RECEIVED	4. DATE APPLICATION COMPLETE

(ITEMS BELOW TO BE FILLED BY APPLICANT)

5. APPLICANT'S NAME	8. AUTHORIZED AGENT'S NAME AND TITLE (agent is not required)
First - Wilord Middle - Last -Metellus	First - Katie Middle - Last - Castor
Company - Florida Department of Transportation District 4	Company - Scalar Consulting Group
E-mail Address - Wilord.Metellus@dot.state.fl.us	E-mail Address - kcastor@scalarinc.net
6. APPLICANT'S ADDRESS:	**9. AGENT'S ADDRESS:**
Address- 3400 W Commercial Blvd	Address- 13337 North 56th Street
City - Fort Lauderdale State - FL Zip - 33309 Country - U.S.	City - Tampa State - FL Zip - 33617 Country - U.S.
7. APPLICANT'S PHONE NOs. w/AREA CODE	**10. AGENTS PHONE NOs. w/AREA CODE**
a. Residence b. Business (954) 777-4461 c. Fax	a. Residence b. Business 813-988-1199 ex. 213 c. Fax

STATEMENT OF AUTHORIZATION

11. I hereby authorize, Katie Castor to act in my behalf as my agent in the processing of this application and to furnish, upon request, supplemental information in support of this permit application.

Metellus Wilord

SIGNATURE OF APPLICANT DATE

NAME, LOCATION, AND DESCRIPTION OF PROJECT OR ACTIVITY

12. PROJECT NAME OR TITLE (see instructions)
Oakland Park Blvd. Bridge Scour Countermeasure (FPID: 441474-1-52-01)

13. NAME OF WATERBODY, IF KNOWN (if applicable)	14. PROJECT STREET ADDRESS (if applicable)
C-13 Canal	Address Oakland Park Blvd. just west of I-95 (bridge No. 860139)
15. LOCATION OF PROJECT	
Latitude: ◦N 26°09'57.48" Longitude: ◦W 80°09'48.37"	City - Fort Lauderdale State- FL Zip- 33311

16. OTHER LOCATION DESCRIPTIONS, IF KNOWN (see instructions)

State Tax Parcel ID Municipality

Section - 21 and 28 Township - 49S Range - 42E

17. DIRECTIONS TO THE SITE

The project is located under the Oakland Park Boulevard bridge (No. 860139) where it crosses the C-13 Canal at the I-95 interchange in Broward County. Heading east on W Oakland Park Boulevard, the project site is 0.58-mile past NW 21st Avenue.

18. Nature of Activity (Description of project, include all features)

The proposed solution is an 18-inch gabion mattress for erosion control made with wire baskets filled with small riprap stones and lined with the existing riprap around the two bridge piles (the piles are currently lined with riprap which will remain in place on top of the mattress edges). Proposed work will consist of minor excavation of existing sediment and placement of the 18-inch thick mattress. The total work area is equal to the area of the mattress; approximately 13,920 sf (0.358 acre). The proposed work in surface waters will result in the permanent excavation of 1,695 cubic yards of sediment, and the placement of 1,328 cubic yards of fill material (the gabion mattress). Approximately five cubic yards of existing riprap will be replaced along the edges of the mattress around the bridge piles. The mattress will be placed on unvegetated, sandy bottom and is not expected to impact any wildlife (a benthic survey in 2018 confirmed absence of protected wildlife or habitat).

19. Project Purpose (Describe the reason or purpose of the project, see instructions)

Based on the Scour Evaluation Report, due to insufficient pile embedment, degradation of the channel, and damaged abutment protection, scour countermeasure protection is needed for the channel bottom underneath the bridge in order to maintain the integrity of the bridge.

USE BLOCKS 20-23 IF DREDGED AND/OR FILL MATERIAL IS TO BE DISCHARGED

20. Reason(s) for Discharge

Dredge is required at this location to remove sediment, and filling is required for placement of the gabion mattress.

21. Type(s) of Material Being Discharged and the Amount of Each Type in Cubic Yards:

Type Amount in Cubic Yards	Type Amount in Cubic Yards	Type Amount in Cubic Yards
1,695 of dredging	1,328 of fill	

22. Surface Area in Acres of Wetlands or Other Waters Filled (see instructions)

Acres 0.358

or

Linear Feet

23. Description of Avoidance, Minimization, and Compensation (see instructions)

From an engineering perspective, the erosion control mattress scour countermeasure method is recommended over other potential alternatives (e.g. rubble rip-rap covering a smaller footprint) for this particular location given the severity of the identified scour and site-specific conditions including velocity during storm events. It has been determined that the entire footprint of the bridge requires stabilization, regardless of the selected material. Since there are no seagrass communities, hardbottom communities, oyster beds, or other submerged resources within or immediately adjacent to the project area, and since the white mangroves are outside of the footprint of work, no adverse effects are anticipated to occur as part of this project.

24. Is Any Portion of the Work Already Complete? ☐ Yes ☒ No IF YES, DESCRIBE THE COMPLETED WORK

N/A

25. Addresses of Adjoining Property Owners, Lessees, Etc., Whose Property Adjoins the Waterbody (if more than can be entered here, please attach a supplemental list).

a. Address- SFWMD - 80 South Hoagland Blvd

City - Kissimmee State - FL Zip - 34741

b. Address- South Florida Hospitality - 1595 W Oakland Park Blvd

City - Oakland Park State - FL Zip - 33311

c. Address- CSX Transportation Inc. - 500 Water Street

City - Jacksonville State - FL Zip - 32202

d. Address- Broward County - 960 NW 38 Street

City - Oakland Park State - FL Zip - 33309

e. Address-

City - State - Zip -

26. List of Other Certificates or Approvals/Denials received from other Federal, State, or Local Agencies for Work Described in This Application.

AGENCY	TYPE APPROVAL*	IDENTIFICATION NUMBER	DATE APPLIED	DATE APPROVED	DATE DENIED
SFWMD	General Permit	191104-2207	11/4/2019	Pending	

* Would include but is not restricted to zoning, building, and flood plain permits

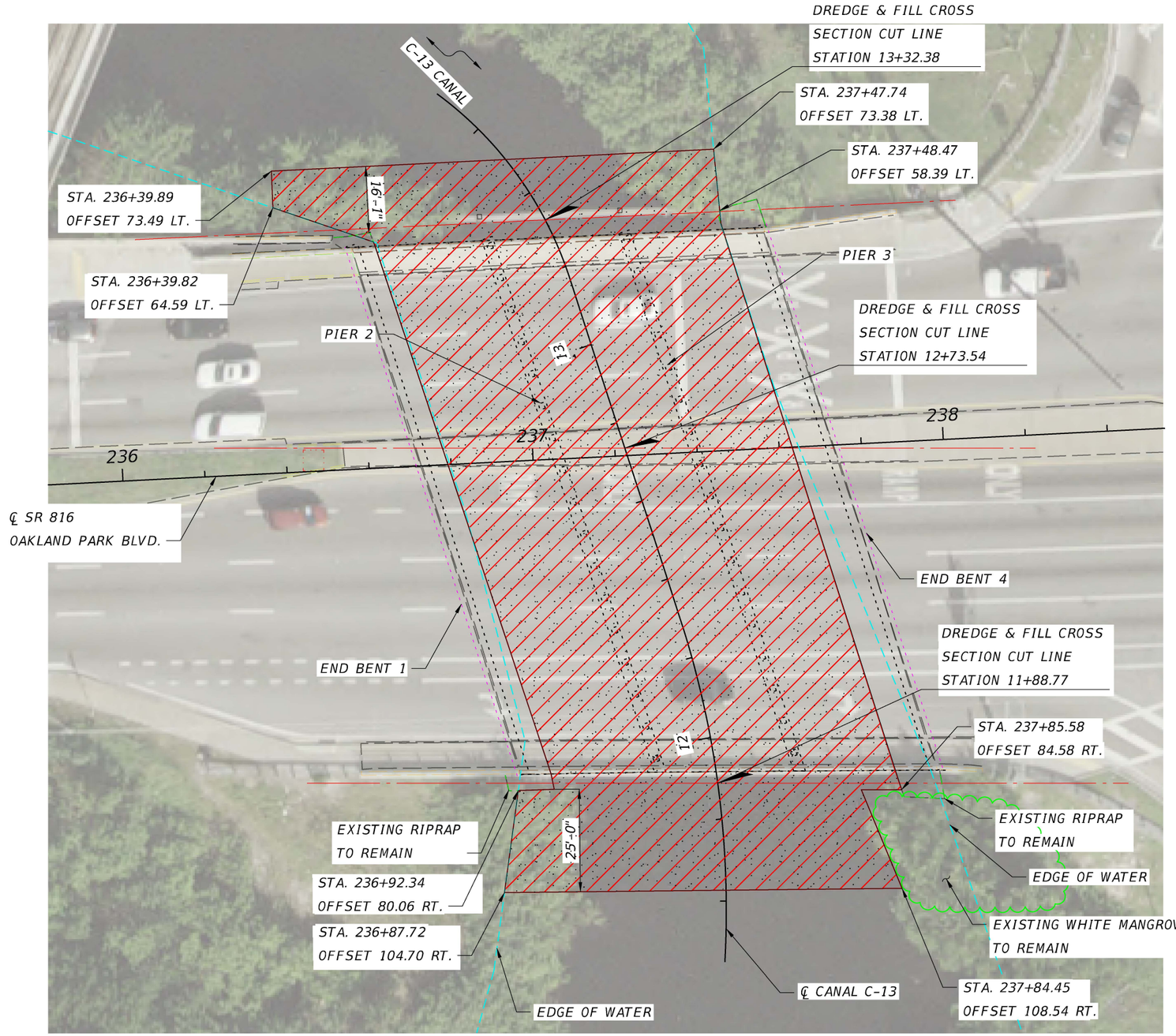
27. Application is hereby made for permit or permits to authorize the work described in this application. I certify that this information in this application is complete and accurate. I further certify that I possess the authority to undertake the work described herein or am acting as the duly authorized agent of the applicant.

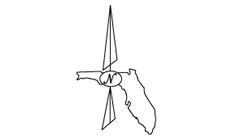
Melissa Wilson

SIGNATURE OF APPLICANT DATE SIGNATURE OF AGENT DATE

The Application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent if the statement in block 11 has been filled out and signed.

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willfully falsifies, conceals, or covers up any trick, scheme, or disguises a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statements or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.





LEGEND

EXCAVATION

FILL

EXCAVATION AREA = 15602 SF
EXCAVATION VOLUME = 1695 CY

FILL AREA = 15602 SF
FILL VOLUME = 1328 CY

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

PLAN

BRIDGE NO. 860139

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
DEJ	LPR	DPV	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

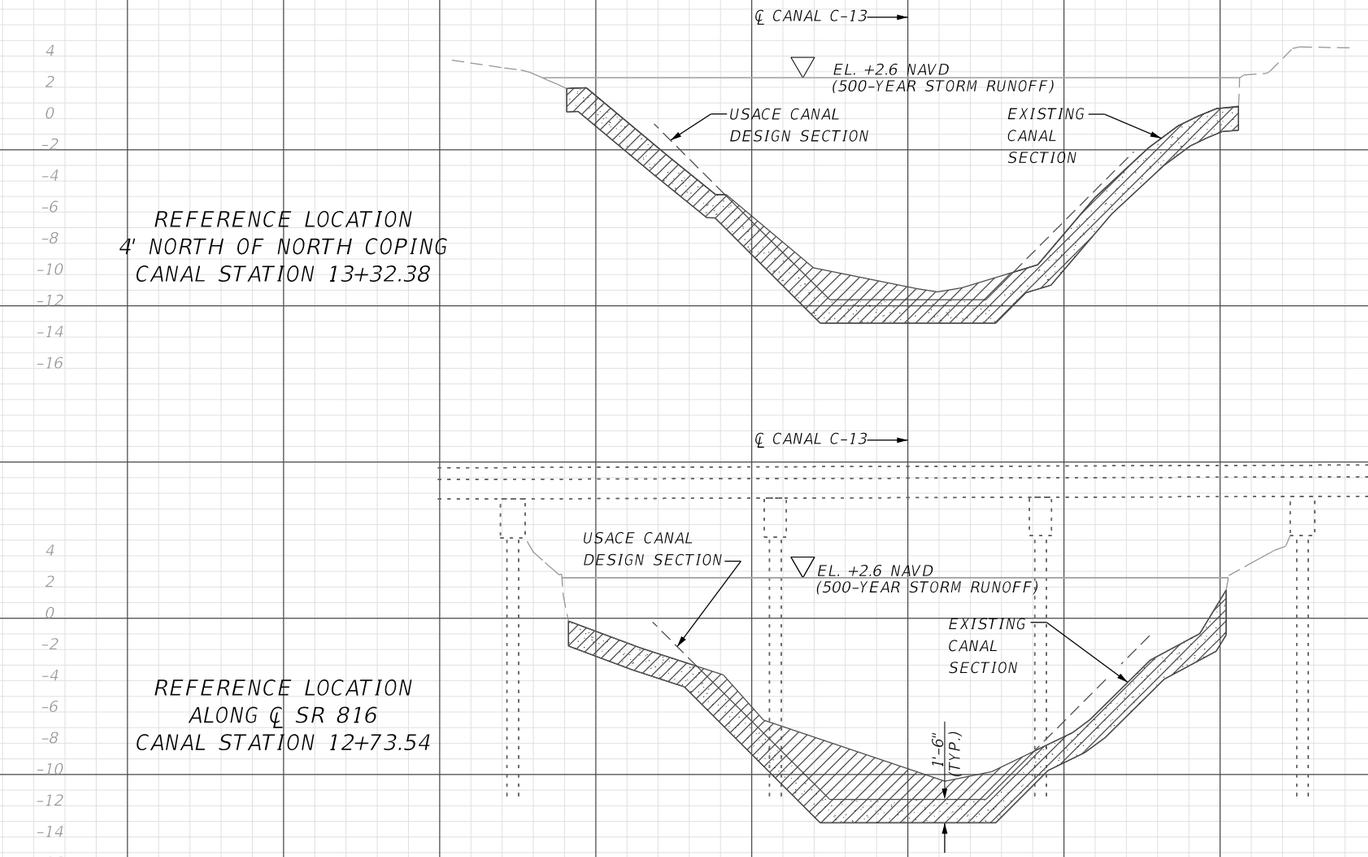
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: PLAN DREDGE & FILL SKETCH

REF. DWG. NO.:

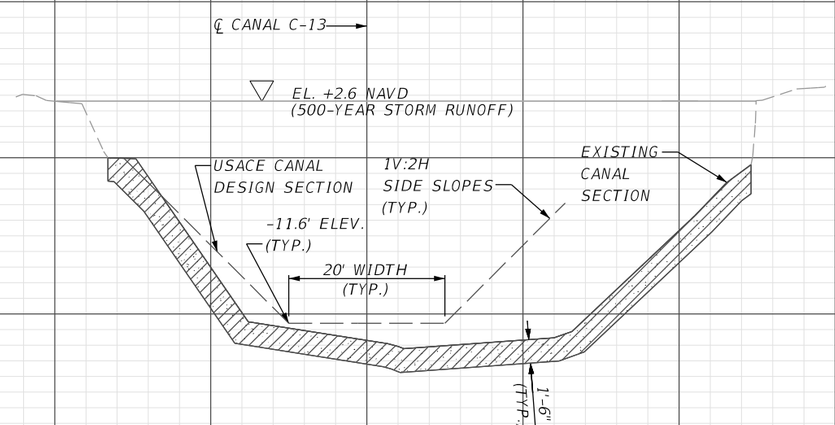
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 1



REFERENCE LOCATION
4' NORTH OF NORTH COPING
CANAL STATION 13+32.38

REFERENCE LOCATION
ALONG ℄ SR 816
CANAL STATION 12+73.54



REFERENCE LOCATION
3' SOUTH OF SOUTH COPING
CANAL STATION 11+88.77

1" = 20' Horizontal
1" = 10' Vertical

140 120 100 80 60 40 20 0 20 40 60 80 100

NOTE:
ELEVATIONS REFERENCE NAVD 88.
TO CONVERT FROM NAVD 88 TO NGVD 29,
ADD 1.6 FT TO NAVD 88 ELEVATIONS
AT THIS LOCATION.

EXCAVATION: 1695 CY

FILL: 1328 CY

LEGEND:

EXCAVATION

FILL

USACE CANAL DESIGN SECTION

EXISTING CANAL SECTION

1" = 20' Horizontal
1" = 10' Vertical

BRIDGE NO. 860139

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
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CERTIFICATE OF AUTHORIZATION NO. 6500
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DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
DEJ	LPR	DPV	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: DREDGE & FILL CROSS SECTIONS

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 2

CONTRACT PLANS COMPONENTS

STRUCTURE PLANS

STATE OF FLORIDA

DEPARTMENT OF TRANSPORTATION

CONTRACT PLANS

FINANCIAL PROJECT ID 441474-1-52-01

BROWARD COUNTY (86090)

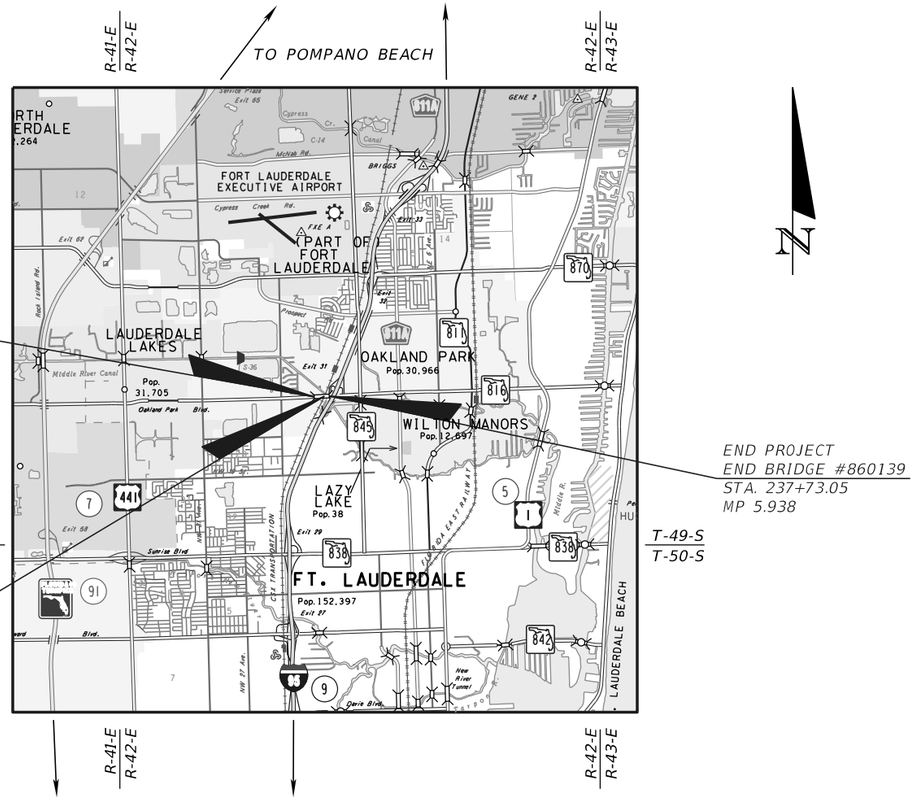
STATE ROAD NO. 816

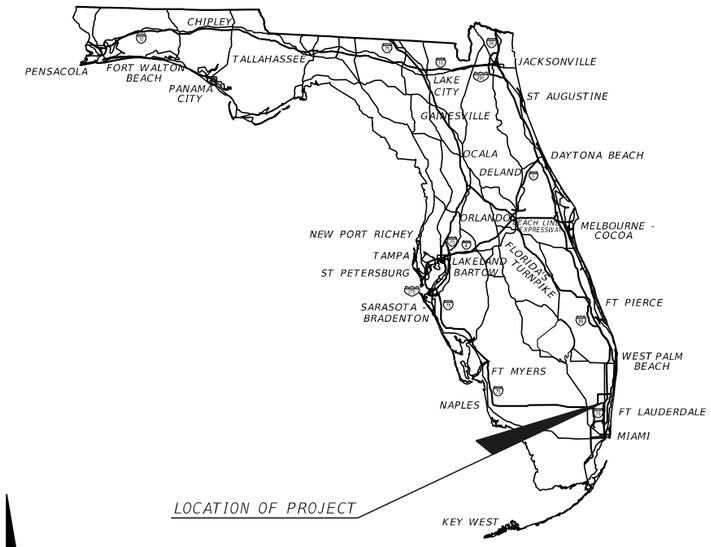
OAKLAND PARK BLVD. OVER THE C-13 CANAL
BRIDGE NO. 860139 SCOUR COUNTERMEASURE

INDEX OF STRUCTURE PLANS

* These sheets are included in the Index of Structure Plans only to indicate that they are part of the Structure Plans. These sheets are contained in separate digitally signed and sealed documents.

** These pages will be included in a later submittal.





GOVERNING STANDARD PLANS:

Florida Department of Transportation, FY2020-21 Standard Plans for Road and Bridge Construction and applicable Interim Revisions (IRs).

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

GOVERNING STANDARD SPECIFICATIONS:

Florida Department of Transportation, January 2021 Standard Specifications for Road and Bridge Construction at the following website: http://www.fdot.gov/programmanagement/implementedSpecBooks

CONSTRUCTABILITY SUBMITTAL

DATE: 12/2019

STRUCTURE PLANS ENGINEER OF RECORD:

LUIS P. RAMOS, P.E.
P.E. NO.: 78122
HNTB CORPORATION
5900 N. ANDREWS AVENUE, SUITE 400
FORT LAUDERDALE, FL 33309
(954) 903-1785
CONTRACT NO.: C9W31
VENDOR NO.: F431623092
CERTIFICATE OF AUTHORIZATION NO.: 6500

FDOT PROJECT MANAGER:

BING WANG, P.E.

CONSTRUCTION CONTRACT NO.	FISCAL YEAR	SHEET NO.
E4U45	21	1

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

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

LUIS P. RAMOS
LICENSE
No 78122
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

THIS ITEM HAS BEEN DIGITALLY SIGNED AND SEALED BY:

ON THE DATE ADJACENT TO THE SEAL.

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HNTB CORPORATION
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FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

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

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2	SIGNATURE SHEET
3	SUMMARY OF PAY ITEMS
4	PROJECT CONTROL
5	GENERAL NOTES
9	PLAN AND ELEVATION (1 OF 2)
10	PLAN AND ELEVATION (2 OF 2)
11	CHANNEL CROSS SECTIONS
12	GABION MATTRESS DETAILS
SQ-1	SUMMARY OF QUANTITIES

KYLE K. CHEERANGIE
LICENSE
No 81392
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

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SHEET NO.	SHEET DESCRIPTION
2	SIGNATURE SHEET
7	TEMPORARY TRAFFIC CONTROL PLANS
8	SELECTIVE CLEARING AND GRUBBING

DAVID M. BOYER
LICENSE
No 43226
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

THIS DOCUMENT HAS BEEN DIGITALLY SIGNED AND SEALED BY:

ON THE DATE ADJACENT TO THE SEAL.

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SCALAR CONSULTING GROUP INC.
4152 BLUE HERON BLVD., SUITE 119
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P: (561) 429-5065
DAVID BOYER P.E. LIC. NO. 43226

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

SHEET NO.	SHEET DESCRIPTION
2	SIGNATURE SHEET
6	EROSION CONTROL PLAN

NOT FOR CONSTRUCTION PRELIMINARY AND SUBJECT TO CHANGE

BRIDGE NO. 860139

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY:	JGL
CHECKED BY:	LPR
DESIGNED BY:	DPV
CHECKED BY:	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: SIGNATURE SHEET

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 2

12/18/2019 11:55:08 AM

FLORIDA DEPARTMENT OF TRANSPORTATION
PROPOSAL SUMMARY OF PAY ITEMS
FOR PROPOSAL: E4U45

LEAD PROJECT : 441474-1-52-01 | DISTRICT : 04 | COUNTY/SECTION : 86090000

PROJECT(S) : 44147415201 | COUNTY : BROWARD

SUMMARY OF STRUCTURES

SPC	ALT	ITEM NUMBER	ITEM DESCRIPTION	UNIT	44147415201	44147415201 BR# 860139	QUANTITY TOTAL
		0999- 25-	INITIAL CONTINGENCY AMOUNT, DO NOT BID 44147415201	LS		1.000 N	1.000
		0102- 1-	MAINTENANCE OF TRAFFIC 44147415201	(LS)		1.000	1.000
		0101- 1-	MOBILIZATION 44147415201	LS		1.000	1.000
		0110- 2- 3	SELECTIVE CLEARING AND GRUBBING, PLANT PRESERVATION AREA	AC		0.010	0.010
		0102- 60-	WORK ZONE SIGN	ED		5040.000	5040.000
		0102- 74- 1	CHANNELIZING DEVICE- TYPES I, II, DI, VP, DRUM, OR LCD	ED		4320.000	4320.000
		0102- 74- 7	CHANNELIZING DEVICE- PEDESTRIAN LCD (LONGITUDINAL CHANNELIZING DEVICE)	LF		12.000	12.000
		0102- 76-	ARROW BOARD / ADVANCE WARNING ARROW PANEL	ED		240.000	240.000
		0104- 10- 3	SEDIMENT BARRIER	LF		250.000	250.000
		0104- 11-	FLOATING TURBIDITY BARRIER	LF		500.000	500.000
		0530- 5- 2	GABION, 1 FOOT AND GREATER THICKNESS	SY		1770.000	1770.000
		0120- 5-	CHANNEL EXCAVATION	CY		1184.000	1184.000
T		0400-153-	NON SHRINK GROUT, F&I, MISCELLANEOUS- STRUCTURES REHAB	CF		120.500	120.500

PAY ITEM NOTES:

530-5-2. PRICE AND PAYMENT FOR GROUT MATERIALS, LABOR AND PLACEMENT IS INCLUDED IN PRICE AND PAYMENT FOR GABION. MEET THE REQUIREMENTS OF SPECIFICATIONS SECTION 934 FOR GROUT.

BRIDGE NO. 860139

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HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY: DPV
CHECKED BY: LPG
DESIGNED BY: DPV
CHECKED BY: LPG

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

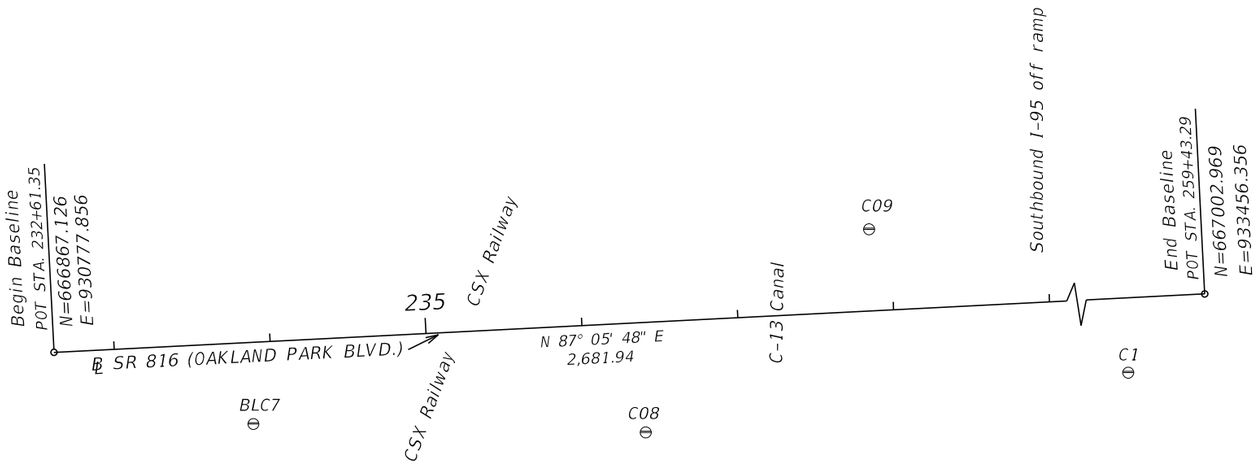
SHEET TITLE: SUMMARY OF PAY ITEMS
REF. DWG. NO.:
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL
SHEET NO.: 3

PROJECT CONTROL POINTS
SECTION'S 21 & 28, TOWNSHIP 49 S., RANGE 42 E.

N

SCALE:
1" = 100'

LEGEND
℄ = BASELINE
FDOT = FLORIDA DEPARTMENT OF TRANSPORTATION
S.R. = STATE ROAD
RT = RIGHT
LT = LEFT
⊖ = FDOT BRASS OR ALUMINUM DISC IN CONCRETE
N.A.V.D. = NORTH AMERICAN VERTICAL DATUM
NAD = NORTH AMERICAN DATUM
N = NORTHING
E = EASTING



PROJECT NETWORK CONTROL TABULATION SHEET DETAILS

POINT NAME	(Y) NORTHING	(X) EASTING	SCALE FACTOR	LATITUDE	LONGITUDE		OFFSET	ELEVATION NAVD-88	DESCRIPTION
C08	666815.841	931156.988	1.00002788	26°09'56.64654	80°09'41.76909	236+37.40	70.42 (RT)	8.63'	SET ALUMINUM DISC STAMPED "816/86/18/C08"
C09	666945.901	931300.085	1.00002797	26°09'57.92546	80°09'40.18941	237+86.90	52.22 (LT)	9.15'	SET ALUMINUM DISC STAMPED "816/86/18/C09"
C1	666897.097	932308.935	1.00002861	26°09'57.37750	80°09'29.12090	247+91.98	47.62 (RT)	5.20'	FOUND ALUMINUM DISK IN CONCRETE STAMPED 816-86-04-C1
BLC7	666821.184	930905.617	1.00002773	26°09'56.71551	80°09'44.52748	233+86.62	52.35 (RT)	8.15'	FOUND CONCRETE MONUMENT STAMPED 816/86/05/C07

* BASELINE OF SURVEY HAS NOT BEEN STAKED IN THE FIELD.

PROJECT CONTROL POINTS C8 AND C9 WERE SET BY C.H. PEREZ and ASSOCIATES DURING THE COURSE OF THIS SURVEY.
PROJECT CONTROL POINTS C1 AND BLC7 WERE PROVIDED BY FDOT SURVEYING AND MAPPING ON PNC SHEET FPID 428732-1-52-01, PREPARED BY KEITH & ASSOCIATES.

BEARINGS AND COORDINATES ARE RELATIVE TO THE STATE PLANE COORDINATES, FLORIDA EAST ZONE, NORTH AMERICAN DATUM (NAD) OF 1983, ADJUSTMENT OF 1990
A BEARING OF N 47°43'57.0" E HAS BEEN ESTABLISHED BETWEEN MONUMENTS
C8 ALUMINUM DISC IN CONCRETE STAMPED 816/86/18/C08
C9 ALUMINUM DISC IN CONCRETE STAMPED 816/86/18/C09
VERTICAL DATUM: N.A.V.D. 1988
PROJECT UNITS: U.S. SURVEY FEET
FIELD BOOK REFERENCE: 4320118
GEOPAK CoGo DATABASE: job001.gpk
CAICE ELECTRONIC DATABASE: 4414741.zip

LIMITS: SR 816 (OAKLAND PARK BLVD.) @ THE C-13 CANAL, JUST WEST OF I-95

THIS IS NOT A SURVEY.

THIS SHEET REPRESENTS THE RESULTING DATA FROM A FIELD SURVEY PERFORMED BY C.H. PEREZ & ASSOCIATES, INC. AND COMPLETED ON FEBRUARY 2019 AND APPROVED BY FDOT DISTRICT-4. THE SURVEY WAS CERTIFIED BY AND DONE UNDER THE RESPONSIBLE CHARGE OF PROFESSIONAL SURVEYOR AND MAPPER LAZARO E. FLEITAS, P.S.M. #6518.

A SIGNED SEALED AND CERTIFIED COPY IS ON FILE AT THE DISTRICT SURVEY OFFICE.

BRIDGE NO. 860139

REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY: DPV
CHECKED BY: LPG
DESIGNED BY: LEF
CHECKED BY: LPG

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: PROJECT CONTROL
REF. DWG. NO.:
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL
SHEET NO.: 4

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GENERAL NOTES:

A. DESIGN SPECIFICATIONS:
1. FDOT STRUCTURES MANUAL DATED JANUARY 2020 AND ALL SUBSEQUENT FDOT STRUCTURES DESIGN BULLETINS.
2. FDOT DRAINAGE MANUAL DATED JANUARY 2020 AND ALL SUBSEQUENT FDOT DRAINAGE DESIGN BULLETINS.
3. FEDERAL HIGHWAY ADMINISTRATION (FHWA) BRIDGE SCOUR AND STREAM INSTABILITY COUNTERMEASURES: EXPERIENCE, SELECTION, AND DESIGN GUIDANCE, THIRD EDITION, VOLUMES 1 & 2.
4. FDOT DESIGN MANUAL DATED JANUARY 2020 AND ALL SUBSEQUENT FDOT ROADWAY DESIGN BULLETINS.

B. PROJECT CONTROL:
1. BENCHMARK ELEVATIONS SHOWN IN THE PLANS ARE BASED ON NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88).
2. ALL SURVEY INFORMATION WAS OBTAINED FROM A LICENSED FLORIDA PROFESSIONAL SURVEYOR AND MAPPER AND UTILIZED AS SUPPORTING DATA IN THE PRODUCTION OF DESIGN PLANS AND FOR CONSTRUCTION ON SUBJECT PROJECT. THE PROFESSIONAL SURVEYOR AND MAPPER OF RECORD IS:

LAZARO E. FLEITAS, P.S.M.
P.S.M. LICENSE NO. 6518
C.H. PEREZ AND ASSOCIATES CONSULTING ENGINEERS, INC.
9594 N.W. 41st STREET, SUITE 201
DORAL, FLORIDA 33178
CERTIFICATE OF AUTHORIZATION NO. EB-25975/LB-7360

C. ENVIRONMENT:
SUPERSTRUCTURE – SLIGHTLY AGGRESSIVE
SUBSTRUCTURE – CONCRETE: SLIGHTLY AGGRESSIVE
STEEL: SLIGHTLY AGGRESSIVE

D. DESIGN METHODOLOGY:
DESIGN GUIDELINE 10 – GABION MATTRESS FOR BED ARMOR AND PIER PROTECTION, FEDERAL HIGHWAY ADMINISTRATION (FHWA) BRIDGE SCOUR AND STREAM INSTABILITY COUNTERMEASURES: EXPERIENCE, SELECTION, AND DESIGN GUIDANCE, THIRD EDITION, VOLUMES 2.

E. MATERIALS:
1. GABIONS:
GABIONS SHALL BE IN ACCORDANCE WITH MODIFIED SPECIAL PROVISION SECTION 530 OF THE FDOT STANDARD SPECIFICATIONS.
2. GEOTEXTILE FILTER FABRIC:
GEOTEXTILE FILTER FABRIC SHALL BE IN ACCORDANCE WITH SECTION 514, 530, AND 985 OF THE FDOT STANDARD SPECIFICATIONS.

F. PLAN DIMENSIONS:
ALL DIMENSIONS IN THESE PLANS ARE MEASURED IN FEET EITHER HORIZONTALLY OR VERTICALLY UNLESS OTHERWISE NOTED.

G. UTILITIES:
1. FOR PLAN LOCATIONS OF EXISTING UTILITIES, SEE PLAN AND ELEVATION SHEET(S). THE LOCATIONS OF THE UTILITIES SHOWN IN THE PLANS (INCLUDING THOSE DESIGNATED VV, VH, AND VVH) ARE BASED ON LIMITED INVESTIGATION TECHNIQUES AND SHOULD BE CONSIDERED APPROXIMATE ONLY. THE VERIFIED LOCATIONS/ELEVATIONS APPLY ONLY AT THE POINTS SHOWN. INTERPOLATIONS BETWEEN THESE POINTS HAVE NOT BEEN VERIFIED.
2. UTILITY/AGENCY OWNERS:

COMPANY	CONTACT	PHONE NUMBER
AT&T DISTRIBUTION	OTIS KEEVE	(954) 723-2540
BROWARD COUNTY TRAFFIC ENGINEERING	ROBERT BLOUNT	(954) 847-2600
COMCAST	LEONARD MAXWELL-NEWBOLD	(954) 447-8405
CROWNE CASTLE	DANNY HASKETT	(305) 552-2931
FDOT ITS – ARTERIAL	CHRIS BEAUDRY	(954) 847-1995
FPL DISTRIBUTION	BYRON SAMPLE	(954) 321-2056
FPL TRANSMISSION	JAMES JOSEPH	(561) 904-3634
MCI (VERIZON)	DEAN BOYERS	(469) 886-4238
SFRTA	NIKEISHA THOMAS	(954) 788-1788

H. EXISTING BRIDGE CONSTRUCTION CONSIDERATIONS:
1. DIMENSION VERIFICATION
UNLESS OTHERWISE NOTED, THE DIMENSIONS, ELEVATIONS, AND INTERSECTING ANGLES SHOWN ARE BASED ON THE INFORMATION AS DETAILED IN THE ORIGINAL CONSTRUCTION PLANS OF THE EXISTING BRIDGES AND MAY NOT REPRESENT AS-BUILT CONDITIONS. IT IS THE CONTRACTOR'S RESPONSIBILITY TO VERIFY THIS DATA BEFORE BEGINNING CONSTRUCTION AND NOTIFY THE ENGINEER OF ANY DISCREPANCIES.

I. NAVIGABLE WATERWAY:
AT NO TIME DURING CONSTRUCTION WILL THE WATERWAY BE CLOSED TO NAVIGATION WITHOUT PRIOR NOTIFICATION AND APPROVAL OF THE SEVENTH COAST GUARD MARINE SAFETY OFFICE IN MIAMI (MSO, MIAMI). ALL CONSTRUCTION EQUIPMENT MUST BE MARKED IN ACCORDANCE WITH THE U.S. COAST GUARD "NAVIGATION RULES (CG-169)" AND BE WELL REMOVED FROM THE CHANNEL WHEN NOT ENGAGED IN CONSTRUCTION ACTIVITIES. A COPY OF THE CONTRACTOR'S PLAN, SCHEDULE, AND SEQUENCE OF OPERATIONS SHALL BE SUBMITTED TO THE U.S. COAST GUARD MSO, MIAMI AND THE CONSTRUCTION RESIDENT ENGINEER FOR APPROVAL 30 DAYS PRIOR TO STARTING. ANY WORK THAT WOULD POTENTIALLY REDUCE THE HORIZONTAL AND/OR VERTICAL CLEARANCE OF THE WATERWAY SHALL BE INCLUDED WITH THE ABOVE. IMMEDIATELY NOTIFY THE COAST GUARD MARINE SAFETY OFFICE, MIAMI, BARRY DRAGON AT (305) 415-6743 TO SCHEDULE THE PLACEMENT OF BARGES OR FLOATING EQUIPMENT IN THE WATERWAY AND ANY CHANNEL CLOSURES REQUIRED FOR THIS CONSTRUCTION. USCG HAS AUTHORIZED A MAXIMUM HORIZONTAL CHANNEL RESTRICTION OF XX FEET. FLOATING BARRIERS AND EQUIPMENT NEED TO BE USED WITH CAUTION DUE TO TIDAL CURRENTS AND BOAT TRAFFIC.

J. ENVIRONMENTAL NOTES:
1. THE ADJACENT MARINE AREAS ARE HABITAT FOR MANATEES. CONTACT THE DISTRICT CONSTRUCTION ENVIRONMENTAL COORDINATOR (DCEC) IN ORDER TO ENSURE ALL POSTING AND PROTECTION REQUIREMENTS ARE FULFILLED. THE DCEC CAN BE REACHED IN THE DISTRICT OFFICE BY CALLING (954) 448-2880.

2. THERE ARE MANGROVES PRESENT IN THE VICINITY OF THE PROJECT THAT MUST NOT BE DISTURBED. STAGE, STORE, AND MOVE BARGES AND VESSELS IN A MANNER THAT DOES NOT IMPACT MANGROVE BEDS OR DISPLACE BOTTOM MATERIALS.

BRIDGE NO. 860139

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REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

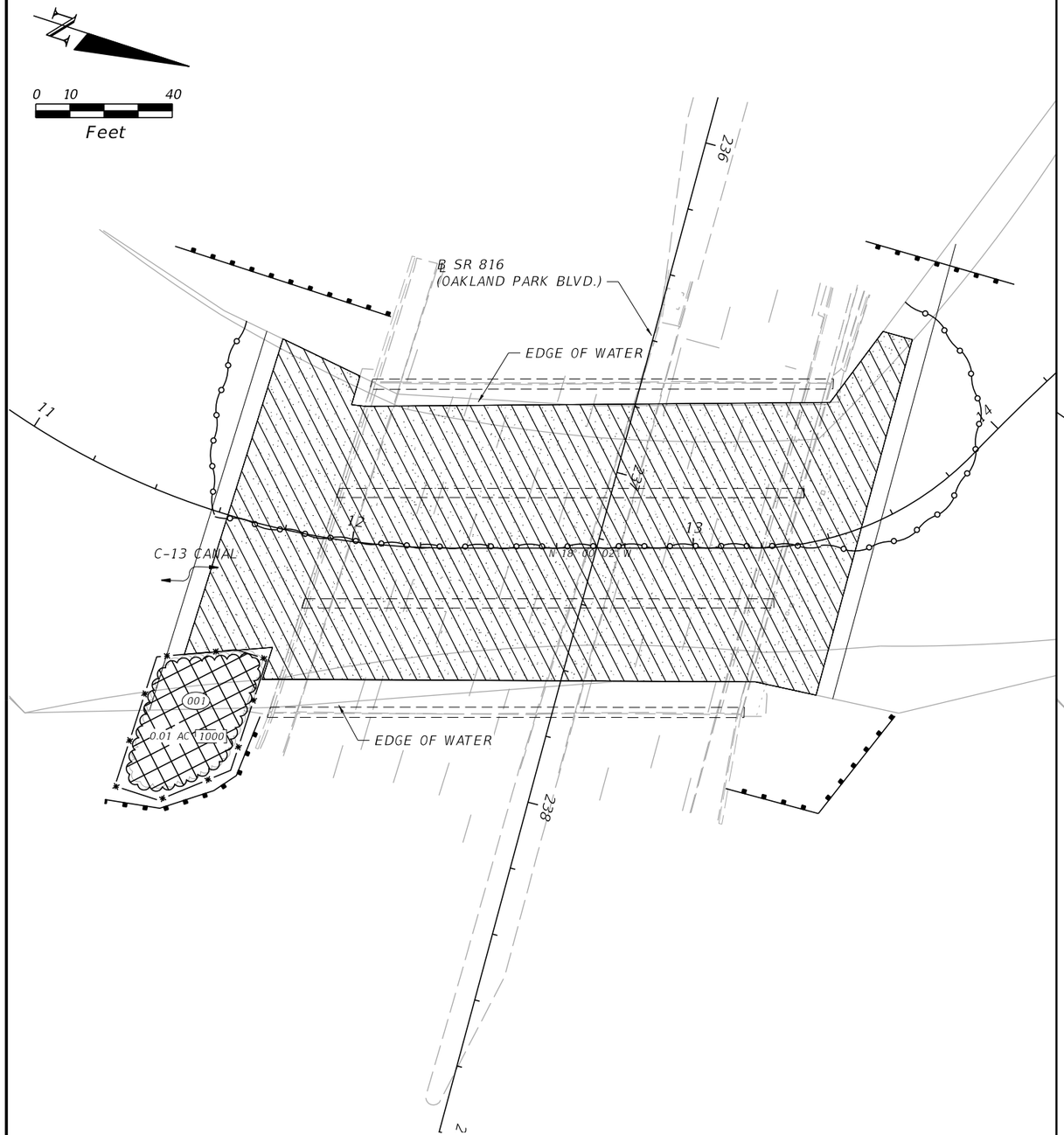
ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY: JGL
CHECKED BY: LPR
DESIGNED BY: DPV
CHECKED BY: LPR

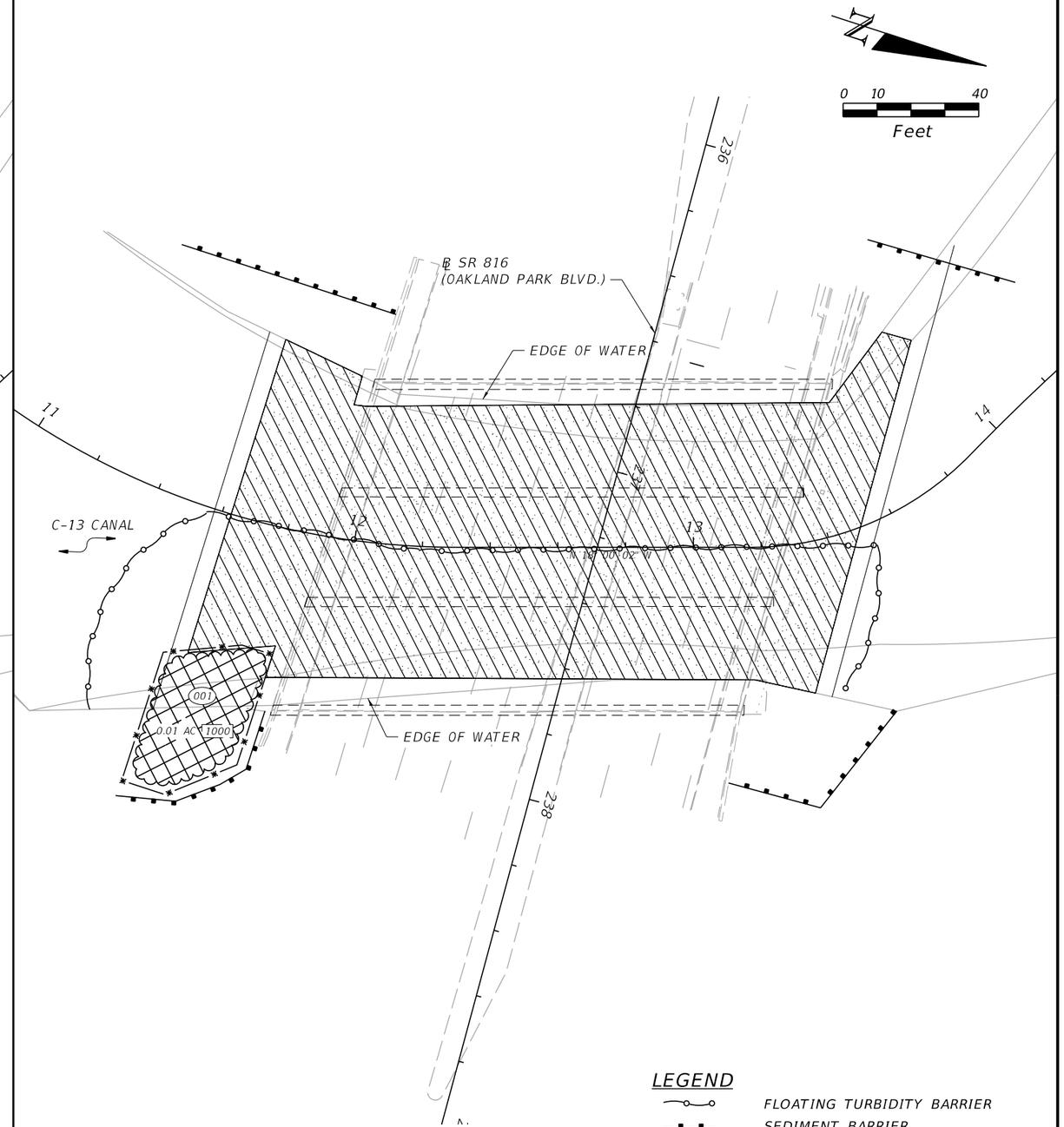
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: GENERAL NOTES
REF. DWG. NO.:
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL
SHEET NO.: 5



PHASE I



PHASE II

NOTE:

1. PROVIDE ACCESS BY BOATERS DURING ALL PHASES OF CONSTRUCTION

LEGEND

- FLOATING TURBIDITY BARRIER
- SEDIMENT BARRIER
- TREE PROTECTION BARRIER
- XXX — PLANT PRESERVATION AREAS
- XXXX — EXISTING MANGROVES TO REMAIN

BRIDGE NO. 860139

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

DAVID M BOYER P.E.
P.E. LICENSE NUMBER 43226
SCALAR CONSULTING GROUP INC.
4152 W. BLUE HERON BOULEVARD, SUITE 119
RIVIERA BEACH, FLORIDA 33404
CERTIFICATE OF AUTHORIZATION 29560

DRAWN BY:	SLH
CHECKED BY:	DMB
DESIGNED BY:	DMB
CHECKED BY:	JDW

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: EROSION CONTROL PLAN

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 6

TRAFFIC CONTROL PLAN GENERAL NOTES

1. THE TRAFFIC CONTROL PLANS SHALL BE IN ACCORDANCE WITH THE PROJECT PLANS AND THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES 2009 (MUTCD) AS MINIMUM CRITERIA.

2. THE REGULATORY SPEED DURING CONSTRUCTION FOR ALL PHASES OF WORK SHALL BE THE EXISTING POSTED SPEED FOR INTERSTATE, FREEWAYS, RAMPS AND ARTERIAL ROADWAYS WITHIN THE PROJECT LIMITS UNLESS OTHERWISE APPROVED BY THE PROJECT ENGINEER.
   I-95 POSTED SPEED = 65 MPH.
   OAKLAND PARK BLVD POSTED SPEED = 45 MPH.

3. LANE CLOSURES ARE LIMITED TO ONE LANE CLOSURE IN EACH DIRECTION OF TRAVEL ON OAKLAND PARK BLVD. LANE CLOSURES ARE ONLY ALLOWED BETWEEN THE HOURS OF 9:00 PM TO 5:00 AM.

4. MAINTAIN SINGLE LANE CLOSURES AND SIDEWALK CLOSURES IN ACCORDANCE WITH FDOT STANDARD PLANS INDEXES 102-045 & 102-075.

5. CONSTRUCTION VEHICLES SHALL NOT BE PARKED/STAGED OR STOPPED WITHIN THE RAILROAD RIGHT-OF-WAY AT ANY TIME.

BRIDGE NO. 860139

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P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
KYLE K. CHEERANGIE P.E. LIC. NO. 81392

DRAWN BY: DPV
CHECKED BY: LPG
DESIGNED BY: KKC
CHECKED BY: LPG

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

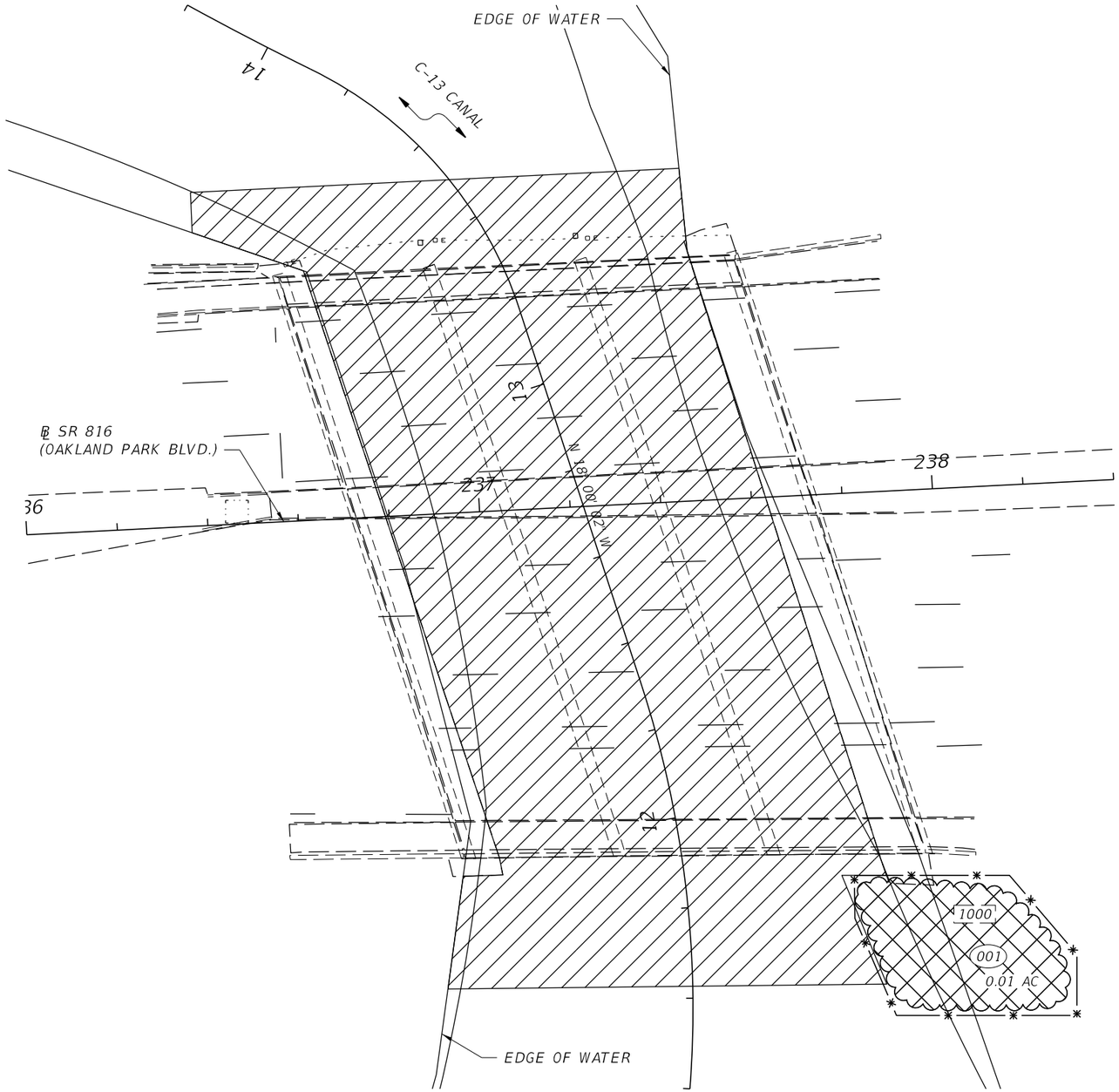
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

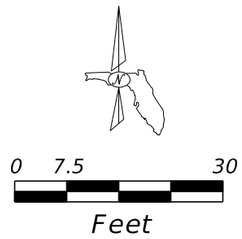
SHEET TITLE: TEMPORARY TRAFFIC CONTROL PLANS

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 7





LEGEND

- WORK ZONE
- TREE PROTECTION BARRIER
- XXX — PLANT PRESERVATION AREAS
- XXXX — EXISTING MANGROVES TO REMAIN

BRIDGE NO. 860139

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REVISIONS					
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

ENGINEER OF RECORD:
HNTB CORPORATION
5900 N. ANDREWS AVE., SUITE 400
FORT LAUDERDALE, FL. 33309
P: (954) 903-1785
CERTIFICATE OF AUTHORIZATION NO. 6500
KYLE K. CHEERANGIE P.E. LIC. NO. 81392

DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
DPV	CAM	DPV	CAM

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

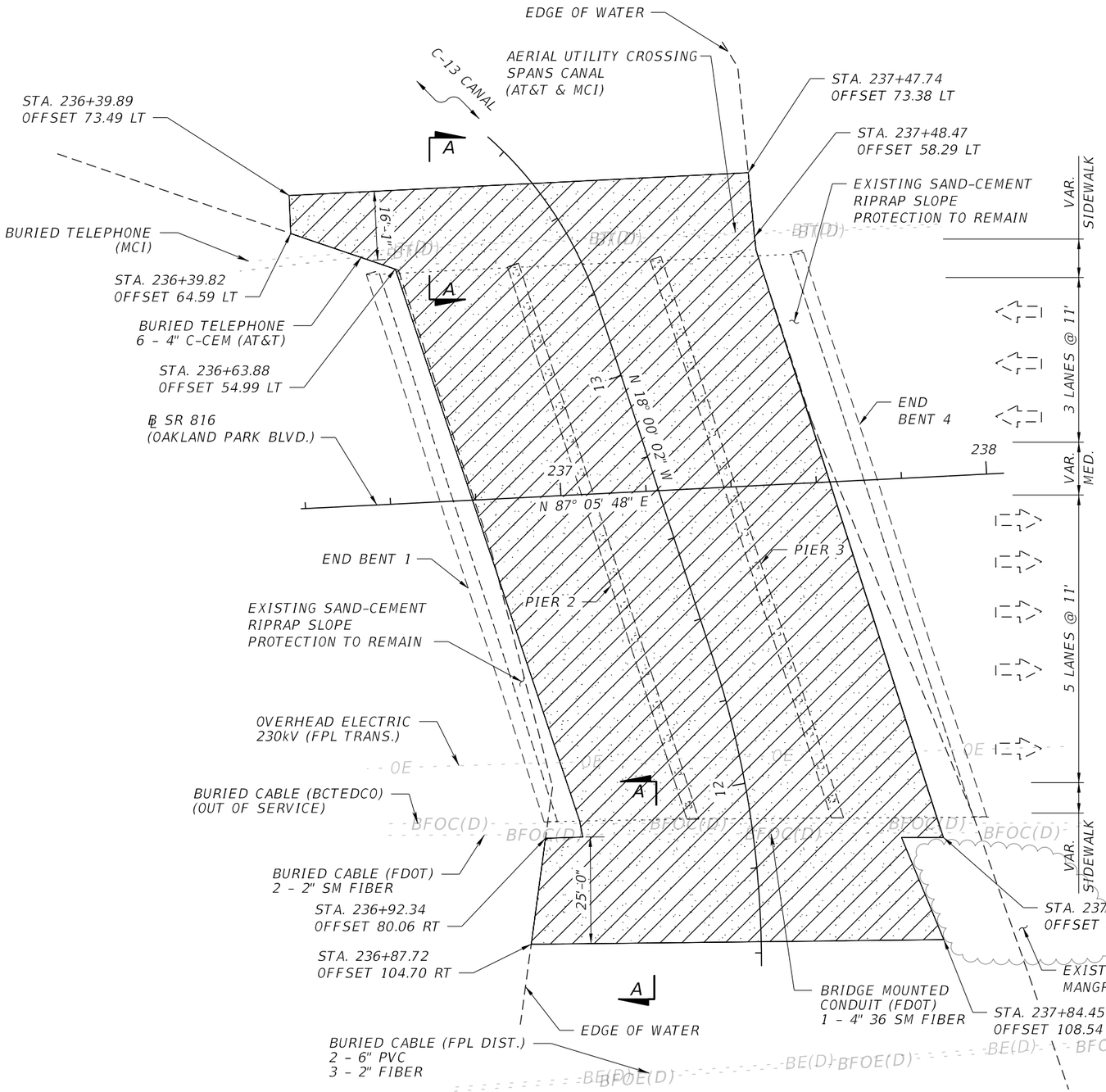
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: SELECTIVE CLEARING AND GRUBBING

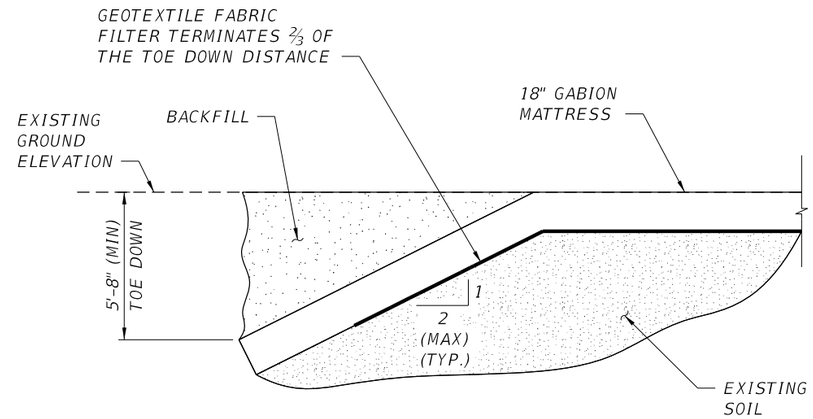
REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 8



PLAN
SCALE 1'=30'



SECTION A-A

LEGEND

- EXCAVATION
- FILL
- EXISTING SOIL

NOTES:

1. EACH GABION MARINE MATTRESS SHALL BE SEAMED UNDERWATER, AND THE MATTRESS SHALL HAVE A TOE DOWN TO 5'-8" WITH A MAXIMUM SLOPE OF 2:1 AT UPSTREAM AND DOWNSTREAM END OF THE BRIDGE.
2. MARINE MATTRESS SHALL BE PLACED DIRECTLY INTO FINAL POSITION. DRAGGING OF MARINE MATTRESS ON CHANNEL BOTTOM WILL NOT BE PERMITTED.
3. SEAL INTERFACE BETWEEN GABION MATTRESS AND PILES/ABUTMENTS WITH GROUT.

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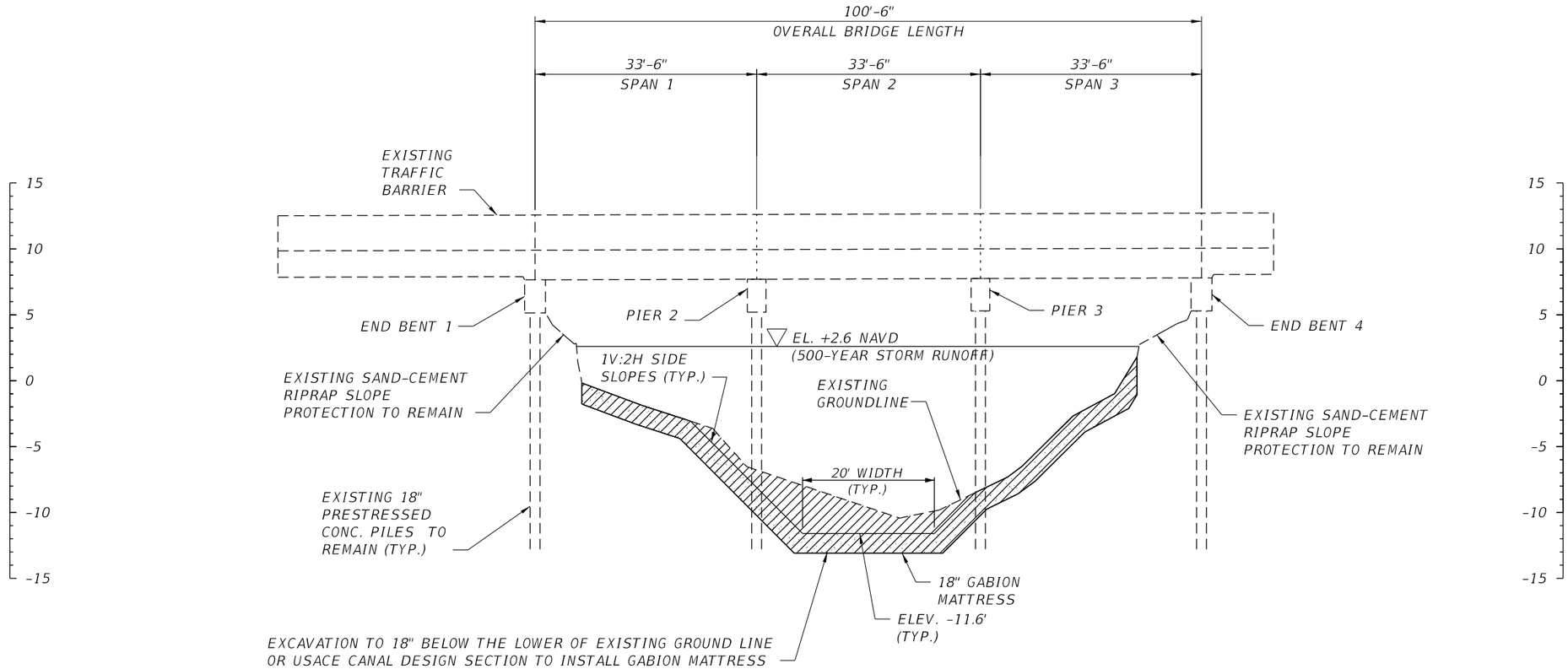
LUIS P. RAMOS P.E. LIC. NO. 78122

DRAWN BY: JGL
CHECKED BY: LPR
DESIGNED BY: DPV
CHECKED BY: LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: PLAN AND ELEVATION (1 OF 2)
REF. DWG. NO.:
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL
SHEET NO.: 9



NOTE:
1. SPECIALIZED EQUPIMENT MAY BE NECESSARY DUE TO LOW CLEARANCE UNDER BRIDGE.

ELEVATION
SCALE

1" = 20' Horizontal
1" = 10' Vertical

LEGEND

EXCAVATION

FILL

BRIDGE NO. 860139

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DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
JGL	LPR	DPV	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

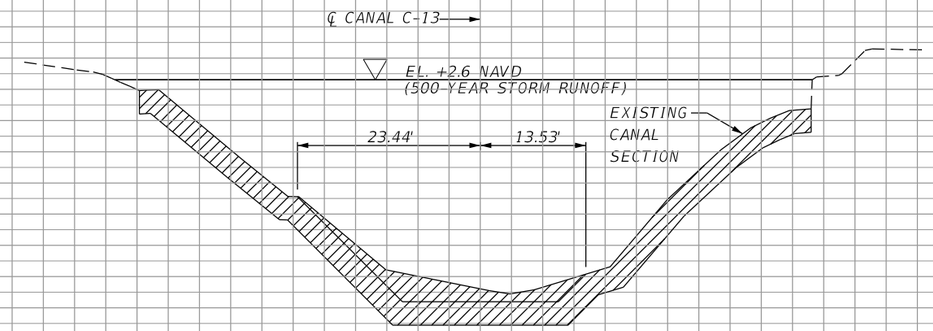
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: PLAN AND ELEVATION (2 OF 2)

REF. DWG. NO.:

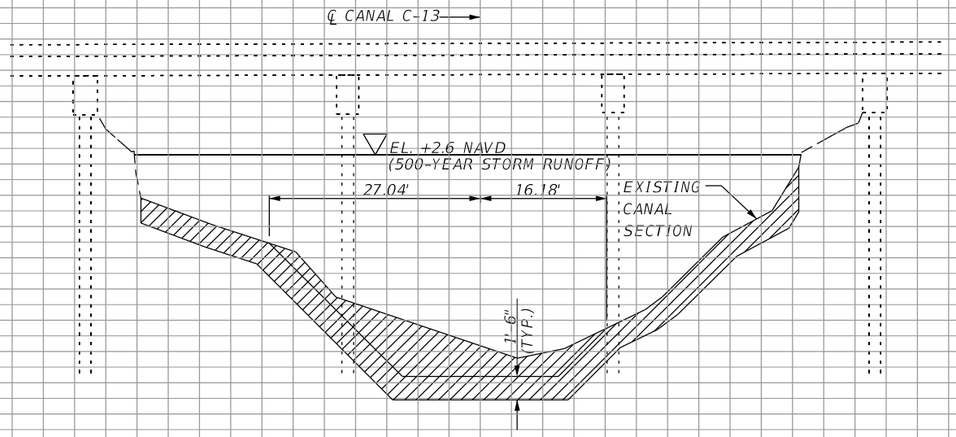
PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 10



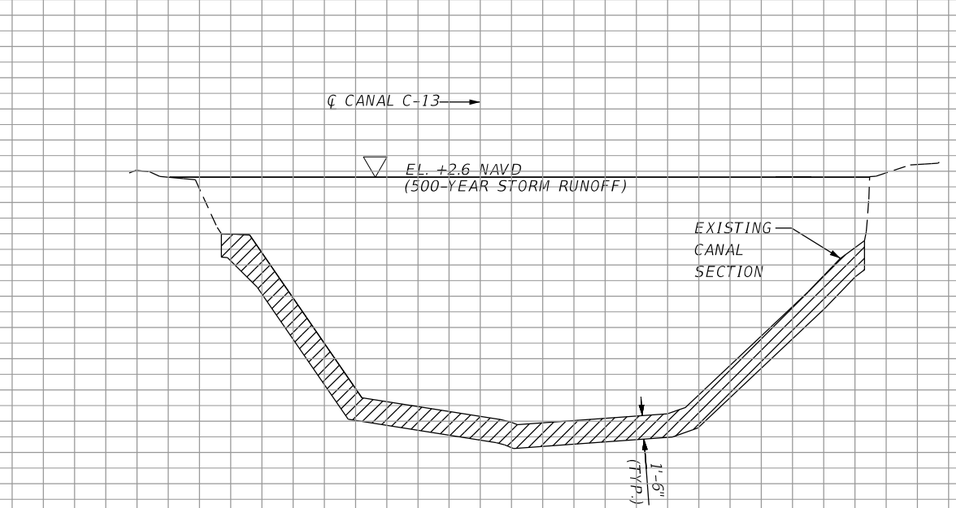
13+32.38

Channel Exc.		Embankment	
A	V	A	V
	191		



12+73.54

	713		
	277.5		



11+88.77

	983		
	154.3		

LEGEND:

EXCAVATION

1" = 20' Horizontal

1" = 10' Vertical

REVISIONS					
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DRAWN BY:	CHECKED BY:	DESIGNED BY:	CHECKED BY:
XSD	LPR	DPV	LPR

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

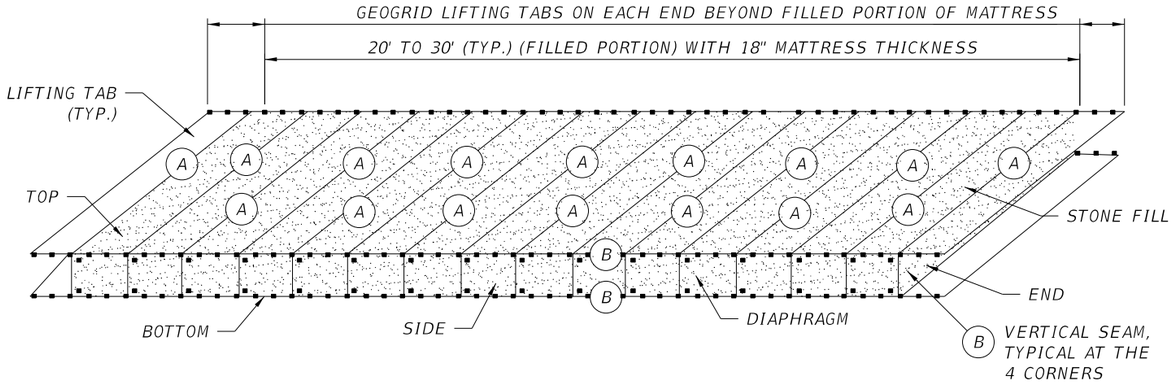
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: CHANNEL CROSS SECTIONS

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 11



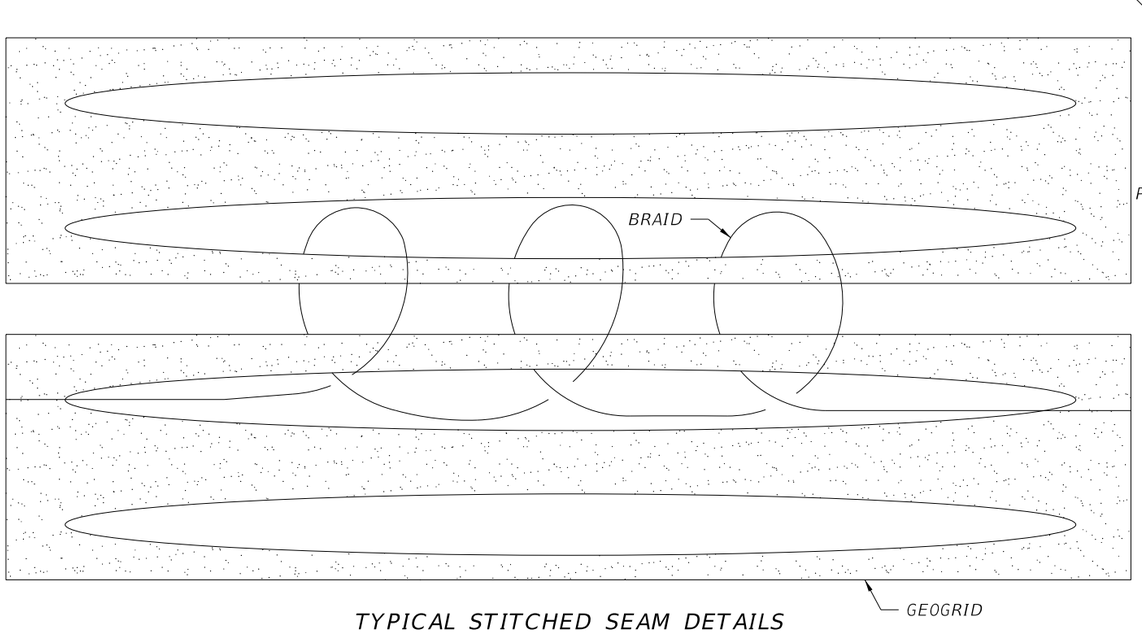
TYPICAL CONFIGURATION OF FILLED MATTRESS UNITS

(A) INDICATES BODKIN CONNECTION USING ⅜" DIAMETER HDPE BODKIN ROD

(B) INDICATES BRAIDED SEAM USING 1/16" DIAMETER HIGH UV HDPE BRAID

NOTES:

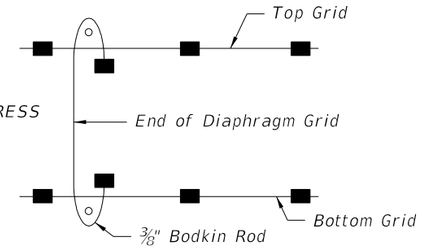
1. ENDS, TOP, BOTTOM, SIDES AND ANY EXTRA LENGTH USED FOR LIFTING OR ANCHORING PURPOSES SHALL BE COMPOSED OF AN ADEQUATE GEOGRID.
2. INTERNAL DIAPHRAGMS SHALL BE COMPOSED OF AN ADEQUATE GEOGRID.
3. NOMINAL WIDTH OF UNITS: 5 FT (FILLED), 4.3 FT (UNFILLED).
4. TYPICAL THICKNESS (FILLED): 18 INCHES.
5. PLASTIC CABLES TIES MAY BE USED TO SECURE BODKIN CONNECTORS IN POSITION PRIOR TO TENSIONING OR FILLING OF MATTRESS UNITS.



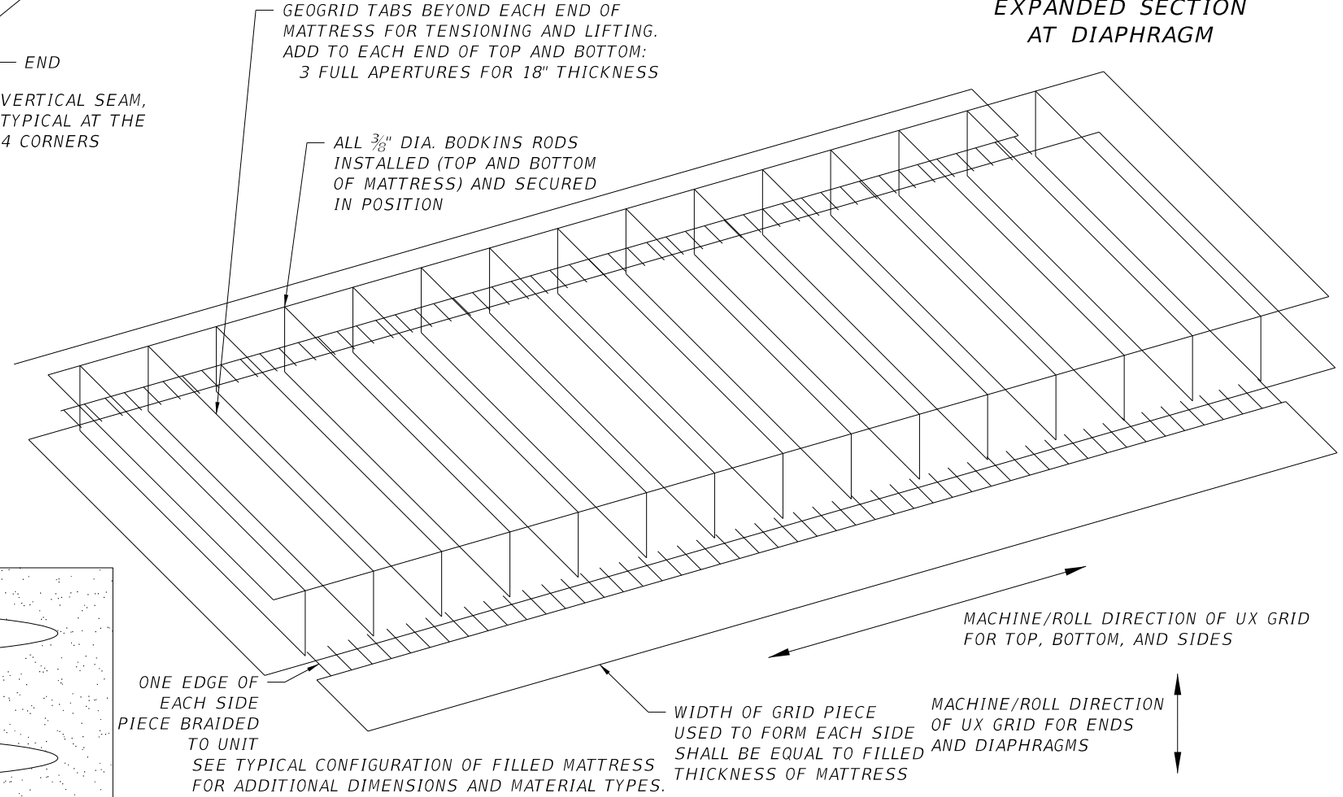
TYPICAL STITCHED SEAM DETAILS

NOTES:

TYPICAL SPACING OF DIAPHRAGMS IS EVERY THREE APERTURE LENGTHS. A SHORTER SPACING MAY BE USED IN ORDER TO MATCH THE REQUIRED MATTRESS LENGTH.
LENGTH OF END PIECES AND INTERNAL DIAPHRAGMS PIECES SHALL BE:
FOR 18" (FILLED) MATTRESS THICKNESS: 3 GRID APERTURES LONG;



EXPANDED SECTION AT DIAPHRAGM



TYPICAL CONFIGURATION OF FABRICATED MATTRESS

NOTES:

ALL CUT ENDS OF BRAID MATERIAL SHALL BE KNOTTED WITHIN ½" TO 2" OF THE END TO PREVENT RAVELING OF BRAID.

AT ALL ENDS OF ALL BRAIDED SEAMS THE BRAID SHALL BE SECURELY KNOTTED TO THE GEOGRID.

AT ALL ENDS OF ALL PIECES OF BRAID MATERIAL USED, THE BRAID SHALL BE KNOTTED TO SPLICE IT TO THE NEXT PIECE OF BRAID, OR TO SECURE IT TO THE GEOGRID. EACH BRAIDED SEAM SHALL BE CONTINUOUS, WITH SECURELY KNOTTED SPLICES ALLOWED. THE BRAID SHALL BE SECURELY KNOTTED TO THE GEOGRID AT A SPACING NOT TO EXCEED 6 FT ALONG ANY SEAM.

THE BRAID SHALL BE STITCHED THROUGH EACH PAIR OF APERTURES ALONG THE SEAM AT LEAST ONCE, AND THE MINIMUM NUMBER OF STITCHES PER FOOT ALONG THE SEAM SHALL BE SIX (6). THE SPACING OF STITCHES ALONG EACH SEAM SHALL BE REASONABLY UNIFORM.

ALL KNOTS SHALL BE TIED IN A MANNER TO PREVENT SLIPPING AND CINCHING.

THE WRAPS ALONG THE SEAM SHALL BE SUFFICIENTLY TIGHT TO CLOSE THE GAP BETWEEN THE ADJACENT PIECES OF GEOGRID, BUT SHALL NOT BE OVER-TIGHTENED SUCH THAT THE GEOGRID BINDS ALONG THE SEAM.

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DESIGNED BY: DV
CHECKED BY: LPR

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DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: GABION MATTRESS DETAILS

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 12

SUMMARY OF STRUCTURE QUANTITIES - BRIDGE XXXXXX

SECTION	PAY ITEM NO.	PAY ITEM DESCRIPTION	LOCATION	UNIT	QUANTITY		TOTAL		DESIGN NOTES	CONSTRUCTION REMARKS
					P	F	P	F		
LUMP SUM ITEMS										
EARTHWORK										
FOUNDATION										
CULVERT										
SUBSTRUCTURE										
APPROACH SLABS										
SUPERSTRUCTURE										
RAILING/ BARRIERS										
MOVABLE BRIDGE/ ARCHITECTURAL										
SPECIAL FEATURES										

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ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 816	BROWARD	441474-1-52-01

SHEET TITLE: SUMMARY OF QUANTITIES

REF. DWG. NO.:

PROJECT NAME: OAKLAND PARK BLVD. OVER THE C-13 CANAL

SHEET NO.: 14