FLORIDA INLAND NAVIGATION DISTRICT
INTRACOASTAL WATERWAY MAINTENANCE DREDGING
SOUTH OF PORT OF PALM BEACH
PALM BEACH COUNTY, FLORIDA

ADDENDUM NO. 2
SEPTEMBER 28, 2018

SUMMARY OF SPECIFICATION MODIFICATIONS

**SPECIFICATION UPDATES ARE ATTACHED, AND REFERENCED CHANGES ARE DENOTED VIA TRACKED CHANGES AND/OR IN RED FONT.

SECTION NO.	SPECIFICATION	MODIFICATION
00 10 00	BID SOLICITATION	• MODIFIED BASE PROJECT REFERENCE • MODIFIED PROJECT SUMMARY • MODIFIED CONTRACT PERIOD FROM 180 DAYS TO 270 DAYS
00 41 63	BID FORM	• MODIFIED CONTRACT PERIOD FROM 180 DAYS TO 270 DAYS • ADDED REQUIREMENTS TO THE SIMILAR PROJECTS • ADDED REQUIREMENTS TO THE BIDDERS PLAN
00 41 63A	BID SCHEDULE	• ADDED ALLOWANCE BID ITEM NO. 0005 FOR IN-CHANNEL SUBAQUEOUS DEBRIS REMOVAL AND DISPOSAL
00 52 00	CONTRACT	• MODIFIED CONTRACT PERIOD FROM 180 DAYS TO 270 DAYS
00 55 00	NOTICE TO PROCEED	• MODIFIED CONTRACT PERIOD FROM 180 DAYS TO 270 DAYS
00 11 00	SUMMARY OF WORK	• MODIFIED BASE PROJECT REFERENCE • MODIFIED PROJECT SUMMARY • MODIFIED CONTRACT PERIOD FROM 180 DAYS TO 270 DAYS
01 29 00	MEASUREMENT AND PAYMENT	• ADDED REFERENCE TO PRE- AND POST-CONSTRUCTION SUBMERGED NATURAL RESOURCES SURVEY IN BID ITEM NO. 0003. • ADDED UNIT PRICE BID ITEM NO. 0005 FOR IN-CHANNEL SUBAQUEOUS DEBRIS REMOVAL AND DISPOSAL
01 35 43	ENVIRONMENTAL PROTECTION	• ADDED SUBMITTALS 1.2.G AND 1.2.H FOR A PRE-AND POST-CONSTRUCTION SUBMERGED NATURAL RESOURCES SURVEY
35 20 23	DREDGING AND DREDGED MATERIAL PLACEMENT	• MODIFIED BASE PROJECT REFERENCE • MODIFIED PROJECT SUMMARY • ADDED SUBMITTAL NO. 1.3.R IN-CHANNEL SUBAQUEOUS DEBRIS REMOVAL AND DISPOSAL LANDFILL WEIGHT TICKETS • ADDED MINIMUM EQUIPMENT REQUIREMENTS
APPENDIX H	DRAFT SUBMITTAL REGISTER	• ADDED SUBMITTAL NO. 22A AND 22B FOR A PRE-AND POST-CONSTRUCTION SUBMERGED NATURAL RESOURCES SURVEY • ADDED SUBMITTAL NO. 53 – IN-CHANNEL SUBAQUEOUS DEBRIS REMOVAL AND DISPOSAL LANDFILL WEIGHT TICKETS

FLORIDA INLAND NAVIGATION DISTRICT
INTRACOASTAL WATERWAY MAINTENANCE DREDGING
SOUTH OF PORT OF PALM BEACH
PALM BEACH COUNTY, FLORIDA

ADDENDUM NO. 2
SEPTEMBER 28, 2018

SUMMARY OF QUESTIONS AND RESPONSES (SUBMITTED BY CONTRACTORS ON OR BEFORE SEPTEMBER 26, 2018)

1. **QUESTION: What is the estimated project budget?**

   RESPONSE: Between $1 and $5 Million.

2. **QUESTION: There is no mention of needing to provide copies of the bid package. Are we to only provide the original (zero copies)?**

   RESPONSE: A single, original copy of the bid package is all that is required.

3. **QUESTION: Can you please provide the bathymetric survey data in electronic format?**

   RESPONSE: An electronic copy of the bathymetric survey was provided as part of Addendum No. 1 issued on September 24, 2018 and reissued (with an updated link to the survey) on September 26, 2018. **https://ftp.taylorengineering.com; Username:** AICW; **Password:** find2018

4. **QUESTION: For Alternate Bid Item A01, is there an expected date that AT&T will have completed the utility line decommissioning?**

   RESPONSE: See attached September 17, 2018 letter from AT&T. ATTACHMENT 1.

5. **QUESTION: For Alternate Bid Item A01, please provide a full description of the 5-inch conduit and its weight per LF, as well as the associated infrastructure that is to be removed and disposed?**

   RESPONSE: See September 21, 2018 correspondence from AT&T copied below.

   > "I'm trying to find information on the cable, but due to the age, we no longer have the specifications. Based on the description, it is a 915-pair, 22 gauge, armored subaqueous cable. My best guess for weight is between 5-10 pounds per foot, plus water weight, silt and marine growth.
   >
   > Cordially,
   > **Garth Bedward, MBA**
   > Manager OSP Plng & Eng Design
   > AT&T Wireline Access- Construction and Engineering
   >
   > **AT&T**
   > 120 North K St, Room 3D-05, Lake Worth, FL 33460
   > 561.540.9263 | gb7410@att.com"

ADDENDUM NO. 2
SEPTEMBER 28, 2018

6. **QUESTION: The permit authorizes direct impacts to seagrass within the design limits of the federal navigation channel. Impacts to natural hardbottom are not authorized by the permit. Please confirm any restrictions the contractor will have when dredging hardbottom areas that are located within the design limits of the federal navigation channel.**

   RESPONSE: See attached September 6, 2017 letter from the Department of the Army. As a result of this letter, no restrictions (with respect to hardbottom) are placed on the Contractor for removal of sediment within the federal navigation channel. ATTACHMENT 2.

7. **QUESTION: Please confirm that this is a maintenance project and that the channel has been previously dredged to -10' throughout the project area. If there is a possibility of rock being found above -10', it needs to be stated in the bid documents and you should consider adding bid items to cover it, namely a LS line item for mob/demob of rock removal equipment and a separate unit line item for its excavation. As it stands, nothing in the documents give any indication that rock may be encountered above -10'.**

   RESPONSE: Please refer to the Appendix E for a summary of the available geotechnical borings. ATTACHMENT 3 provides a supplemental geotechnical report that was performed for the deepening project north of the Port of Palm Beach.

   To FIND's knowledge, the project extent has not been maintenance dredged since the original construction of the Waterway. It is unknown to what depth below -10 ft MLLW that was dredged during the original project construction; however, rock is not expected to be encountered above -10 ft MLLW.

   Given this and as stated during the pre-bid meeting, the (1) Contractor is responsible for utilizing the appropriate equipment on the job to accomplish the objectives and scope of this project and that will allow for removal of sediment for the full range of blow counts (i.e., identified between -10 and -21 ft MLLW) provided in the geotechnical borings and (2) FIND encourages the removal of the entire 2-ft overdepth in order for this to be considered a successful project.

   See modifications made to SECTION 00 41 63 BID FORM and SECTION 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT.

8. **QUESTION: Based on the borings, findings, recommendations and information supplied in the Geotechnical Report, will rock encountered at or above elevation -12.0 be considered differing conditions subject to additional compensation to the Contractor?**

   RESPONSE: See response to No. 6.

ADDENDUM NO. 2
SEPTEMBER 28, 2018

9. **QUESTION: Regarding the above referenced project. Would you please provide station by station volume calculations for this project?**

   RESPONSE: ATTACHMENT 4 provides an average end volume report. A surface-to-surface method provides the Acceptance Section volume provided in Attachment A, Sheet C-1.

10. **QUESTION: Please provide a point of contact for the Port of Palm Beach.**

    RESPONSE: Kenneth Hern, Director of Seaport Operations & Security; hern@portofpalmbeach.com; T: 561-383-4180; C: 561-253-4810

11. **QUESTION: Will the Port of Palm Beach have any ongoing activities during the expected timeframe of the Florida Inland Navigation District project?**

    RESPONSE: We understand that the USACE plans to award a contract for maintenance dredging the Palm Beach Harbor the 1st or 2nd quarter of Fiscal Year 2019. Material deposition will likely occur south of the inlet; therefore, there should be no impact to the barge access area located on Peanut Island.

12. **QUESTION: Permit Number: RGP SAJ-93, page 6, contains the following Special Condition:**

    "6. If the pre-construction survey identifies seagrass adjacent to the federal channel, the project may proceed under this permit when the project includes hydraulic dredging of sandy or coarse sediments (no more than 10% of the material passing a #230 sieve for no more than 10% of the total dredged material composition) and seagrass can be avoided with a minimum 25-foot buffer between seagrass and all dredging activities or when the project includes mechanical dredging of fine sediments (material passing a #230 sieve) and seagrass can be avoided with a minimum 100-foot buffer between seagrass and all dredging activities."

    In review of the project drawings depicting the seagrass, hardbottom, and hardbottom coral surveys, it appears there are seagrasses that abut the channel in numerous locations. How is the contractor to treat the dredge prism in the areas where there is no minimum buffer available to the seagrass?

    RESPONSE: See ATTACHMENT 5 for the 2016 Submerged Natural Resources Survey. The shapefiles (**PINNACLE Submerged Natural Resources_2016.ZIP**) associated with the report are located on the FIND website. As noted in in RGP SAJ-93 and cited above, a 25-ft buffer is required for hydraulic dredging of **sandy and coarse** sediments and 100-ft buffer is required for mechanical dredging of **fine** sediments. Therefore, with sandy and coarse sediments contained in the geotechnical borings, the above-limitations would largely apply to hydraulic dredges.

ADDENDUM NO. 2
SEPTEMBER 28, 2018

13. **QUESTION: I see that Addendum No. 1 does not have a date issued to acknowledge on the bid form. Is the Addendum Date the same as the Pre-Bid date (September 20th)? Please clarify.**

    RESPONSE: Denote the date on the Bid Form that the Addendum No. 1 (9/24) was issued.

14. **QUESTION: In Appendix F of the specs, it states "During clamshell operations…nighttime light of waters within and adjacent to the Project area shall be illuminated using shielded or low-pressure sodium-type lights to a degree that allows the dedicated observer to sight any manatee on the surface within 200 ft of the dredging operation." Does this project require only one Manatee observer during nighttime operations or should there be two Manatee observers during nighttime operations?**

    RESPONSE: A minimum of one manatee observer is required during all in-water dredging operations. If there is concern, a second manatee observer may be added.

SECTION 00 10 00

BID SOLICITATION

Florida Inland Navigation District
1314 Marcinski Road
Jupiter, Florida 33477
(561) 627-3386

INTRACOASTAL WATERWAY MAINTENANCE DREDGING; SOUTH OF PORT OF PALM BEACH; PALM BEACH COUNTY, FLORIDA

The Florida Inland Navigation District (District) will receive sealed bids for the construction of the District's Intracoastal Waterway Maintenance Dredging project at its offices at 1314 Marcinski Road; Jupiter, Florida 33477 until **2 PM, local time, October 4, 2018** and then, at said office, the bids will be publicly opened and read aloud. The District will award the project to the qualified, responsible, and responsive Bidder presenting the lowest Bid.

The base project (Bid Item No. 0001 – 00045) generally entails dredging approximately 90,000 CY of material from ±4.5 miles of the Intracoastal Waterway (ICWW) between the Port of Palm Beach (Cut PB-36, Station 29+00) to the Town of Palm Beach Docks (Cut PB-41, Station 6+81) to a depth of -12 feet Mean Lower Low Water, (MLLW) (project depth of -10 feet and 2-foot allowable overdredge). In accordance with permit conditions, material shall be dredged via the use of either a mechanical or hydraulic dredge to remove all material (inclusive of all in-channel debris) from the dredge template. Contractor is responsible for utilizing the appropriate equipment on the job to accomplish the objectives and scope of this project and that will allow for removal of sediment for the full range of blow counts (i.e., identified between -10 and -21 ft MLLW) provided in the geotechnical borings, Dredged material shall be offloaded at a District-owned ±17-acre dredged material management area (DMMA) located on the north end of Peanut Island.

The Alternate Bid Item (Bid Item No. A01) includes the removal and disposal of a 5-inch AT&T abandoned conduit that lies within the Intracoastal Waterway channel bottom (identified at Utility Crossing No. 6).

The successful Bidder will have ~~180~~ 270 calendar days from the Notice to Proceed to complete the entire project.

The District will hold a **mandatory** pre-bid meeting at **11:00 AM, local time, September 20, 2018** at the project site. Attendees shall meet at Riviera Beach City Marina located at 200 E 13th Street; Riviera Beach, FL 33404. Bidders are required to RSVP (with the name of all attendees) to Lori Brownell, P.E. (lbrownell@taylorengineering.com) and Yehya Siddiqui, E.I. (ysiddiqui@taylorengineering.com) no later than 1 week (7 calendar days) prior to the date of the meeting.

A Bid Bond will be required for bids that exceed $200,000.00. Bids providing less than 90 days for District acceptance after the date bids are due will not be considered and will be rejected. Bidders may obtain the Contract Documents, Project Drawings, and Specifications from the offices of the District or the District's website (http://www.aicw.org) at no charge.

--End of Section--

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SECTION 00 41 63

BID FORM

FLORIDA INLAND NAVIGATION DISTRICT

INTRACOASTAL WATERWAY MAINTENANCE DREDGING; SOUTH OF PORT OF PALM BEACH
PALM BEACH COUNTY, FLORIDA

Submitted on _____ (Date)

_____ _____
Bidder (Firm Name) Address

_____ _____
Signature of Authorized Representative Name & Title

1. The above signed, as Bidder, hereby declares that the only person or persons interested in the Bid as Principal or Principals is or are named herein and that no other person than herein mentioned that has any interest in this Bid or in the Contract to be entered into; that this Bid is made without connection with any other person, company or parties making a bid or proposal; and that it is in all respects fair and in good faith without collusion or fraud.

2. The Bidder further declares that he has examined the site and has informed himself fully in regard to all conditions pertaining to that place where the Work is to be done; that he has examined the Project Drawings and Specifications for the Work and Contractual Documents relative thereto. The Bidder also acknowledges that he has read all of the provisions furnished prior to the opening of Bids; and that he has satisfied himself relative to all Work to be performed.

3. If this Bid is accepted, the undersigned Bidder agrees to complete all Work included under the Contract within ~~180~~ 270 calendar days from the date established in the "Notice to Proceed." If the Contractor fails to complete the work within this time the District may obtain the services of another Contractor to complete the Work. Such monies required for the District to complete the Work shall be chargeable to the Contractor.

4. In case of failure on the part of the Contractor to complete the Work within the time fixed in the Contract, or any extension thereof granted, then the Contractor shall be liable to pay the District: (i) not as a penalty but as liquidated damages, $1,500.00 per day for each calendar day the Work remains incomplete after the expiration of the time limit specified or any extension(s) thereof for the total contract plus (ii) any monies which are paid by the District to any other person, firm or corporation for services rendered for the preservation or completion of the Work. These monies shall include, but are not limited to, all Engineering and Inspection fees required to oversee the completion of the Work. Such monies shall be chargeable to the Contractor and shall be deducted from any monies due said Contractor, or if no money is due or the amount due is insufficient to cover the amount charged, then the Contractor and his Surety shall be liable for said amount. Bidder agrees to perform all the Work described in the Contract Documents for the unit and lump sum prices identified on the following Bid Schedule (located at the end of this section).

5. If this Bid is accepted, it is understood that the terms and conditions of the bid provisions and documents relative thereto, shall be binding upon the parties; however, the undersigned Bidder agrees, upon acceptance and prior to commencement of any Work, to:

   a. Execute the aforementioned Contract with Florida Inland Navigation District as a written memorial and formalization of said Bid provisions and matters relative.

   b. Provide the necessary Certificates of Insurance, Performance and Payment Bonds (each Bond equal to one hundred percent (100%) of the total Contract Bid), of which this Bid, Instructions to Bidders,

General Conditions, Technical Specifications, and Project Drawings shall be made a part for the performance of Work described therein.

c. Furnish all necessary materials, equipment, machinery, tools, apparatus, transportation, supervision, labor and all means necessary to construct and complete the Work specified in this Bid and Contract and called for in the Project Drawings, upon "Notice to Proceed with Contract Work" from the Engineer;

d. Complete all Contract Work within the time specified in the Bid Form or pay for liquidated damages and cost of supervision for each calendar day in excess thereof according to the terms set forth in the Contract and Specifications.

e. Provide complete copies of any or all required insurance policies to the District upon request. The Bidder shall attach to each policy a sworn statement executed by an officer of the Bidder or by the issuing insurance company certifying that the copy is true, correct and complete.

6. The Bidder understands this Bid does not constitute a Contract with the Bidder, and there is no official Contract binding the parties until:

   a. bids are reviewed and accepted by the District; and

   b. applicable Bonds and Certificates of Insurance are reviewed and accepted by the District; and

   c. the Contract has been approved by the District; and

   d. the Contract has been executed by both parties.

7. The undersigned agrees that, in case of failure on his part to execute and deliver the said Contract and the Bonds within fifteen (15) days after receipt of the Contract, the Bid Bond, or securities accompanying his Bid, shall be paid into the funds of Florida Inland Navigation District, otherwise, any Bid Bond or securities accompanying this Bid shall be returned to the undersigned.

8. The Corporation, Partnership or Business name and signature of authorized Corporate Officer, Partner, or Individual making this Bid, together with the signature of the licensee qualifying Bidder, must appear on the signature page of this Bid.

9. The Bidder understands and agrees that he must perform all Work necessary to complete the Work as described in the Project Drawings and Specifications. Payment to the Contractor will be made only for the actual quantities of Work performed and accepted or materials furnished in accordance with the Contract. All Work and materials not specified under "Item" in the Bid shall be considered incidental to the Contract.

10. The Bidder has attached to this Bid an approved Bid Bond or a certified check as described in SECTION 00 21 13 INSTRUCTIONS TO BIDDERS, for the sum of ten percent (10%) of the Bid Amount according to the conditions under the Instructions to Bidders and provisions herein.

11. The Bidder, if apparent low Bidder, agrees to provide the following after the bid opening within the time specified herein:

    a. evidence of the appropriate insurance coverage,

    b. approved Performance and Payment Bonds for each one hundred (100%) of the Contract Amount according to the conditions under the General Conditions and provisions therein.

    c. requested credentials, past Work information, and other evidence as requested by the Engineer to verify the ability of the Contractor to perform the Work, if not previously furnished.

12. In accordance with §287.135, Florida Statutes, Bidder hereby certifies that Bidder is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, and that it does not have business operations in Cuba or Syria. "Business operations"

means, for purposes specifically related to Cuba or Syria, engaging in commerce in any form in Cuba or Syria, including, but not limited to, acquiring, developing, maintaining, owning, selling, possessing, leasing, or operating equipment, facilities, personnel, products, services, personal property, real property, military equipment, or any other apparatus of business or commerce.

13. Both the Bidder and the licensee shall fill in the information below, pursuant to Chapter 489, Florida Statutes. Licensee is defined as the person who is the licensed Contractor who qualifies the bidding Company, Corporation or Partnership. If the Bidder is an individual, he must be licensed.

(Please print or type)

BIDDER'S NAME: _____

ADDRESS: _____

PHONE NUMBER: _____

FEID OR SOCIAL SECURITY NUMBER: _____

BIDDER'S SIGNATURE, BY: _____

LICENSE NUMBER: _____

LICENSE TYPE: _____
(Attach copy of license)

STATE OR COUNTY: _____

LICENSE LIMITATIONS, IF ANY: _____
(Attach a separate sheet, if necessary)

LICENSE SIGNATURE, BY: _____

(If an INDIVIDUAL or SOLE PROPRIETOR is Bidder, sign on this line.)

By: _____
Signature

_____
Type or Print Name

_____
Address

(If a CONTRACTOR OPERATING UNDER A TRADE NAME or FICTITIOUS is bidder, fill in the trade name followed by signature)

_____
Trade Name

By: _____
Signature

_____
Type or Print Name

(If a GENERAL OR LIMITED PARTNERSHIP

Is bidder, fill in name of joint venture, followed by signature of the partners signing)

_____
Name of Partnership

By: _____
Partner

_____
Business Address of Partnership

(Names and Addresses
of all General Partners - attach a
separate sheet if necessary)

(**If a CORPORATION is Bidder, fill in the name of the Corporation, followed by the signature of the President or Vice President)**

(Corporate Seal)

_____
Name of Corporation

By: _____
President or Vice President

_____
Address of Corporation

Organized under the Laws of the State of _____, and authorized by the law to make this Bid and perform all Work and furnish materials and equipment required under the Contract Documents.

CERTIFICATE AS TO CORPORATE PRINCIPAL

I, _____, certify that I am the Secretary of the Corporation named as principal in the within Bid; that _____, who signed the said Bid on behalf of the Principal, was then _____ of said Corporation; that I know his signature, and his signature thereto is genuine; and that said bond was duly signed, sealed and attested for and in behalf of said Corporation by authority of its governing body.

_____
Secretary

(Corporate Seal)

REFERENCES

Provide the names, addresses, and telephone numbers of three (3) clients (former or current) who can attest to your company's experience in work similar in nature to the Work (i.e., hydraulic or mechanical dredging in open tidal coastal waters) required to construct this project in the spaces provided below.

FIRM NAME: _____

ADDRESS: _____

CONTACT PERSON: _____

TELEPHONE NUMBER: _____

FIRM NAME: _____

ADDRESS: _____

CONTACT PERSON: _____

TELEPHONE NUMBER: _____

FIRM NAME: _____

ADDRESS: _____

CONTACT PERSON: _____

TELEPHONE NUMBER: _____

SIMILAR PROJECTS

Provide descriptions of at least three (3) projects of a similar nature (i.e., hydraulic or mechanical dredging of harder material with similar blow counts as reported in Appendix E in open tidal coastal waters) that the Bidder has completed in the last three (3) years or currently has under way in the spaces provided below. For each project, explain why it is relevant, problems encountered, actions taken to correct problems, and any environmental impacts that were encountered. If additional spaces are needed, make copies of this form.

PROJECT NAME: _____

OWNER'S NAME: _____

CONTACT PERSON: _____ TELEPHONE: _____

START DATE: _____ COMPLETION DATE: _____

DESCRIPTION: _____

_____

_____

_____

_____

_____

_____

_____

PROJECT NAME: _____

OWNER'S NAME: _____

CONTACT PERSON: _____ TELEPHONE: _____

START DATE: _____ COMPLETION DATE: _____

DESCRIPTION: _____

_____

_____

_____

_____

_____

_____

_____

PROJECT NAME: _____

OWNER'S NAME: _____

CONTACT PERSON: _____ TELEPHONE: _____

START DATE: _____ COMPLETION DATE: _____

DESCRIPTION: _____

_____

_____

_____

_____

_____

_____

BIDDERS PLAN

Provide a detailed narrative plan for execution of the dredging and disposal of dredged material. The minimum plan requirements shall include:

1. Description of project related activities
2. Identification and description of major pieces of equipment required for the project (Note: Refer to Section 35 20 23, Paragraph 1.3.E for minimum equipment requirements)
3. Assurance the Contractor can complete the work within the given amount of time
4. Assurance that the work can be performed with minimum impact to water quality and within the stated permit conditions.
5. Description of how quality control will be achieved, conducted, and maintained throughout the project duration.
6. Estimate of weekly productivity
7. Other matters the Contractor considers critical to the completion of the work.

_____

_____

_____

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_____

If extra space is necessary, append additional pages.

--End of Section--

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TAYLOR ENGINEERING, INC.

SECTION 00 41 63A

BID SCHEDULE

INTRACOASTAL WATERWAY MAINTENANCE DREDGING; SOUTH OF PORT OF PALM BEACH
PALM BEACH COUNTY, FLORIDA

BIDDER (FIRM NAME): _____

ALL BID ITEMS SHALL INCLUDE ALL COSTS FOR FURNISHING TO THE OWNER ALL MATERIALS, EQUIPMENT, SUPPLIES, AND PERMITS INCURRED IN PROVIDING ALL WORK SHOWN ON THE PROJECT DRAWINGS AND OUTLINED IN THE CONTRACT SPECIFICATIONS FOR CONSTRUCTION.

BASE BID ITEMS

ITEM	DESCRIPTION	UNITS	QUANTITY	UNIT COST	TOTAL COST
	LUMP SUM				
0001	Insurance	LS	1	$	$
0002	Mobilization and Demobilization	LS	1	$	$
0003	Environmental Protection and Erosion Control	LS	1	$	$
	UNIT COST				
0004	Dredging and Dredged Material Placement	CY	90,000	$	$
0005	In-Channel Subaqueous Debris Removal and Disposal	TONS	10	$	$
	TOTAL BASE BID (ITEMS 0001 THRU 0005):			**$**	**$**

AMOUNTS FOR BASE, ALTERNATE, AND BASE + ALTERNATE SHALL BE SHOWN IN BOTH WORDS AND NUMBERS. IN CASE OF DISCREPANCIES, THE AMOUNT SHOWN IN WORDS SHALL GOVERN FOR EACH BID ITEM AND TOTAL BID.

TOTAL BASE BID (WRITTEN): _____

	ALTERNATE BID ITEM				
A01	Removal and Disposal of AT&T Utility Line	LS	1	$	$
	TOTAL ALTERNATE BID (ITEM A01):			**$**	

TOTAL ALTERNATE BID (WRITTEN): _____

TOTAL BASE AND ALTERNATE BID (ITEMS 0001 THRU A01): **$**

TOTAL BASE AND ALTERNATE BID (WRITTEN): _____

Name of Authorized Representative

Signature of Authorized Representative

Title

Date

Bidder has to sign below that they have read and understood all addendums related to this project. Failure to acknowledge any addendum issued *may* disqualify the Bidder.

ADDENDUM ACKNOWLEDGEMENT		
NO.	**ISSUE DATE**	**SIGNATURE**
1		
2		
3		
4		
5		
6		

NOTICE TO ALL BIDDERS	
1	The District reserves the right to waive any informality in any bid, to reject any or all bids, and to delete any part of any of the above items.
2	Changes in the Contract Price and Contract Time require prior authorization in writing from the District, in the form of a Change Order or Work Change Directive. The Contractor is responsible for verification of all bid quantities and to report to the Engineer any discrepancies found prior to ordering materials and or equipment for construction.
3	Bid prices for the various work items are intended to establish a total price for completing the project in its entirety. The Contractor shall include in the Bid, any item for which a separate pay item has not been established in the Bid Form (under any related pay item), to reflect the total price for completing the project in its entirety. All bids must be for the entire work and must have each blank space completed.
4	Quantities shown are estimated. Actual quantity may vary.
5	Contractor shall meet requirements of all applicable permits and codes (in their current edition).
6	Award of the Alternate Bid Item shall be at the sole discretion of the District.

Bidder (Firm Name)

Name of Authorized Representative

Signature of Authorized Representative

Title

Date

SECTION 00 52 00

CONTRACT

CONTRACT
BETWEEN
FLORIDA INLAND NAVIGATION DISTRICT
AND
_____CONTRACTOR

THIS Contract, made this _____ day of _____, 20___, by and between the Florida Inland Navigation District, an independent special district of the State of Florida, hereinafter designated as the "DISTRICT," and _____, at _____, a _____ Corporation, FEID Number _____, hereinafter designated as the "CONTRACTOR."

WITNESS THAT:

WHEREAS, the District is an independent special district created by the Florida Legislature and given those powers and responsibilities enumerated in Chapter 374, Florida Statues; and

WHEREAS, the District desires the services of a qualified and experienced Contractor to provide construction services; and

WHEREAS, the District solicited on **September 9, 2018** and received Bids on **October 4, 2018** for the project called "**Intracoastal Waterway Maintenance Dredging; South of Port of Palm Beach; Palm Beach County, Florida.**"

WHEREAS, the Contractor has responded to the District's solicitation and the Contractor is qualified and willing to provide said services; and

WHEREAS, the District has found the Contractor's response to be acceptable and wishes to enter into a Contract; and

WHEREAS, the District has funds in its current fiscal year budget which are available for the funding of the Contract;

NOW THEREFORE, the District and the Contractor in consideration of the benefits flowing from each to the other do hereby agree as follows:

ARTICLE 1 - STATEMENT OF WORK

1.1 The Contractor shall furnish all equipment, tools, materials, labor, and everything necessary and shall perform the required Work in accordance with the Contract Documents for the contract entitled **"Intracoastal Waterway Maintenance Dredging; South of Port of Palm Beach; Palm Beach County, Florida.**"

ARTICLE 2 - TERM OF THE CONTRACT

2.1 Unless extended or terminated, the period of performance of the Contract shall commence upon the effective date of the Notice to Proceed and continue for a period of ~~180~~ 270 calendar days. The Contractor shall not proceed with Work under this Contract until a Notice to Proceed is received from the District.

ARTICLE 3 - COMPENSATION/CONSIDERATION

3.1 The consideration, for the full and complete performance under this Contract, shall be in the amount of $_____, subject only to any additions and/or deduction as provided in the Contract Documents and formally approved by the District.

The consideration stated above is based upon the aggregate Contract price submitted to the District, in which the aggregate amount is obtained from the summation of the total prices for each of the Bid items shown in the Bid.

ARTICLE 4 - INVOICING AND PAYMENT

4.1 If acceptable progress is being made, the Contractor may request partial payments on monthly estimates, based on the actual value of Work done or completed, which request may be approved and paid by the District. All pay requests shall reference the District's Contract Number, shall follow the same format as AIA Document G702-2017, and shall be in accordance with the terms specified in the General Conditions.

4.2 The Executive Director of the District has been authorized to approve and execute change orders, with the concurrent approval of the District's Chair, totaling up to ten (10) per cent of the initially executed contact value. When change orders in total exceed ten (10) percent of the initially executed construct value, they will be presented to the District's Board of Commissioners for approval at one of their regularly scheduled meetings. However, if there is a finding by the Engineer, the District's Executive Director and the District's Chair that a delay in approving the change order will result in an unnecessary delay causing negative financial, environmental, or health safety and welfare impacts, a change order up to 20% of the executed contract value can be executed by the District's Executive Director.

ARTICLE 5 - REMEDIES

5.1 If either party initiates legal action, including appeals, to enforce this Contract, the prevailing party shall be entitled to recover a reasonable attorney's fee.

5.2 It is acknowledged that the Contractor's failure to complete the Work within the Contract Time provided by the Contract Documents, or any extension thereof granted, will cause the District to incur substantial economic damages and losses of types and in amounts which are impossible to compute and ascertain with certainty as a basis for recovery by the District of actual damages, and that liquidated damages represent a fair, reasonable and appropriate estimate thereof. Accordingly, in lieu of actual damages for such delay, the Contractor agrees that liquidated damages may be assessed and recovered by the District as against Contractor and its Surety, in the event of delayed completion and without the District being required to present any evidence of the amount or character of actual damages sustained by reason thereof; therefore Contractor shall be liable to the District for payment of liquidated damages in the amount of One Thousand Five Hundred Dollars ($1,500) for each day that Substantial Completion is delayed beyond the Contract Time as adjusted for time extensions provided by the Contract Documents. Such liquidated damages are intended to represent estimated actual damages and are not intended as a penalty, and Contractor shall pay them to District without limiting District's right to terminate this agreement for default as provided elsewhere herein.

5.3 In case of any other failure to perform the Contract, the Contractor shall be liable to pay the District any monies which are paid by the District to any other person, firm or corporation for services rendered for the preservation or completion of the Work. These monies shall include, but are not limited to, all Engineering and Inspection fees required to oversee the completion of the Work.

5.4 Such liquidated damages and monies shall be chargeable to the Contractor and shall be deducted from any monies due said Contractor, of if no money is due or the amount due is insufficient to cover the amount charged, then the Contract and his Surety shall be liable for said amount.

ARTICLE 6 - STANDARDS OF COMPLIANCE

6.1 The Contractor, its employees, Subcontractors, or assigns, shall comply with all applicable federal, state, and local laws and regulations relating to the performance of this Contract. The District undertakes no duty to ensure such compliance, but will attempt to advise the Contractor, upon request, as to any such laws of which it has present knowledge.

6.2 The Contractor hereby assures that no person shall be excluded on the grounds of race, color, creed, national origin, handicap, age, or sex, from participation in, denied the benefits of, or be otherwise subjected to discrimination in any activity under this Contract. The Contractor shall take all measures necessary to effectuate these assurances.

6.3 The laws of the State of Florida shall govern all aspects of this Contract. In the event it is necessary for either party to initiate legal action regarding this Contract, venue shall be in the Fifteenth Judicial Circuit or claims under state law and in the Southern District of Florida for any claims which are justifiable in federal court.

6.4 The Contractor hereby warrants that he has not, during the bidding process, nor shall he, during the term of this Contract, offer to pay any officer, employee or agent of the District, anything of value including, but not limited to gifts, loans, rewards, promises of future employment, favors or services, based on the understanding that the actions, decision or judgments of such officer, employee, or agent would be influenced thereby. For breach of this provision, the District may terminate this Contract without liability and, at its discretion, deduct or otherwise recover the full amount of such fee, commission, percentage, gift, or other consideration.

6.5 The Contractor, by its execution of this Contract, acknowledges and attests neither he, nor any of his suppliers, subcontractors, or consultants who shall perform Work which is intended to benefit the District, is a convicted vendor or, if the Contractor or any affiliate of the Contractor has been convicted of a public entity crime, a period longer than thirty-six (36) months has passed since that person was placed on the convicted vendor list. The Contractor further understands and accepts that this Contract shall be either voidable by the District or subject to immediate termination by the District, in the event there is any misrepresentation or lack of compliance with the mandates of Section 287.133, Florida Statutes. The District, in the event of such termination, shall not incur any liability to the Contractor for any Work or materials furnished. The Contractor is required to submit a completed Public Entity Crime Statement with the Bid Form.

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid, proposal, or reply on a contract to provide any goods or services to a public entity; may not submit a bid, proposal, or reply on a contract with a public entity for the construction or repair of a public building or public work; may not submit bids, proposals, or replies on leases of real property to a public entity; may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. 287.017 for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted vendor list.

6.6 While this package cites Florida Department of Transportation (FDOT) specifications and references, the Contractor does not have to be FDOT certified.

ARTICLE 7 - RELATIONSHIP BETWEEN THE PARTIES

7.1 The Contractor is an independent Contractor and is not an employee or agent of the District. Nothing in this Contract shall be interpreted to establish any relationship, other than that of an independent Contractor, between the District and the Contractor, its employees, agents, subcontractors, or assigns, during or after the performance of this Contract. The Contractor is free to provide similar services to others.

7.2 The Contractor shall not assign, delegate, or otherwise transfer its rights and obligations as set forth in this Contract without the prior written consent of the District.

ARTICLE 8 - GENERAL PROVISIONS

8.1 The Contract Documents listed below, by this reference, shall become a part of this Contract as though physically attached as a part hereof and all documents in this Contract shall be interpreted together to yield the most consistent results to achieve the purpose of the project:

a. General Conditions
b. General Requirements
c. Technical Specifications
e. Project Drawings
f. Such addenda supplementing the documents forming this Contract as are referenced to it and attached as a part of it.
g. Bid Solicitation, Bid Form, Instructions to Bidders, Addenda, provided however, that no exceptions to the District's specifications, whether stated or implied in the Contractor's Bid, shall be allowed **EXCEPT** as shall be itemized, listed, approved by the District and recorded as written Addenda with the District as a supplement to this Contract.

8.2 This Contract states the entire understanding between the parties and supersedes any written or oral representations, statements, negotiations, or agreements to the contrary. The Contractor recognizes that any representations, statements, or negotiations made by District staff do not suffice to legally bind the District in a Contractual relationship unless they have been reduced to writing, approved, and signed by an authorized District representative. This Contract, once properly executed, shall bind the parties, their assigns, and successors in interest.

8.3 This Contract may be amended only with the prior written approval of the parties.

IN WITNESS WHEREOF, the parties or their duly authorized representatives hereby execute this Contract on the date first written above.

Legal Form Approved
District Counsel

By:_____

Date:_____

FLORIDA INLAND NAVIGATION DISTRICT

By:_____
Executive Director

WHEN THE CONTRACTOR IS AN INDIVIDUAL OR SOLE PROPRIETOR:

Signed, sealed, and delivered in the presence of:

_____
Witness

_____
Witness

By:_____
Signature

_____
Type or Print Name

WHEN THE CONTRACTOR OPERATES UNDER A TRADE NAME OR FICTITIOUS NAME:

Signed, sealed, and delivered in the presence of:

_____	_____
Witness	Trade Name or Fictitious Name
_____	_____
Witness	Signature
	_____
	Type or Print Name

WHEN THE CONTRACTOR IS A GENERAL OR LIMITED PARTNERSHIP:

Signed, sealed, and delivered in the presence of:

_____	_____
Witness	Partnership Name
_____	_____
Witness	Signature of General Partner
	_____
	Type or Print Name of General Partner

WHEN THE CONTRACTOR IS A CORPORATION:

ATTEST:

_____	_____
Secretary	Corporation Name
	By:_____
(Corporate Seal)	Signature of Officer or Authorized Agent
	_____
	Type or Print Name/Title

WHEN THE CONTRACTOR IS A LIMITED LIABILITY COMPANY:

Signed, sealed, and delivered in the presence of:

_____	_____
Witness	LLC Name and State of Organization
_____	_____
Witness	Signature of Manager or Managing Member
	_____
	Type or Print Name/Title

--End of Section--

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SECTION 00 55 00

NOTICE TO PROCEED

Date: _____

To: _____

_____

_____

Project: Intracoastal Waterway Maintenance Dredging; South of Port of Palm Beach; Palm Beach County, Florida

In accordance with the Contract, for the above referenced project dated _____, you are hereby notified to commence Work on _____ and you are to complete the Work within ~~180~~ 270 calendar days.

Owner: Florida Inland Navigation District

Authorized Signature: _____ Date: _____

Title: _____

ACCEPTANCE OF NOTICE

Receipt of the Notice to Proceed is hereby acknowledged by:

Authorized Signature: _____ Date: _____

Title: _____

--End of Section--

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SECTION 01 11 00

SUMMARY OF WORK

PART 1 - GENERAL

1.1 WORK COVERED BY CONTRACT DOCUMENTS

A. Project Description

1. The base project (Bid Item No. 0001 – 00045) generally entails dredging approximately 90,000 CY of material from ±4.5 miles of the Intracoastal Waterway (ICWW) between the Port of Palm Beach (Cut PB-36, Station 29+00) to the Town of Palm Beach Docks (Cut PB-41, Station 6+81) to a depth of -12 feet Mean Lower Low Water, (MLLW) (project depth of -10 feet and 2-foot allowable overdredge). In accordance with permit conditions, material shall be dredged via the use of either a mechanical or hydraulic dredge to remove all material (inclusive of all in-channel debris) from the dredge template. Contractor is responsible for utilizing the appropriate equipment on the job to accomplish the objectives and scope of this project and that will allow for removal of sediment for the full range of blow counts (i.e., identified between -10 and -21 ft MLLW) provided in the geotechnical borings, Dredged material shall be offloaded at a District-owned ±17-acre dredged material management area (DMMA) located on the north end of Peanut Island.

2. The Alternate Bid Item (Bid Item No. A01) includes the removal and disposal of the AT&T conduit that lies within the Intracoastal Waterway right-of-way (identified at Utility Crossing No. 6). The line and associated infrastructure shall be removed and disposed, in its entirety, along the entire Intracoastal Waterway channel bottom and 25 feet outside the delineated boundary, as indicated in the Project Drawings (**APPENDIX A**). **APPENDIX J** provides a copy of the decommission letter from AT&T. The award of the Alternate Bid Item shall be at the sole discretion of the District.

3. Refer to **APPENDIX E, F, and G** for available field data. The original bathymetric, magnetometer, seismic, and side-scan survey (**APPENDIX F)** and diver investigation survey (**APPENDIX G**) can be provided to the Contractor in CAD format on request.

B. Work Schedule

1. The Contractor will have ~~180~~ 270 calendar days from the Notice to Proceed to complete the project. Construction of the project is funded and administered by the Florida Inland Navigation District.

2. An Important Manatee Area (IMA) and Warm Water Aggregation Area (WWAA) are located in the northern portion of project area. Regardless of dredging method, dredging shall be limited to daylight hours only between November 15 and March 31 in the area indicated on the Project Drawings (**APPENDIX A**). An independent manatee observer shall be on-site at all times during in-water work.

3. Minimal work stoppage will be required due to water activities near or around the project area. No additional compensation (time or money) shall be awarded; therefore, the Contractor shall factor these considerations into the overall bid.
   a. No dredging shall occur in the immediate area of the Palm Beach International Boat Show (Cut PB-38, Station 21+00 to Cut PB-40, Station 0+00) between March 15 and April 12.

b. Increased boat traffic on the weekends and during the Palm Beach International Boat show (scheduled to occur between March 28 and 31, 2019) is expected.
c. AT&T intends to decommission Utility Crossing No. 6 (near Cut PB-36, Station 104+50). The Engineer will notify the Contractor when AT&T has decommissioned this utility. Until such time, the Contractor shall dredge no closer than 50 ft on either side of the crossing.

4. The Contractor shall schedule its dredging operation to minimize work stoppage and maximize dredging during unrestricted times.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION (NOT APPLICABLE)

--End of Section--

SECTION 01 29 00

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes requirements to be used for the basis of measurement and payment. The Contractor shall receive and accept the compensation provided in the Bid Schedule as full payment for furnishing all materials, labor, tools and equipment for performing all operations necessary to complete the Work under the Contract. Payment for all loss or damages arising from the nature of the Work, or from the action of the elements or any unforeseen difficulties, encountered during the Work until final acceptance by the District is also included in the compensation provided in the SECTION 00 41 63A BID SCHEDULE.

B. Bid prices for the various work items are to establish a total price for completing the project in its entirety. The Contractor shall include in the Bid, any item for which a separate pay item has not been established in the Bid Schedule, to reflect the total price for completing the project in its entirety, as depicted on the Project Drawings and specified herein. Unless there is a specific line item for administrative costs, such as Project Management, Quality Control and Safety, allocate such costs proportionally across all line items. The Contractor must include all costs for this project to complete all work, in total, designated in the project drawings, specifications, and bid schedule.

1.2 SUBMITTALS

The following submittals shall be submitted in accordance with SECTION 01 33 00 SUBMITTAL PROCEDURES. Bring the following administrative submittal items to the Preconstruction Meeting:

A. Schedule of Values

1. The Contractor will submit a printed schedule on Contractor's standard form in electronic printout for review and approval by the Engineer at least fifteen (15) calendar days prior to the first Payment Application. List payment items sequentially in the same order as they appear in the Bid Form.

2. Lump sum items are to have adequate breakdown of components to facilitate evaluating completeness for payment. Breakdown components shall appear directly under the payment item heading to which they apply.

3. The Contractor will revise the schedule to list approved Change Orders, with each Application for Payment. The Contractor will submit a revised Schedule of Values in accordance with this specification.

B. Construction Schedule

At or before the scheduled pre-construction meeting, the Contractor shall prepare and submit to the Engineer for approval a draft construction schedule in the form of a progress chart. The Contractor shall indicate on the progress chart, the bid items contained in the Contract, showing the amount of the item and its relative weighted percentage of the total Contract. The Contractor may separate features of Work under each item to show salient work elements such as procurement of materials, plants, and equipment, and supplemental work elements such as excavation, reinforcing steel, backfill, etc. These salient features shall total to the cost and weighted percentages shown for the major bid item. When quantity variations impact the

weighted percentages of a separate item by five percent or more, the Contractor shall revise the Contract progress charts to accurately reflect the impact of such variations.

C. Revised Construction Schedule

1. Submit copies of the updated construction schedule to the Engineer for each Payment Application. Changes that have occurred since the last update shall be clearly marked.

D. Payment Surveys

1. With each Payment Application, the Contractor shall submit both hard and digital copies of payment surveys to the engineer for review and approval. The Contractor will only be paid for the volumetric change between payment surveys as compared to the Engineer-Approved pre-construction bathymetric survey and payment survey within the defined dredged template boundary (see SECTION 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT).

1.3 MEASUREMENT

A. Measurement for Payment for this Project is based upon completion of the Work in accordance with Project Drawings and Specifications for each of the items. Field measurements will determine the percent complete of work components when listed on the approved Schedule of Values. Measurements will be made using linear, area, volumetric units, or by unit quantity count, as listed on the SECTION 00 41 63A BID SCHEDULE for unit quantity items and at the Engineer's sole discretion for lump sum items.

B. The Contractor will take all measurements and compute quantities. The Engineer will verify measurements and quantities as appropriate.

C. The Contractor will provide all necessary equipment, workers, and survey personnel as required.

D. Measurement Devices:

1. Weigh Scales: Inspected, tested, and certified by the applicable State Weights and Measures department within the past year.

2. Platform Scales: Of sufficient size and capacity to accommodate the conveying vehicle.

3. Metering Devices: Inspected, tested, and certified by the applicable State department within the past year.

E. Linear Measurement: Measured by linear dimension, at the item centerline or mean chord, in feet and hundredths of a foot.

F. Measurement by Area: Measured by square dimension using mean length and width or radius, in feet and hundredths of a foot.

G. Measurement by Volume: Measured by cubic dimension using mean length, width and height or thickness, in feet and hundredths of a foot.

H. Stipulated Sum/Price Measurement: Items measured by weight, volume, area, or linear means or combination, as appropriate, as a completed item or unit of the Work.

1.4 BASIS FOR PAYMENT

A. Unless indicated on the Contract Documents, all work indicated on the Project Drawings and specified in the Bid Documents and Contract shall be included in the Contract Sum indicated on the Bid Form.

B. Prices stated in the Bid Schedule shall include all costs and expenses for taxes, labor, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the Work as depicted on the Project Drawings and specified herein. The basis of payment for an item in the amount shown in the Bid Schedule shall be in accordance with the description of that item provided in this Section.

C. The Contractor's attention is again called to the fact that the quotations for the various items of work are intended to establish a total price for completing the Work in its entirety. Should the Contractor feel that the cost for any item of work has not been established by the Bid Form or Payment Items, the Contractor shall include the cost for that work in another applicable bid item, in order that the Proposal for the project reflects the total price to be paid by the District for completing the Work in its entirety.

D. Changes in the Contract Price and Contract Time require prior authorization in writing from the District and the Engineer, in the form of a Change Order or Work Change Directive. The Contractor is responsible for verification of all bid quantities and to report to the Engineer any discrepancies found prior to ordering materials and/or equipment for construction. Refer to SECTION 00 72 00 GENERAL CONDITIONS.

E. The various major items of Work will be paid for either by 1) the quantity of the actual Work complete by the Contractor and accepted by the Engineer multiplied by the unit price or 2) the lump sum amount indicated for each Bid Schedule Item. The Work shall include all miscellaneous and ancillary items necessary to construct a complete and functional Project.

1.5 SCHEDULE OF VALUES

A. The below descriptions generally outline the scope of work required for those elements of the Work to be paid for under each item listed in the Schedule of Bid Items. The Contractor shall submit a Schedule of Values per SECTION 00 72 00 GENERAL CONDITIONS and shall be consistent with SECTION 01 33 00 SUBMITTAL PROCEDURES.

1.6 PAYMENT ITEMS

A. Basis of Payment for Unit Price Items

1. Quantities indicated in the Bid Form (SECTION 00 41 63 BID FORM) are for bidding and Contract purposes only. Quantities and measurements supplied or placed in the Work and verified by the Engineer determine payment.

2. If the actual Work requires more or fewer quantities than those quantities indicated, the Contractor will provide the required quantities at the unit prices contracted.

3. If the actual Work requires a fifty percent (50%) or greater change in quantity than those quantities indicated, the District or Contractor may claim for a Contract Price adjustment for that item.

B. Basis of Payment for Lump Sum Items

1. Payment for lump sum items for this Project will be made at the lump sum price named in the Contract. The Contract price shall constitute full compensation for each item, including all required labor, products, tools, equipment, plant, transportation, services and incidentals, erection, application or installation of an item of the Work, overhead and profit as required to complete the item as indicated in the Project Drawings and Specifications.

C. Progress Payments

1. One progress payment will be made upon completion of mobilization to the site.

2. Subsequent progress payments will be made upon receipt and acceptance of surveys used for progress payments. Surveys will be evaluated based on the volumetric change (within the accepted dredge template) between the Engineer-approved pre-dredge bathymetric survey and payment, post-dredge surveys (see SECTION 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT). A copy of the original bathymetric survey, completed by Morgan & Eklund, Inc., February 2016 is included in **APPENDIX F** of these specifications. An electronic version of this survey is available upon request. The Contractor is required to have all surveys performed by a Florida Registered Professional Surveyor. Sounding depths used for determining of acceptance surveys will be derived from multi-beam survey data collected and processed in accordance the latest USACE specifications for dredging measurement and payment surveys (200 kHz acoustic frequency) and using a median depth sort with a 10- by 10-foot matrix. Once accepted by the Engineer, the pre-bathymetric survey will be used to evaluate all progress payments in which the Contractor is requesting payment for dredging.

3. Final payment for Work governed by unit prices will be made on the basis of the actual measurements and quantities accepted by the Engineer multiplied by a unit price of the item. Final payment for unit price Work will be accomplished by reconciliation Change Orders to adjust quantities at the end of the Project.

4. No payment, partial or complete, will be made for defective or rejected Work. The Contractor will not receive payment for any material dredged outside of the horizontal or vertical limits of the dredge template nor any material that falls within the setback requirements of the regulatory permits.

5. No separate payment will be made for additional labor and materials required for accomplishing the Project in its entirety. All labor, materials, and incidental costs shall be included for payment as part of the Proposal and the Contract, under the several scheduled items of the Project.

1.7 DESCRIPTION OF WORK ITEMS AND SCHEDULE OF VALUES

A. The following Work items are described in order to assist the Contractor in the preparation of the Proposal and to assist the Engineer in the evaluation of Bids and evaluation of progress payments during construction. The Contractor shall submit a Schedule of Values containing the work components of each Bid Item of the Proposal for approval prior to the first Payment Application for Payment for work in progress.

B. No separate payment will be made for any testing and/or surveying performed to complete the Work; costs for testing and/or surveying (as applicable), are included in the cost to complete the Work item.

C. Submittals are considered part of the Contractor's administrative and overhead costs. The Contactor will not be compensated separately for submittals required by these specifications or those listed on the Project Drawings.

D. Separate payment will not be made for providing and maintaining an effective Quality Control program, and all costs associated there with shall be included in the applicable unit prices or lump-sum prices contained in the Bid Schedule.

E. For the purpose of the work items listed below, complete installation will mean the inclusion of demolition work, site restoration to existing or better conditions, and testing, all included in the cost to complete the work item (as applicable).

F. All work shall be completed in accordance with all applicable permits and District requirements.

G. The following provides a description of the Work listed in the Schedule of Bid Items. This description is not intended to be a complete and all-inclusive record of the required work items. Work includes but is not limited to the following:

H. Bid Item Description

1. Lump Sum Items

a. Insurance (Bid Item No. 0001) – Payment will be as a lump sum (LS) for costs associated with and incidental to acquiring and maintaining the appropriate insurance requirements for this project as listed in SECTION 00 72 00 GENERAL CONDITIONS.

b. Mobilization and Demobilization (Bid Item No. 0002) - Payment for this item will be made as a lump sum (LS) for costs associated with or incidental to mobilization, demobilization, and establishment of initial project management and coordination. Sixty percent (60%) of the lump sum payment will be payable to the Contractor upon completion of the mobilization at the work site with the remaining forty percent (40%) payable upon the completion of demobilization. The Contractor shall breakdown the cost for Mobilization and Demobilization in the Schedule of Values for Engineers approval prior to the first Payment Application.

c. Environmental Protection and Erosion Control (Bid Item No. 0003) – Payment will be as a lump sum (LS) for full compensation for furnishing and installing all materials, labor, and equipment required for compliance with all permits and specifications related to environmental protection. This includes, but not limited to, all turbidity, water quality monitoring and testing, erosion control, sediment chemistry testing, associated reporting of data, manatee observation, pre- and post-construction submerged natural resource surveys, etc. The Contractor shall breakdown the cost for Environmental Protection in the Schedule of Values for Engineer approval prior to the first application for payment. See SECTION 01 35 43 ENVIRONMENTAL PROTECTION.

2. Unit Price Items

a. **Dredging and Dredged Material Placement (Bid Item No. 0004)** – Payment will be made as a unit price (Cubic Yards) for costs associated with or incidental to maintenance dredge the Intracoastal Waterway between the Port of Palm Beach and Town of Palm Beach Docks and transfer and dewater the material to the District-owned Peanut Island dredged material management area. These prices shall include all labor, equipment, materials, upland site work, operational costs, surveys, and in-channel debris and vegetation removal and disposal required to complete the dredging and upland work necessary at the disposal area. Work stoppages for manatees, turbidity control, and Maintenance of Marine Traffic must be included in

the overall cost. This project is set up with five (5) acceptance sections (A/S) based on each defined cut and station (i.e., CUT PB-36, STA 29+00 – STA 56+00; CUT PB-36, STA 56+00 – STA 95+00; CUT PB-36, STA 95+00 – CUT PB-37, STA 28+50; CUT PB-37, STA 28+50 – STA 60+50 AND CUT PB-37, STA 60+50 – CUT PB-41, STA 6+81) in the project. The District will base final payment for dredging on an accepted survey conducted within each A/S only. Volumes of material dredged will be based off pre- and post-construction bathymetric surveys approved by the Engineer. See SECTION 01 40 00 CONTRACTOR QUALITY CONTROL, SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS, SECTION 01 78 00 PROJECT CLOSEOUT, and SECTION 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT.

b. **In-Channel Subaqueous Debris Removal and Disposal (Bid Item No. 0005)** –This unit price item (TONS) is full compensation to the CONTRACTOR for all necessary and ancillary work to remove, separate, and dispose of subaqueous in-channel debris from within the defined work sites. Debris in this case is defined as timbers, rope, cables, miscellaneous metals or other items not including tires or rubber products, which shall be separated from clean spoil material for loading into trucks or dumpsters for disposal at a certified landfill site. The Engineer will have the final decision on what material is to be considered Subaqueous Debris payable under this unit price item. See SECTION 01 40 00 CONTRACTOR QUALITY CONTROL, SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS, SECTION 01 78 00 PROJECT CLOSEOUT, and SECTION 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT.

3. Alternate Bid Item

a. **Removal and Disposal of AT&T Utility Line (Alternate Bid Item No. A01)** - Payment for this item will be made as a lump sum (LS) for costs associated with or incidental to the removal and disposal of the AT&T conduit that lies within the Intracoastal Waterway right-of-way (identified as Utility Crossing No. 6). This shall include all labor, equipment, materials, operational and disposal costs required to complete the removal and disposal of the line and associated infrastructure, in its entirety, along the entire Intracoastal Waterway right-of-way and 25 feet outside the delineated boundary, as indicated in the Project Drawings (**APPENDIX A**). See SECTION 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT.

1.8 DEFECTIVE WORK

A. The Contractor shall replace the Work, or portions of the Work, not conforming to specified requirements as directed by the Engineer.

B. If, in the opinion of the Engineer or of the District, it is not practical to remove and replace the Work, the Engineer will direct one of the following remedies:

1. The defective Work may remain, but the unit or lump sum price for the item will be adjusted to a new price. The adjustment will be performed at the sole discretion of the District. The determination for the adjustment will be done by the Engineer, whose determination will be final.

2. The defective Work will be partially repaired to the instructions of the Engineer, and the unit or lump sum price will be adjusted to a new price at the sole discretion of the District. The determination for the adjustment will be done by the Engineer, whose determination will be final.

C. The individual specification sections may modify these options or may identify a specific formula or percentage sum/price reduction.

D. The authority of the Engineer to assess the defect and identify payment adjustment is final.

E. Payment will not be made for any of the following:

1. Products wasted or disposed of in a manner that is not acceptable.
2. Products determined as unacceptable before or after placement.
3. Products damaged in transit, during handling, or due to improper storage.
4. Products not completely unloaded from the transporting vehicle.
5. Products placed beyond the lines and levels of the required Work.
6. Products remaining on hand after completion of the Work.
7. Removing, demolishing, and disposing of rejected Work.
8. Loading, hauling, and disposing of rejected Products.

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PAYMENT PROCEDURES

A. Requesting Progress Payment

1. Provide hard copies of supporting invoices and quantity measurements to support all requested earnings. Ensure that sum of payment activities do not exceed Contract award funding amounts.

B. Options and Modification

1. When additional work is added by modification, existing funding amounts must be updated, or new line items for modification will be created. If Contract has option line item not yet awarded, option line item will appear as zero dollars until option is awarded by modification. No payment may be requested for Options or Modification until Contract modification has been funded and signed.

--End of Section--

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SECTION 01 35 43

ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This section covers prevention of environmental pollution and damage as the result of construction operations under this contract and for those measures set forth in other Technical Requirements of these specifications. For the purpose of this specification, environmental pollution and damage are defined as the presence of chemical, physical, or biological elements or agents, which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic, cultural, and/or historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

B. Contractor shall establish and maintain quality control for environmental protection of all items set forth herein. Contractor shall record on daily quality control reports or attachments thereto, any problems in complying with laws, regulations and ordinances, and corrective action taken.

C. Contractor shall comply with all requirements under terms and conditions set forth in the following environmental permits and authorizations for this project:

- Florida Department of Environmental Protection permit 50-0351799-001-EE (**APPENDIX B**)
- Department of the Army permit SAJ-2017-00503(RGP-LCK), Department of the Army Regional General Permit SAJ-93, and Regional General Permit Modification #1 (**APPENDIX C**)

Copies of these environmental permits are appended to these contract documents. The Contractor shall familiarize himself and his personnel with these and any other permits issued for this project and comply with all requirements under the terms and conditions set forth therein. The contractor shall be responsible for any fines resulting from violations of construction conditions set forth in the environmental permits. The Contractor shall include all costs for preparation and submittal of required reporting within each relative bid item. It is the Contractor's responsibility to obtain all other relevant Federal, State and local permits at no cost to the Owner. The Contractor shall be responsible for any delays and costs resulting from failure to comply with these and all federal, state and local environmental protection laws and regulations.

1.2 SUBMITTALS

The following submittals shall be submitted in accordance with SECTION 01 33 00 SUBMITTAL PROCEDURES.

A. Environmental Protection Plan

1. At least fifteen (15) calendar days before the scheduled pre-construction conference, the Contractor shall submit in writing an Environmental Protection Plan that is specific to this project. The Engineer may, at its discretion, consider an interim plan for the first thirty (30) days of operations. However, the Contractor shall furnish an acceptable final plan no

later than thirty (30) calendar days after receipt of Notice to Proceed. Acceptance of the Contractor's plan shall not relieve the Contractor of its responsibility for adequate and continuing control of pollutants and other environmental protection measures. Acceptance of the plan is conditional and predicated on satisfactory performance during construction. The Engineer reserves the right to require the Contractor to make changes to the Environmental Protection Plan or operations if the Engineer determines that environmental protection requirements are not being met. No physical work at the site shall begin prior to acceptance of the Contractor's Plan or an interim plan covering the work to be performed. The Environmental Protection Plan shall include but not be limited to the following:

a. A list of federal, state, and local laws, regulations, and permits concerning environmental protection, pollution control, and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations and permits.
b. Methods for protection of features and resources to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection, i.e., submerged natural resources, mangroves, trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archeological, and cultural resources.
c. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall provide written assurance that immediate corrective action will be taken to correct pollution of the environment due to accident, natural causes, or failure to follow the procedure set out in accordance with the environmental protection plan.
d. A permit or license for and the location of the solid waste disposal area.
e. Drawings showing locations of any proposed temporary and permanent excavations or embankments for haul roads, steam crossing, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.
f. Environmental monitoring plans for the job site, including land, water, air, and noise monitoring.
g. Methods for protection of species identified as state and/or federally Threatened Endangered Species.
h. Methods for protecting surface and groundwater during construction activities.
i. Spill prevention Plan. The Contractor shall specify all potentially hazardous substances to be used on the job site and intended actions to prevent accidental or intentional introduction of such materials into the air, ground, water, wetlands, or drainage areas. The plan shall specify the Contractor's provisions to be taken to meet Federal, State, and local laws and regulations regarding labeling, storage, removal, transport, and disposal of potentially hazardous substances.
j. Spill contingency plan for hazardous, toxic or petroleum material.
k. Work area plan showing the proposed activity in each portion of the area and identify the areas of limited use or non-use. Plan should include measures for marking the limits of use areas.
l. Plan inclusive of construction limits and dredging procedures.
m. A statement identifying the Contractor's personnel who shall be responsible for implementation of the Environmental Protection Plan. The Contractor's personnel responsible shall report directly to the Contractor's top management and shall have the authority to act for the Contractor in all environmental protection matters.
n. A Certification Letter must be signed acknowledging the Contractor has a copy of all environmental permits and licenses applicable to the project and understand the conditions in the permits. The Certification Letter (see **APPENDIX I**) shall be attached to the Environmental Protection Plan.

B. Manatee Observation

1. Qualifications: At or before the scheduled pre-construction meeting and at least fourteen (14) calendar days prior to construction commencement, the Contractor shall submit qualifications (a professional resume and FWC Observer Approval Form, revised January

2008) for the person that is designated as a manatee observer when in-water work is being performed. That person, **independent from the Contractor**, shall be approved by the Engineer two weeks before the beginning of construction and be equipped with polarized sunglasses to aid in observation. This person must be on site during all in-water construction activities and will advise personnel to cease operation upon sighting a manatee within 50 feet of any in-water construction activity. All Contractor 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.

2. Daily Reports: Observers shall maintain a daily log detailing manatee sighting, work stoppages, and other protected species-related incidents. An example form is provided in **APPENDIX I**.

3. Summary Report: Within thirty (30) days of project completion, the Contractor shall submit a summary report detailing all activities noted in the observer logs, the location and name of project, and the dates and times of work.

4. Important Manatee Area (IMA) and Warm Water Aggregation Area (WWAA): As identified in the Project Drawings (**APPENDIX A**) and the USACE Permit (**APPENDIX C**), the northern portion of the project lies immediately adjacent to the IMA and WWAA. As identified in **APPENDIX A**, no nighttime dredging shall occur in these areas. Refer to **APPENDIX C** for special conditions for Federally listed species.

C. Shorebird Monitor

1. Should dredging activities occur during the shorebird nesting season (April 1 – August 31), the Contractor shall supply a Florida Fish and Wildlife Conservation Commission (FWC) approved bird monitor to perform daily shorebird nest surveys at the Peanut Island DMMA.

2. Qualifications: At least fifteen (15) days before the scheduled pre-construction conference, the Contractor shall supply the resumes of at least two (2) FWC-approved shorebird monitors for the project.

3. Daily Reports: The shorebird monitor shall provide daily reports to Taylor Engineering on FWC-approved data sheets. The shorebird monitor shall upload the survey data to the FWC Florida Shorebird Database on a weekly basis.

D. Turbidity and Water Quality Management and Monitoring Plan

1. At least fifteen (15) calendar days before the scheduled pre-construction conference, the Contractor shall submit a detailed turbidity and water quality management and monitoring plan to the Engineer for approval. At a minimum this plan should specifically detail specific project equipment, techniques, procedures, and sequencing including all feasible turbidity reduction measures, applicable regulatory standards, anticipated handling, transport and disposal of dredged materials and all efforts to preserve adjacent or downstream resources. The document, including both narrative and illustrative documentation, shall also describe in detail the specific turbidity and sedimentation monitoring, sampling and reporting protocols proposed.

2. The Contractor shall also include specific details and drawings that specifically describe how the overall dredging operations and turbidity control measures will not adversely impact marine mammals. Barrier details and drawings — including the location, method of securing, and monitoring schedule — to avoid manatee entanglement, entrapment, and movement impedance.

E. Turbidity Monitoring Reports

1. During construction, the Contractor shall submit daily monitoring reports containing the turbidity data gathered. Monitoring reports shall be submitted to the Engineer via e-mail on a daily basis. All sampling and analyses shall be in accordance FDEP-approve field procedures and laboratory methods as specified in Chapter 62-160. All reports shall contain the following information:

   a. Permit number
   b. Project name
   c. Dates of sampling and analysis
   d. Turbidity sampling results
   e. Description of data collection methods (via a statement describing the methods use in collection, handling, storage, sample analysis, and date that the sampling meter was last calibrated)
   f. Time of day profile was taken
   g. Depth of sample
   h. Depth of water body
   i. Weather conditions at time of sampling
   j. Tidal stage and direction of flow
   k. Wind direction and velocity
   l. Water temperature.
   m. Map indicating sampling locations, dredging and discharge locations, and direction of tidal flow
   n. Statement and signature by the individual responsible for implementation of the sampling program attesting to the authenticity, precision, limits of detection, and accuracy of the data.
   o. When samples cannot be collected, include an explanation in the report. If unable to collect sample due to severe weather conditions, include a copy of a weather report from a reliable, independent source, such as an online weather service.

2. See **APPENDIX I** for an example Turbidity Monitoring Report Form.

F. Project Environmental Summary Sheet

1. Within thirty (30) days of project completion, the Contractor shall complete the Project Environmental Summary Sheet located in **APPENDIX I**. The purpose of this summary sheet is to demonstrate compliance — as well as to summarize any deviations — from the conditions and requirements set forth in the project's environmental resource permits.

G. Pre-Construction Submerged Natural Resources Survey

1. Within thirty (30) days prior to commencement of dredging operations, the Contractor shall complete the pre-construction submerged natural resources survey from the limits of dredging to 100 feet beyond that line. Contractor shall follow Johnson's seagrass protocols for the seagrass survey effort. Contractor shall generally follow the hardbottom survey methods described in Addendum 2, Attachment 5 (*Benthic Assessment and Resource Survey Associated with Potential ICWW Channel Deepening Dredge Activities, Palm Beach County, Florida*. Pinnacle Ecological, Inc. November 2016). Contractor shall report in tabular and graphic formats the locations and species names of all stony corals with a base diameter ≥ 10 cm (reporting the specific location, species, base diameter and condition), but otherwise report only hardbottom species presence, relative abundance and other characteristics as described in the methods descriptions of the Addendum 2, Attachment 5 document.

   Seagrass reporting shall include results of both preliminary and detailed survey efforts as described in the Johnson's seagrass protocol. The Johnson's seagrass survey protocol is

available in "Final Recovery Plan for Johnson's Seagrass (*Halophila johnsonii* Eiseman)" in the section titled "Recommendations for sampling *Halophila johnsonii* at a project site". The plan with the sampling protocol can be found here: https://sero.nmfs.noaa.gov/protected_resources/johnsons_seagrass/documents/recoveryplan.pdf

H. Post-Construction Submerged Natural Resources Survey

1. Within thirty (30) days post-project acceptance, the Contractor shall complete the post-construction submerged natural resources survey. Using the same protocol as the pre-construction survey, the post-construction survey shall include a graphic and numeric comparison of pre- and post-seagrass coverages outside the limits of dredging, report hardbottom natural resources as prescribed for the pre-construction survey. The report hardbottom section will provide graphic and quantitative numeric comparison of hardbottom areas. For each stony coral with a base diameter ≥ 10 cm identified in the preconstruction survey, the post construction survey will report and compare the presence and condition of each of those stony corals to the preconstruction survey report information.

1.3 SUBCONTRACTORS

1. Assurance of compliance with this section by subcontractors will be the responsibility of Contractor.

1.4 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL

2. Contractor shall train his personnel in all phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, both statutory and contractual, and installation and care of facilities to insure adequate and continuous environmental pollution control. Quality Control and supervisory personnel shall be thoroughly trained in the proper use of monitoring devices and abatement equipment, and shall be thoroughly knowledgeable of federal, state, and local laws, regulations, and permits as listed in the Environmental Protection Plan submitted by Contractor. Quality Control personnel will be identified in the Quality Control Plan submitted in accordance with SECTION 01 40 00 CONTRACTOR QUALITY CONTROL.

1.5 NONCOMPLIANCE

1. The Engineer will notify the Contractor in writing of any observed noncompliance with the aforementioned federal, state, or local laws or regulations, permits and other elements of the Contractor's Environmental Protection Plan. The Contractor shall, after receipt of such notice, inform the Engineer of proposed corrective action and take such action as may be approved. If the Contractor fails to comply promptly, the Engineer may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions shall be granted or costs or damages allowed to the Contractor for any such suspension.

2. Monitoring of permit and/or regulation compliance by the Engineer is for the sole benefit of the District and shall not relieve the Contractor of the responsibility of knowing and complying with all local, state, and federal laws and regulations concerning the protection of the environmental resources, nor does it relieve the Contractor of the responsibility of ensuring that all environmental permit requirements governing the project work are met.

3. The Contractor shall immediately notify the Engineer, via phone and e-mail, of the occurrence of any environmental incident.

PART 2 - PRODUCTS

2.1 GENERAL

A. All upland erosion/turbidity control devices shall be installed pursuant to Chapter 6 of The Florida Land Development Manual, A Guide to Sound Land and Water Management, prior to the commence of construction activities. The devices shall remain functional at all times.

2.2 SILTATION FENCES

A. The siltation fences shall be geotechnical woven or non-woven fabric conforming to the applicable application requirement of Section 985 of the Florida Department of Transportation "Standards Specifications for Road and Bridge Construction." The type and size of posts and wire mesh reinforcement will be at the option of the Contractor an applicable to the installation conditions.

2.3 EROSION CONTROL MATTING

A. Erosion control matting shall be woven, biodegradable geotechnical fabric. It shall be used to temporarily stabilize channels or steep slopes until vegetation is established. The type selected shall be comparable to the vegetation cover applied for the particular installation. The material shall be stapled in place at 18 inches on center with a minimum matting lap of 4 inches.

2.4 HAY OR STRAW BALES

A. Hay or straw bales shall be individual bales each entrenched 4 inches into the soil. The bales shall be clean, fresh hay or straw. Bales shall be replaced when they become clogged with silt, deteriorate, or after a period of 3 weeks, whichever occurs first. The particular application may require that bales be staked into the ground with rebar.

2.5 TURBIDITY SCREENS

A. Floating turbidity screens with weighted skirts that extend to within 1 foot of the bottom and shall be placed at the construction site (DMMA discharge) where feasible. The Contractor is responsible for ensuring that turbidity control devices are inspected daily and maintained in good working order so that there are no violations of water quality standards outside of the mixing zone. The Contractor is solely responsible for ensuring that the turbidity screens (1) do not impact seagrasses; (2) avoid manatee entanglement and entrapment; and (3) do not impede manatee movement.

PART 3 - EXECUTION

3.1 PROTECTION OF ENVIRONMENTAL RESOURCES

A. General

1. For contract work, the Contractor shall comply with all applicable federal, state, and local laws and regulations. The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. Contractor shall confine his activities to areas defined by the drawings and specifications. Environmental protection shall be as stated in

the following paragraphs. Failure to meet the requirements of these Specifications for environmental protection may result in Work stoppages or termination for default. No part of the time lost due to any such Work stoppages shall be made the subject of claims for extensions of time or for excess costs or damages by Contractor. If Contractor fails or refuses to promptly repair any damage caused by violation of provisions of these Specifications, the Owner may have the necessary Work performed and charge the cost thereof to Contractor.

3.2 PROTECTION OF LAND RESOURCES

A. Before beginning any construction, Contractor shall identify all land resources to be preserved within Contractor's work area. Contractor shall not remove, cut, deface, injure, or destroy land resources including trees, shrubs, vines, grasses, topsoil, and landforms without special permission from Engineer. Contractor shall engage a qualified tree surgeon to perform all tree surgery, and shall repair injuries to bark, trunk, branches, and roots of protected trees by dressing, cutting, and painting as specified for Class I Fine Pruning, of the National Arborist Association Pruning Standards for Shade Tree or as per State's Agricultural Extension Agency Guidelines, immediately as occurrences arise. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, Contractor shall provide effective protection for land and vegetation resources at all times as defined in the following subparagraphs.

B. Work Area Limits

1. The Contractor’s field offices, staging areas, stockpile storage, and temporary buildings shall be placed in areas approved by the Engineer. Temporary movement or relocation of the Contractor facilities shall be made only upon approval by the Engineer.

2. Prior to any construction, the Contractor shall mark the areas that are not required to accomplish all work to be performed under this contract. Isolated areas within the general work area that are to be saved and protected shall also be marked or fenced. Protect from damage all existing trees designated to remain. Protect tree roots from noxious materials in solution caused by run-off or spillage. No materials, trailers, or equipment shall be stored within the drip line of any protected tree.

3. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The Contractor shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

C. Protection of Landscape

1. With exception of the Contractor Staging and Storage area, the District will not allow vegetation to be disturbed or removed from the DMMA nor perimeter road and access areas. Please refer to the Project Drawings for the allowable vegetation removal area. The vegetation removed in the Contractor offloading, staging, and storage area shall be minimized to the extent possible.

2. Trees and their roots, shrubs, vines, grasses, land forms, and other landscape features (indicated, defined, and delineated on the Drawings to be preserved, such as wetlands) shall be clearly identified and protected by fencing or any other approved techniques. Place tree protection fencing before excavation or grading is begun and maintain in place until construction is complete.

D. Disturbed Areas

1. The Contractor shall effectively prevent erosion and control sedimentation through approved methods include, but are not limited to, the following:

a. Retardation and Control of Runoff: Runoff from the construction site or from storms shall be controlled, retarded, and diverted to protected drainage courses by means of diversion ditches, benches, and by any other erosion control measures necessary.

b. The Contractor shall select, implement, and maintain erosion and sediment control measures as required by local, state, and federal laws and regulations.

E. Disposal of Solid Wastes

1. Solid wastes (excluding clearing debris) shall be placed in containers that are emptied on a regular schedule. All handling and disposal shall be conducted to prevent contamination. The Contractor shall transport all solid waste off the properties within the project limits and dispose of it in compliance with federal, state, and local requirements for solid waste disposal. Discarded materials other than those that can be handled in the solid waste category will be handled as directed by the Engineer.

F. Dispensing of Fuel

1. Fuel dispensers shall have a 4-foot square, 16-gauge metal pan with borders banded up and welded at corners right below the bib. Edges of the pans shall be 8-inch minimum in depth to ascertain that no contamination of the ground takes place. Pans shall be cleaned by an approved method immediately after every dispensing of fuel and wastes disposed of offsite in an approved area. Should any spilling of fuel occur the CONTRACTOR shall immediately recover the contaminated ground and dispose of it offsite in an approved area.

G. Disposal of Chemical Waste

1. Chemical waste shall be stored in corrosion resistant containers, removed from the work area and disposed of in accordance with Federal, State, and local regulations.

H. Disposal of Discarded Materials

1. Discarded materials other than those that can be included in the solid waste category shall be handled as directed.

3.3 PROTECTION OF WATER RESOURCES

A. General

1. The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. The Contractor shall conduct his operations in a manner to minimize erosion, and shall conform to all water quality standards as prescribed all other relevant Federal, State and local regulatory criteria. Special management techniques as set out below shall be implemented to control water pollution by the listed construction activities that are included in this contract. In the event of unforeseen conditions, the Engineer may require the use of control features or methods other than those indicated or proposed by the Contractor.

2. Storage, stockpiling or access of equipment on, in, over or through seagrass (or other aquatic vegetation) beds is prohibited unless a work area or ingress/egress corridor is specifically approved by this permit. Refer to the Project Drawings. Anchoring or spudding of vessels and barges within beds of aquatic vegetation or over hardbottom areas is prohibited.

B. Turbidity Control

1. Turbidity shall be monitored and conducted in accordance with techniques described in the FDEP Standard Operating Procedure (SOP) for field turbidity measurements:

   a. Every four (4) hours during all dredging and every six (6) hours during discharge operations.

   b. Background: At one-foot below surface, mid-depth, and one-foot above bottom, clearly outside the influence of any artificially generated turbidity plume.

      1) Dredge Site: approximately 100 feet up-current of the work site and clearly outside the influence of construction activities.
      2) DMMA Discharge: approximately 100 feet in the opposite direction in the prevailing current flow.

   c. Compliance: At one-foot below surface, mid-depth, and one-foot above bottom, within the densest portion of any visible turbidity plume generated by this project.

      1) Dredge Site and DMMA Discharge: Immediately outside the authorized 150-meter mixing zone surrounding the work sites and within the densest portion of any visible turbidity plume.

   d. See **APPENDIX I** for a sample Turbidity Monitoring Report Form.

2. The compliance locations given above shall be considered the limits of the temporary mixing zone for turbidity allowed during construction. If turbidity monitoring (collected and recorded during daylight hours only) shows an increase in compliance sampling turbidity greater than 29 NTU above background, the Contractor shall:
   a. Notify the Engineer and Florida Department of Environmental Protection (561-681-6636) at the time the violation is first detected.
   b. Immediately cease all work contributing to the water quality violation.
   c. Stabilize all exposed soils contributing to the violation. Modify the work procedures that were responsible for the violation, install more turbidity containment devices, and repair any non-functional turbidity containment devices.
   d. Perform turbidity monitoring
   e. Resume construction activities once turbidity levels outside turbidity curtains fall below 29 NTUs.

3. Work Delay

   a. Delays in work due to the fault or negligence of the Contractor or Contractor's failure to comply with the required turbidity requirements shall not be compensable.

C. Washing and Curing Water

1. Wastewaters directly derived from construction activities shall not be allowed to enter surface water areas. These wastewaters shall be collected and placed in retention ponds where suspended materials can be settled out or the water evaporates so that pollutants are separated from the water.

2. The Contractor shall provide siltation fences, hay bales, and other means and materials to prevent the pollution of the Intracoastal Waterway, Dania Cutoff Canal, streams, canals, lakes, ditches, rivers, and other water improvements including on-site retention areas from siltation from erosion, run off, concrete truck wash, mortar mixer cleanout, and other construction activities. Under no circumstances will material delivery trucks be cleaned out on District property. The Contractor is responsible for arranging for proper clean out facilities.

3. The Contractor shall take sufficient precautions to prevent discharge of fuels, oils, bitumen, calcium chloride, and other harmful materials to the surface and ground water.

D. Oil Spill Prevention

1. Prevent oil or other hazardous substances from entering the ground, drainage, or local bodies of water. Provide containment, diversionary structures, or equipment to prevent discharged oil from reaching a watercourse. Take immediate action to contain and clean up any spill of oily substances, petroleum products, and hazardous substances. Immediately report such spills to the Engineer. Provide on or more of the following preventive systems at each oil storage site. The provision of such preventive systems shall be approved by the Engineer prior to tank installation and use.

   a. Dikes, berms, retaining walls, culverting, curbing, guttering, or other similar structures shall be capable of containing the contents of the largest single tank.

   b. Spill diversion ponds shall be capable of containing the contents of the largest single tank.

   c. Absorbent materials shall be capable of absorbing the contents of the largest single tank.

2. Oil Storage Tank Installation: All oil storage tank installation shall be constructed so that a secondary means of containment is provided for the entire contents of the largest single tank. Dikes and other structures shall be positioned or located so as to provide a secondary containment identical to that required for non-mobile storage tanks. Storage tanks shall be located where they will not be subject to flooding or washout. When it is determined that the installation of containment structures or equipment to prevent discharged oil from reaching a watercourse is not practicable, a clear demonstration of such impracticability shall be submitted to the Engineer for approval prior to installation or use of the storage tank. The following shall also be provided to the Engineer for approval prior to installation use of the storage tank.

   a. An oil spill contingency plan.

   b. A written certification of commitment of manpower, equipment, and materials required to expeditiously control and remove the discharge oil.

3. Liabilities: Contractor shall be liable for the damage caused by oil spills when it can be shown that oil was discharged as a result of willful negligence or willful misconduct. The penalty for failure to report the discharge of oil shall be in accordance with state and federal laws.

3.4 PROTECTION OF WETLANDS

A. General

1. The Contractor shall protect all natural areas both inside and adjacent to the work area from erosion, siltation, scouring, and/or dewatering resulting from his operations. There shall be no storage of tools, materials (e.g., clearing debris, lumber, fill dirt) within

wetlands, along the shoreline in the littoral zone, or elsewhere within waters of the state except as specified in the project Specifications and/or Project Drawings. Turbidity/erosion controls shall be installed prior to any clearing, excavation, or placement of fill material and shall be maintained in an effective condition at all locations until construction is completed and disturbed areas are stabilized. Appropriate erosion control barriers shall be placed at the edge of fill slopes adjacent to wetlands to prevent turbid run-off and erosion.

I. Shoreline Vegetation

1. Mangroves are known to exist along portions of the Peanut Island shoreline. Trimming, alteration or removal of mangroves is strictly prohibited as defined in the 1996 Mangrove Trimming and Preservation Act. Unauthorized impacts to mangroves due to construction activities will require mitigation and will result in enforcement action. **Should penalties be leveed and/or mitigation be required (as a result of Contractor actions) — all such cost will be borne by the Contractor at no cost to the Owner.**

3.5 PROTECTION OF SEAGRASSES

1. Submerged natural resources exist within the footprint and adjacent to the project area (seagrasses). The Contractor shall instruct all personnel associated with the project of the presence of seagrasses, especially the Federally-listed threatened Johnson's Seagrass (*Halophlia johnsonii*), and the need to avoid contact with seagrasses adjacent to the project area. All construction personnel shall be advised that there are civil and criminal penalties for harming or destroying seagrasses, especially Johnson's Seagrass which is protected under the Endangered Species Act of 1973, as amended. The Contractor may be held responsible for any seagrasses (adjacent to the project area) that are harmed or destroyed due to construction activities. **Should penalties be leveed and/or mitigation be required (as a result of Contractor actions) — all cost will be borne by the Contractor at no cost to the Owner.**

2. Vessels crossing seagrass beds shall have a minimum of eighteen inches of water below the hull or propellers, whichever is lower.

3. Coordinates of all dredge anchor drop points, specifically anchor points outside the dredge template, shall be recorded in the dredge operational logs (using DGPS technology, accurate to two (2) meters). Logs shall also include the dates, times and circumstances of all work stoppages and equipment malfunctions. A copy of the dredge logs shall be submitted to the Contracting Officer with the submittal "Daily/Monthly Report of Operations" in the submittal requirements for 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT.

3.5 PROTECTION OF FISH AND WILDLIFE RESOURCES

A. Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife. Species that require specific attention along with measures for their protection will be listed in Contractor's Environmental Protection Plan prior to the beginning of construction operation. In the event that a threatened or endangered species is harmed because of construction activities, the Contractor shall cease all work and notify the Engineer. The Engineer will provide emergency contact information at the Pre-Construction Meeting.

B. Manatee

1. The Contractor shall comply with the Standard Manatee Construction Conditions for In-Water Work (2011) and conditions as cited in **APPENDIX B** and **APPENDIX C** for all in-water activity.

C. Sea Turtle and Smalltooth Sawfish

1. The Contractor shall comply with National Marine Fisheries Service's "Sea Turtle and Smalltooth Sawfish Construction Conditions" dated March 23, 2006.

3.6 PRESERVATION AND RECOVERY OF HISTORIC, ARCHEOLOGICAL, AND CULTURAL RESOURCES

A. Inadvertent Discoveries

1. If, during construction activities, Contractor observes items that may have historic or archeological value, such observations shall be reported immediately to Engineer so that the appropriate authorities may be notified, and a determination made as to their significance and what, if any, special disposition of the finds should be made. Contractor shall cease all activities that may result in the destruction of these resources and shall prevent his employees from trespassing on, removing, or otherwise damaging such resources.

B. Claims for Downtime due to Inadvertent Discoveries

1. Upon discovery and subsequent reporting of a possible inadvertent discovery of cultural resources, the Contractor shall seek to continue work well away from, or otherwise protectively avoiding, the area of interest, or in some other manner that strives to continue productive activities in keeping with the contract. Should an inadvertent discovery be of the nature that substantial impact(s) to the work schedule are evident; such delays shall be coordinated with the Engineer. Contract adjustments resulting from compliance with this paragraph shall be determined in accordance with Article 14 of the General Conditions.

3.7 PROTECTION OF AIR RESOURCES

A. The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources. All activities, equipment, processes and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with the applicable air pollution standards of the State of Florida and all Federal emission and performance laws and standards.

3.8 PROTECTION FROM SOUND INTRUSIONS

A. The Contractor shall keep construction activities under surveillance and control to minimize damage to the environment by noise and to comply with all federal, state, and local noise ordinances. The use of horns, bells or the use of whistle signals shall be held to a minimum necessary in order to ensure as safe and as quiet an operation as possible.

3.9 POST CONSTRUCTION CLEANUP

A. The Contractor shall clean up any area(s) used for construction to the satisfaction of the Engineer and Owner.

3.10 MAINTENANCE OF POLLUTION CONTROL FEATURES

A. The Contractor shall, at his expense, provide routine maintenance of permanent and temporary erosion control features until the project is completed and accepted. If such erosion control

features must be reconstructed due to the Contractor's negligence, carelessness, or in the case of temporary erosion control features, failure by the Contractor to install permanent erosion control features as scheduled, such replacement shall be on the Contractor's expense.

B. If the Contractor through any construction activity degrades, destroys, or impacts the ground cover on any adjoining property including rights-of-way, effected area shall be fully repaired and re-vegetated at the Contractor's expense. Where the area affected is undeveloped with no maintained stand of grass, the area shall be sodded with Bahia, and where affected areas are grassed, the sod shall match the applicable vegetative cover.

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SECTION 35 20 23

DREDGING AND DREDGED MATERIAL PLACEMENT

PART 1 - GENERAL

1.1 SUMMARY

A. The Work covered by this section consists of furnishing all labor, materials, equipment, supplies and material, surveying, and performing all operations necessary to mechanically or hydraulically dredge the Intracoastal Waterway project limits (as indicated in the Project Drawings, **APPENDIX A**), transfer all excavated material to the District-owned Peanut Island Dredged Material Management Area (DMMA), and dispose of in-channel debris. In-channel debris shall be separated, hauled off of Peanut Island, and property disposed of in an approved landfill. All watercraft associated with the execution of the permitted project shall only operate within waters of sufficient depth so as to preclude bottom scouring, prop dredging, grounding, and damage to the submerged bottom or submerged resources (a minimum eighteen-inches clearance must be maintained at all times). Temporary and permanent impacts to surrounding wetland and submerged natural resource areas are not authorized.

1. The base project (Bid Item No. 0001 – 00054) generally entails dredging approximately 90,000 CY of material from ±4.5 miles of the Intracoastal Waterway (ICWW) between the Port of Palm Beach (Cut PB-36, Station 29+00) to the Town of Palm Beach Docks (Cut PB-41, Station 6+81) to a depth of -12 feet Mean Lower Low Water, (MLLW) (project depth of -10 feet and 2-foot allowable overdredge). In accordance with permit conditions, material shall be dredged via the use of either a mechanical or hydraulic dredge to remove all material (inclusive of all in-channel debris) from the dredge template. Contractor is responsible for utilizing the appropriate equipment on the job to accomplish the objectives and scope of this project and that will allow for removal of sediment for the full range of blow counts (i.e., identified between -10 and -21 ft MLLW) provided in the geotechnical borings. Dredged material shall be offloaded at a District-owned ±17-acre DMMA located on the north end of Peanut Island.

2. The Alternate Bid Item (Bid Item No. A01) includes the removal and disposal of the AT&T conduit that lies within the Intracoastal Waterway right-of-way (identified at Utility Crossing No. 6). The line and associated infrastructure shall be removed and disposed, in its entirety, along the entire Intracoastal Waterway channel bottom and 25 feet outside the delineated boundary, as indicated in the Project Drawings (**APPENDIX A**). **APPENDIX J** provides a copy of the decommission letter from AT&T. The award of the Alternate Bid Item shall be at the sole discretion of the District.

B. As part of this Work (included as part of Bid Item No. 0004) and indicated in the Project Drawings, the Contractor shall, prior to the start of dredging activities, (1) make minor repairs to the existing Peanut Island DMMA, (2) install an appropriate discharge point leading from the DMMA to the Intracoastal Waterway, and (3) construct a temporary American with Disabilities Act (ADA)-accessible pedestrian walkway over the Peanut Island park pathway.

1. As discussed in **APPENDIX D**, repairs to the DMMA shall include (1) tightening and replacing any loose and missing bolt connections on the timberdeck and weir structure; (2) removal of the vegetation growth around the base of the weir; and (3) removal of the vegetation growth along the perimeter road. Hot-dipped galvanized metal hardware shall be used to replace missing components on the timberdeck and weir structure. Cut vegetation located within the DMMA, perimeter road and perimeter ditch shall be either chipped and stockpiled near the site's southeast gate or hauled off-site. Contractor shall compact the material in areas of removed vegetation.

2. The Contractor shall also inspect both the quality and quantity on on-site weir boards for use during construction. The Contractor is responsible for verification and acquisition of needed weir boards necessary to operate the on-site weir structure. Refer to Section 2.2.

3. Two of the three weir discharge pipes are currently sealed via a plastic blind flange. The remaining and southern weir structure is fitted with a reducer to an 18-in HDPE discharge pipe and 6-inch C515 gate valve. Refer to Section 3.7.

C. Throughout all phases of the project, the Contractor shall remain responsible for ensuring that all work complies with the requirements specified in the regulatory permits (**APPENDIX B** and **APPENDIX C**). Failure to meet the environmental requirements of the aforementioned permits or of these Specifications may result in work stoppages or termination for default. The Contractor shall make no part of the time lost due to any such work stoppages the subject of claims for extensions of time or for excess costs or damages. If Contractor fails or refuses to promptly repair any damage caused by violation of the provisions of these permits and/or Specifications, the District may have the necessary work performed and charge the cost thereof to the Contractor.

1.2 REFERENCES

A. American Society of Mechanical Engineers (ASME)

ASME B18.2.2	Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.2.6	Fasteners for Use in Structural Applications
ASME B18.21.1	Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

B. American Society of Testing Materials (ASTM)

ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
ASTM D698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort.
ASTM D1140	Standard Test Methods for Amount of Material in Soils Finer than the No. 200 (75-um) Sieve
ASTM D1556	Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
ASTM D2216	Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
ASTM D2487	Standard Practice for Classification of Soils for Engineering Purposes.

C. American Wood Preservers' Association (AWPA)

AWPA U1	User Specification for Treated Wood
AWPA M4	Standard for the Care of Preservative-Treated Wood Products

1.3 SUBMITTALS

The following shall be submitted in accordance with SECTION 01 33 00 SUBMITTAL PROCEDURES:

A. Notice to Mariners

1. Prior to the commencement of work on this Contract, the Contractor shall notify the Commander, Seventh Coast Guard District in Miami, Florida of his intended operations to dredge and request that it be published in the Local Notice to Mariners. This notification must

be given in sufficient time so that it appears in the Notice to Mariners at least two weeks prior to the commencement of this dredging operation. A copy of the notification shall be provided to the Engineer.

B. Notification of Discovery of Historical Resources

1. Contractor shall immediately notify Engineer if any shipwreck, artifact, or other objects of antiquity that have scientific or historical value, or are of interest to the public, are discovered, located, and/or recovered. Contractor acknowledges that the site(s), articles, or other materials are the property of the State of Florida, with title vested in the Department of State, Division of Historical Resources.

C. Notice of Misplaced Material

1. Contractor shall immediately notify the U.S. Coast Guard Marine Safety Office and the Engineer of any misplaced material (e.g., dredge pipe, cable, etc.).

D. Notification of Aids Relocation

1. Unless expressly stated in the Project Drawings, the Contractor shall not remove, change the location of, obstruct, willfully damage, make fast to, or interfere with any aid to navigation without written consent from the U.S. Coast Guard. Within seven (7) calendar days following receipt of the Notice to Proceed, the Contractor shall notify the Commander, Seventh Coast Guard District in Miami, Florida of his plan to dredge adjacent to any aids which require relocation to facilitate dredging. This notification shall be immediately followed by formal written request with a copy to the Engineer. The Contractor shall contact the U.S. Coast Guard for information concerning the position to which these aids will be relocated.

E. Dredge Plan

1. At least fifteen (15) calendar days before the scheduled pre-construction conference, the Contractor shall submit to Engineer for approval, a dredge plan that provides for a comprehensive summary of proposed project methodology (equipment, material transport, daily dredging productivity), operational controls (quality control, minimization of marine and upland traffic delays, permit compliance), security, and turbidity management/monitoring procedures to be implemented. The plan shall also include a specific discussion on staging areas, work sequencing, and minimization of impacts to recreational users of Peanut Island.
2. Listed equipment specifications must include the following:
    a. Dredge dimensions including draft and freeboard
    b. Production rate of dredge in similar material and disposal distance
    c. GPS positioning systems and commercial navigation dredging software (HYPACK or equivalent)
    d. Marine surveyor's inspection certificate that includes a statement that the dredge can safely operate in waters associated with this Contract
        i. The certificate shall be issued by a licensed and accredited marine surveyor within the last 12 months.
        ii. Marine surveys are accredited by either the National Associated of Marine Surveyors or the Society of Accredited Marine Surveyors.
    e. Hydraulic Dredge
        i. Plant weight
        ii. Cutterhead dredge size (minimum 14 inch as measured at the neck of the pump)
        iii. Booster capability, as applicable, and noise suppressant equipment
    f. Mechanical Dredge
        i. Breakout force must be sufficient for material removal of sediment for the full range of blow counts (i.e., identified between -10 and -21 ft MLLW) provided in the geotechnical borings.
3. The Dredge Plan shall include a discussion of staging areas, work sequencing, and a Maintenance of Marine Traffic Plan

F. Maintenance of Marine Traffic Plan

1. The Contractor shall develop and submit a Maintenance of Marine Traffic Plan to the Engineer for approval within fifteen (15) calendar days before the scheduled pre-construction conference. The plan — addressing traffic within the Intracoastal Waterway — must clearly demonstrate, via narrative and illustrative documentation, how the Contractor will avoid disruption of ongoing traffic to the maximum extent possible.
2. During active dredging, the plan shall also include a daily email correspondence to local mariners that provides via narrative and illustrative documentation, at a minimum, the planned location of the dredge, local landmarks for ease of reference, and hours of operation.
3. In order to form a complete plan and ensure ongoing dredging and offloading operations, the Contractor shall coordinate, at a minimum with the U.S. Coast Guard, Bar Pilots, local marinas, marine industry groups, and organizer of the Palm Beach International Boat Show.

G. DMMA Facility Operation Plan

1. Within fifteen (15) days of the Notice to Proceed, the Contractor shall submit plans to the Engineer for approval of the DMMA Facility Operation Plan. The Plan shall include a detailed narrative for transporting and placing the material at Peanut Island. Primary plan components include both the Site Plan and Placement Operations Plan:

    a. Site Plan

        1) Proposed location and dimensions of any on-site facilities (storage area, field office, sanitation, etc.)
        2) On-site turbidity control measures
        3) Avenues of ingress/egress
        4) The Contractor shall also indicate if the use of a supplemental or other staging area will be used.

    b. Placement Operations Plan

        1) The Contractor shall describe the procedure and equipment that will be used by the Contractor to manage the DMMA.

        2) The Placement Operations Plan shall include, at a minimum, the proposed commencement and completion date relevant to the District's Notice to Proceed, hours of operation, material unloading and handling equipment, anticipated production rates, maintenance and operation of inflow pipe, effluent monitoring, discharge monitoring and reporting, equipment and vehicles to be used on site, key personnel names and telephone numbers, pipeline route, fuel spill plan, and other pertinent procedures relating to material unloading, transportation and placement of the dredged material required under this Contract.

        3) The Placement Operations Plan shall also include, but shall not be limited to, the following items:

            i. A scaled drawing and description of the inflow pipeline design and layout. The description shall include details including: pipe material, size and thickness; location of all proposed inflow pipe end points; pipeline valves and wyes; inflow pipe end point conditions, including use of spreaders, distance off the dike and pontoons or other equipment used.
            ii. Listing of all equipment to be mobilized on site and a description of the intended use. Equipment shall include but shall not be limited to: all pumps and pump details, spill cleanup equipment, monitoring

equipment, and material excavation/trenching equipment. The Contractor shall be responsible for designing any necessary pumping system and sizing any pumps.

iii. Procedure for inspection and maintenance of inflow pipeline to prevent leaks and spills. The Contractor shall inspect the full length of the inflow pipe a minimum of two (2) times per day.

iv. Procedure for communication between the dredge and DMMA.

v. Health, Safety, and Security measures that will be implemented by the Contractor at the work site and along the pipeline locations to ensure safety and security for onsite personnel and to keep the public free and clear from work site and pipeline.

vi. Location and description of any ramps, trenches or road crossing areas to be constructed by the Contractor along the pipeline on the DMMA.

vii. Operating procedures to control discharge water and water quality including sampling and monitoring procedure and equipment.

viii. Detailed plan of the operation and procedures that will be used to monitor the Contractor's operations at the disposal area and ensure compliance with the facility permits requirements.

Note, the Contractor has access to the on-site weir boards for use during the project construction. The Contractor shall inspect both the quality and quantity on on-site weir boards for use during construction. The Contractor is responsible for verification and acquisition of needed weir boards necessary to operate the on-site weir structure.

H. ADA-Accessible Pedestrian Walkway Shop Drawing

1. The Contractor shall construct a temporary ADA-accessible ramp over the dredge pipeline (as applicable) that intersects the Peanut Island park pathway. Ramps, sufficient in width and quality to support a 6-ft wide golf cart used by Palm Beach County park staff, shall be maintained in good condition at all times during the project. As such, within fifteen (15) days of the Notice to Proceed, the Contractor shall submit a Shop Drawing (plan-view and cross-section) to the Engineer for approval. Palm Beach County park staff shall approve the Shop Drawing before dredging activities commence.

I. Preservative Treatment Certificate Lumber

1. Prior to the order of materials, the Contractor shall provide a preservative treatment certificate from an approved testing organization attesting that the dimensional lumber to be used in the work is in accordance specifications provided in SECTION 35 20 23 (2.2 B DIMENSIONAL LUMBER PRESERVATIVE TREATMENT). A copy of the invoice shall also be submitted.

J. Hardware Manufacturer Information

1. Prior to the repair of the timberdeck, the Contractor shall submit manufacturer's information demonstrating that the hardware meets the galvanizing requirements. This includes but is not limited to nails, screws, bolts, and washers.

K. Daily Dredging Report of Operations

1. For each 24-hour period of dredging operations, the Contractor shall prepare and submit to Engineer one (1) copy of the Daily Report of Operations. A sample daily report form is provided in **APPENDIX I**. These reports shall be submitted to Engineer in Adobe PDF format by 5:00 pm on the day following the 24-hour period covered by the report. Upon completion of the job, Contractor shall summarize the daily reports in a consolidated job report and submit this report to Engineer.

2. DMMA Seepage Control and Observation

a. The Contractor shall daily monitor the embankment for signs of increased seepage flow, development of pipes/boils, slope depressions, sloughs, etc. Any development of these conditions shall be immediately reported to the Engineer and pumping operations shall cease until said conditions can be observed and evaluated.

b. The daily report observations at the DMMA shall be noted on the Daily Report of Operations aforementioned and in additional detail, as necessary, in the DMMA Placement Daily Operations Report.

L. Daily DMMA Placement Report of Operations

a. The Contractor shall also generate and maintain a Daily Operations Report to record the placement operations at the DMMA. The reports shall be generated for the entire duration of the placement and dewatering operations conducted by the Contractor. The forms to record the information shall be developed by the Contractor and submitted the Engineer for approval ten (10) days prior to the intended start of dredging. The information contained in the daily operations report shall include, at a minimum, the following:

1) A drawing showing the location of each material discharge point within the disposal site.
2) Date, starting and ending times of deposition of dredged material from each discharge point.
3) Daily average pond elevation in the basin
4) Daily meteorological data including precipitation, sky conditions, winds (direction and miles per hour) and temperature.
5) Date, starting and ending times, quantity and duration of effluent water discharged through the weir, number of weir boards in place, ponding and freeboards depths
6) Daily narrative describing Contractor's operations including water control and discharge operations, any maintenance or material handling/grading activities performed, and site condition including any signs of dike erosion or other condition requiring remediation.
7) Daily tally of persons on site including Contractor personnel. Forms shall be filled out completely and legibly each day by the Site Superintendent using black ink, including signatures. The original, completed Forms shall be submitted to the Engineer by 5:00 pm on the day following the 24-hour period covered by the report.

M. Waterfront Marine Structures Photo-Documentation

1. Pre-Construction: At least fifteen (15) days prior to the commencement of dredging activities, the Contractor shall submit photo-documentation of all waterfront structures within fifty (50) ft from the channel bottom (See **APPENDIX A** - Yellow zones indicate areas with structures located within 50-ft of limits of dredging) along the entire project length. The Contractor shall supply a narrative and accompanying photographs that detail the specific condition of the structure(s) and denote any structural deficiency's that are cross-referenced and appropriately labeled, via location and owner name, in the survey via location and owner name, in the survey.

2. Post-Construction: Within fifteen (15) days after the completion of each acceptance section (A/S) and in the equivalent areas of the Pre-Construction Waterfront Marine photo-documentation area, the Contractor shall supply a narrative and accompanying photographs that detail the specific condition of the structure(s) and denote any structural deficiency's (as strictly compared to the pre-construction condition) that are cross-referenced and appropriately labeled, via location and owner name, in the survey.

N. Pre-Construction Bathymetric Survey

1. At least fifteen (15) days prior to the commencement of dredging activities, Contractor shall perform a pre-construction bathymetric survey of the project dredge area. Note that all dredging surveys used to determine pay quantities shall be conducted by an Engineer-approved bathymetric surveyor licensed in the State of Florida. The Engineer must review and approve the pre-dredge survey prior to any dredging activity.

O. Pre-Construction Utility Survey

1. The location of utilities provided Project Drawings (**APPENDIX A**), **APPENDIX F**, and in **APPENDIX G** are current as of February 2016. The location of the identified utilities supplied is directly limited to those areas where divers (in February of 2018) were able to successfully locate the utilities within the identified dredged template. It is the Contractor's sole responsibility to investigate the location of all utility crossings, via an independent and comprehensive pre-construction utility survey and submit to the Engineer for approval, at least fifteen (15) calendar days prior to any dredging operations. The Contractor shall take precautions against damages which might result from his operations in the vicinity of the utility crossings. **The Contractor assumes all liability for submerged and buried utility facilities. If any utility damage occurs as a result of its operations, the Contractor shall suspend dredging in the area of the damaged utility until the damage is repaired and resumption of the dredging is approved by the Engineer. The District shall not be responsible for the cost of such damage and repairs regardless of cause – including but not limited to any costs associated with interruption of utility services and delay damages.**

P. Post-Construction Bathymetric Survey

1. Within seven (7) days of the completion of construction activities within an acceptance section, the Contractor shall perform the post-dredge bathymetric survey (by equivalent methods, standards, and density to the pre-construction dredging survey). Upon submittal to the Engineer, the surveys shall be reviewed for accuracy, completeness, and to calculate payment quantities relative to the pre-construction bathymetric survey or progress payment surveys. The payment quantities, within the permitted template and broken down by required depth and allowable overdepth, shall be shown on the front cover of each Acceptance Section survey and be sealed by a Florida Registered Professional Surveyor as part of the submittal. At the end of each acceptance section, the Contractor shall submit two (2) signed and sealed surveys.

2. At project completion of all Acceptance Sections, the Contractor shall submit five (5) copies of a signed and sealed survey of the entire project within fifteen (15) calendar days of the completion of dredging activities for Engineer for approval. At a minimum, the project certification survey must include the pre-construction bathymetric survey, permitted dredging template, construction template, and post-dredge bathymetric survey (combining each of the acceptance sections). The payment quantities, within the permitted template and broken down by required depth and allowable overdepth, shall be shown on the front cover (summarizing each Acceptance Section) and be sealed by a Florida licensed surveyor as part of the submittal.

Q. Post-Construction DMMA Topographic Survey

1. After the acceptance of the post-construction bathymetric survey and at least sixty (60) days post-site dewatering, the Contractor shall perform a 50-ft x 50-ft grid survey of the Peanut Island DMMA that encompasses the site inward from the perimeter road. Ground elevations shall also be obtained at all material changes and changes in elevation greater than six (6) inches. Material changes such as but not limited to tree lines, dense vegetation, roadways, fencing, gates, trails, levees, marsh, ditches, and edge of water shall be mapped. The survey

shall be conducted using conventional angle-distance/level-rod methods and/or Real-time Kinematic Differential Global Positioning techniques, whichever methodology is deemed most practical. Horizontal and vertical datum for the post-construction DMMA shall be referenced to the Florida State Plan Coordinate System, East Zone, North American Datum, 1983 and North American Vertical Datum of 1988. The Contractor shall submit five (5) copies of a signed and sealed post-construction topographic survey of the DMMA within ninety (90) calendar days of substantial completion date.

R. In-Channel Subaqueous Debris Removal and Disposal Landfill Weigh Tickets

~~2.~~1. Subaqueous debris removed and disposed of from the project as measured by truck weigh tickets from a certified landfill's weigh scale which will substantiate the truck license number, time, date, net weight of the debris, weight of empty truck and shall be signed by the disposal site operator. To qualify for payment, each invoice shall be accompanied by the truck weigh tickets and a copy of the truck inspection review ticket (signed by the CQC System Manager before leaving the DMMA). The truck inspection review tickets shall also list the vehicle license, time, date and inspector's comments on size, type of load, and destination for each truck load of subaqueous debris disposed of. Contractor is required to keep a journal and photographic log of all debris removed from the project that includes location, time and date.

1.3 DEFINITIONS

A. Limits of Dredging: The area in which the dredge is free to excavate material. All vessels and construction equipment, tools, and dredging activities shall be setback a minimum of 25 feet from all structures within the main channel. Anchoring, spudding of vessels, storage, stockpiling or access of equipment on, in, over or through submerged aquatic vegetation is strictly prohibited.

B. Required Depth: The material actually removed from the designated areas to be dredged, to a depth of not more than the "Project Depth" as shown on the drawings, will be estimated and paid for in accordance with the provisions contained in SECTION 01 29 00 MEASUREMENT AND PAYMENT.

C. Allowable Overdepth: To cover the inaccuracies of the dredging process, material actually removed from the designated areas to a depth below the required depth of not more than the allowable overdepth shown on the drawings, will be measured and paid for in accordance with the provisions contained in in SECTION 01 29 00 MEASUREMENT AND PAYMENT.

D. Side Slopes: Although dredging of side slope material may be necessary to provide the required project channel dimensions (depth and width), the side slopes shown on the drawings are provided for payment purposes only. Side slopes may be formed by box cutting, step cutting, or dredging along the side slope. Material actually removed, confined by the "Limits of Dredging", to provide for final side slopes not flatter than that shown on the Project Drawings, but not in excess of the amount originally lying above the limiting side slope, will be measured and paid for in accordance with SECTION 01 29 00 MEASUREMENT AND PAYMENT.

1.4 PUMPING OF BILGES

A. Contractors are warned that pumping oil or bilge water containing oil into navigable waters, or into areas which would permit the oil to flow into such waters, is prohibited by Section 13 of the River and Harbor Act of 1899, approved March 3, 1899 (30 Stat. 1152; 33 U.S.C. 407). Violation of this prohibition is subject to the penalties under the referenced acts.

1.5 UTILITY CROSSINGS

A. The Contractor shall be responsible for investigating the locations and depths of all utility crossings. Contractor will take precautions against damages which might result from his operations, especially the sinking of dredge spuds and/or anchors into the channel bottom, in the vicinity of underwater

utility crossings. If any damage occurs because of his operations, Contractor will be required to suspend dredging until the damage is repaired and approved by the District and Engineer. Costs for such repairs and for the downtime of the dredge and attendant equipment shall be at Contractor's expense.

1.6 SIGNAL LIGHTS

A. The Contractor shall display signal lights and conduct operations in accordance with the General Regulations of the Department of the Army and of the Coast Guard governing lights and day signals to be displayed by towing vessels with tows on which no signals can be displayed, vessels working on wrecks, dredges, and vessels engaged in laying cables or pipe or in submarine or bank protection operations, lights to be displayed on dredge pipe lines, and day signals to be displayed by vessels of more than 65 feet in length moored or anchored in a fairway or channel, and the passing by other vessels of floating plant working in navigable channels, as set forth in the U.S. Coast Guard August 2014 Navigation Rules and Regulations Handbook, or 33 CFR 80 through 33 CFR 82 (International) and 33 CFR 83 through 33 CFR 90 (Inland) as applicable.

PART 2 - PRODUCTS

2.1 WEIR BOARD AND WALKWAY MATERIALS

A. DIMENSIONAL LUMBER

1. Materials shall bear the grade-mark, stamp or other identifying marks indicating grades of material and rules or standards under which produced. Such identifying marks on material shall be in accordance with the rule or standard under which the material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification. The inspection agency for lumber shall be certified by the Board of Review, American Lumber Standards Committee, to grade species used. Except for lumber, bundle marking or certificates will be permitted in lieu of marking each individual piece. Lumber sizes shall conform to PS 20 and shall be surfaced on four sides. Size references, unless otherwise specified are nominal sizes, and actual sizes shall be within manufacturing tolerances allowed by the standard under which the project is produced.

B. DIMENSIONAL LUMBER PRESERVATIVE TREATMENT

1. Structural timber, stringers, stiffeners, weir boards, diagonal braces, deck boards, and other lumber shall be treated in accordance with AWPA U1 to the requirements of Use Category 5c (UC5C) for Marine Use – Southern Waters. Wood treated with water-borne preservatives shall be air-dried or kiln-dried to the moisture content specified for lumber and marked with the word "Dry". Surfaces of lumber that will be exposed shall not be incised. Exposed areas of wood that are cut or drilled after treatment shall receive a field treatment in accordance with AWPA M4.

PART 3 - EXECUTION

3.1 GENERAL

A. Contractor shall dredge within the Limits of Dredging as necessary to complete the Work as defined in the Project Drawings and Specifications and transport the dredged material to the designated placement area. Contractor shall not dredge outside the Limits of Dredging.

B. Work Hours

1. Refer to Section 01 11 00 SUMMARY OF WORK, **APPENDIX B** and **APPENDIX C** for Work Hour restrictions.

2. An Important Manatee Area (IMA) and Warm Water Aggregation Area (WWAA) are located in the northern portion of project area. Regardless of dredging method, dredging shall be limited to daylight hours only between November 15 and March 31 in the area indicated on the Project Drawings (**APPENDIX A**). An independent manatee observer shall be on-site at all times during in-water work.

C. Access to Work Sites

1. Contractor shall be responsible for providing and maintaining access necessary for his equipment to and from the Work sites.

D. Weather

1. The project area is subject to windy and rainy weather, including severe electrical storms and other sudden and locally severe meteorological occurrences that approach hurricane conditions, during any time of the year. Contractor shall maintain full-time monitoring of the NOAA marine weather broadcasts, and avail themselves of such other local commercial weather forecasting services as may be available. It shall be Contractor's responsibility to obtain information concerning rain, wind, and wave conditions that could influence his dredging and disposal operations.

E. Noise Control

1. Contractor shall ensure that all possible measures are employed to reduce the amount of noise produced by his operations. Contractor shall conduct his operations to comply with all federal, state and local laws pertaining to noise. Additionally, Contractor shall inform all crewmembers of the need to maintain a professional manner while on the job sites, in radio communications, and in dealing with the public, Palm Beach, Port of Palm Beach employees.

2. All hauling and excavating equipment including dredges, dredge/barges, booster pumps, tugs and other support vessels, dozers, loaders, etc. used on this Work shall be equipped with satisfactory mufflers and/or other noise abatement devices.

3. Contractor shall consider the proximity of the dredge operations to residential areas, especially during early evening and early morning hours. Such consideration should include but not be limited to—reducing deck noise, reducing throttle, holding the use of horn and whistle signals to a minimum, and restraining the use of P.A. loudspeaker systems.

F. Light Control

1. Contractor shall ensure that all work lights (as opposed to safety lighting) are shielded to prevent them from shining on residential areas.

G. Damage to Property

1. Any damages to private or public property (inclusive of utilities) resulting from Contractor's operations shall be repaired and paid for by Contractor.

3.2 NOTIFICATION OF COAST GUARD

A. Navigation Aids

1. Navigation aids located within or near the areas required to be dredged will be removed, if necessary, by the U.S. Coast Guard in advance of dredging operations. The Contractor shall

not remove, change the location of, obstruct, willfully damage, make fast to, or interfere with any aid of navigation.

B. Dredging Aids

1. The Contractor shall obtain approval from the U.S. Coast Guard for all buoys, dredging aid markers to be placed in the water, and dredging aid markers affixed with a light prior to the installation. Dredging aid markers and lights shall not be colored or placed in a manner that they will obstruct or be confused with navigation aids.

3.3 WATERBORNE OPERATIONS

A. All areas to be dredged shall be in accordance with the attached Project Drawings and shall not exceed the specific areas and depths indicated on those drawings. The Contractor is NOT authorized to dredge outside of the area depicted. Material excavated shall be transported to and deposited in the DMMA designated on the Project Drawings. No wetlands or submerged aquatic vegetation outside the project area is to be disturbed as a result as result of this project construction. Failure to comply with this condition and all other permit conditions may result in enforcement action. All regulatory enforcement actions, stemming from the project construction, are the strict responsibility of the Contractor. **Failure to comply with this condition and all other permit conditions may result in enforcement action. All regulatory enforcement actions, stemming from the project construction, are the strict responsibility of the Contractor.**

B. Bridge-To-Bridge Communication

1. In order that radio communication may be made with passing vessels, all dredges engaged in Work under this Contract shall be equipped with bridge-to-bridge radio telephone equipment. The radio equipment shall operate on a single channel very high frequency (VHF), FM, on a frequency of 156.55 MC per second with low power output having a communication range of approximately ten (10) miles. The frequency has been approved by the Federal Communication Commission (FCC). Channels #13 and #16 must be monitored at all times.

C. Right-of-Way Limits

1. Contractor shall conduct his operations to minimize interference with the movement of vessels in the adjacent waters not being actively dredged. However, the Contractor will be permitted to exclude the public from the work areas including in the immediate vicinity of active dredging or material placement operations. Enforcement shall be Contractor’s responsibility at no additional cost to District. When appropriate, the enforcement shall be coordinated with local law enforcement agencies, and will be subject to approval of Engineer.

C. Access

1. The Contractor shall be responsible for providing and maintaining access necessary for his equipment and plant to and from the work site and the DMMA site. The Contractor shall ascertain the environmental conditions which can affect the access such as climate, winds, currents, waves, depths, shoaling, and scouring tendencies.

D. Protection of Existing Waterways

1. The Contractor shall conduct his operations in such a manner that material or other debris are not pushed outside of dredging limits or otherwise deposited in existing side channels, basins, docking areas, or other areas being utilized by vessels. The Contractor will be required to change his method of operations as may be required to comply with the above requirements. Should any bottom material or other debris be pushed into areas described above, as a result of the Contractor's operations, the same must be promptly removed by and at the expense of the Contractor to the satisfaction of the Engineer.

2. Obstruction to Navigable Waterways

a. Contractor shall promptly recover and remove any material, plant, machinery, or appliance Contractor loses dumps, throws overboard, sinks, or misplaces, and which, in the opinion of Engineer, may be dangerous to or obstruct navigation. If required by Engineer, Contractor will mark or buoy such obstructions; Engineer may have the obstructions removed by a separate Contract and deduct the cost from any monies due or becoming due to Contractor, or recover the cost under Contractor's bond. Contractor's Liability for the removal of a vessel, wrecked or sunk without fault of negligence is limited to that provided in sections 15, 19, and 29 of the River and Harbor Act of March 3, 1899 (33 U.S.C. 409 et seq.).

3. Solid Waste Disposal

a. Contractor may encounter solid waste (tires, cans, bottles, fibrous plant material, boards and other debris) within the dredging template that cannot be dredged and/or hydraulically transported to the DMMA site. Contractor shall be responsible for the appropriate disposal of such material.

E. Adjacent Property and Structures

1. No dredging will be permitted within twenty-five (25) feet of any structure. Any damage to private or public property or structures resulting from the disposal or dredging operations shall be repaired promptly by the Contractor at his expense. Any damage to structures as a result of Contractor's negligence will result in suspension of dredging and require prompt repair at the Contractor's expense as a prerequisite to the resumption of dredging.

2. In vicinity of Cut PB-39, Station 8+00 to 16+00, the District and Engineer will coordinate with Palm Harbor Marina to temporarily relocate vessels to allow the Contractor to access the area for dredging. Contractor shall limit, to the extent possible, impact on the marina's day-to-day activities.

F. Barge and Equipment Anchoring

1. If Contractor's operations require anchoring of barges or other equipment within the work areas, Contractor shall be responsible for assuring that the anchoring technique does not impact or interfere with navigation or damage public or private property. If pilings are used for anchorage, the pilings shall be well marked and removed in their entirety upon completion of Contractor's operation. Contractor shall, at his own expense, repair any damages to private or public property resulting from Contractor's operations. Anchoring or spudding of vessels and barges within wetland or submerged natural resource areas, including the identified Important Manatee Area and Warm Water Aggregation Area, is prohibited.

G. Subaqueous Cable Crossings

1. The Contractor shall be responsible for verifying the locations and depths of all utility crossings and take precautions against damages which might result from his operations, especially the sinking of dredge spuds and/or anchors into the channel bottom, in the vicinity of utility crossings. **The Contractor assumes all liability for submerged and buried utility facilities. If any utility damage occurs as a result of its operations, the Contractor shall suspend dredging in the area of the damaged utility until the damage is repaired and resumption of the dredging is approved by the Engineer. The District shall not be responsible for the cost of such damage and repairs regardless of cause – including but not limited to any costs associated with interruption of utility services and delay damages.**

H. Booster Pumps

1. Any booster pumps installed by the Contractor shall be located at least 300 feet from any residential-type building or house. Booster pumps, their prime movers, and any auxiliary

equipment shall be fitted or equipped with mufflers, noise control enclosures, or other engineering noise control methods, measures, and features such that steady noise emanating from this equipment does not exceed the local ordinances. Such items shall be maintained throughout the project duration. Location of booster pumps and noise control methods must be submitted to the Engineer for approval.

I. Noise Control

1. Contractor shall ensure that all possible measures are employed to reduce the amount of noise produced by his operations. Contractor shall conduct his operations to comply with all federal, state and local laws pertaining to noise. Additionally, Contractor shall inform all crewmembers of the need to maintain a professional manner while on the job sites, in radio communications, and in dealing with other team members involved in the project.

2. The District retains the right to require the Contractor to install additional noise control measures if the public is not satisfied and the noise is within the decibel requirements of this specification. These additional measures will be paid for by the District.

3. All hauling and excavating equipment including dredges, dredge/barges, booster pumps, tugs and other support vessels, dozers, loaders, etc. used on this Work shall be equipped with satisfactory mufflers and/or other noise abatement devices.

4. Contractor shall consider the proximity of the dredge operations to residential areas, especially during evening, night, and early morning hours. Such consideration should include but not be limited to — reducing deck noise, reducing throttle, holding the use of horn and whistle signals to a minimum, and restraining the use of P.A. loudspeaker systems.

J. Light Control

1. The Contractor shall ensure that all work lights (as opposed to safety lighting) are shielded to prevent them from shining on residential property.

K. Interference with Other Contractors

1. The District reserves the right to perform other work in the vicinity of the project area under separate contracts. Contractor shall afford District and other Contractor's reasonable opportunity for the introduction and storage of their materials and execution of their respective work, and shall properly connect and coordinate his work with theirs.

2. If the performance of any contract for the project is likely to be interfered with by the simultaneous execution of some other contract or contracts, Engineer shall decide which Contractor shall cease work temporarily and which Contractor shall continue, or whether work under the contracts can be coordinated so that the Contractors may proceed simultaneously. District shall not be responsible for any damages suffered or extra costs incurred by Contractor resulting directly or indirectly from the award or performance or attempted performance of any other contract or contracts on the project or caused by the omission of consultation with the Engineer with respect to the order of precedence in the performance of the contracts other than for an extension of time.

3.4 REMOVAL AND DISPOSAL OF AT&T CONDUIT

A. The Alternate Bid Item (Bid Item No. A01) includes the removal and disposal of the AT&T conduit that lies within the Intracoastal Waterway right-of-way (identified at Utility Crossing No. 6). The line and associated infrastructure shall be removed and disposed, in its entirety, along the entire Intracoastal Waterway channel bottom and 25 feet outside the delineated boundary, as indicated in the Project Drawings (**APPENDIX A**). **APPENDIX J** provides a copy of the decommission letter from AT&T. The award of the Alternate Bid Item shall be at the sole discretion of the District.

B. The Contractor shall conduct operations to prevent damage or injury to adjacent structures, other facilities, and persons. The Contractor shall protect existing finished work that is to remain in place from damage during the demolition phase. The Contractor shall promptly repair damages caused to adjacent facilities by demolition operations at no cost to the District.

C. If hazardous materials are found, the Contractor shall notify the District and Engineer immediately. If hazardous materials are encountered during demolition operations, the Contractor shall comply with applicable regulations, laws, and ordinances concerning removal, handling and protection against exposure or environmental pollution. The Contractor shall remove and dispose of offsite all debris, rubbish, and other materials resulting from demolition operations. The Contractor shall transport demolished materials and properly dispose of them at an approved site according to state, federal and local laws and regulations. The Contractor may not burn combustible products of the demolition operations onsite. The Contractor shall not bury material onsite.

3.5 TRANSPORT OF DREDGED MATERIALS

A. All excavated material shall be transported to the DMMA site. If any material is deposited other than in places designated or approved, Contractor may be required to remove such misplaced material and redeposit it where directed at his expense. To the greatest extent possible, Contractor shall configure his activities (inclusive of pipelines) to allow continuous boat access to navigable waters. Contractor shall restrict access to these areas only as required to ensure public safety.

B. Hydraulic Dredge Pipelines

1. A tight dredge discharge pipeline shall be maintained to prevent spilling of dredged material or dredge water outside of the disposal area. The Contractor shall ensure that the entire pipeline route is devoid of any leaks before commencing dredging operations. The Contractor shall provide and maintain radio communication between the dredge and the disposal areas. The pipeline shall be inspected at least twice daily for leaks. Failure to immediately repair leaks in the discharge pipeline will result in suspension of dredging operations and require prompt repair of pipeline as a prerequisite to the resumption of dredging. Any pipeline leak will be immediately surveyed to determine the extent of the material spill. All spilled or misplaced materials will be recovered by the Contractor and any damage to private or public property resulting from the Contractor's operations shall be repaired by the Contractor at his expense.

2. Hydraulic Discharge Pipeline Marking

   a. The Contractor shall plainly mark the pipeline access route (along the entire access) with conspicuous stakes, targets and/or buoys (in accordance with required U.S. Coast Guard requirements and **APPENDIX C**) to be maintained throughout the Contract operations.
   b. Additionally, the Contractor shall clearly label the upland pipeline every 100 feet with signs reading as follows: “DANGER: HIGH PRESSURE DISCHARGE LINE.”

3. Submerged Pipeline

   a. In the event the Contractor elects to submerge his pipeline, the pipeline shall rest on the bottom, and the top of the submerged pipeline and any anchor securing the submerged pipeline shall be no higher than the project depth for any navigation channel in which the submerged pipeline is placed. Should Contractor elect to use a pipeline material that is buoyant or semi-buoyant, such as PVC pipe or similar low-density materials, the Contractor shall securely anchor the pipeline to prevent pipeline from lifting off the bottom under any conditions. Contractor shall make daily inspections of the submerged pipeline to ensure buoyancy has not loosened the anchors. Contractor shall remove all anchors when the submerged pipeline is removed. The location of the entire length of submerged pipeline shall be marked with signs, buoys, lights, and flags conforming to U.S. Coast Guard regulations.

Under no circumstances shall the pipeline be anchored within any area identified with submerged natural resources.

4. Floating Pipeline

a. Should the Contractor's pipeline not rest on the bottom, it will be considered a floating pipeline and shall be visible on the surface and clearly marked. In no case will the Contractor's pipeline be allowed to fluctuate between the surface and the bottom or lie partly submerged. Lights shall be installed on the floating pipeline as required in paragraph SIGNAL LIGHTS above. The lights shall be supported either by buoys or by temporary piling, provided by the Contractor and approved by the Engineer. Where the pipeline does not cross a navigable channel, the flashing yellow all-around lights shall be spaced not over 200 feet apart, unless closer spacing is required by U.S. Coast Guard personnel, in which case the requirements of the U.S. Coast Guard shall govern, at no additional cost to the Government.

3.6 PLACEMENT OF DREDGED MATERIALS

A. The Contractor shall supply all labor, equipment, plant, supplies and material to place the dredged material only in the DMMA as shown on the Project Drawings. The DMMA discharge water quality, settling basin water depth limits, and containment dike freeboard shall be maintained as specified in the following sections.

1. The Contractor shall supply all labor, equipment, plant, supplies and material to perform water control and discharge operations of the effluent from the dredged material containment cell during the entire term of this Contract in a manner consistent with regulatory and permit requirements prescribed for this facility. This includes water control and discharge during placement of the material and active dewatering and material handling/grading operations to promote drying of the containment cell material between, during, and after placement operations.

2. A freeboard of two (2) feet shall be maintained at all times between the top of the containment dikes and the top of the water surface within the containment cell. This limit shall be maintained at all times during the term of this contract. During placement operations, if the freeboard limit is reached, the Contractor shall cease pumping into the containment area and shall allow sufficient time for drainage and settlement of solids before additional material is deposited. Between placement operations the freeboard limit shall also be maintained. The Contractor shall actively dewater the site and shall not allow rainwater to accumulate in the containment cell without periodic discharge.

3. The maximum settling basin water depth in the DMMA shall be maintained at an elevation suitable for proper material settling while preventing material resuspension and dike erosion/scour due to wind-wave activity. During active inflow operations, a minimum basin depth of two (2) feet should be maintained to achieve proper water quality and effective site operation. Greater depths may be needed to allow for sufficient settling of solids. Lower water depths may be necessary during periods of no- or low-inflow. At no times shall the basin depth exceed three (3) feet unless approved by the Engineer. The water depth shall not exceed the two (2) foot freeboard restriction.

4. Water depths shall be measured using a standard USGS Style A Water Level Staff Gauge to be located on the discharge control structure. The Staff Gauge is to be installed and maintained by the CONTRACTOR. Mudline elevation in the DMMA and settling basin water depths shall be measured a minimum of twice per day and shall be recorded and submitted to the Engineer on the ***Daily Report of Operations***.

3.6 PERIMETER ROAD REPAIR

A. Before the commencement of dredging operations, remove the vegetation from the perimeter road and recompact the disturbed material to the lines and grades adjoining the eroded area.

3.7 DREDGED MATERIAL DISCHARGE AND PLACEMENT OPERATIONS

A. The excavated dredged material shall be placed in the DMMA as shown on the Project Drawings. This Contract and all Bids shall be based on placing excavated material in the designated DMMA only.

The Contractor shall provide an inflow pipeline to discharge material and shall provide an even distribution of material in and along the interior of the cell with a positive flow toward the weir. Inflow pipe locations shall be in accordance with the Contractor-submitted ***DMMA Facility Operation Plan: Placement Operations Plan***.

B. The inflow pipeline shall be made of either new or used High Density Polyethylene (HDPE) with no obvious imperfections or weak areas. The pipeline shall be placed within the alignment limits as shown on the Project Drawings. The Contractor shall ensure that the pipeline does not create a public hazard and does not block access to any existing facilities. The pipeline shall be placed so there is not interference with traffic on existing DMMA roadways, roadway markers, wells, bench marks, piezometers or other instrumentation.

C. The Contractor shall place material in the DMMA in a manner to: minimize turbidity of the ponded water column; increase settlement of deposited material; decrease disturbance of deposited material; and eliminate the potential for interior dike/levee erosion or scouring. The methods for placement and controlling of the dredged material into the dredged material containment cell shall be the Contractor's responsibility.

D. The Contractor shall maintain the operation of all pipeline, valves, and endpoints including, determination of which endpoints to use during placement to maintain the cell filling operations consistent with the requirements of the Contract and Project Drawings. The Contractor shall outfit the inflow pipeline with wyes, valves and other appurtenances or relocate the pipeline endpoints as necessary to achieve uniform filling of the containment cell, prevent excessive mounding of dredged material within the containment cell, minimize areas of standing surface water, prevent excessive loading against the containment dike system, and prevent short circuiting of material.

E. The Contractor is responsible for advancing or relocating the inflow endpoints as required to prevent the settled material from accumulating to an elevation that blocks inflow, diverts flow towards the dikes causing erosion/scour, or exceeding permit requirements. The inflow endpoints may require relocation due to their effects on effluent quality or other special circumstances as determined by the Engineer. Relocation of inflow endpoints shall be achieved by the Contractor within forty-eight (48) hours notification from the Engineer.

F. Dike erosion, caused by excessive inflow velocities, wave action, or other means, shall be repaired within twenty-four (24) hours. Verbal notification of dike erosion shall be given to the Engineer within one (1) hour and written notification shall be submitted within twenty-four (24) hours.

G. The Contractor shall outfit the pipeline endpoints with spreaders or other appurtenances and shall position pipeline endpoints in a manner that will minimize the potential for dike erosion, to promote spreading of material and prevent material build-up.

H. The Contractor shall be responsible for managing the placement and dewatering of the dredged material and for scheduling the delivery of the dredged material to accommodate all the material designated on the Project Drawings for disposal at the site.

I. The Contractor shall provide qualified personnel to monitor and control inflow of dredged material at all times that inflow is occurring. The person(s) monitoring and controlling inflow shall have a phone, radio, or other direct communication contact with the dredge or other plant that is supplying material to the containment cell. The inflow installation shall be capable of immediate shutdown to avoid exceeding freeboard requirements within the cell or as needed to satisfy water quality criteria for effluent discharge.

J. Interruptions to Placement: The Contractor may be required to stop placement in order to permit the fill to settle and/or allow the water quality to improve to meet permit and regulatory requirements. Inflow operations may be required to stop if discharge limits cannot be met. There shall be no compensation to the Contractor for interruptions to placement operations.

K. Two of the three weir discharge pipes are currently sealed via a plastic blind flange. The remaining and southern weir structure is fitted with a reducer to an 18-in HDPE discharge pipe and 6-inch C515 gate valve.

a. The Contractor may use all three discharge pipes at the weir, if needed; however, must replace the sealed plastic blind flanges at project completion.

b. An inflatable “pig” must be placed within the discharge end of each of the sealed HDPE discharge pipes prior to dredging operation.

c. A 6-inch gate valve is currently installed at the southern weir structure. The Contractor may remove the gate valve in order to connect to the Contractors discharge pipe. Once the site is dewatered to completion, the gate valve must be replaced and restored to its pre-construction condition.

3.8 EFFLUENT DISCHARGE AND WATER CONTROL OPERATIONS

A. The Contractor shall supply all labor, equipment, plant, supplies and material to manage and discharge the effluent from the DMMA. During placement operations, the Contractor shall establish and maintain a basin in the cell to control retention of effluent to allow settling of Total Suspended Solids (TSS) until water quality reaches a level that would enable discharge consistent with regulatory requirement (and in accordance with SECTION 01 35 43 ENVIRONMENTAL PROTECTION) prescribed for discharges from the DMMA. The Contractor shall be responsible for the operation and maintenance of the water control structure to maintain an appropriate sized basin in the containment cell. The maximum basin water depth in the DMMA shall be maintained at an elevation suitable for proper material settling while preventing material re-suspension and dike erosion/scour due to wind-wave activity, not to exceed three (3) feet above the mudline. The Contractor shall discharge the effluent through the DMMA weir structure.

B. During the term of this Contract, the Contractor is required to manage the cell water to protect the physical integrity of the site, to direct flow and settlement of dredged material to maintain a positive grade toward the weir without excessive mounding, and to discharge cell water as quickly as possible following placement operations to facilitate dewatering and consolidation of the placement material.

C. During dredged material placement operations and during the immediate period of time following placement during which the drawdown of the DMMA is to be performed, the Contractor shall provide adequate staff to operate, inspect and monitor the discharge operations from the facility. No discharge from the facility can occur unless the Contractor is present on location, operating and monitoring the discharge.

D. Following the completion of dredging of the final project segment and final approval of the dredging operations, the Contractor shall completely draw down and discharge the settling basin water level in the DMMA, at which point the District shall assume control of further dewatering operations.

3.9 WATER CONTROL STRUCTURE OPERATIONAL PROCEDURES

A. Water control structure operational procedures are discussed in three sections, corresponding to the stages in operations at the site: beginning of inflow and end of inflow.

B. Beginning of Inflow

a. Prior to the scheduled commencement of inflow, the Contractor will verify that all necessary preparations have been made to receive dredged material.

1) The water control structure and weir pipes shall be boarded up with the on-site and/or Contractor-provided weir boards New weir crest elevations shall be established with the addition of the weir boards to an elevation that can accommodated the volume of settled solids expected from the upcoming inflow cycle plus the depth of basin required for adequate settling of suspended solids. This weir crest elevation should be no less than three (3) feet above the existing cell surface and the elevation must not exceed the two (2) foot minimum freeboard requirement from cell water elevation to top of dike or upset the integrity of the dike system.

b. As inflow begins, the Contractor will hydraulically pump material into the DMMA cell. The cell will gradually fill and the basin elevation shall rise to the established weir crest elevation. If acceptable water quality has not been accomplished by the time the basin level nears the weir crest elevation, another row of weir boards shall be added to the water control structure. The weir crest elevations should always be maintained above an unstable basin to prevent sediments from entering the water control structure.

c. Water Quality Management

1) Water quality shall be monitored at all times during discharge. The water control structure operator will remain at the water control structure for a sufficient period to ensure that of the discharge is stable.

2) The ponding elevation must be maintained within specified range. Once the desirable ponding elevation has been reached the Contractor shall take all necessary steps to maintain the basin elevation by increasing the weir crest elevation at about the same rate as the sediment builds in the basin.

3) Wind conditions should be closely monitored. Any increase in wind speed or change in the wind direction may cause turbidity in the basin to rise. Strong winds will cause wave action and this turbulence will raise turbidity.

C. End of Inflow

a. When the inflow of dredged material is completed, the Contractor must continue to operate the weir system and slowly release the clarified surface water that remains ponded within the basin over the weir crest by incrementally removing weir boards. This process shall continue until all residual ponded water within the basin at the completion of dredge is released over the weirs. The Contractor will continue this operation until released from this requirement by the Engineer.

b. To maintain effluent quality, the Contractor should allow the flow over the weirs to drop essentially to zero before removing another row of weir boards. The Contractor may be required to grade the deposited dredged material to drain isolated pockets of water so that this water may also be released over the weirs.

c. If at any time during this process monitoring shows effluent turbidity to exceed permitted standards, the Contractor must add weir boards until testing of the ponded waters that remains with the basin confirms that turbidity has returned to acceptable limits.

d. Following the completion of decanting and removal of all residual ponded water, the Contractor must re-install the weir boards to a sufficient height to ensure that no storm water discharges over the weir crest.

3.10 SURVEYS

A. Pre-Dredge Bathymetric Survey

1. Morgan & Eklund, Inc., completed a February 2016 examination survey of the project area entitled *Bathymetric Survey, Intracoastal Waterway, Cut PB-36 through Cut PB-39; Palm Beach County, Florida*. Project No. 5629.00. The contours shown on the Project Drawings represent the bathymetric conditions existing at the time of the survey.

2. At the time of construction, actual conditions at the project sites may vary significantly. Since the Contractor will be paid for quantity of material removed from the project area, the Contractor shall perform a new pre-construction bathymetric survey of the project area. When approved by the Engineer, this survey will be used as the pre-dredge survey for payment quantity calculations. Refer to SECTION 01 78 00 PROJECT CLOSEOUT.

B. Post-Dredge Bathymetric Survey

1. Within 7 days of the completion of construction activities within an acceptance section, the Contractor shall perform the post-construction bathymetric survey (by equivalent methods and density to the pre-construction bathymetric survey). Upon submittal to the Engineer, the surveys shall be reviewed for accuracy, completeness, and to calculate payment quantities relative to the pre-dredge survey or progress payment surveys. At the project completion and for final project certification, the Contractor shall submit three copies of a signed and sealed survey of the entire project. Refer to SECTION 01 78 00 PROJECT CLOSEOUT.

3.11 FINAL EXAMINATION AND ACCEPTANCE

A. Final Examination of Dredging Work

1. As soon as practicable as and no later than one (1) week after receipt of the post-construction bathymetric surveys, the Engineer will review the surveys and/or examine the Work sites. Methods of examination, at no expense to the District, may include but are not limited to review of survey data and additional survey soundings or sweeping. Should any lumps or other lack of depth be disclosed by this examination, the Contractor will be required to remove by dredging. Contractor or his authorized representative will be notified when the examination is to be made and will be permitted to accompany the survey party. When the area is found to be in a satisfactory condition, it will be accepted.

2. The District reserves the right to conduct an independent survey. Any discrepancies between the Contractor and Districts surveys will be in favor of the District.

3. Should more than two examinations by Engineer over an area be necessary by reason of work for the removal of lack of depth disclosed at a prior examination, the cost of such third and any subsequent soundings or sweeping operations will be charged against Contractor at the rate of $5,000 per day for each day in which the examination survey crew is engaged in sounding and/or is en route to or from the site or held at or near the site for such operation.

B. Final Acceptance

1. Final acceptance of the whole or a part of the work and the deductions or corrections of deductions made thereon will not be reopened after having once been made, except on evidence of collusion, fraud or obvious error, and the acceptance of a completed section shall

not change the time of payment of the retained percentages of the whole or any part of the work.

3.12 FINAL CLEANUP

A. Final cleanup shall include the removal of all Contractor's plant, equipment, and materials for either disposal or reuse. All such disposal shall be in a manner and at locations approved by the District and Engineer. Contractor shall not be permitted to abandon equipment or materials in any area within or adjacent to the project sites, including the dredging area and the DMMA.

-End of Section-

FLORIDA INLAND NAVIGATION DISTRICT
INTRACOASTAL WATERWAY
MAINTENANCE DREDGING
SOUTH OF PORT OF PALM BEACH
PALM BEACH COUNTY, FLORIDA

APPENDIX H
DRAFT SUBMITTAL REGISTER

SECTION 01 33 00A

DRAFT SUBMITTAL REGISTER

TAYLOR ENGINEERING, INC.

PROJECT NAME: INTRACOASTAL WATERWAY MAINTENANCE DREDGING; SOUTH OF PORT OF PALM BEACH; PALM BEACH COUNTY, FLORIDA	**CONTRACTOR:**

TRANSMITTAL NO	SPEC. SECTION NO.	DESCRIPTION OF ITEMS SUBMITTED	TYPE				CONTRACTOR ACTION				ENGINEER ACTION		REMARKS
			NOTICE TO PROCEED SUBMITTAL	PRE CONSTRUCTION SUBMITTAL	ENGINEER APPROVED	INFORMATION ONLY	REVIEWER	SUBMISSION DATE	APPROVAL NEEDED BY	MATERIAL NEEDED BY	DATE	APPROVAL CODE	
SECTION 00 73 19 SAFETY AND OCCUPATIONAL HEALTH REQUIREMENTS													
1	00 73 19	Accident Prevention Plan (APP)	X	X		X							
2	00 73 19	Activity Hazard Analysis (AHA)				X							
3	00 73 19	Accident Reports				X							
4	00 73 19	Drug Free Work Place Compliance		X		X							
5	00 73 19	Personnel Qualification Requirements		X	X								
SECTION 01 29 00 MEASUREMENT AND PAYMENT													
6	01 29 00	Schedule of Values			X								
7	01 29 00	Construction Schedule		X	X								
8	01 29 00	Revised Construction Schedule			X								
9	01 29 00	Payment Surveys			X								
SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION													
10	01 31 00	List of Subcontractors		X		X							
11	01 31 00	Signature of Authority		X		X							
SECTION 01 33 00 SUBMITTAL PROCEDURES													
12	01 33 00	Draft Submittal Register		X	X								
13	01 33 00	Revised Submittal Register			X								

SECTION 01 33 00 APPROVAL CODES:
AP - APPROVED
RE - REJECTED
RR - REVISE AND RESUBMIT
AC - APPROVED AS CORRECTED
SNR - SUBMITTAL NOT REQUIRED - RETURNED WITHOUT REVIEW
SRI - SUBMITTAL RECEIVED, FOR INFORMATION ONLY
SSI - SUBMIT SPECIFIED ITEM

PROJECT NAME: INTRACOASTAL WATERWAY MAINTENANCE DREDGING; SOUTH OF PORT OF PALM BEACH; PALM BEACH COUNTY, FLORIDA	**CONTRACTOR:**

TRANSMITTAL NO	SPEC. SECTION NO.	DESCRIPTION OF ITEMS SUBMITTED	TYPE				CONTRACTOR ACTION				ENGINEER ACTION		REMARKS
			NOTICE TO PROCEED / SUBMITTAL	PRE CONSTRUCTION SUBMITTAL	ENGINEER APPROVED	INFORMATION ONLY	REVIEWER	SUBMISSION DATE	APPROVAL NEEDED BY	MATERIAL NEEDED BY	DATE	APPROVAL CODE	**SECTION 01 33 00 APPROVAL CODES:** **AP -** APPROVED **RE -** REJECTED **RR -** REVISE AND RESUBMIT **AC -** APPROVED AS CORRECTED **SNR -** SUBMITTAL NOT REQUIRED - RETURNED WITHOUT REVIEW **SRI -** SUBMITTAL RECEIVED, FOR INFORMATION ONLY **SSI -** SUBMIT SPECIFIED ITEM
SECTION 01 35 43 ENVIRONMENTAL PROTECTION													
14	01 35 43	Environmental Protection Plan	X	X	X								
15	01 35 43	Manatee Observation: Qualifications	X	X									
16	01 35 43	Manatee Observation: Daily Reports				X							
17	01 35 43	Manatee Observation: Summary Report				X							
18	01 35 43	Shorebird Monitor: Qualifications		X	X								
19	01 35 43	Shorebird Monitor: Daily Reports			X								
20	01 35 43	Turbidity and Water Quality Management and Monitoring Plan	X	X	X								
21	01 35 43	Daily Turbidity Monitoring Reports				X							
22	01 35 43	Project Environmental Summary Sheet				X							
22A	01 35 43	Pre-Construction Submerged Natural Resources Survey			X								
22B	01 35 43	Post-Construction Submerged Natural Resources Survey			X								
SECTION 01 40 00 CONTRACTOR QUALITY CONTROL													
23	01 40 00	Contractor Quality Control Plan	X	X	X								
24	01 40 00	Preparatory and Initial Phase Checklists				X							
25	01 40 00	Registered Surveyor Qualifications				X							

PROJECT NAME: INTRACOASTAL WATERWAY MAINTENANCE DREDGING; SOUTH OF PORT OF PALM BEACH; PALM BEACH COUNTY, FLORIDA	**CONTRACTOR:**

TRANSMITTAL NO	SPEC. SECTION NO.	DESCRIPTION OF ITEMS SUBMITTED	TYPE				CONTRACTOR ACTION				ENGINEER ACTION		REMARKS
			NOTICE TO PROCEED	SUBMITTAL	PRE CONSTRUCTION	SUBMITTAL	ENGINEER APPROVED	INFORMATION ONLY	REVIEWER	SUBMISSION DATE	APPROVAL NEEDED BY	MATERIAL NEEDED BY	DATE	APPROVAL CODE	**SECTION 01 33 00 APPROVAL CODES:** **AP -** APPROVED **RE -** REJECTED **RR -** REVISE AND RESUBMIT **AC -** APPROVED AS CORRECTED **SNR -** SUBMITTAL NOT REQUIRED - RETURNED WITHOUT REVIEW **SRI -** SUBMITTAL RECEIVED, FOR INFORMATION ONLY **SSI -** SUBMIT SPECIFIED ITEM
SECTION 01 50 00 TEMPORARY FACILITIES AND CONTROLS															
26	01 50 00	Mobilization/Demobilization Plan				X									
27	01 50 00	Security Plan				X									
28	01 50 00	Hurricane and Severe Storm Plan					X								
29	01 50 00	Temporary Facility Shop Drawings					X								
30	01 50 00	Boat Operator's License					X								
SECTION 01 78 00 PROJECT CLOSEOUT															
31	01 78 00	Record Drawings				X									
32	01 78 00	As-Built Drawings				X									
33	01 78 00	Request for Inspection					X								
SECTION 35 20 23 DREDGING AND DREDGED MATERIAL PLACEMENT															
34	35 20 23	Notice to Mariners					X								
35	35 20 23	Notification of Discovery of Historical Resources					X								
36	35 20 23	Notice of Misplaced Material					X								
37	35 20 23	Notification of Aids Relocation					X								
38	35 20 23	Dredge Plan	X		X	X									
39	35 20 23	Maintenance of Marine Traffic Plan	X		X	X									
40	35 20 23	DMMA Facility Operation Plan: Site Plan			X	X									
41	35 20 23	DMMA Facility Operation Plan: Placement Operations Plan			X	X									

PROJECT NAME: INTRACOASTAL WATERWAY MAINTENANCE DREDGING; SOUTH OF PORT OF PALM BEACH; PALM BEACH COUNTY, FLORIDA			**CONTRACTOR:**										
			TYPE				**CONTRACTOR ACTION**				**ENGINEER ACTION**		**REMARKS**
TRANSMITTAL NO	**SPEC. SECTION NO.**	**DESCRIPTION OF ITEMS SUBMITTED**	**NOTICE TO PROCEED SUBMITTAL**	**PRE CONSTRUCTION SUBMITTAL**	**ENGINEER APPROVED**	**INFORMATION ONLY**	**REVIEWER**	**SUBMISSION DATE**	**APPROVAL NEEDED BY**	**MATERIAL NEEDED BY**	**DATE**	**APPROVAL CODE**	**SECTION 01 33 00 APPROVAL CODES:** **AP -** APPROVED **RE -** REJECTED **RR -** REVISE AND RESUBMIT **AC -** APPROVED AS CORRECTED **SNR -** SUBMITTAL NOT REQUIRED - RETURNED WITHOUT REVIEW **SRI -** SUBMITTAL RECEIVED, FOR INFORMATION ONLY **SSI -** SUBMIT SPECIFIED ITEM
42	35 20 23	ADA-Accessible Pedestrian Walkway Shop Drawings			X								
43	35 20 23	Preservative Treatment Certificate Lumber				X							
44	35 20 23	Hardware Manufacturer Information				X							
45	35 20 23	Daily Dredging Report of Operations				X							
46	35 20 23	Daily DMMA Placement Report of Operations				X							
47	35 20 23	Waterfront Marine Structures Photo-Documentation: Pre-Construction			X								
48	35 20 23	Waterfront Marine Structures Photo-Documentation: Post-Construction			X								
49	35 20 23	Pre-Construction Bathymetric Survey			X								
50	35 20 23	Pre-Construction Utility Survey			X								
51	35 20 23	Post-Construction Bathymetric Survey (by Acceptance Section and Comprehensive)			X								
52	35 20 23	Post-Construction DMMA Topographic Survey			X								
53	35 20 23	In-Channel Subaqueous Debris Removal and Disposal Landfill Weight Tickets			X								

September 17, 2018

Lori Brownell, P.E.
Director of Waterfront Engineering
Taylor Engineering, Inc.
10199 Southside Blvd.
Suite 310,
Jacksonville, FL 32256

Re: **AT&T Crossing To Be Decommissioned**

County(s): **Palm Beach**
Description: **From 34th St/33rd Ct, West Palm Beach to Bahama Ln, Palm Beach,**

To Whom It May Concern:

Based on the request from Florida Inland Navigation District, it appears that AT&T has several subaqueous crossings within the limits of the project. Details of the crossing locations have been provided to FIND. These crossings are active and provide vital telecommunication service to the Town of Palm Beach, located on the barrier island.

It appears that one crossing may conflict with the dredging of the federal navigational channel located between the Port of Palm Beach and Okeechobee Blvd. This crossing is being decommissioned and placed out of service. AT&T anticipates the line to be deactivated in place on or before September 30, 2018. Please, call for locates prior to any excavation in the area.

I would recommend that Sunshine One-Call of Florida be called to locate our facilities prior to digging. They can be reached at 811 or 800-432-4770.

Should you require additional information, please contact me at 561-540-9263.

Cordially,

Garth Bedward
Manager OSP Planning & Engineering Design
AT&T Utility Coordinator (Palm Beach County)

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

REPLY TO
ATTENTION OF

September 6, 2017

Regulatory Division
South Permits Branch
Palm Beach Gardens Permits Section
SAJ-2017-00503 (GP-LCK)

Ms. Virginia M. Fay
Assistant Regional Administrator
Southeast Regional Office, Habitat Conservation
NOAA, National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Ms. Fay:

We have received your letter dated July 17, 2017, regarding Department of the Army (DA) permit application number SAJ-2017-00503 (GP-LCK) submitted by the Florida Inland Navigation District (FIND), where National Marine Fisheries Service (NMFS) concluded the proposed dredge would eliminate a substantial amount of seagrass and hardbottom habitat designated as Habitat Areas of Particular Concern (HAPCs), and provided one Essential Fish Habitat (EFH) conservation recommendation pursuant to Section 305(b)(4)(A) of the Magnuson-Stevens Fishery Conservation and Management Act. The NMFS recommended the U.S. Army Corps of Engineers (Corps) require compensatory mitigation for the impacts to seagrass and hardbottom habitat caused by the proposed dredging and the use of a functional assessment to determine the amount of mitigation for both direct and indirect impacts to seagrass and hardbottom areas.

The Corps is also in receipt of your letter dated August 11, 2017 in which NMFS stated that pursuant to Part IV 3(b) of the Memorandum of Agreement between the Department of Commerce and the Department of the Army dated August 11, 1992, it was determined that the proposed work would adversely impact Aquatic Resources of National Importance (ARNI). NMFS comments were in response to the Corps issuing a public notice on July 3, 2017. The Corps informed NMFS by email dated July 5, 2017 that the project qualified for review and processing under the Corps Regional General (RGP) Permit-93 (FIND maintenance dredging actions) and the standard permit would not be processed. Because the project is being processed under the Corps RGP, consultation procedures outlined in 50 CFR Section 600.920 of the regulation to implement and respond to the EFH provisions of the Magnuson-Stevens Act are not applicable.

Coordination with NMFS for the RGP was required because there is less than a 25-buffer between the dredge footprint and adjacent seagrass. The Corps will address your

comments from the July 17, 2017 letter. The Corps determined that no direct or indirect impacts to seagrass or hardbottom outside of the channel limits are proposed or anticipated. The RGP allows for maintenance of the man-made channel bottom. Maintenance dredging removes sediment and may expose more of the rock channel wall and any rock rubble at the bottom of the channel, allowing for recolonization, until the channel refills with sediment, requiring another maintenance event. Due to unsafe practice of leaving shoals or high spots in the federal navigation channel, the terms and conditions of the RGP SAJ-93 allows for impacts to aquatic resources within the federal navigation channel consistent with operations and maintenance of federal navigation dredging. Therefore, the Corps will not require that the applicant provide compensatory mitigation for impacts to submerged aquatic vegetation and rock rubble within the federal channel due to the dredging activity qualifying as maintenance dredge. Please let me know if you have any questions.

Sincerely,

Alisa Zarbo

Alisa A. Zarbo
Chief, Palm Beach Gardens Section

Copy Furnished:
NMFS, 400 North Congress Ave, Suite 120, West Palm Beach, Florida 33401

DUNKELBERGER
engineering & testing, inc.
A Terracon COMPANY

November 13, 2015

Project No. HD155091

Florida Inland Navigation District
1314 Marcinski Road
Jupiter, FL 33477-9498

Attention: Mr. Mark Crosley
Executive Director

Subject: ***Geotechnical Engineering Report***
Additional Subsurface Exploration
Intracoastal Waterway Deepening Project
Palm Beach County, Florida

Telephone: 561 627-3386
E-mail: mcrosley@aicw.org

Dear Mr. Crosley:

Dunkelberger Engineering & Testing, A Terracon Company (DUNKELBERGER) has completed additional subsurface exploration related to the above-referenced project. The work was completed in accordance with our Proposal and Agreement for Services with the Florida Inland Navigation District (FIND) dated November 5, 2015. The following report provides a summary of the project considerations, methods utilized for subsurface exploration, and key findings from the work.

1.0 PROJECT CONSIDERATIONS

Current plans are to deepen a portion of the Intracoastal Waterway immediately west of Peanut Island. The project plans, prepared by Taylor Engineering, Inc., currently call for dredging between Stations 0+50 and 28+79 of CUT PB 36, and between Stations 0+00 and 7+00 of CUT PB 37, for a total distance of approximately 3,500 feet. The dredging is to be accomplished to an elevation of -15 feet Mean Low Water (MLW), with an allowable over-dredge depth of 2 feet (i.e. -17 feet MLW). Review of the Hydrographic Survey for the project provided by Morgan & Eklund, Inc., and dated September 9, 2014, indicates that the pre-existing mudline elevation along the project corridor ranges between approximately -6 and -12 feet MLW.

Subsurface conditions for the subject project were previously explored by DUNKELBERGER and the results of the exploration are summarized in a report dated March 27, 2015. Borings drilled for that study generally disclosed sandy soils with shell fragments in three of the four boring locations, and coquina rock formation in the fourth boring. Currently, the Contractor (Cavache) has begun dredging materials for the channel deepening project. The purpose of this additional exploration work was to provide supplemental subsurface information related to the types and depths of materials anticipated to be found within the proposed dredging template. Much of the previous work is incorporated into this report for ease of reference.

2.0 SCOPE OF SERVICES

The work consisted of the following elements:

1. Coordination with Cavache to place a truck-mounted drilling rig on the deck of one of their barges.

2. Selection of ten (10) boring locations for additional subsurface exploration. Locations of the borings were selected based upon the limits of the proposed dredging project as shown on the construction drawings, and the locations of the previously drilled borings, and in order to be approximately evenly spaced along the alignment of the proposed dredging work. The locations were navigated to utilizing a hand held GPS device. Some of the boring locations were modified in the field and the adjusted locations were determined using the GPS unit. Upon arrival at each boring location, the barge was fixed horizontally using steel spuds that extended from the deck of the barge to the mudline.

3. SPT Borings – Subsurface exploration was accomplished at ten locations.
    - At each location, a single SPT boring was drilled to a depth of 26 feet below the top of the drilling mud tub. The depth to water from the top of the mud tub was measured to be approximately 5 feet. The time of day was recorded at the beginning and ending of the sampling for each boring.
    - Three inch or four inch diameter steel casing was suspended from the deck of the barge and penetrated into the mudline as needed to maintain borehole stability and to enable recirculation of drilling fluids. Upon completion of the drilling operations at each boring location, the steel casing was removed.
    - SPT samples were obtained continuously for each boring at a vertical spacing of 24 inches on center. The samples were classified in the field, placed in sealed glass jars, which were labeled and transported to our laboratory for review by a geotechnical engineer and for laboratory testing.
    - The completed boreholes were sealed with neat cement grout. Drilling mud and soil cuttings were mixed with the grout.

4. Laboratory Testing - Samples obtained from the borings were classified by a geotechnical engineer in accordance with the Unified Soil Classification System (ASTM D 2487) and appropriate geologic nomenclature. Representative samples were tested in the laboratory for engineering properties such as moisture and organic content and grain size distribution.

5. Engineering Report – This summary report provides a summary of the methods utilized for the subsurface exploration, a boring location plan, subsurface profiles, laboratory test results and key findings from the work.

3.0 BORING LOCATIONS

Boring locations were selected utilizing the limits of the proposed dredging shown on the construction drawings provided by Taylor Engineering such that they were situated at relatively uniform spacing along the alignment of the channel to be dredged. The following table provides a summary of the boring locations for both those previously drilled (TB-1 through 4) and for the supplemental borings (TB-101 through 110). Boring TB-110A was added to the work.

Table 1 – Boring Locations

Boring Location	GPS Coordinates	State Plane Coordinates	Station Offset	
TB-1	26°46'48.2"N 80° 02'43.4"W	N 890,391 E 967,618	CUT PB 36	0+50, 40' RT
TB-101	26°46'45.7"N 80° 02'44.6"W	N 890,262 E 967,587	CUT PB 36	3+10, 10' RT
TB-102	26°46'43.2"N 80° 02'46.2"W	N 890,008 E 967,444	CUT PB 36	6+00, 5' LT
TB-103	26°46'40.6"N 80° 02'47.9"W	N 889,744 E 967,292	CUT PB 36	9+00, 5' LT
TB-2	26°46'38.4"N 80° 02'49.8"W	N 889,396 E 967,045	CUT PB 36	12+00, 10' RT
TB-104	26°46'36.2"N 80° 02'51.1"W	N 889,299 E 967,005	CUT PB 36	14+30, 0'
TB-105	26°46'33.9"N 80° 02'52.6"W	N 889,065 E 966,871	CUT PB 36	17+00, 5' LT
TB-106	26°46'31.8"N 80° 02'54.1"W	N 888,852 E 966,737	CUT PB 36	19+50, 0'
TB-3	26°46'29.8"N 80° 02'56.0"W	N 888,524 E 966,490	CUT PB 36	22+00, 25' RT
TB-107	26°46'26.8"N 80° 02'57.5"W	N 888,344 E 966,432	CUT PB 36	25+50, 15' LT
TB-108	26°46'24.9"N 80° 02'58.4"W	N 888,152 E 966,352	CUT PB 36	27+50, 45' LT
TB-109	26°46'22.3"N 80° 02'59.1"W	N 887,889 E 966,291	CUT PB 37	1+75, 25' LT
TB-110A	26°46'18.2"N 80° 02'59.7"W	N 887,478 E 966,239	CUT PB 37	5+90, 45' RT
TB-4	26°46'18.1"N 80° 02'58.8"W	N 887,340 E 966,245	CUT PB 37	6+00, 25' LT
TB-110	26°46'17.7"N 80° 02'58.7"W	N 887,425 E 966,330	CUT PB 37	6+40, 30' LT

Notes: 1. State Plane Coordinates refer to Florida State Plane Coordinate System, East Zone, North American Datum (NAD) 1983.
2. PB Cut 36 and 37, and Station Offset information refer to locations provided on construction drawings.
3. Locations shown are approximate.
4. Locations for the borings are provided on Sheets 1A through 1C in Appendix A.

4.0 SAFETY PROTOCOL

The field work was completed under a task hazard plan that was prepared by this office and submitted to the Contractor prior to mobilization of our drilling rig. Under agreement with Cracker Boy Boat Works (a marina), an access ramp was created that enabled us to drive our drilling rig onto a contractor provided barge (see Photograph 1 below).

Photograph 1 – Temporary Access Ramp Marina to Barge

The drilling rig was driven onto large timber mats which then cantilevered out beyond the barge deck. The weight of the drilling rig on the timber mats allowed for the drilling operations to occur on the cantilevered section of the mats. A timber and steel deck was prefabricated and fastened to the mats to create a platform upon which to safely place the drilling crew and drilling mud tub. A hand railing was constructed around the perimeter of the deck for the safety of the workers. The drilling deck is depicted in the following photographs.

Photograph 2 – Drilling Deck Cantilevered Beyond Barge

Photograph 3 – Drilling Deck Mounted on Timber Mats

5.0 VERTICAL CONTROL

The borings were drilled from the deck of a contractor provided barge which was fixed horizontally using steel spuds, but able to float with tidal fluctuations. During the drilling operations, the top of the drilling mud tub was used as the reference for the work (i.e. Depth = 0). The water surface was measured to be approximately 5.0 feet below the top of the mud tub at each boring location. The time of day at the beginning and ending of the sampling operations for each boring location were recorded. Cavache provided the water surface elevation using the times of sampling and tide charts, and we utilized that information to estimate the top of the mud tub elevation for each boring location. The work was completed using the vertical datum of Mean Low Water (MLW). The previously drilled borings were referenced in the same manner.

6.0 SUBSURFACE CONDTIONS

Subsurface materials found in the borings generally consisted of gray to brown sands, fine sands with silt, sands with sand to gravel sized shell and shell fragments and a formation of cemented sand and shell referred to locally as Coquina to the maximum depth explored.

Standard Penetration Tests (SPT's) were competed continuously for the full length of each boring at a vertical spacing of 18 or 24 inches. The SPT was accomplished using a 140 pound hammer freely falling a vertical distance of 30 inches to impact the top of the drilling rods and to drive a 2 inch outside diameter split barrel sampler into the subsurface materials a vertical distance of either 18 or 24 inches. The aggregate number of such impact blows required to drive the sampler from 6 to 18 inches is recorded as the SPT N value and is used to estimate the relative density of granular materials, the relative consistency of fine grained soils, and the degree of cementation of rock formations. Subsurface profiles for the borings are provided on Sheets 2A through 2D within Appendix A.

More specific subsurface information is described as follows:

- The borings drilled within the northern approximately 1,250 feet of CUT PB 36 disclosed mostly sands and sand-silt-shell mixtures with some lenses of organic silt and organic sand. This area is covered by Borings TB-1, TB-101, TB-102, TB-103 and TB-2. Borings TB-1, TB-101 and TB-102 disclosed organic silt, organic sand and sandy silt. The organic silt layer appeared to contain a considerable amount of decayed wooden matter. The SPT data indicates that the granular materials within the area described in this bullet are generally loose to very loose, and that the fine grained materials are very soft.

- Between approximately Station 13+00 of CUT PB 36 and the southern limit of the project (approximately 2,250 feet), the subsurface profiles generally consisted of sands and sand-silt-shell mixtures over a formation of cemented sand and shell (Coquina limestone). The top of the rock formation at the boring locations was estimated to be at the following elevations:

Table 2 – Top of Rock Formation Elevations

Boring No.	Location	Station	Top of Rock El. (feet MLW)
TB-104	CUT PB 36	14+30	-15.8
TB-105	CUT PB 36	17+00	No Rock
TB-106	CUT PB 36	19+50	-15.0
TB-3	CUT PB 36	22+00	-15.5
TB-107	CUT PB 36	25+50	-15.0
TB-108	CUT PB 36	27+50	-17.8
TB-109	CUT PB 37	1+75	-12.2
TB-110A	CUT PB 37	5+90	-13.0
TB-4	CUT PB 37	6+00	No Rock
TB-110	CUT PB 37	6+40	No Rock

- Based upon the results of the SPT's completed for this project, the sands within the southernmost approximately 2,250 feet of the project are generally very loose to loose. The Coquina is weakly cemented to well cemented, based on SPT N-Values that range between 2 and 74 (average value of 30).

- Boring TB-110 disclosed sands with clay and gravel sized shell within the elevation interval of -15 to -17 feet MLW. These materials are described as very loose based upon the SPT data.

7.0 LABORATORY TEST RESULTS

Representative samples of the soils found within the anticipated dredge depth were tested for moisture content, organic content and grain size distribution. The laboratory testing followed procedures and nomenclature described in the American Society for Testing and Materials (ASTM) including Moisture Content (ASTM D 2216), Organic Content (ASTM D 2974) and Grain Size Distribution (ASTM D 422).

Moisture and organic contents and amounts passing the US Standard No. 200 Sieve are shown on the subsurface profiles at the appropriate elevations. Grain size distribution curves for the samples tested are provided in Appendix B. The following table provides a summary of the laboratory test results.

Table 3 – Summary of Laboratory Test Results

Soil Type	Moisture Content (%)	Organic Content (%)	Amount Passing Sieve Size (%)		
			No. 4	No. 40	No. 200
SAND	18 - 28	NA	85 - 100	43 - 97	2 - 8
Silty/Clayey SAND	29 - 68	NA	85 - 96	67 - 76	14 - 17
Organic SILT	90 - 94	5 - 13	99	85	46 - 51

8.0 CONCLUSIONS

The results of the subsurface explorations described herein indicate that the proposed channel deepening project is underlain by very loose to loose sands, sand-silt-shell mixtures and then a formation of Coquina limestone. The Coquina formation was found in seven of the borings drilled within the southern approximately two-thirds of the project alignment. The top of the rock formation elevation generally varied between approximately -12 and -18 feet MLW. Standard Penetration Test (SPT) data obtained in the Coquina indicates that its hardness varies between weakly cemented and well cemented. Some areas contain buried deposits of silty sands, organic silts and sandy silts, as indicated by the soils found at Borings TB-1, TB-101 and TB-102. The organic silts and sandy silts found in Boring TB-1 appeared to contain a significant portion of decaying wooden matter. Our experience with the Coquina limestone formation indicates that it will be significantly more difficult to excavate by dredging when compared with the sandy overburden soils.

9.0 GENERAL COMMENTS

The subsurface information presented in this report is based upon the data obtained from the borings performed at the indicated locations discussed in this report. This report does not reflect variations that may occur across the site, or due to the modifying effects of water currents and/or time. The nature and extent of such variations may not become evident until during dredging. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the information contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

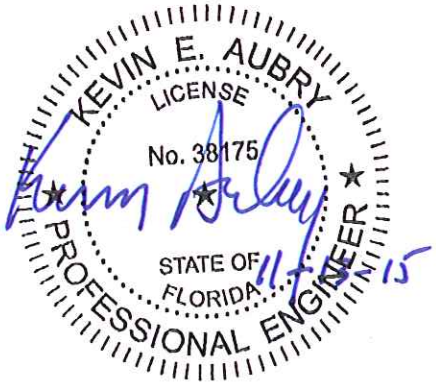
Sincerely,

Dunkelberger Engineering & Testing,
A Terracon Company

Kevin E. Aubry, P.E. 11-13-15
Geotechnical Services Manager
FL Registration No. 38175

Douglas S. Dunkelberger, P.E. FOR
Principal Engineer
FL Registration No. 33317

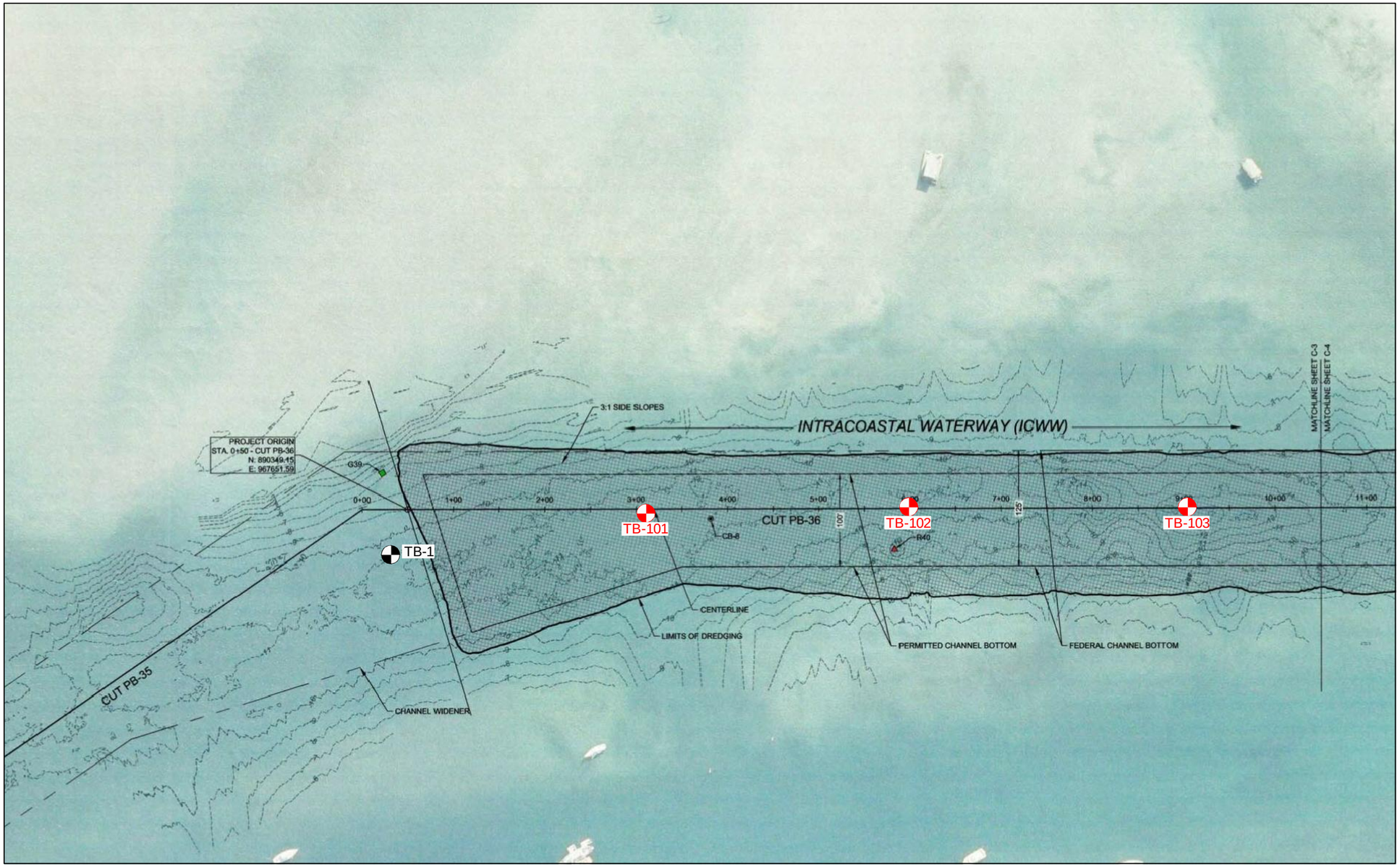
Attachments – Appendix A – Subsurface Exploration
Appendix B – Laboratory Testing



APPENDIX A

SUBSURFACE EXPLORATION

SHEETS 1A -1C: BORING LOCATION PLANS
SHEETS 2A – 2D: SUBSURFACE PROFILES



CONTINUED
ON SHEET 1B

SOURCE: TAYLOR ENGINEERING, INC.

LEGEND

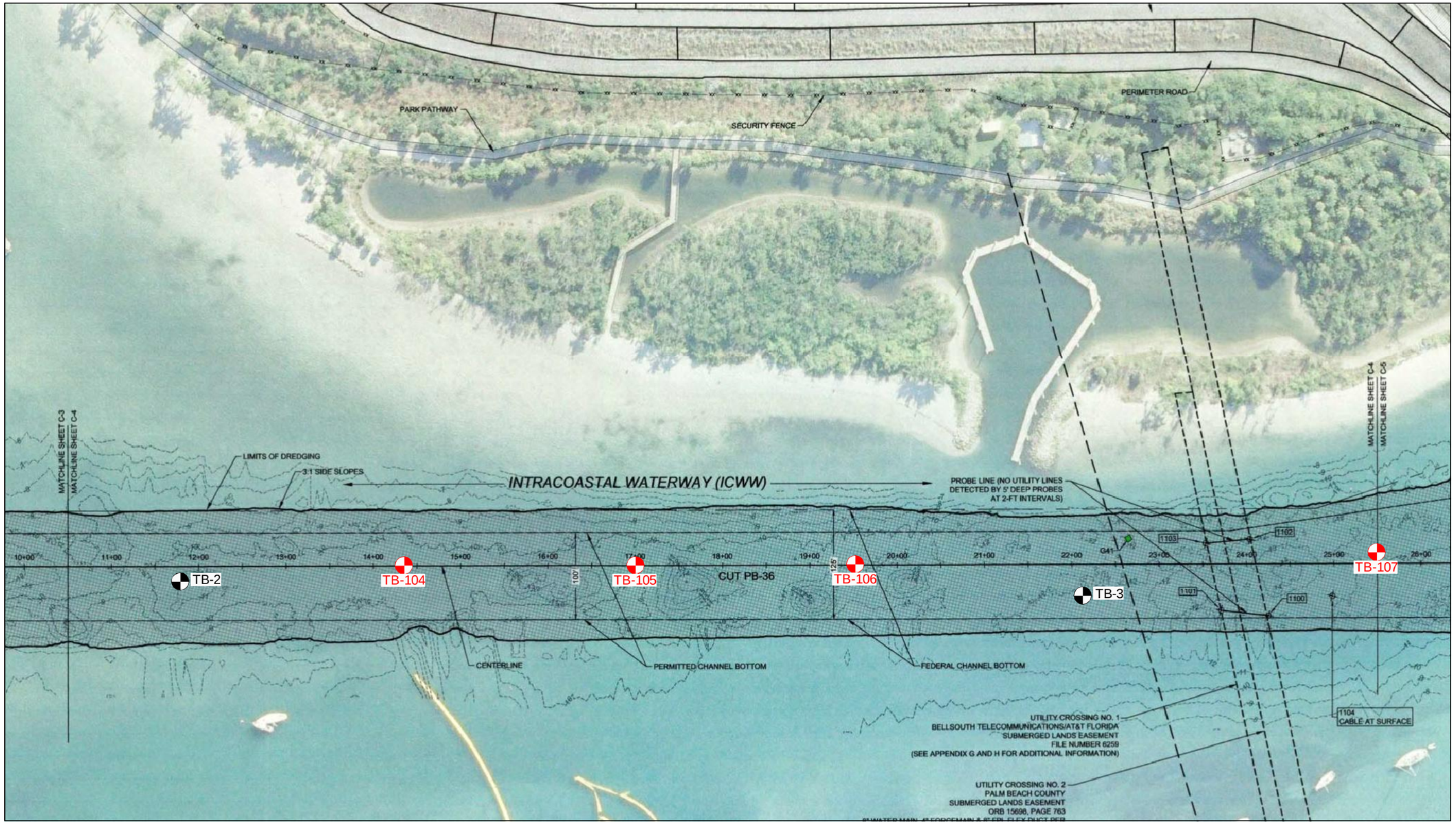
TB-101 APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

TB-1 APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING (PREVIOUSLY DRILLED)

120 0 60 120
SCALE IN FEET

Project Mngr: DM	Project No. HD155091	Terracon Consulting Engineers and Scientists	BORING LOCATION PLAN
Drawn By: JJ	Scale: AS-SHOWN	1225 OMAR ROAD WEST PALM BEACH, FL 33405	GEOTECHNICAL ENGINEERING REPORT
Checked By: DM	File No. 1A	PH. (561) 689-4299 FAX. (561) 689-5955	INTRACOASTAL WATERWAY DEEPENING PROJECT
Approved By: KA	Date: 11-13-15		PALM BEACH COUNTY, FLORIDA

SHEET 1A



CONTINUED ON SHEET 1A

CONTINUED ON SHEET 1C

SOURCE: TAYLOR ENGINEERING, INC.

LEGEND

TB-104 — APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

TB-2 — APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING (PREVIOUSLY DRILLED)

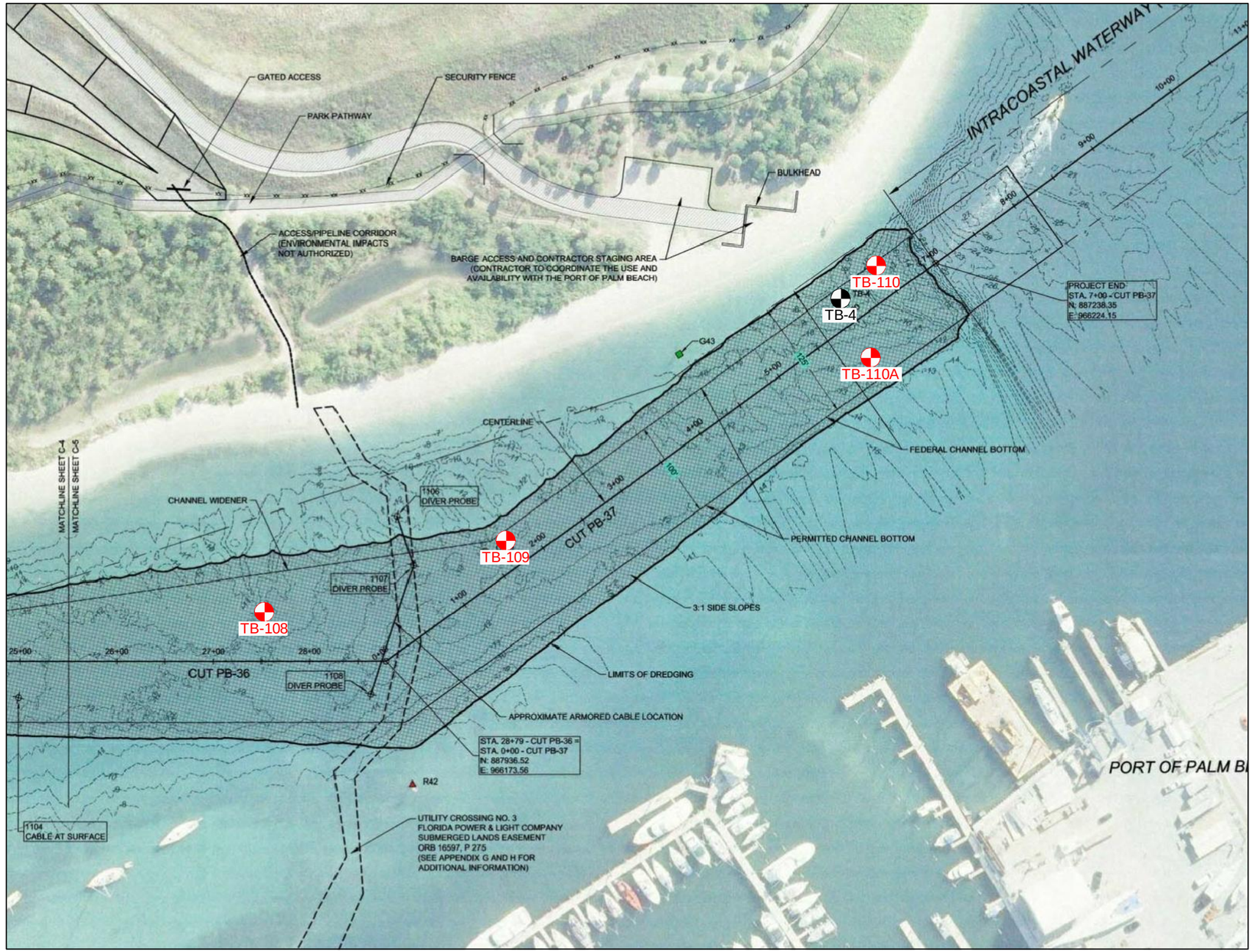
120 0 60 120
SCALE IN FEET

Project Mngr:	DM
Drawn By:	JJ
Checked By:	DM
Approved By:	KA
Project No.	HD155091
Scale:	AS-SHOWN
File No.	1A
Date:	11-13-15

Terracon
Consulting Engineers and Scientists
1225 OMAR ROAD WEST PALM BEACH, FL 33405
PH. (561) 689-4299 FAX. (561) 689-5955

BORING LOCATION PLAN
GEOTECHNICAL ENGINEERING REPORT
INTRACOASTAL WATERWAY DEEPENING PROJECT
PALM BEACH COUNTY, FLORIDA

SHEET 1B



CONTINUED
ON SHEET 1B

SOURCE: TAYLOR ENGINEERING, INC.

LEGEND

TB-108 — APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

TB-4 — APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING (PREVIOUSLY DRILLED)

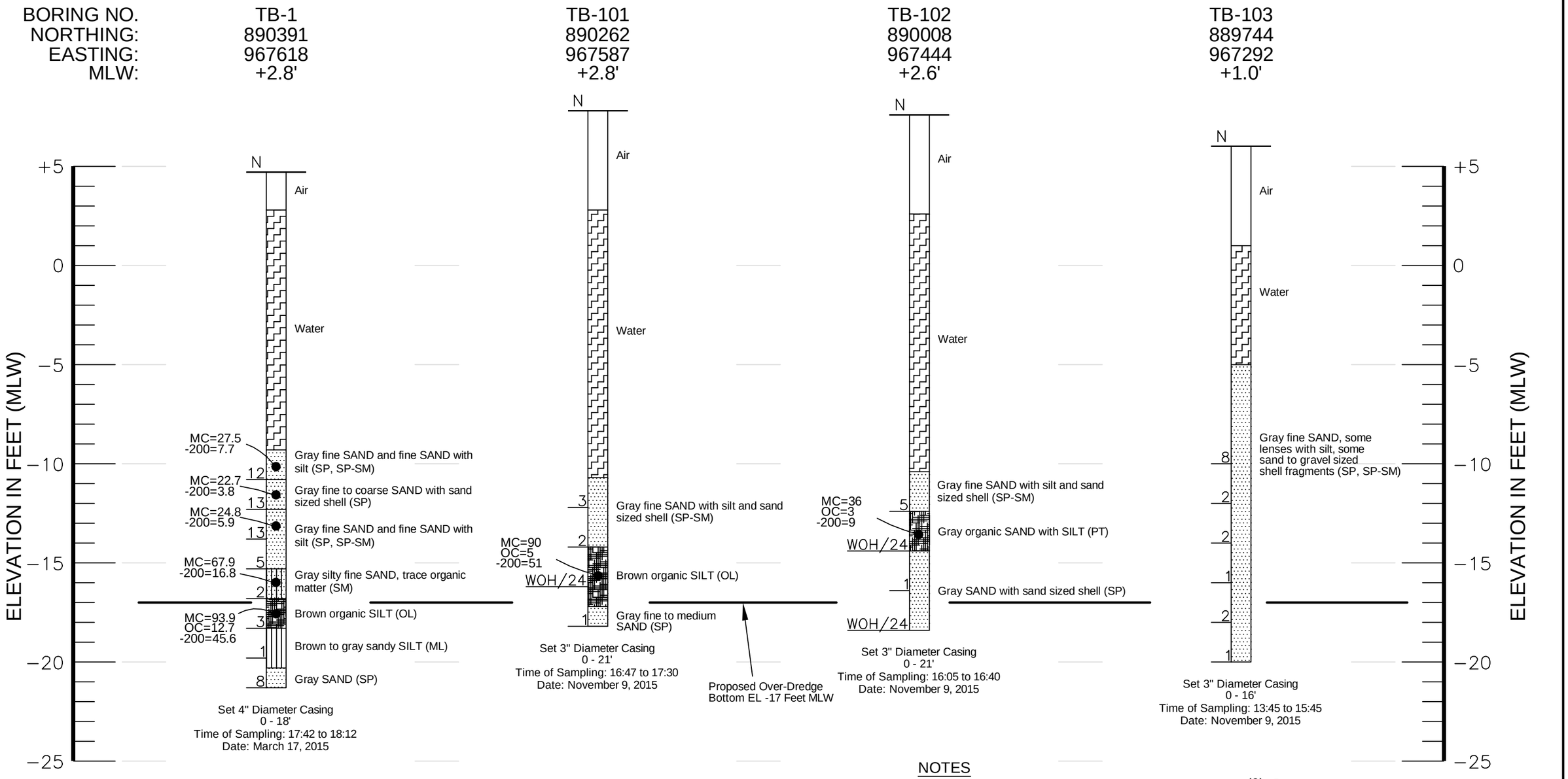
120 0 60 120
SCALE IN FEET

Project Mngr: DM	Project No. HD155091
Drawn By: JJ	Scale: AS-SHOWN
Checked By: DM	File No. 1A
Approved By: KA	Date: 11-13-15

Terracon
Consulting Engineers and Scientists
1225 OMAR ROAD WEST PALM BEACH, FL 33405
PH. (561) 689-4299 FAX. (561) 689-5955

BORING LOCATION PLAN
GEOTECHNICAL ENGINEERING REPORT
INTRACOASTAL WATERWAY DEEPENING PROJECT
PALM BEACH COUNTY, FLORIDA

SHEET 1C



LEGEND

- AIR
- WATER
- SAND
- SILTY SAND
- ORGANIC SILT
- SILT
- COQUINA
- CLAYEY SAND

N – Indicates the number of blows of a 140 pound hammer, freely falling a distance of 30 inches, required to drive a 2-inch diameter sampler 12 inches (ASTM D 1586)

WOH/24 – Indicates sampler advanced 24 inches due to weight of hammer

TB-1 – Standard Penetration Test (SPT) boring and number

SP – Unified Soil Classification System Group Symbol (ASTM D 2487)

-200 – Amount Finer Than The U.S. Standard No. 200 Sieve (%)

MC – Moisture Content (%)

OC – Organic Content (%)

NOTES

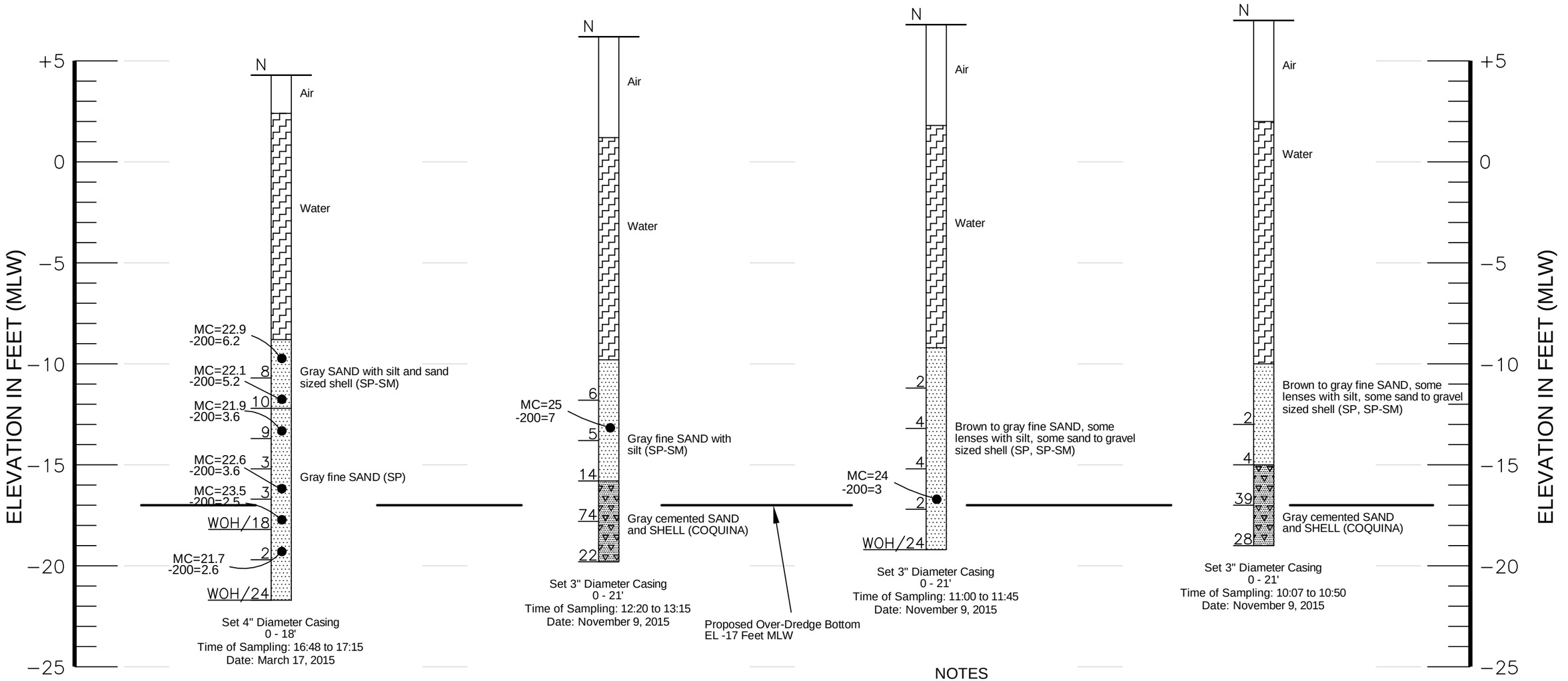
(1) Borings TB-1 through TB-4 were drilled on March 17, 2015 using a barge mounted Diedrich Model D-25 drilling rig. Boring TB-101 through TB-110A were drilled on November 6 and 9, 2015 using a truck mounted Central Mine Equipment Model 45B (CME 45B) drilling rig mounted on a barge.

(2) Strata boundaries are approximate and represent soil strata at each test hole location only. Soil transitions may be more gradual than implied.

(3) Surface water depths shown on the subsurface profiles represent surfacewater depths on the dates and times shown. Surface water level fluctuations should be anticipated with the change in tide.

Project Mngr: DM	Project No. HD155091	Terracon Consulting Engineers and Scientists	SUBSURFACE PROFILES
Drawn By: JJ	Scale: AS-SHOWN	1225 OMAR ROAD WEST PALM BEACH, FL 33405	GEOTECHNICAL ENGINEERING REPORT
Checked By: DM	File No. 2A	PH. (561) 689-4299 FAX. (561) 689-5955	INTRACOASTAL WATERWAY DEEPENING PROJECT
Approved By: KA	Date: 11-13-15		PALM BEACH COUNTY, FLORIDA

SHEET 2A



LEGEND

- AIR
- WATER
- SAND
- SILTY SAND
- ORGANIC SILT
- SILT
- COQUINA
- CLAYEY SAND

N – Indicates the number of blows of a 140 pound hammer, freely falling a distance of 30 inches, required to drive a 2-inch diameter sampler 12 inches (ASTM D 1586)

WOH/24 – Indicates sampler advanced 24 inches due to weight of hammer

TB-2 – Standard Penetration Test (SPT) boring and number

SP – Unified Soil Classification System Group Symbol (ASTM D 2487)

-200 – Amount Finer Than The U.S. Standard No. 200 Sieve (%)

MC – Moisture Content (%)

OC – Organic Content (%)

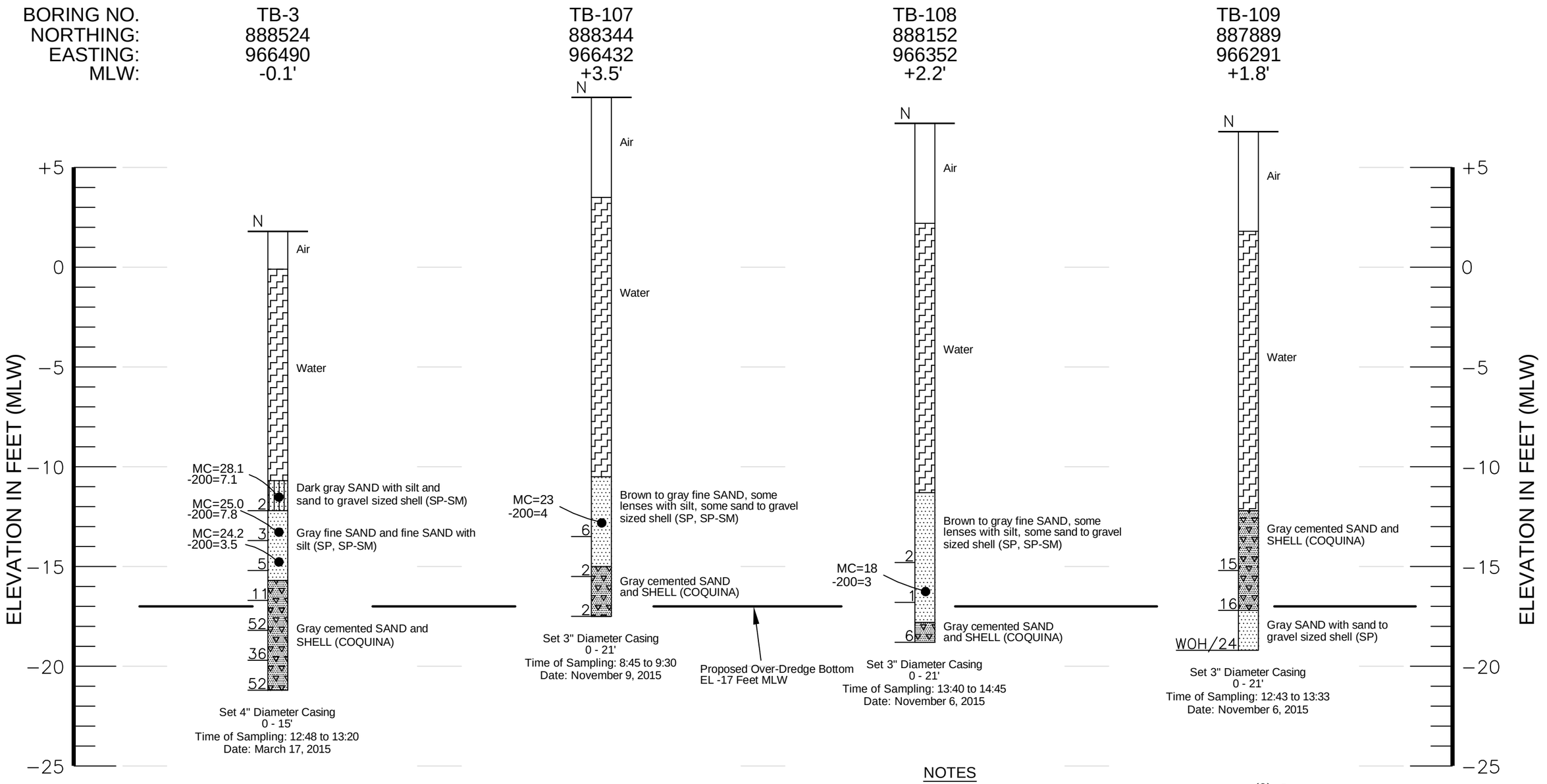
NOTES

(1) Borings TB-1 through TB-4 were drilled on March 17, 2015 using a barge mounted Diedrich Model D-25 drilling rig. Boring TB-101 through TB-110A were drilled on November 6 and 9, 2015 using a truck mounted Central Mine Equipment Model 45B (CME 45B) drilling rig mounted on a barge.

(2) Strata boundaries are approximate and represent soil strata at each test hole location only. Soil transitions may be more gradual than implied.

(3) Surface water depths shown on the subsurface profiles represent surfacewater depths on the dates and times shown. Surface water level fluctuations should be anticipated with the change in tide.

Project Mngr: DM	Project No. HD155091	Terracon Consulting Engineers and Scientists	SUBSURFACE PROFILES	SHEET
Drawn By: JJ	Scale: AS-SHOWN	1225 OMAR ROAD WEST PALM BEACH, FL 33405	GEOTECHNICAL ENGINEERING REPORT	
Checked By: DM	File No. 2B	PH. (561) 689-4299 FAX. (561) 689-5955	INTRACOASTAL WATERWAY DEEPENING PROJECT	2B
Approved By: KA	Date: 11-13-15		PALM BEACH COUNTY, FLORIDA	



LEGEND

- AIR
- WATER
- SAND
- SILTY SAND
- ORGANIC SILT
- SILT
- COQUINA
- CLAYEY SAND

N – Indicates the number of blows of a 140 pound hammer, freely falling a distance of 30 inches, required to drive a 2-inch diameter sampler 12 inches (ASTM D 1586)

WOH/24 – Indicates sampler advanced 24 inches due to weight of hammer

TB-3 – Standard Penetration Test (SPT) boring and number

SP – Unified Soil Classification System Group Symbol (ASTM D 2487)

-200 – Amount Finer Than The U.S. Standard No. 200 Sieve (%)

MC – Moisture Content (%)

OC – Organic Content (%)

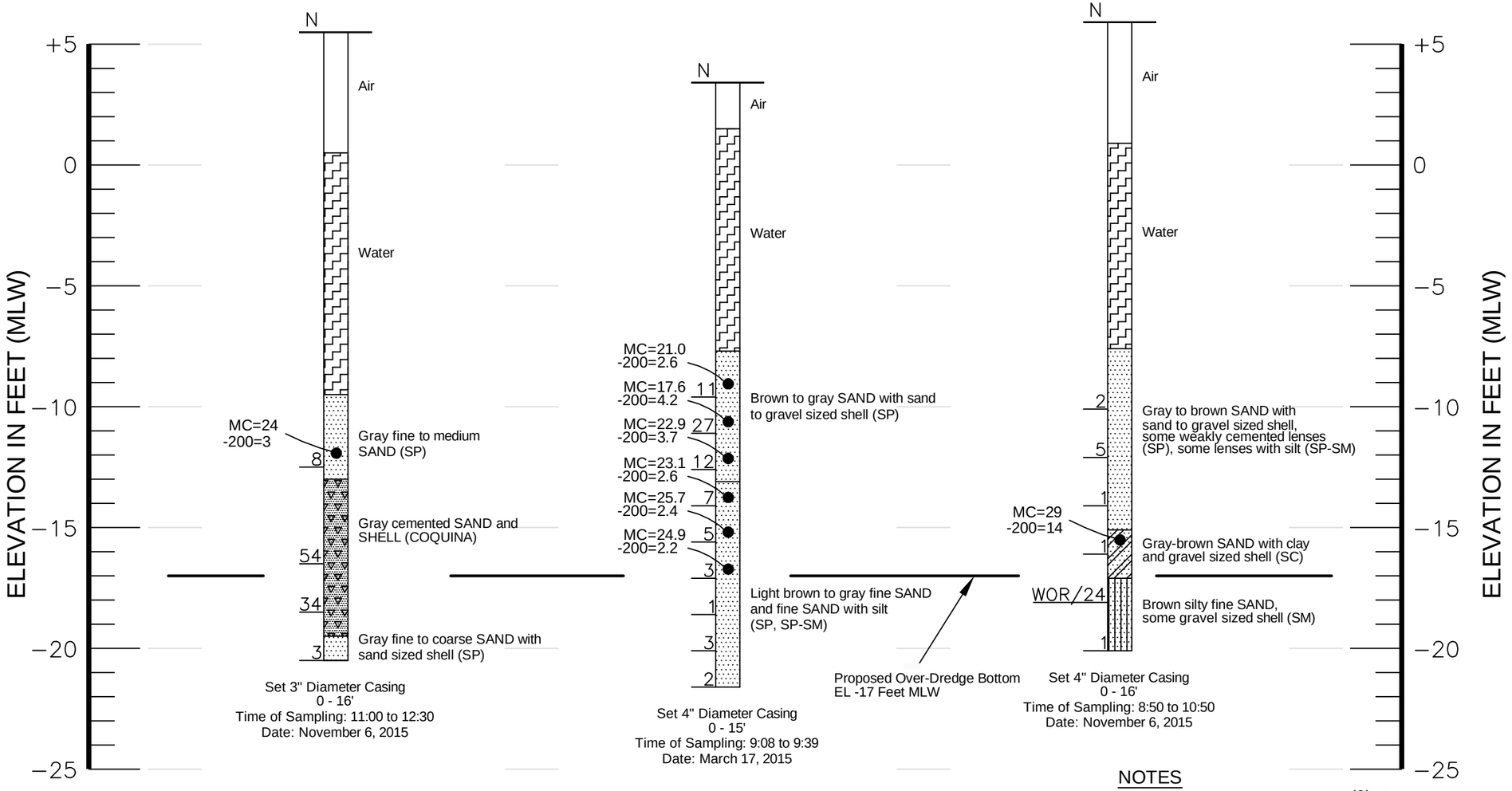
NOTES

(1) Borings TB-1 through TB-4 were drilled on March 17, 2015 using a barge mounted Diedrich Model D-25 drilling rig. Boring TB-101 through TB-110A were drilled on November 6 and 9, 2015 using a truck mounted Central Mine Equipment Model 45B (CME 45B) drilling rig mounted on a barge.

(2) Strata boundaries are approximate and represent soil strata at each test hole location only. Soil transitions may be more gradual than implied.

(3) Surface water depths shown on the subsurface profiles represent surfacewater depths on the dates and times shown. Surface water level fluctuations should be anticipated with the change in tide.

Project Mngr: DM	Project No. HD155091	Terracon Consulting Engineers and Scientists	SUBSURFACE PROFILES	SHEET
Drawn By: JJ	Scale: AS-SHOWN	1225 OMAR ROAD WEST PALM BEACH, FL 33405	GEOTECHNICAL ENGINEERING REPORT	2C
Checked By: DM	File No. 2C	PH. (561) 689-4299 FAX. (561) 689-5955	INTRACOASTAL WATERWAY DEEPENING PROJECT	
Approved By: KA	Date: 11-13-15		PALM BEACH COUNTY, FLORIDA	



LEGEND

- AIR
- WATER
- SAND
- SILTY SAND
- ORGANIC SILT
- SILT
- COQUINA
- CLAYEY SAND

N – Indicates the number of blows of a 140 pound hammer, freely falling a distance of 30 inches, required to drive a 2-inch diameter sampler 12 inches (ASTM D 1586)

WOH/24 – Indicates sampler advanced 24 inches due to weight of hammer

WOR/24 – Indicates sampler advanced 24 inches due to weight of rod

TB-110A – Standard Penetration Test (SPT) boring and number

SP – Unified Soil Classification System Group Symbol (ASTM D 2487)

-200 – Amount Finer Than The U.S. Standard No. 200 Sieve (%)

MC – Moisture Content (%)

OC – Organic Content (%)

NOTES

(1) Borings TB-1 through TB-4 were drilled on March 17, 2015 using a barge mounted Diedrich Model D-25 drilling rig. Boring TB-101 through TB-110A were drilled on November 6 and 9, 2015 using a truck mounted Central Mine Equipment Model 45B (CME 45B) drilling rig mounted on a barge.

(2) Strata boundaries are approximate and represent soil strata at each test hole location only. Soil transitions may be more gradual than implied.

(3) Surface water depths shown on the subsurface profiles represent surfacewater depths on the dates and times shown. Surface water level fluctuations should be anticipated with the change in tide.

Project Mngr: DM	Project No. HD155091	Terracon Consulting Engineers and Scientists	SUBSURFACE PROFILES	SHEET
Drawn By: JJ	Scale: AS-SHOWN	1225 OMAR ROAD WEST PALM BEACH, FL 33405	GEOTECHNICAL ENGINEERING REPORT	2D
Checked By: DM	File No. 2D	PH. (561) 689-4299 FAX. (561) 689-5955	INTRACOASTAL WATERWAY DEEPENING PROJECT	
Approved By: KA	Date: 11-13-15		PALM BEACH COUNTY, FLORIDA	

APPENDIX B

LABORATORY TESTING

SHEETS B1 – B20: GRAIN SIZE DISTRIBUTION CURVES

Sheet B-1

DUNKELBERGER
engineering & testing, inc.
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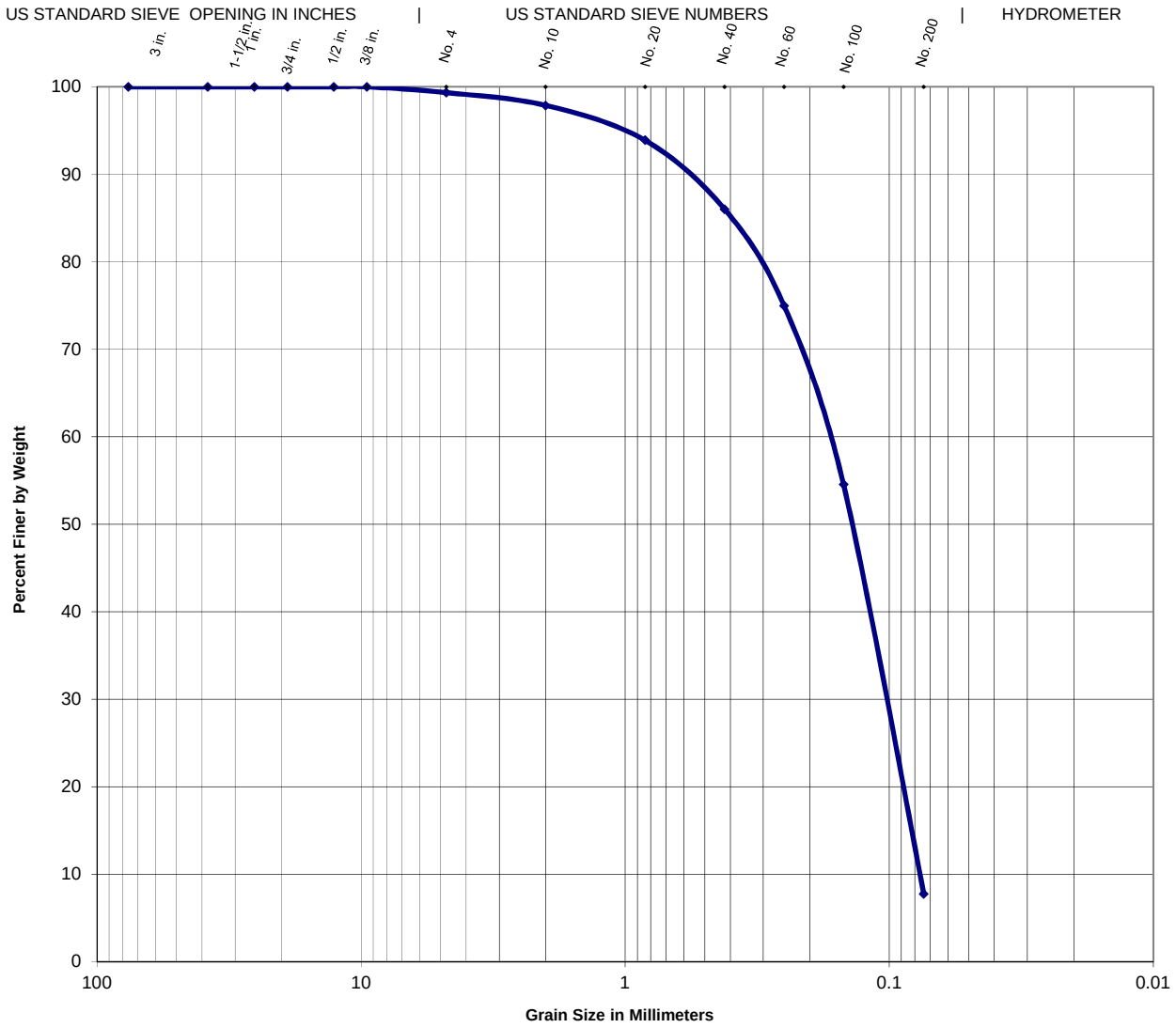

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample 1	14 ft to 15.5 ft	Gray SAND with silt (SP-SM)	27.5	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	99	98	93.9	86.0	75.0	54.6	7.7

Eff. Size (D10) = **0.077 mm** **Unif. Coef. (D60/ D10) =** **2.08**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-2

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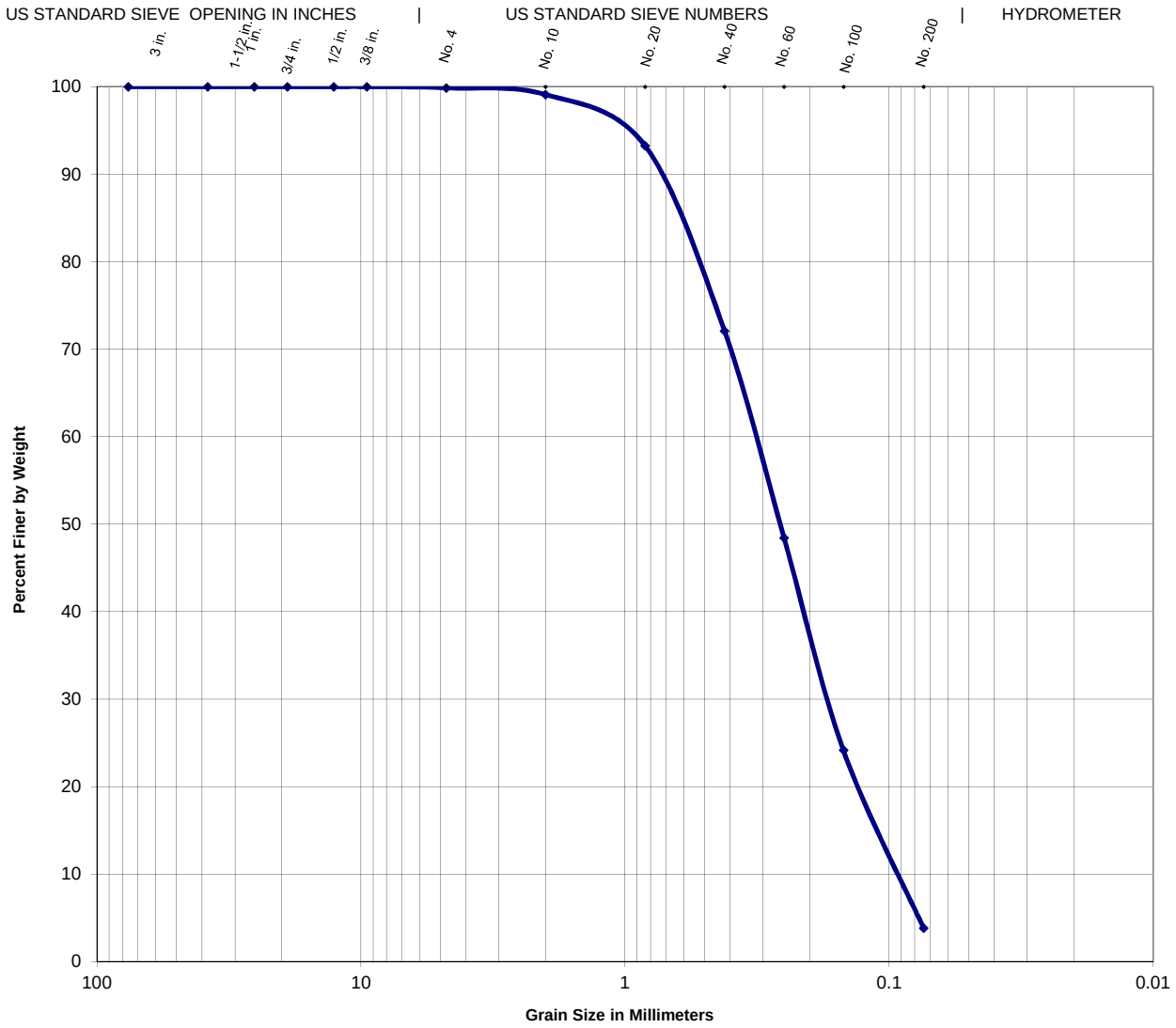

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample 2	15.5 ft to 17 ft	Gray SAND (SP)	22.7	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	99	93.3	72.1	48.4	24.2	3.8

Eff. Size (D10) = 0.093 mm **Unif. Coef. (D60/ D10) =** 3.33

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-3

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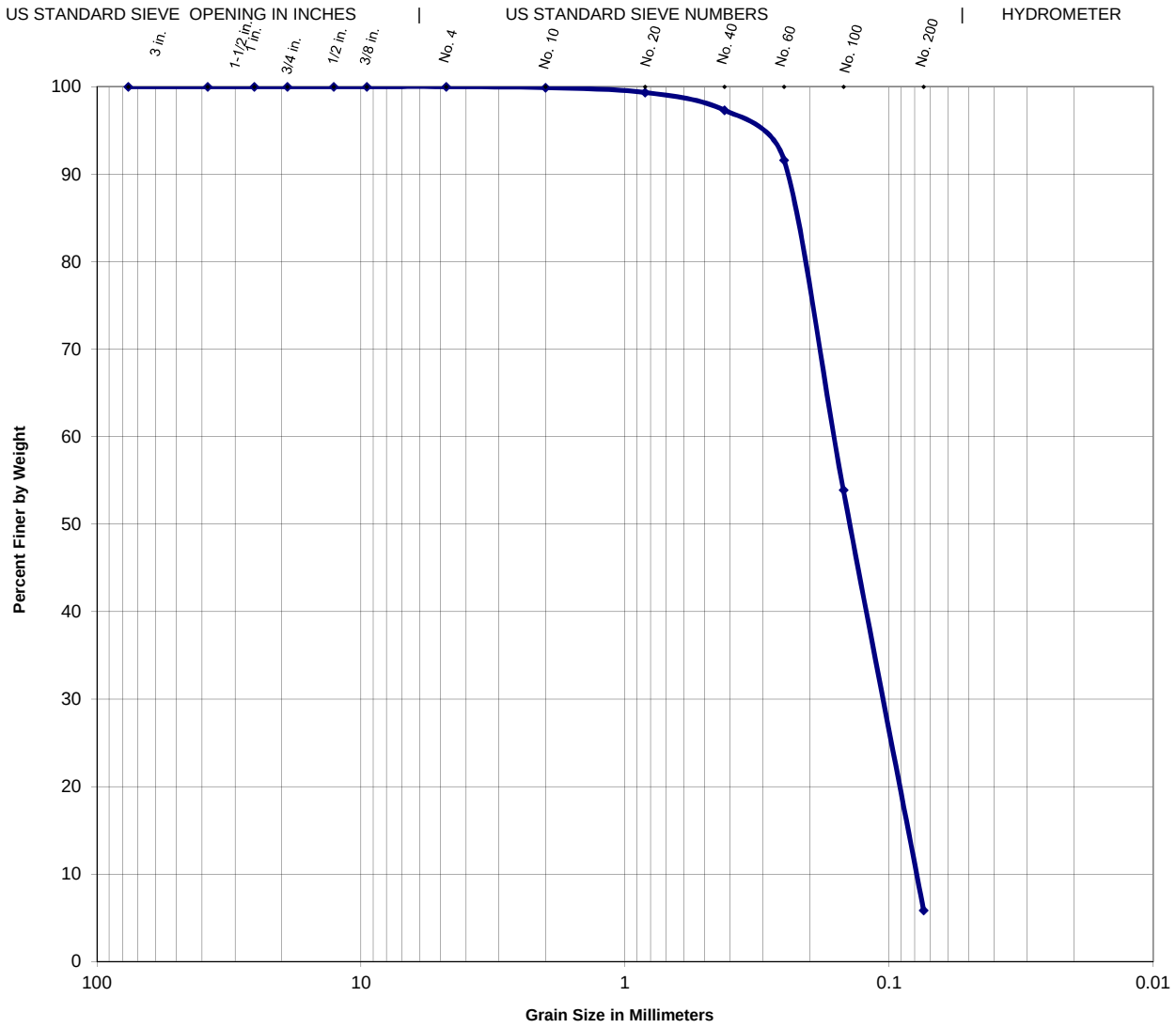

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample 3	17 ft to 18.5 ft	Gray SAND with silt (SP-SM)	24.8	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.3	97.3	91.6	53.9	5.9

Eff. Size (D10) = **0.08 mm** **Unif. Coef. (D60/ D10) =** **2.13**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-4

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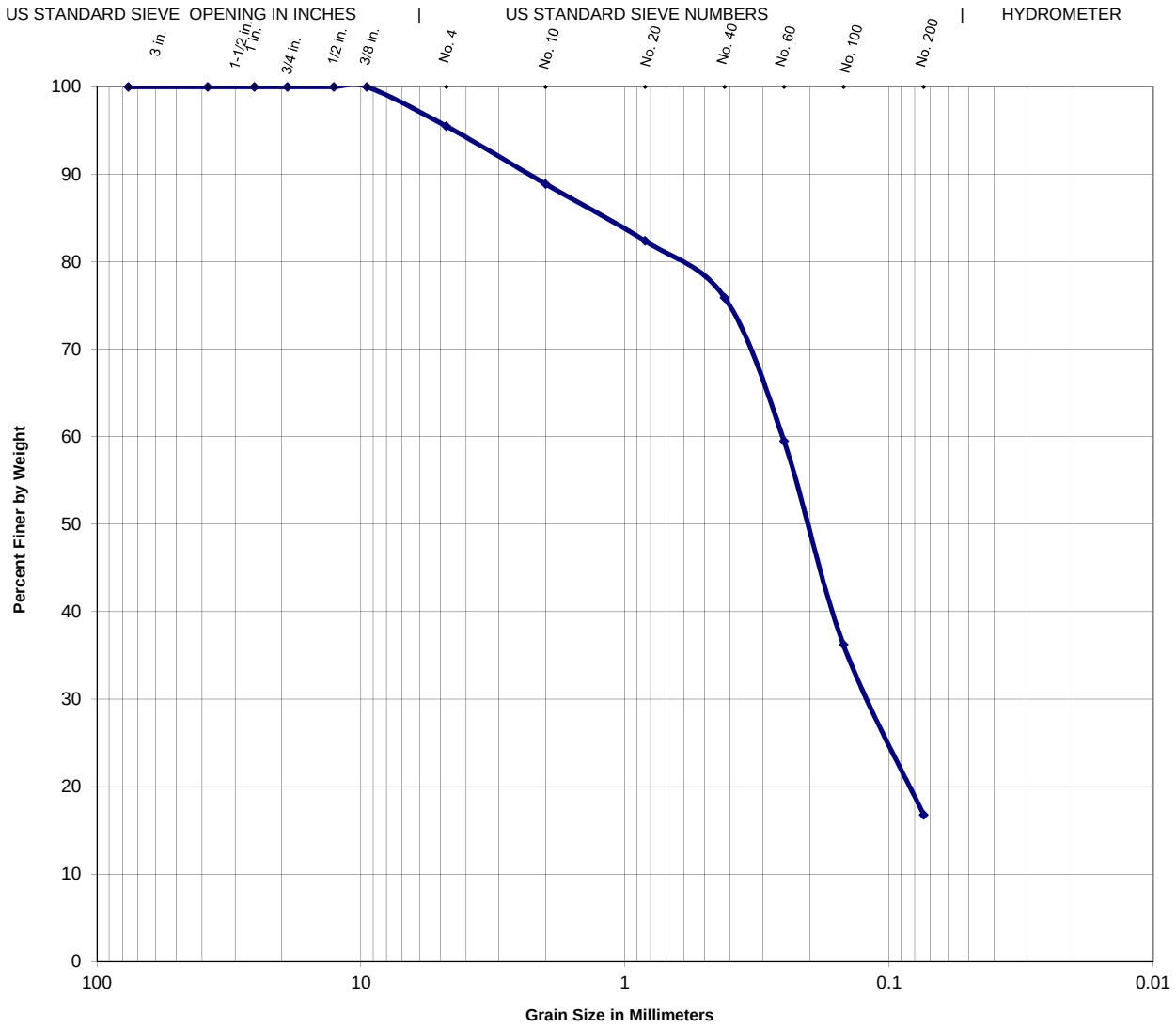
A Terracon COMPANY



GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample 5	20 ft to 21.5 ft	Gray silty SAND (SM)	67.9	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	95	89	82.4	75.9	59.5	36.2	16.8

Eff. Size (D10) = N/A **Unif. Coef. (D60/ D10) =** N/A

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-5

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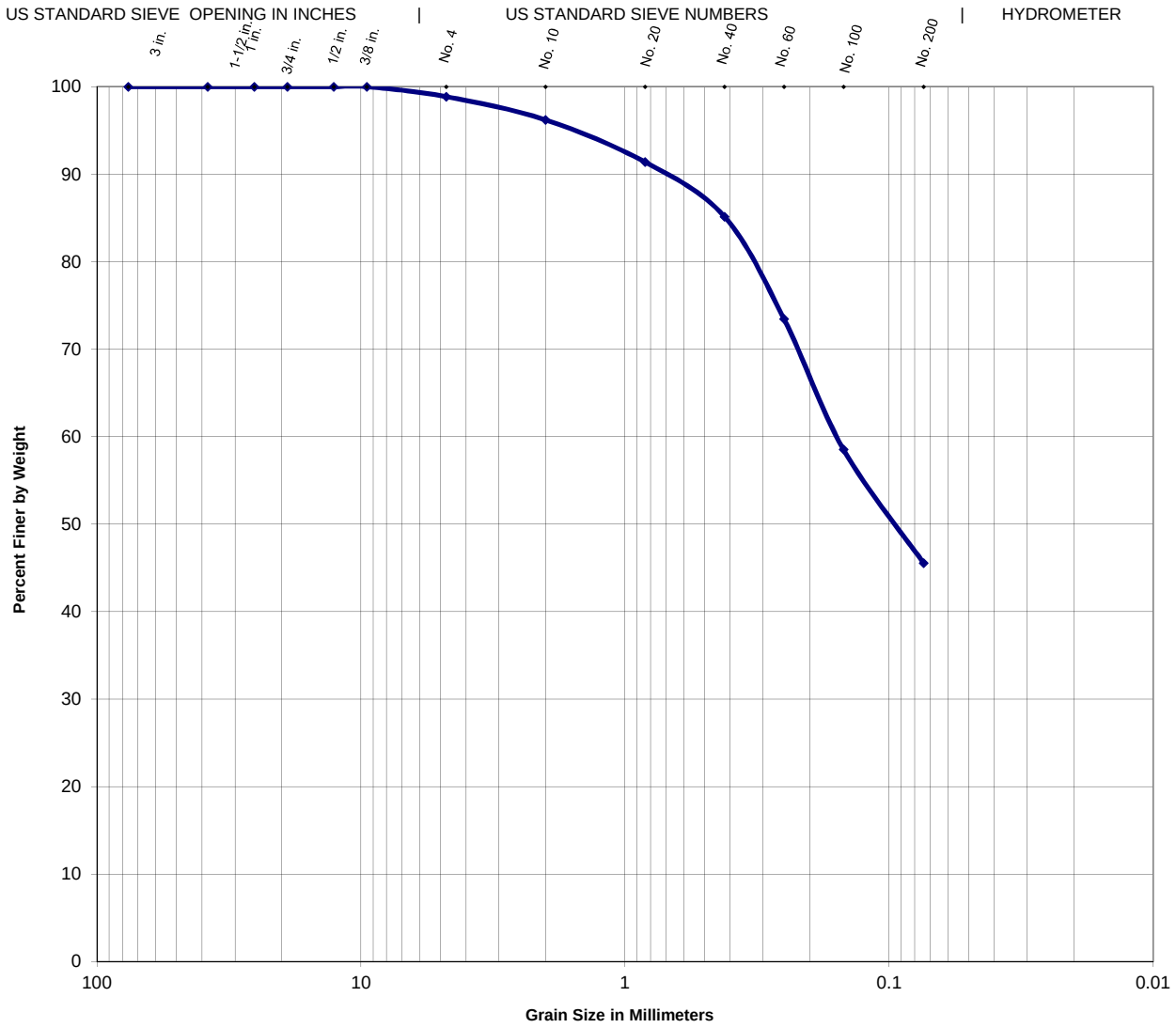

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-1, Sample 6	21.5 ft to 23 ft	Brown organic silty SAND (SM)	93.9	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	99	96	91.4	85.1	73.5	58.5	45.6

Eff. Size (D10) = N/A | **Unif. Coef. (D60/ D10) = N/A**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-6

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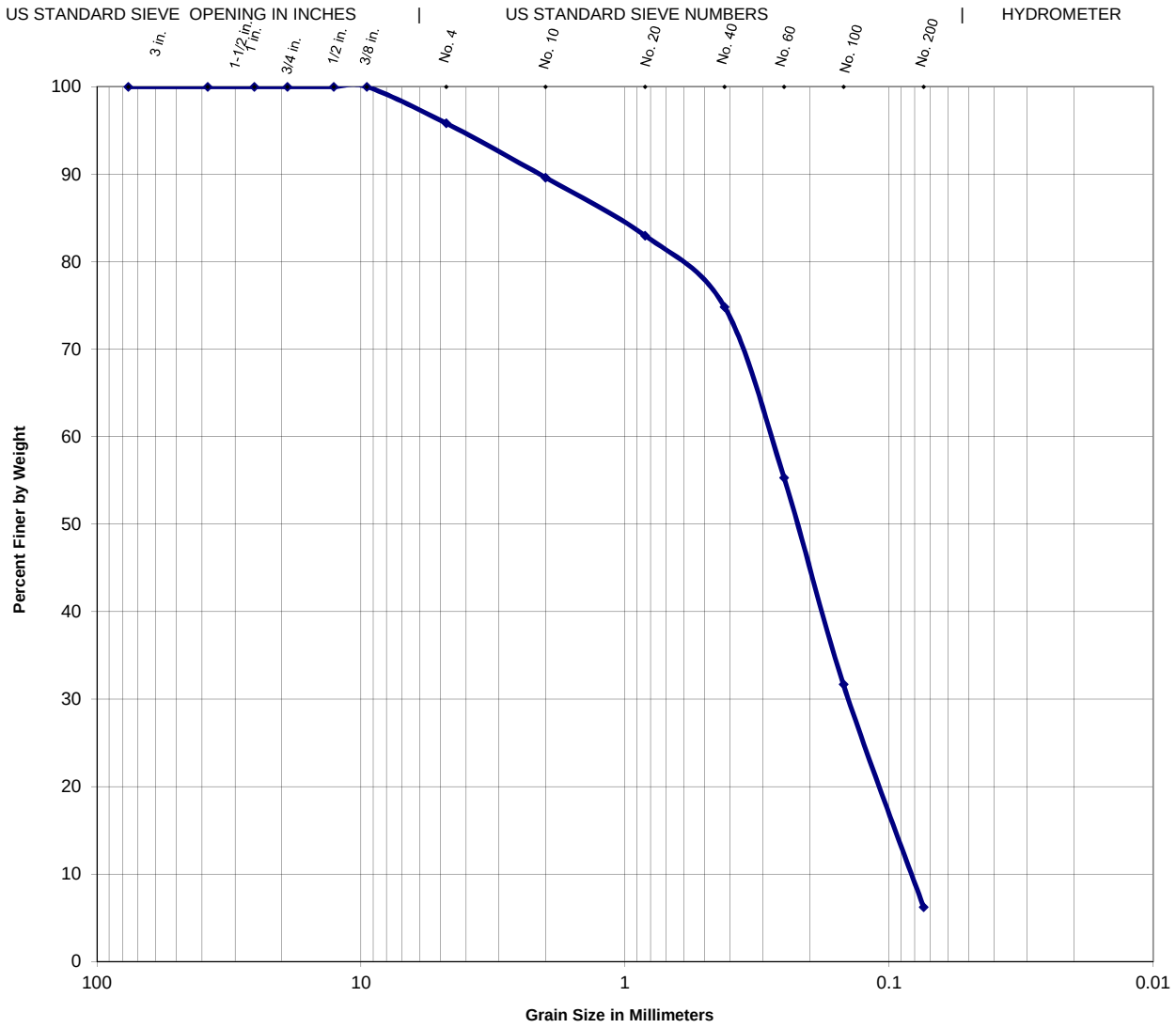

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-2, Sample 1	13.5 ft to 15 ft	Gray SAND with silt (SP-SM)	22.9	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	96	90	83.0	74.8	55.3	31.7	6.2

Eff. Size (D10) = **0.083 mm** **Unif. Coef. (D60/ D10) =** **3.49**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-7

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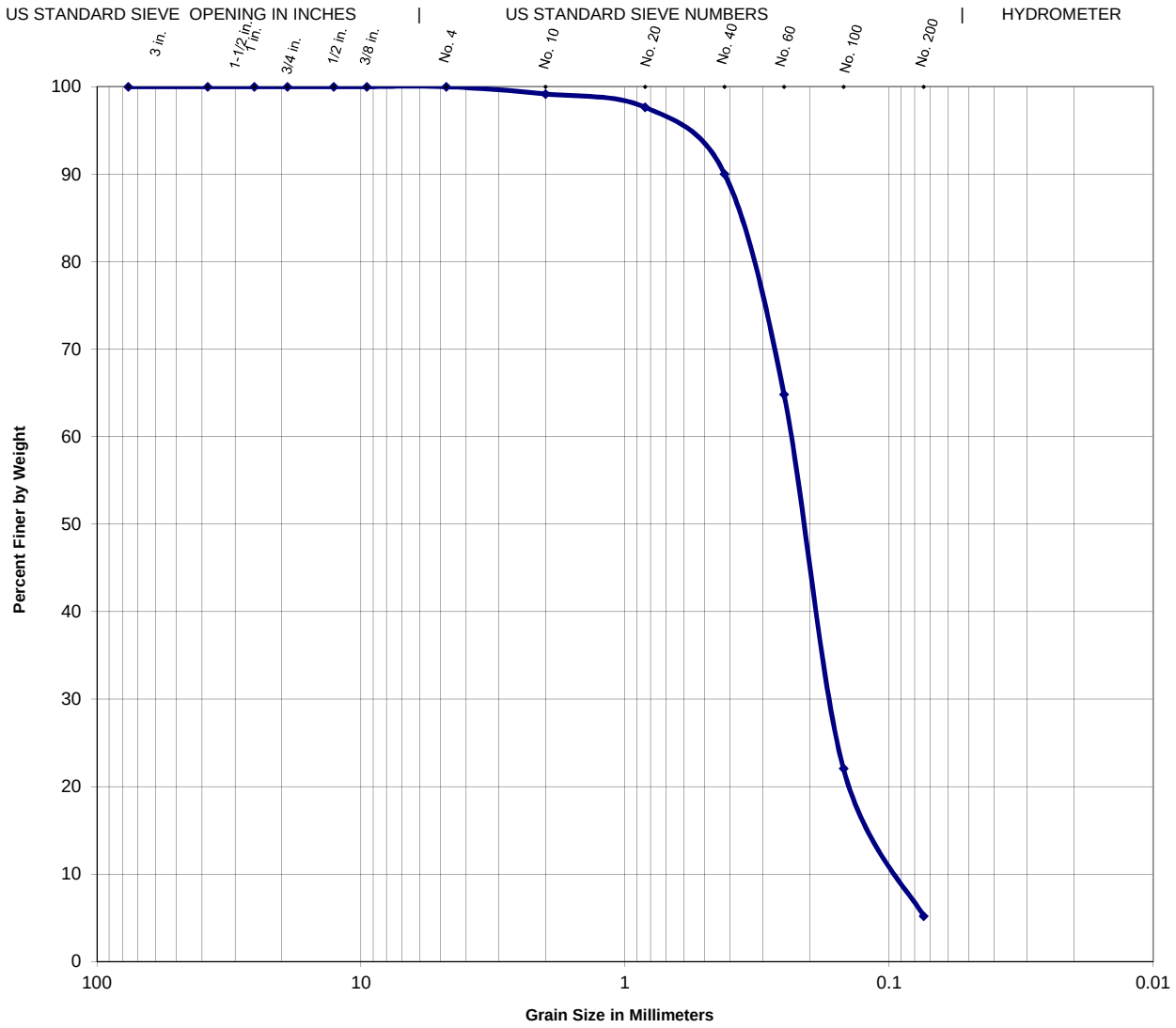

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-2, Sample 2	15 ft to 16.5 ft	Gray SAND with silt (SP-SM)	22.1	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	99	97.7	90.0	64.8	22.1	5.2

Eff. Size (D10) = **0.098 mm** **Unif. Coef. (D60/ D10) =** **2.24**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-8

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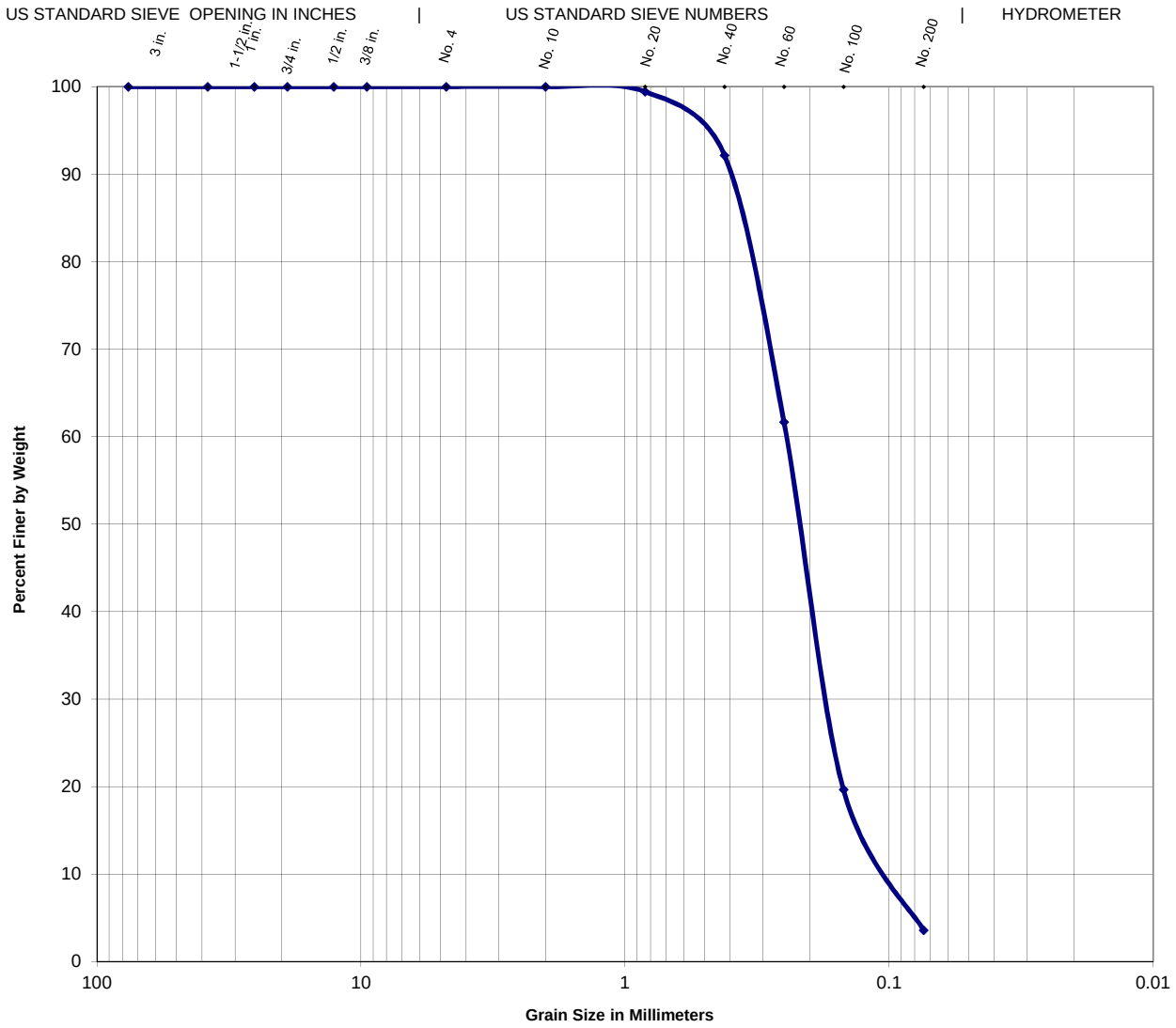

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-2, Sample 3	16.5 ft to 18 ft	Gray SAND (SP)	21.9	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.4	92.2	61.7	19.7	3.6

Eff. Size (D10) = 0.11 mm **Unif. Coef. (D60/ D10) =** 2.18

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-9

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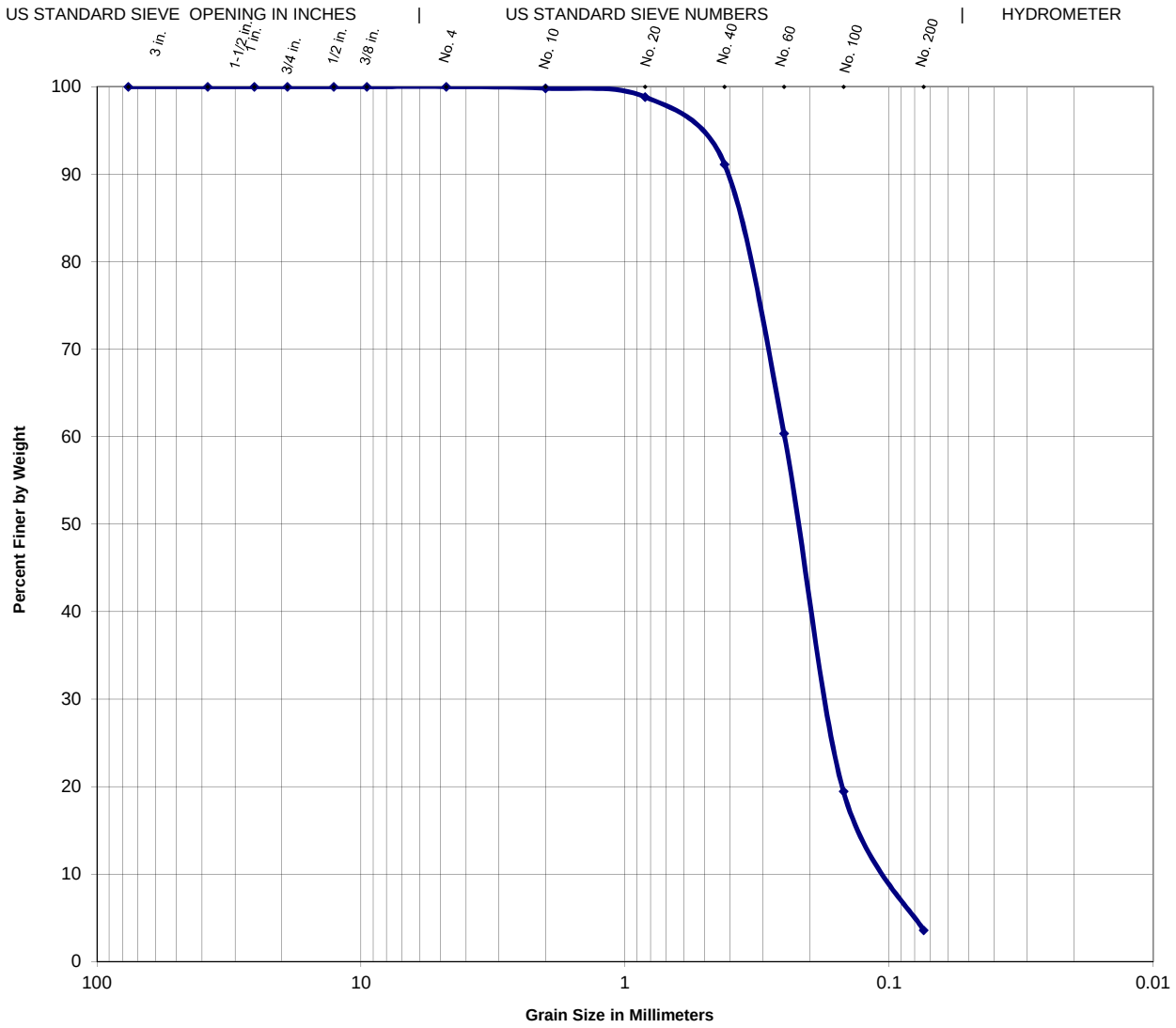

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-2, Sample 4	18 ft to 19.5 ft	Gray SAND (SP)	22.6	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	98.8	91.1	60.4	19.5	3.6

Eff. Size (D10) = 0.11 mm **Unif. Coef. (D60/ D10) =** 2.27

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-10

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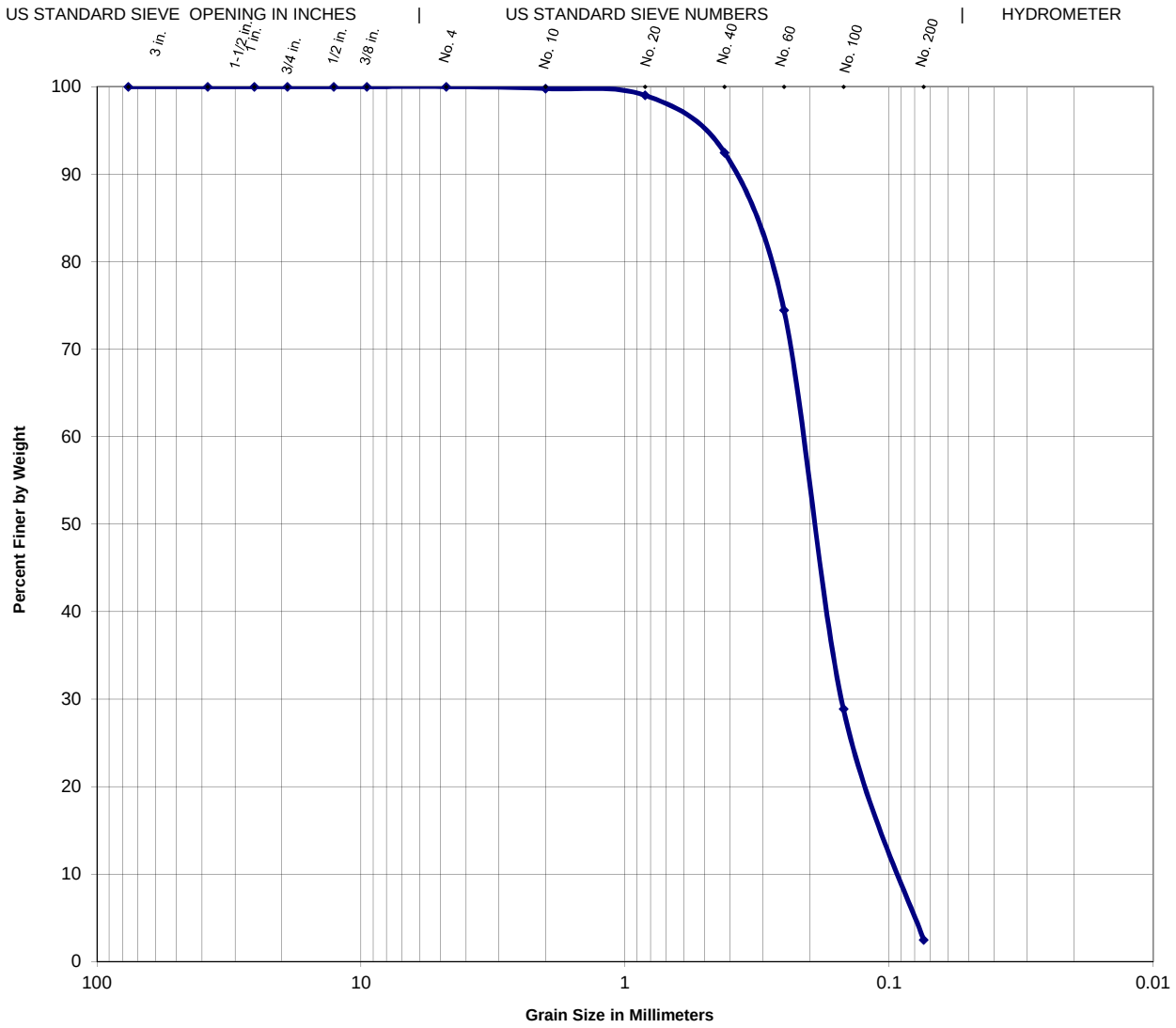

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-2, Sample 5	19.5 ft to 21 ft	Gray SAND (SP)	23.5	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.0	92.5	74.4	28.9	2.5

Eff. Size (D10) = 0.093 mm | **Unif. Coef. (D60/ D10) =** 2.26

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-11

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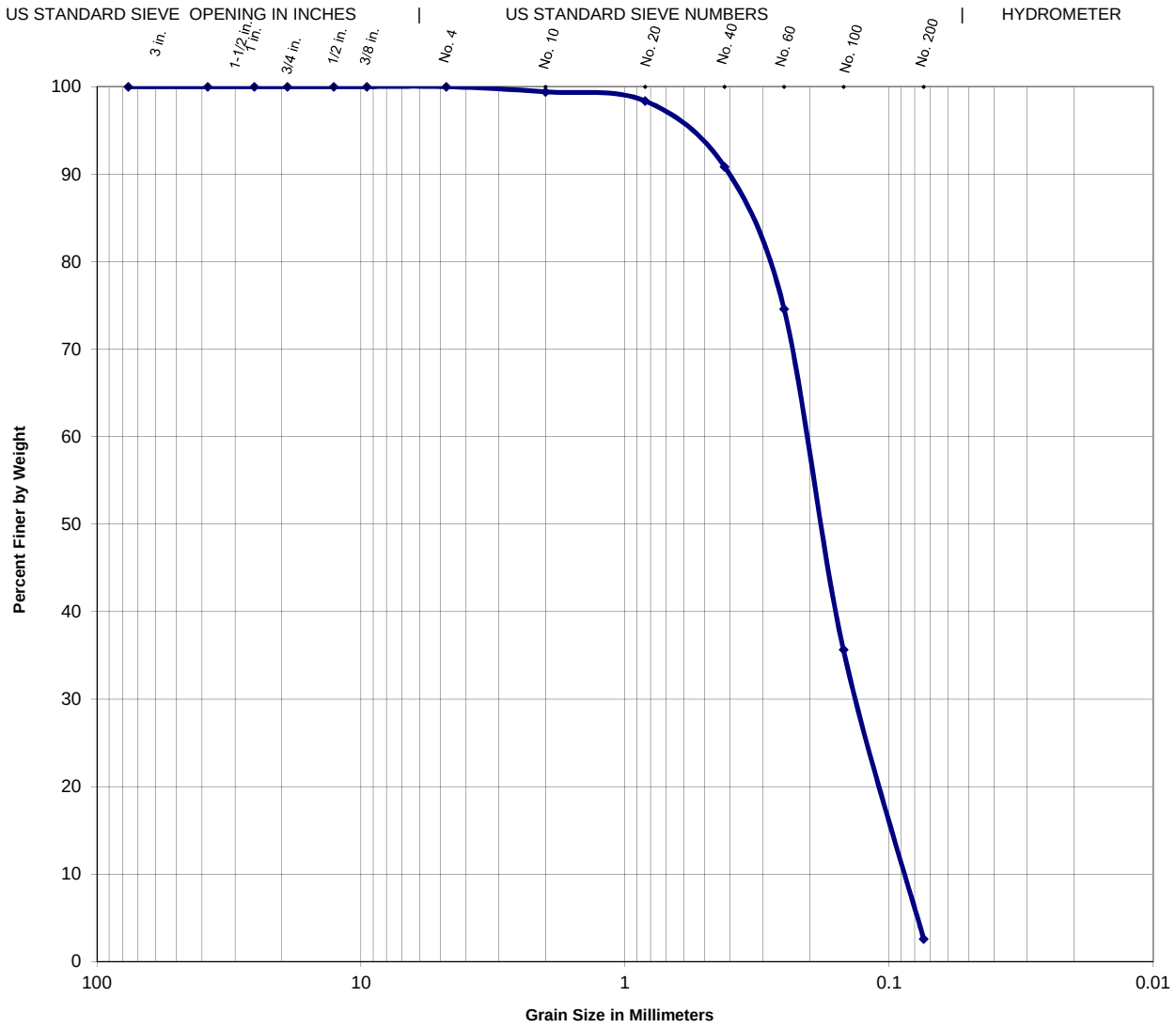

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-2, Sample 6	21 ft to 22.5 ft	Gray SAND (SP)	21.7	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	99	98.4	90.9	74.6	35.7	2.6

Eff. Size (D10) = 0.09 mm **Unif. Coef. (D60/ D10) =** 2.22

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-12

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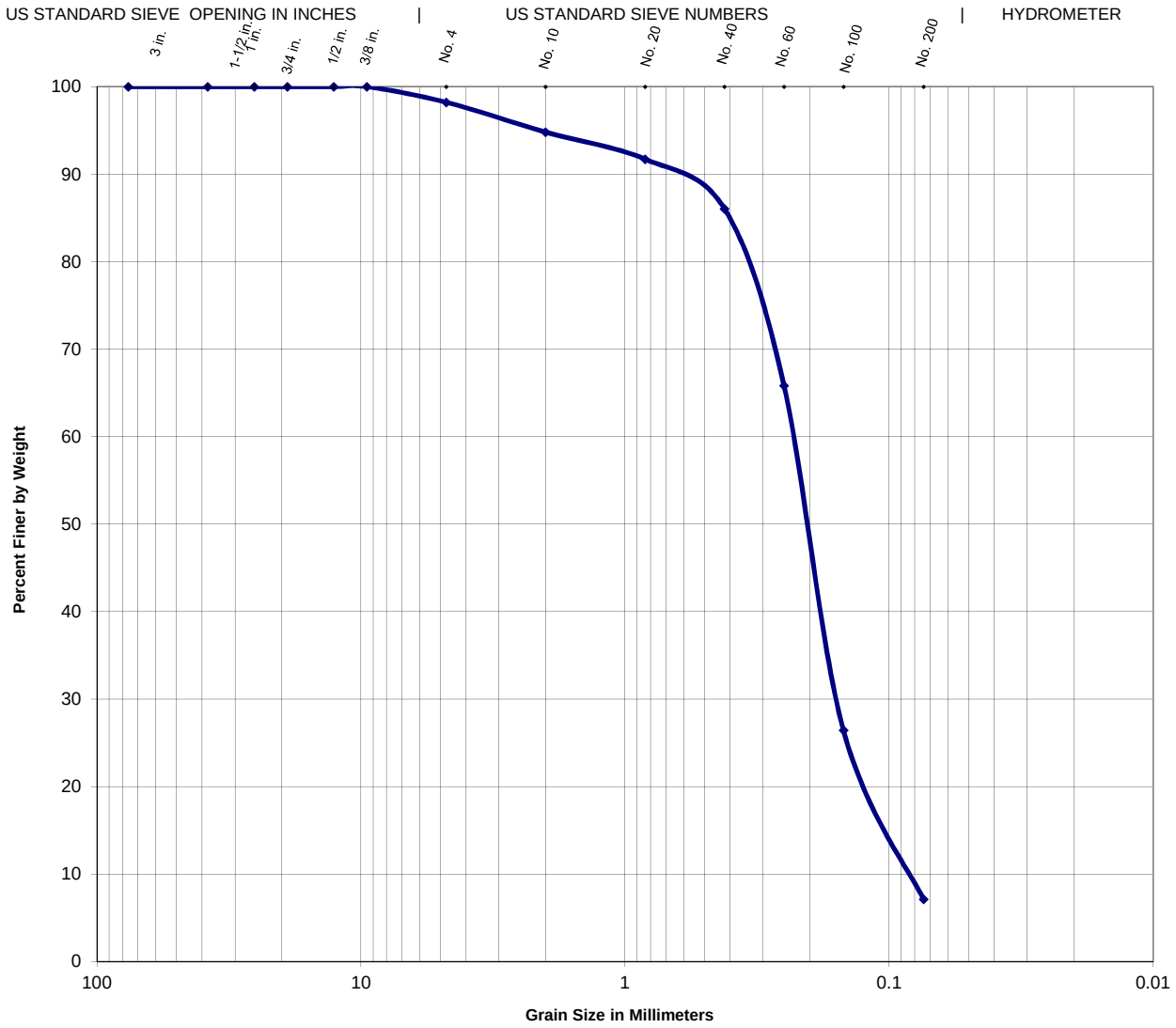

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-3, Sample 1	12.5 ft to 14 ft	Gray SAND with silt (SP-SM)	28.1	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	98	95	91.7	86.0	65.8	26.5	7.1

Eff. Size (D10) = **0.085 mm** **Unif. Coef. (D60/ D10) =** **2.71**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-13

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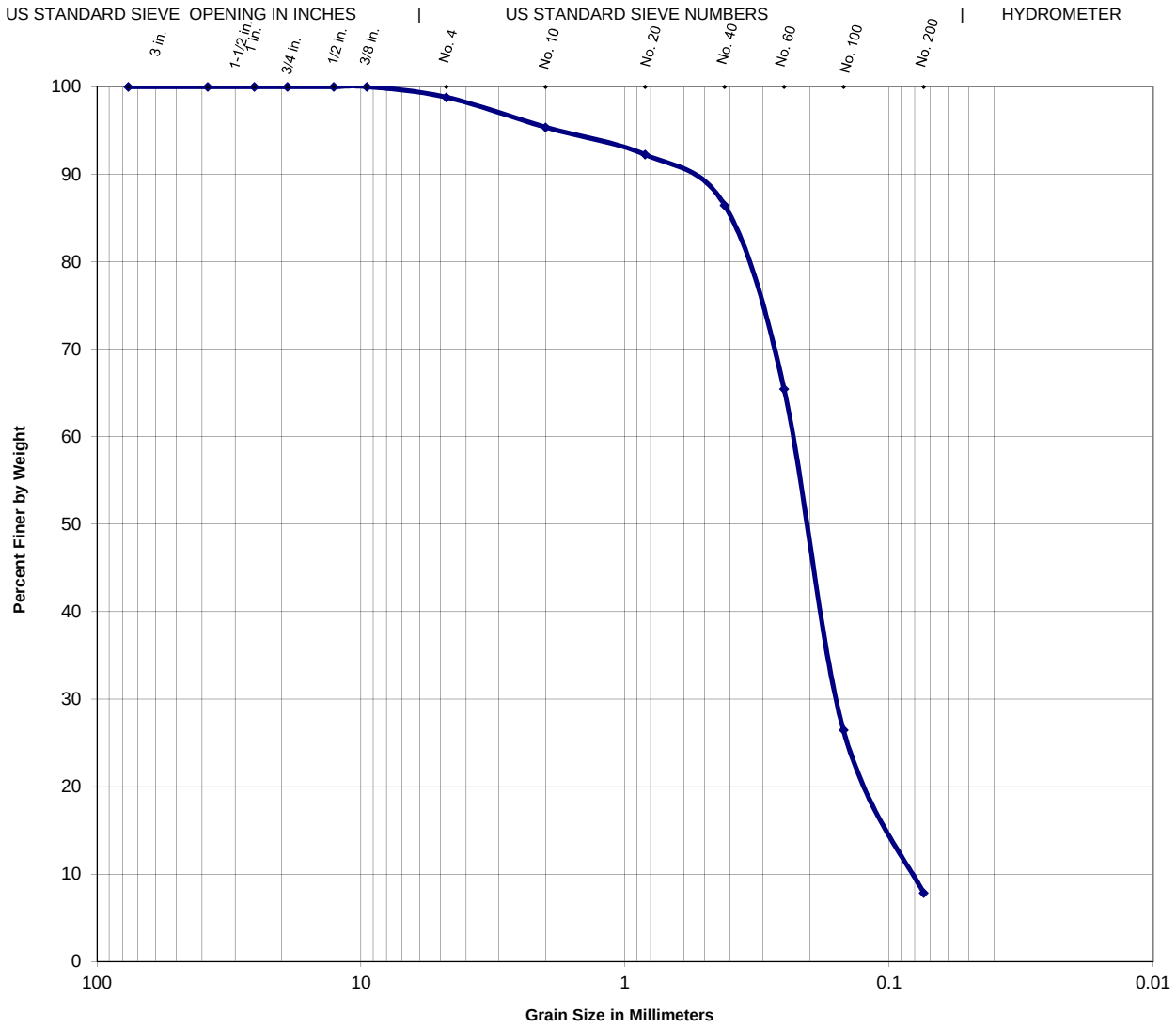

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-3, Sample 2	14 ft to 15.5 ft	Gray SAND with silt (SP-SM)	25.0	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	99	95	92.2	86.5	65.5	26.5	7.8

Eff. Size (D10) = **0.08 mm** **Unif. Coef. (D60/ D10) =** **2.88**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-14

DUNKELBERGER
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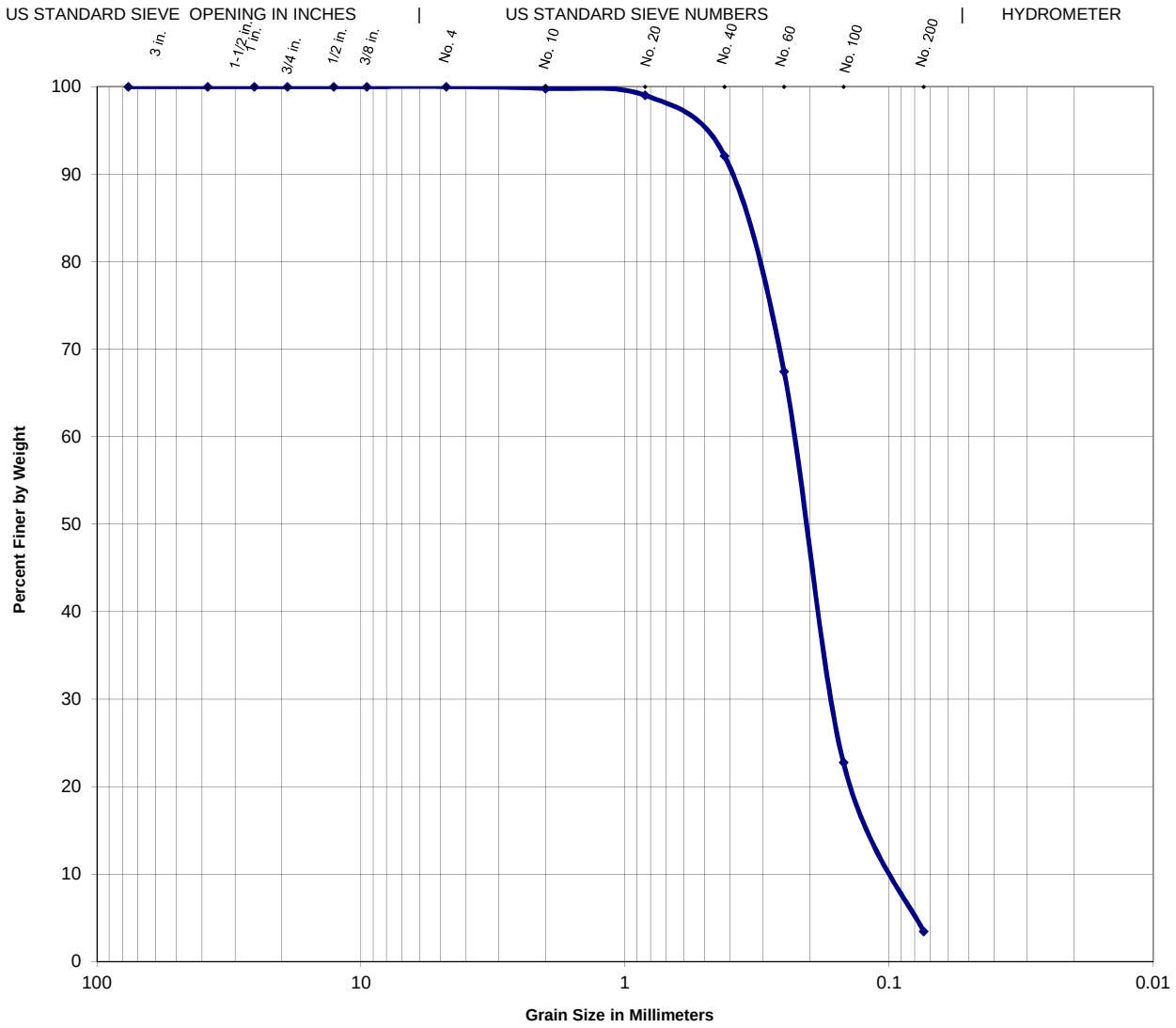

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-3, Sample 3	15.5 ft to 17 ft	Gray SAND (SP)	24.2	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.0	92.1	67.5	22.8	3.5

Eff. Size (D10) = 0.1 mm | **Unif. Coef. (D60/ D10) = 2.20**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-15

DUNKELBERGER
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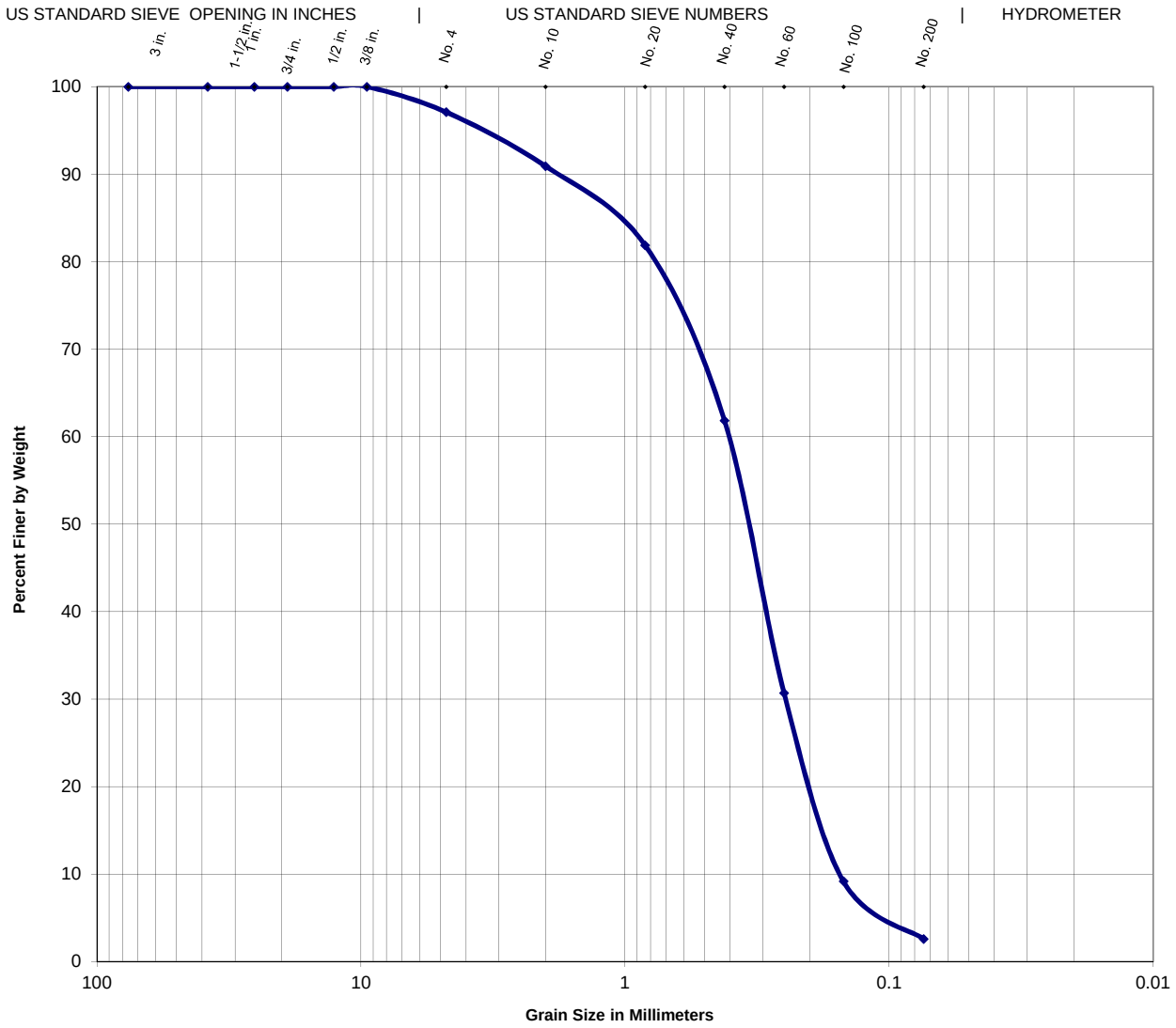

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-4, Sample 1	11.5 ft to 13 ft	Brown to gray SAND (SP)	21.0	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	97	91	81.9	61.8	30.7	9.2	2.6

Eff. Size (D10) = 0.15 mm **Unif. Coef. (D60/ D10) =** 2.67

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-16

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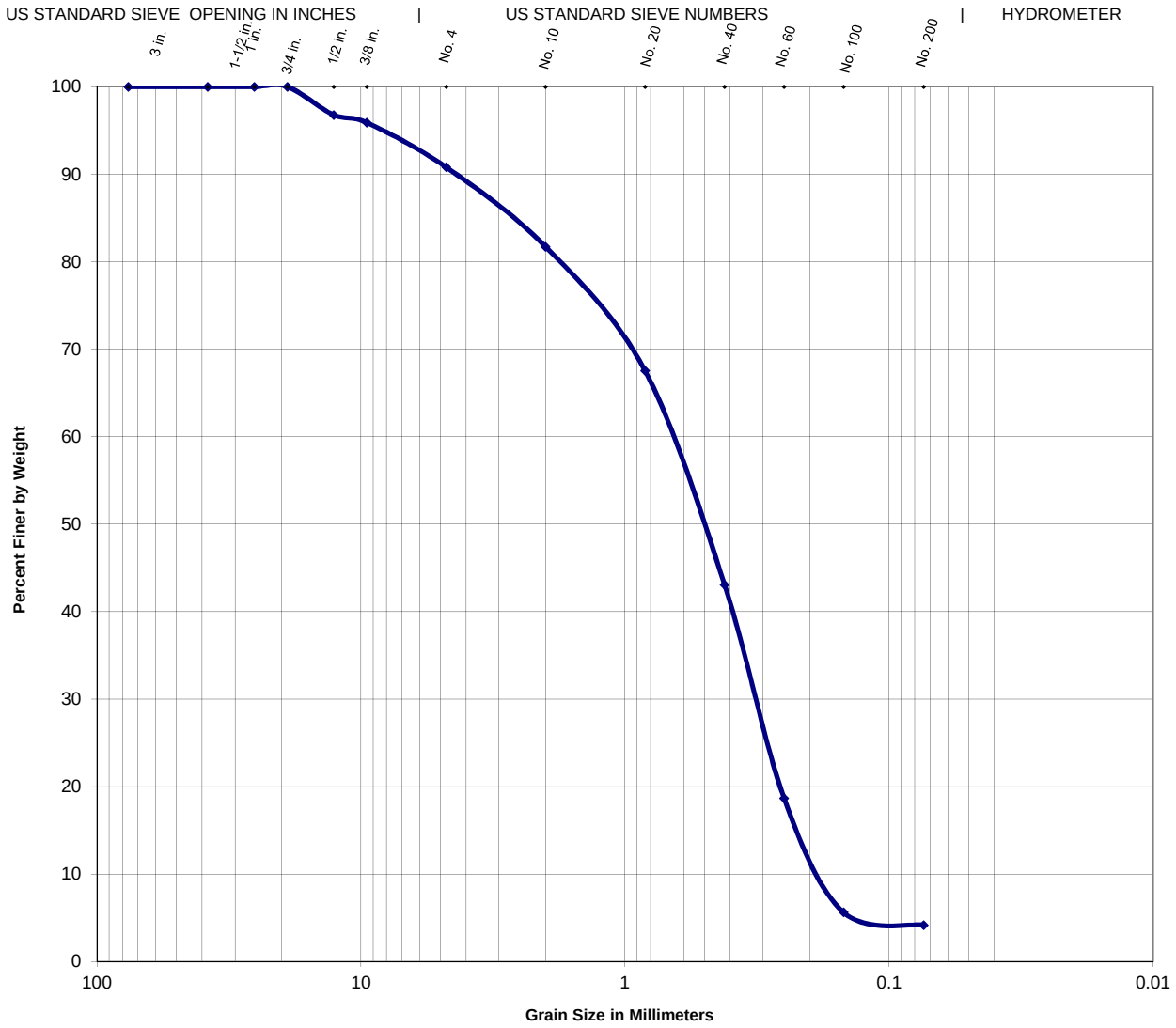

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-4, Sample 2	13 ft to 14.5 ft	Brown to gray SAND (SP)	17.6	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	97	96	91	82	67.6	43.1	18.7	5.6	4.2

Eff. Size (D10) = **0.19 mm** **Unif. Coef. (D60/ D10) =** **3.42**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-17

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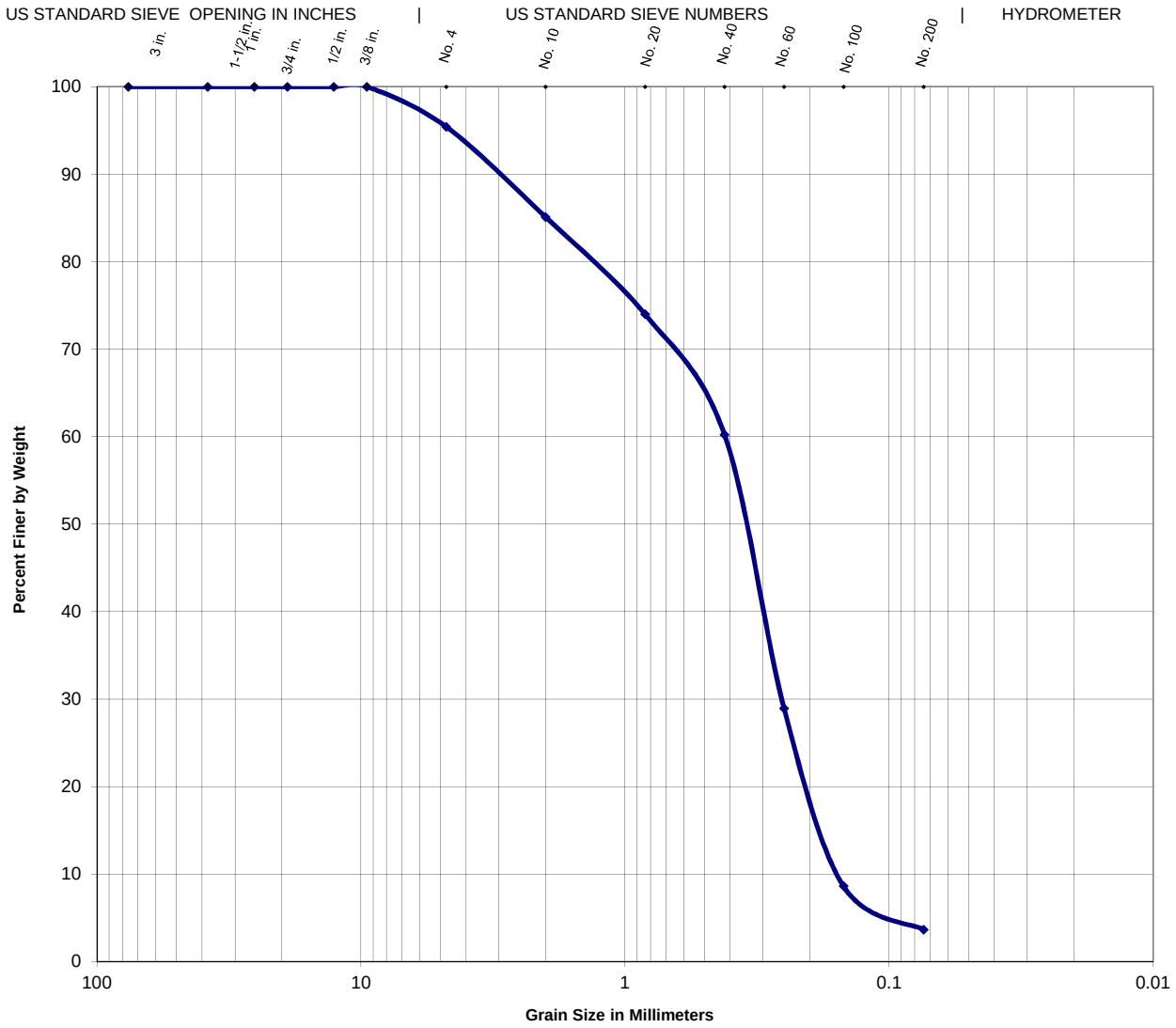

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-4, Sample 3	14.5 ft to 16 ft	Brown to gray SAND (SP)	22.9	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	95	85	74.0	60.2	29.0	8.6	3.7

Eff. Size (D10) = 0.17 mm **Unif. Coef. (D60/ D10) =** 2.47

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-18

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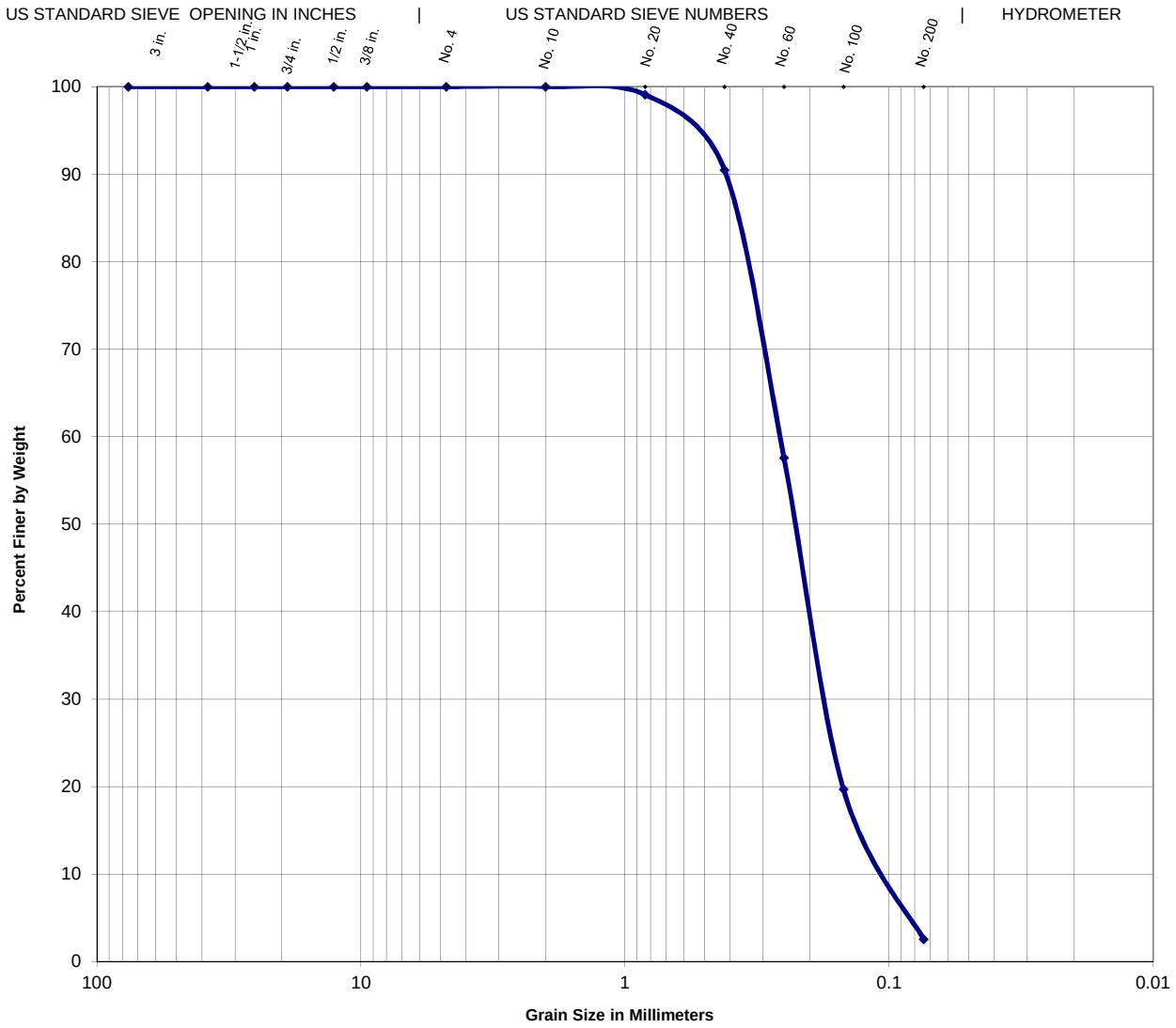

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-4, Sample 4	16 ft to 17.5 ft	Brown to gray SAND (SP)	23.1	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.1	90.5	57.6	19.7	2.6

Eff. Size (D10) = 0.11 mm **Unif. Coef. (D60/ D10) =** 2.36

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-19

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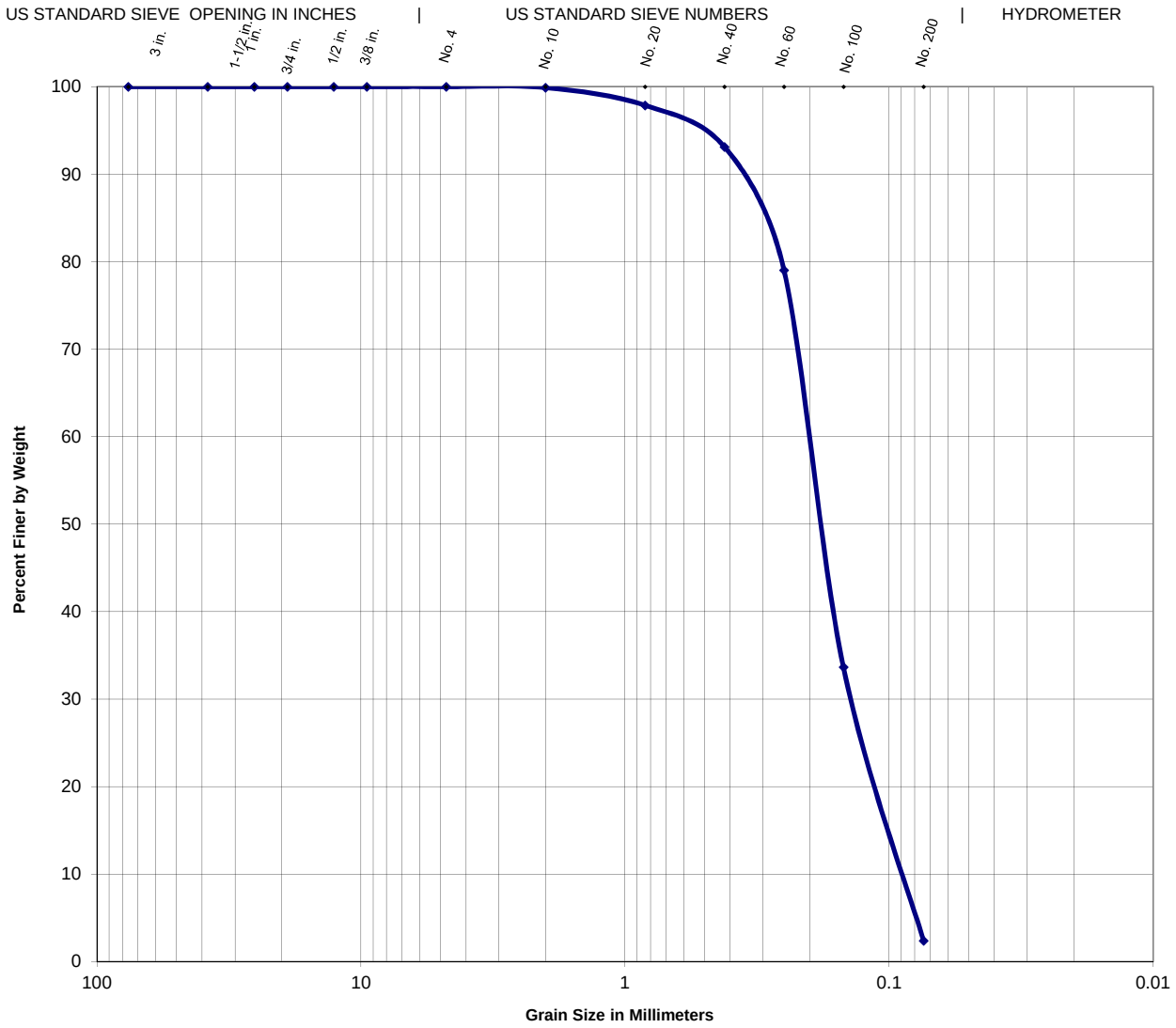

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-4, Sample 5	17.5 ft to 19 ft	Brown to gray SAND (SP)	25.7	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	97.9	93.1	79.0	33.7	2.4

Eff. Size (D10) = 0.09 mm **Unif. Coef. (D60/ D10) =** 2.22

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-20

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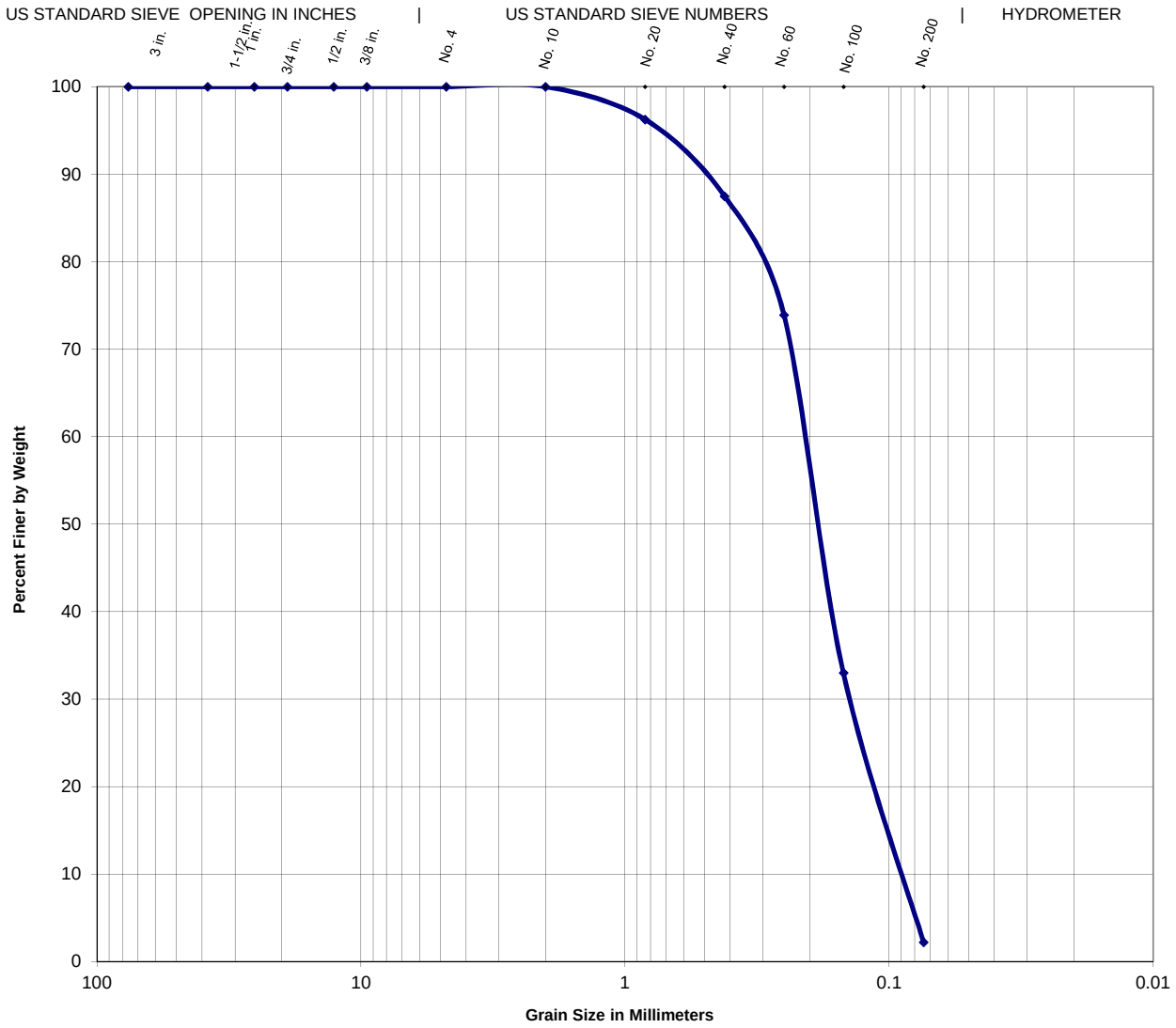

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-4, Sample 6	19 ft to 20.5 ft	Brown to gray SAND (SP)	24.9	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	96.3	87.5	73.9	33.0	2.2

Eff. Size (D10) = 0.09 mm **Unif. Coef. (D60/ D10) =** 2.33

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Taylor Engineering, Inc.
Palm Beach County, FL
Project Number : HD155006
Date : 3/25/15

Sheet B-21

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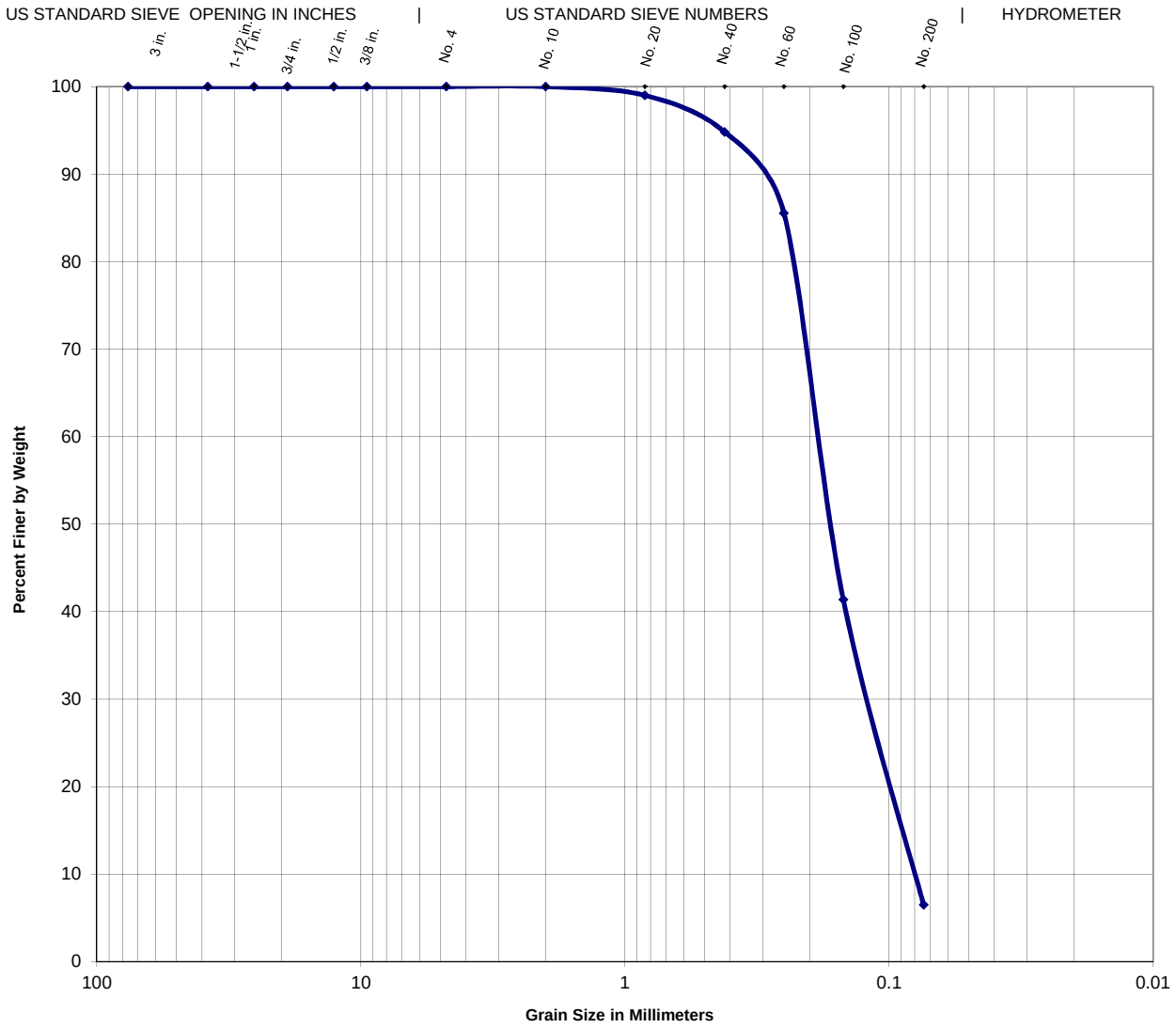

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-104, Sample 2	18 ft to 20 ft	Gray SAND with silt (SP-SM)	24.5	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.0	94.8	85.5	41.4	6.5

Eff. Size (D10) = **0.08 mm** **Unif. Coef. (D60/ D10) =** **2.38**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Florida Inland Navigation District
Palm Beach County, FL
Project Number : HD155091
Date : 11/13/15

Sheet B-22

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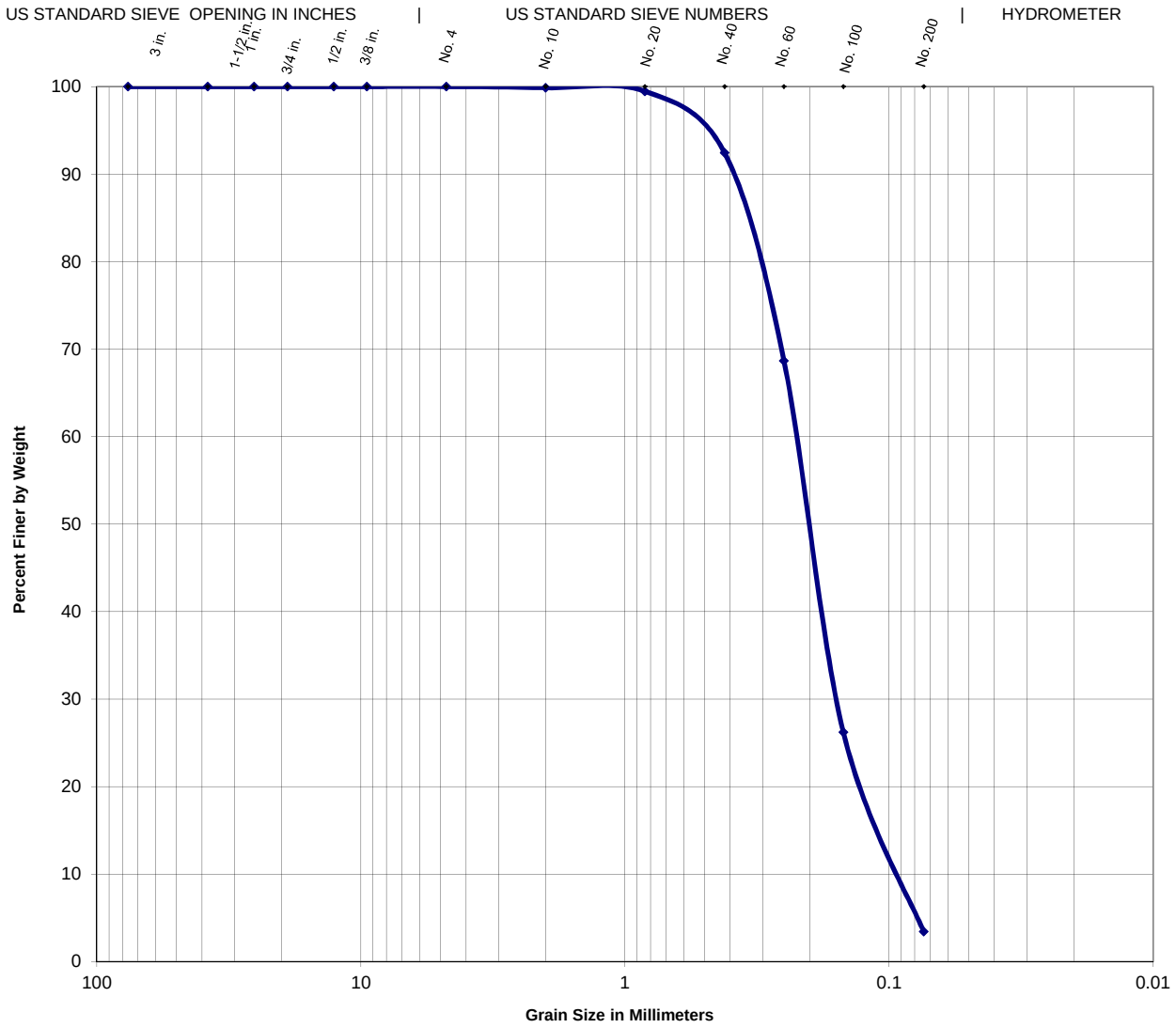

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-105, Sample 4	22 ft to 24 ft	Gray SAND, trace silt (SP)	23.6	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.5	92.4	68.7	26.2	3.4

Eff. Size (D10) = **0.095 mm** **Unif. Coef. (D60/ D10) =** **2.32**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Florida Inland Navigation District
Palm Beach County, FL
Project Number : HD155091
Date : 11/13/15

Sheet B-23

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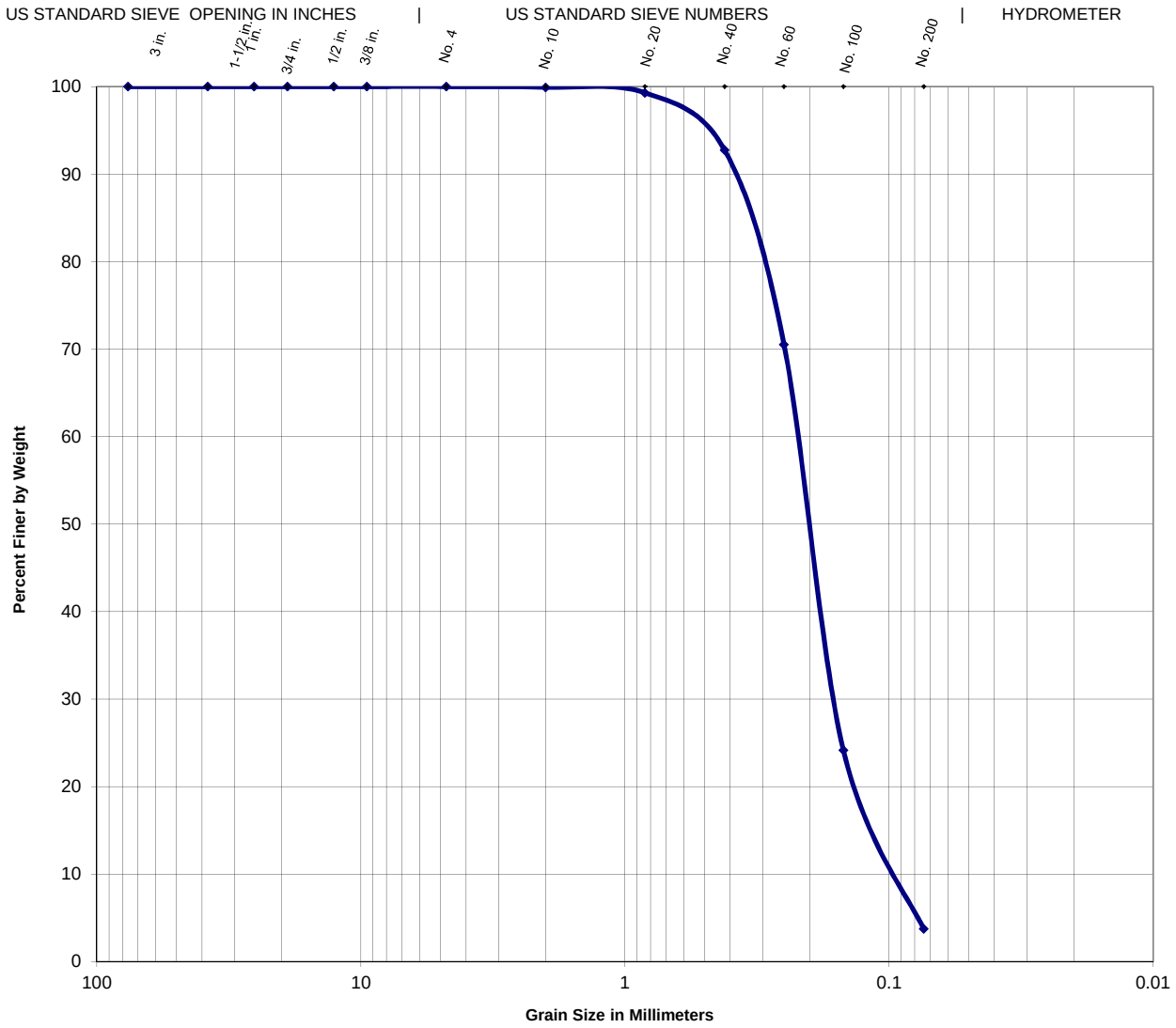

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-107, Sample 1	20 ft to 22 ft	Gray SAND, trace silt (SP)	23.3	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	100	99.3	92.8	70.6	24.2	3.8

Eff. Size (D10) = **0.095 mm** **Unif. Coef. (D60/ D10) =** **2.32**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Florida Inland Navigation District
Palm Beach County, FL
Project Number : HD155091
Date : 11/13/15

Sheet B-24

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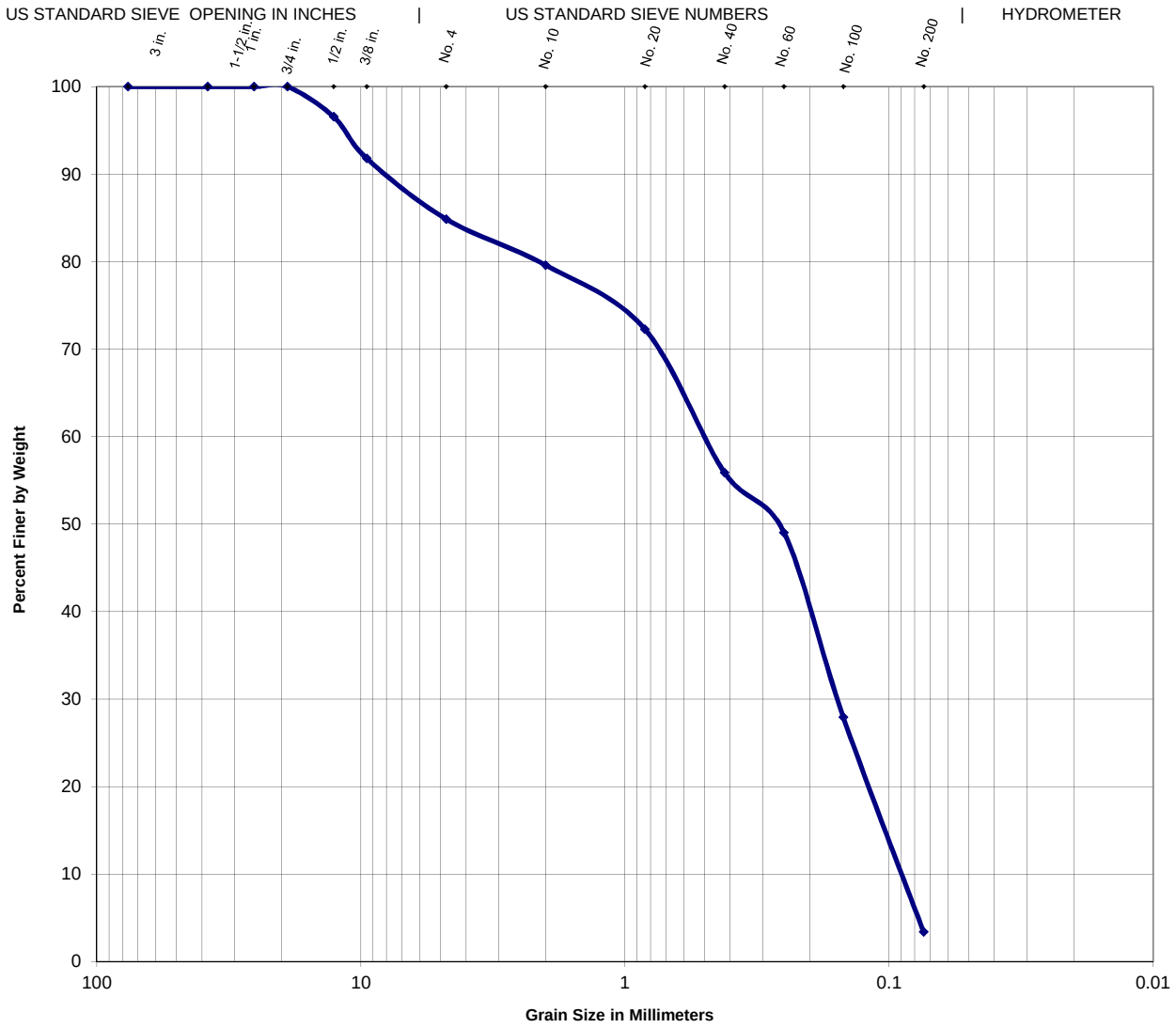

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-108, Sample 2	22 ft to 24 ft	Gray SAND, trace silt, some gravel sized shell (SP)	18.2	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	97	92	85	80	72.3	55.9	49.0	27.9	3.4

Eff. Size (D10) = **0.09 mm** **Unif. Coef. (D60/ D10) =** **5.56**

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Florida Inland Navigation District
Palm Beach County, FL
Project Number : HD155091
Date : 11/13/15

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Sheet B-25

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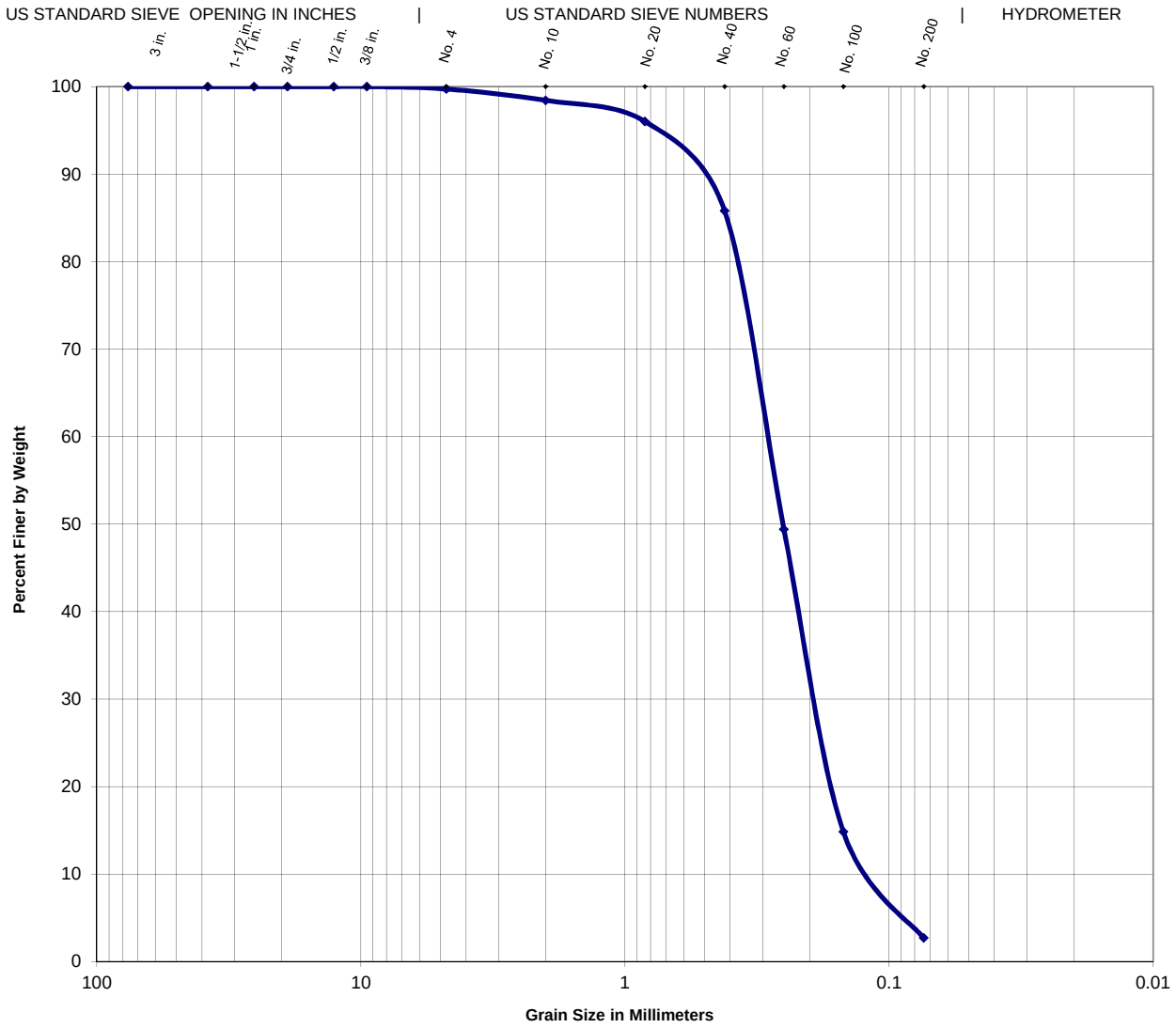

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-110A, Sample 1	16 ft to 18 ft	Gray SAND, trace silt (SP)	23.7	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	100	100	100	98	96.0	85.8	49.4	14.8	2.7

Eff. Size (D10) = 0.13 mm **Unif. Coef. (D60/ D10) =** 2.23

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Florida Inland Navigation District
Palm Beach County, FL
Project Number : HD155091
Date : 11/13/15

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Sheet B-26

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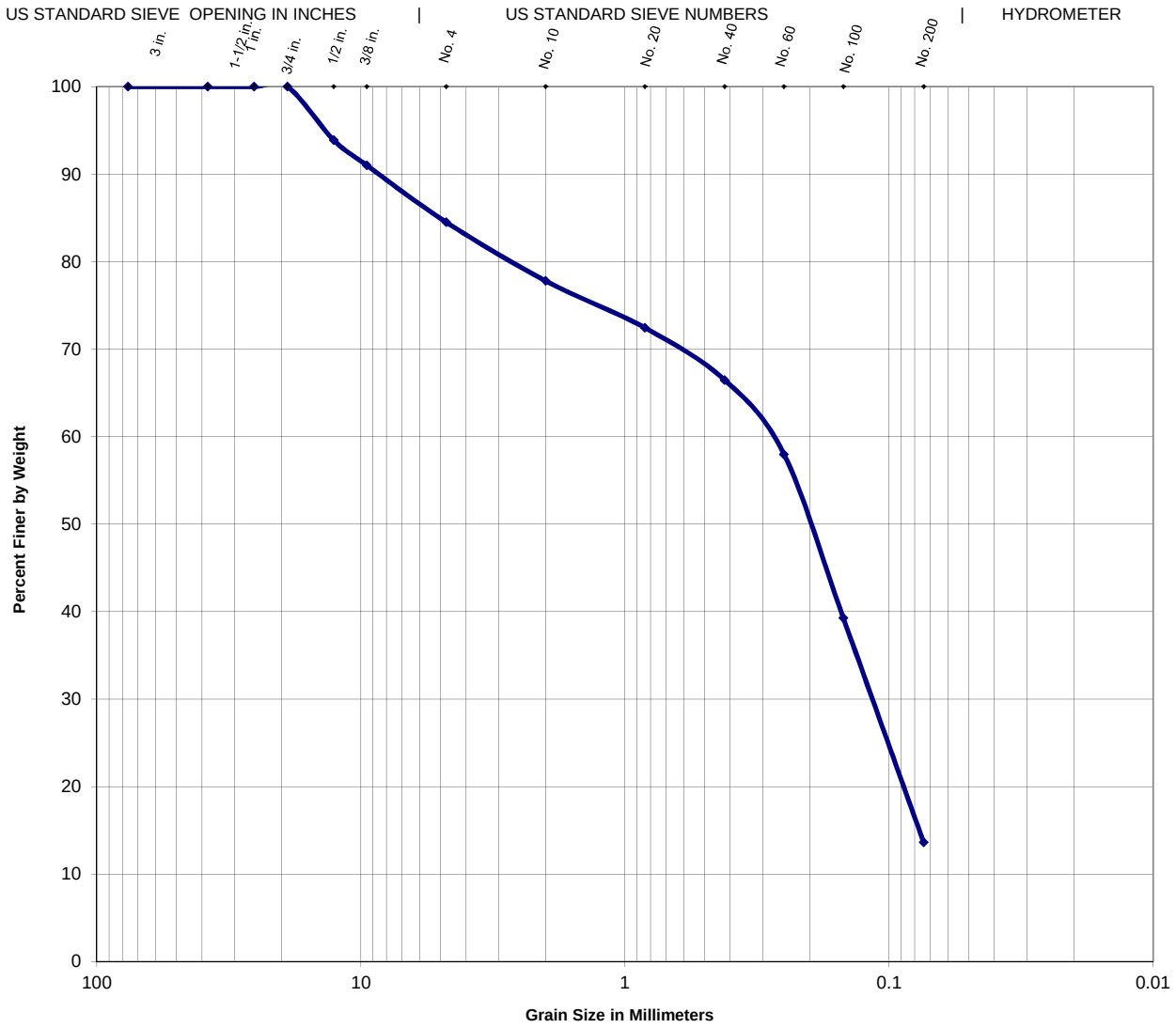

GRAIN SIZE DISTRIBUTION CURVE

Sample No.	Location	SOIL DESCRIPTION	W%	LL	PL	PI
TB-110, Sample 4	20 ft to 22 ft	Gray SAND with clay and gravel sized shell (SC)	29.0	NA	NA	NA

U.S. Sieve Number:	3 in.	1-1/2 in.	1 in.	3/4 in.	1/2 in.	3/8 in.	No. 4	No. 10	No. 20	No. 40	No. 60	No. 100	No. 200
% Passing:	100	100	100	100	94	91	85	78	72.4	66.5	58.0	39.3	13.6

Eff. Size (D10) = **0.065 mm** **Unif. Coef. (D60/ D10) =** **4.31**

Note: D10 size is estimate only.

*NP = Not Plastic

Intracoastal Waterway Deepening Project
Florida Inland Navigation District
Palm Beach County, FL
Project Number : HD155091
Date : 11/13/15

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Volume Report

Project: X:\sys\Projects\C2016-003 FIND_ICWWPalmBeach_South\Construction\C2016-003-C-Sections.dwg

Alignment: CUT PB-36
Sample Line Group: SLG-1
Start Sta: 30+00.000
End Sta: 108+00.000

Station	Cut Area (Sq.ft.)	Cut Volume (Cu.yd.)	Reusable Volume (Cu.yd.)	Fill Area (Sq.ft.)	Fill Volume (Cu.yd.)	Cum. Cut Vol. (Cu.yd.)	Cum. Reusable Vol. (Cu.yd.)	Cum. Fill Vol. (Cu.yd.)	Cum. Net Vol. (Cu.yd.)
30+00.000	298.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32+00.000	93.28	1451.63	1451.63	0.00	0.00	1451.63	1451.63	0.00	1451.63
34+00.000	20.66	422.00	422.00	0.00	0.00	1873.62	1873.62	0.00	1873.62
36+00.000	128.85	553.71	553.71	0.00	0.00	2427.34	2427.34	0.00	2427.34
38+00.000	186.12	1166.56	1166.56	0.00	0.00	3593.89	3593.89	0.00	3593.89
40+00.000	55.53	895.02	895.02	0.00	0.00	4488.92	4488.92	0.00	4488.92
42+00.000	111.45	618.47	618.47	0.00	0.00	5107.39	5107.39	0.00	5107.39
44+00.000	157.75	997.05	997.05	0.00	0.00	6104.44	6104.44	0.00	6104.44
46+00.000	208.99	1358.29	1358.29	0.00	0.00	7462.72	7462.72	0.00	7462.72
48+00.000	132.47	1264.67	1264.67	0.00	0.00	8727.40	8727.40	0.00	8727.40
50+00.000	208.00	1261.00	1261.00	0.00	0.00	9988.39	9988.39	0.00	9988.39
52+00.000	267.97	1762.83	1762.83	0.00	0.00	11751.23	11751.23	0.00	11751.23
54+00.000	260.23	1956.30	1956.30	0.00	0.00	13707.53	13707.53	0.00	13707.53
56+00.000	316.26	2135.14	2135.14	0.00	0.00	15842.67	15842.67	0.00	15842.67
58+00.000	307.75	2311.12	2311.12	0.00	0.00	18153.79	18153.79	0.00	18153.79
60+00.000	227.44	1982.17	1982.17	0.00	0.00	20135.95	20135.95	0.00	20135.95
62+00.000	222.43	1666.17	1666.17	0.00	0.00	21802.12	21802.12	0.00	21802.12
64+00.000	215.72	1622.77	1622.77	0.00	0.00	23424.89	23424.89	0.00	23424.89
66+00.000	177.58	1456.69	1456.69	0.00	0.00	24881.58	24881.58	0.00	24881.58
68+00.000	147.54	1204.18	1204.18	0.00	0.00	26085.76	26085.76	0.00	26085.76
70+00.000	143.65	1078.51	1078.51	0.00	0.00	27164.27	27164.27	0.00	27164.27
72+00.000	40.85	683.36	683.36	0.00	0.00	27847.63	27847.63	0.00	27847.63
74+00.000	14.03	203.25	203.25	0.00	0.00	28050.88	28050.88	0.00	28050.88
76+00.000	86.39	371.89	371.89	0.00	0.00	28422.77	28422.77	0.00	28422.77
78+00.000	105.68	711.35	711.35	0.00	0.00	29134.12	29134.12	0.00	29134.12
80+00.000	24.47	482.02	482.02	0.00	0.00	29616.14	29616.14	0.00	29616.14
82+00.000	79.63	385.54	385.54	0.00	0.00	30001.68	30001.68	0.00	30001.68

84+00.000	52.54	489.52	489.52	0.00	0.00	30491.20	30491.20	0.00	30491.20
86+00.000	0.67	197.09	197.09	0.00	0.00	30688.29	30688.29	0.00	30688.29
88+00.000	57.96	217.17	217.17	0.00	0.00	30905.46	30905.46	0.00	30905.46
90+00.000	22.27	297.15	297.15	0.00	0.00	31202.61	31202.61	0.00	31202.61
92+00.000	80.43	380.37	380.37	0.00	0.00	31582.98	31582.98	0.00	31582.98
94+00.000	127.72	770.94	770.94	0.00	0.00	32353.92	32353.92	0.00	32353.92
96+00.000	134.42	970.87	970.87	0.00	0.00	33324.79	33324.79	0.00	33324.79
98+00.000	99.41	866.03	866.03	0.00	0.00	34190.82	34190.82	0.00	34190.82
100+00.000	106.11	761.18	761.18	0.00	0.00	34951.99	34951.99	0.00	34951.99
102+00.000	99.58	761.82	761.82	0.00	0.00	35713.81	35713.81	0.00	35713.81
104+00.000	180.90	1038.81	1038.81	0.00	0.00	36752.63	36752.63	0.00	36752.63
106+00.000	92.23	1011.59	1011.59	0.00	0.00	37764.21	37764.21	0.00	37764.21
108+00.000	79.34	635.47	635.47	0.00	0.00	38399.68	38399.68	0.00	38399.68

Volume Report

Project: X:\sys\Projects\C2016-003 FIND_ICWWPalmBeach_South\Construction\C2016-003-C-Sections.dwg

Alignment: CUT PB-37
Sample Line Group: SLG-3
Start Sta: 0+00.000
End Sta: 71+31.940

Station	Cut Area (Sq.ft.)	Cut Volume (Cu.yd.)	Reusable Volume (Cu.yd.)	Fill Area (Sq.ft.)	Fill Volume (Cu.yd.)	Cum. Cut Vol. (Cu.yd.)	Cum. Reusable Vol. (Cu.yd.)	Cum. Fill Vol. (Cu.yd.)	Cum. Net Vol. (Cu.yd.)
0+00.000	54.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2+00.000	99.81	569.72	569.72	0.00	0.00	569.72	569.72	0.00	569.72
4+00.000	77.66	657.28	657.28	0.00	0.00	1227.00	1227.00	0.00	1227.00
6+00.000	120.53	734.03	734.03	0.00	0.00	1961.03	1961.03	0.00	1961.03
8+00.000	127.21	917.57	917.57	0.00	0.00	2878.61	2878.61	0.00	2878.61
10+00.000	133.44	965.39	965.39	0.00	0.00	3843.99	3843.99	0.00	3843.99
12+00.000	146.64	1037.35	1037.35	0.00	0.00	4881.34	4881.34	0.00	4881.34
14+00.000	178.84	1205.48	1205.48	0.00	0.00	6086.82	6086.82	0.00	6086.82
16+00.000	174.28	1307.86	1307.86	0.00	0.00	7394.68	7394.68	0.00	7394.68
18+00.000	68.38	898.77	898.77	0.00	0.00	8293.45	8293.45	0.00	8293.45
20+00.000	21.40	332.52	332.52	0.00	0.00	8625.97	8625.97	0.00	8625.97
22+00.000	62.88	312.12	312.12	0.00	0.00	8938.09	8938.09	0.00	8938.09
24+00.000	64.99	473.60	473.60	0.00	0.00	9411.69	9411.69	0.00	9411.69
26+00.000	92.57	583.58	583.58	0.00	0.00	9995.27	9995.27	0.00	9995.27
28+00.000	119.29	784.67	784.67	0.00	0.00	10779.94	10779.94	0.00	10779.94
30+00.000	220.01	1256.66	1256.66	0.00	0.00	12036.60	12036.60	0.00	12036.60
32+00.000	196.54	1542.76	1542.76	0.00	0.00	13579.36	13579.36	0.00	13579.36
34+00.000	91.69	1067.52	1067.52	0.00	0.00	14646.88	14646.88	0.00	14646.88
36+00.000	248.87	1261.32	1261.32	0.00	0.00	15908.20	15908.20	0.00	15908.20
38+00.000	76.82	1206.25	1206.25	0.00	0.00	17114.45	17114.45	0.00	17114.45
40+00.000	0.18	285.20	285.20	0.00	0.00	17399.66	17399.66	0.00	17399.66
42+00.000	1.25	5.29	5.29	0.00	0.00	17404.94	17404.94	0.00	17404.94
44+00.000	108.33	405.85	405.85	0.00	0.00	17810.80	17810.80	0.00	17810.80
46+00.000	75.23	679.85	679.85	0.00	0.00	18490.65	18490.65	0.00	18490.65
48+00.000	64.42	517.19	517.19	0.00	0.00	19007.83	19007.83	0.00	19007.83
50+00.000	56.52	447.93	447.93	0.00	0.00	19455.76	19455.76	0.00	19455.76
52+00.000	154.62	782.01	782.01	0.00	0.00	20237.77	20237.77	0.00	20237.77

54+00.000	179.25	1236.56	1236.56	0.00	0.00	21474.33	21474.33	0.00	21474.33
56+00.000	279.05	1697.42	1697.42	0.00	0.00	23171.75	23171.75	0.00	23171.75
58+00.000	225.47	1868.60	1868.60	0.00	0.00	25040.35	25040.35	0.00	25040.35
60+00.000	218.02	1642.55	1642.55	0.00	0.00	26682.90	26682.90	0.00	26682.90
62+00.000	266.23	1793.51	1793.51	0.00	0.00	28476.41	28476.41	0.00	28476.41
64+00.000	293.18	2071.90	2071.90	0.00	0.00	30548.31	30548.31	0.00	30548.31
66+00.000	242.46	1983.85	1983.85	0.00	0.00	32532.16	32532.16	0.00	32532.16
68+00.000	122.68	1352.35	1352.35	0.00	0.00	33884.51	33884.51	0.00	33884.51
70+00.000	24.92	546.67	546.67	0.00	0.00	34431.18	34431.18	0.00	34431.18
71+31.940	20.49	110.97	110.97	0.00	0.00	34542.15	34542.15	0.00	34542.15

Volume Report

Project: X:\sys\Projects\C2016-003 FIND_ICWWPalmBeach_South\Construction\C2016-003-C-Sections.dwg

Alignment: CUT PB-38
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End Sta: 30+00.000

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4+00.000	33.45	151.25	151.25	0.00	0.00	251.43	251.43	0.00	251.43
6+00.000	0.33	125.12	125.12	0.00	0.00	376.54	376.54	0.00	376.54
8+00.000	1.44	6.56	6.56	0.00	0.00	383.11	383.11	0.00	383.11
10+00.000	0.00	5.33	5.33	0.00	0.00	388.43	388.43	0.00	388.43
12+00.000	0.00	0.00	0.00	0.00	0.00	388.43	388.43	0.00	388.43
14+00.000	1.10	4.08	4.08	0.00	0.00	392.52	392.52	0.00	392.52
16+00.000	86.65	325.02	325.02	0.00	0.00	717.53	717.53	0.00	717.53
18+00.000	6.49	344.97	344.97	0.00	0.00	1062.50	1062.50	0.00	1062.50
20+00.000	0.00	24.03	24.03	0.00	0.00	1086.53	1086.53	0.00	1086.53
22+00.000	1.83	6.79	6.79	0.00	0.00	1093.33	1093.33	0.00	1093.33
24+00.000	12.92	54.65	54.65	0.00	0.00	1147.97	1147.97	0.00	1147.97
26+00.000	38.97	192.20	192.20	0.00	0.00	1340.18	1340.18	0.00	1340.18
28+00.000	194.41	864.40	864.40	0.00	0.00	2204.58	2204.58	0.00	2204.58
30+00.000	231.48	1577.36	1577.36	0.00	0.00	3781.94	3781.94	0.00	3781.94

Volume Report

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4+00.000	0.00	0.00	0.00	0.00	0.00	82.12	82.12	0.00	82.12
6+00.000	0.00	0.00	0.00	0.00	0.00	82.12	82.12	0.00	82.12
8+00.000	16.09	59.60	59.60	0.00	0.00	141.72	141.72	0.00	141.72
10+00.000	24.26	149.45	149.45	0.00	0.00	291.17	291.17	0.00	291.17
12+00.000	78.15	379.28	379.28	0.00	0.00	670.45	670.45	0.00	670.45
14+00.000	3.27	301.53	301.53	0.00	0.00	971.98	971.98	0.00	971.98
16+00.000	154.21	583.25	583.25	0.00	0.00	1555.24	1555.24	0.00	1555.24
18+00.000	23.58	658.49	658.49	0.00	0.00	2213.72	2213.72	0.00	2213.72
20+00.000	80.32	384.81	384.81	0.00	0.00	2598.53	2598.53	0.00	2598.53

Volume Report

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Alignment: CUT PB-40
Sample Line Group: SLG-6
Start Sta: 0+00.000
End Sta: 22+00.000

Station	Cut Area (Sq.ft.)	Cut Volume (Cu.yd.)	Reusable Volume (Cu.yd.)	Fill Area (Sq.ft.)	Fill Volume (Cu.yd.)	Cum. Cut Vol. (Cu.yd.)	Cum. Reusable Vol. (Cu.yd.)	Cum. Fill Vol. (Cu.yd.)	Cum. Net Vol. (Cu.yd.)
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2+00.000	0.00	413.11	413.11	0.00	0.00	413.11	413.11	0.00	413.11
4+00.000	0.20	0.74	0.74	0.00	0.00	413.85	413.85	0.00	413.85
6+00.000	4.10	15.91	15.91	0.00	0.00	429.76	429.76	0.00	429.76
8+00.000	20.74	92.00	92.00	0.00	0.00	521.76	521.76	0.00	521.76
10+00.000	2.89	87.55	87.55	0.00	0.00	609.31	609.31	0.00	609.31
12+00.000	0.00	10.72	10.72	0.00	0.00	620.03	620.03	0.00	620.03
14+00.000	0.00	0.00	0.00	0.00	0.00	620.03	620.03	0.00	620.03
16+00.000	0.00	0.00	0.00	0.00	0.00	620.03	620.03	0.00	620.03
18+00.000	0.00	0.00	0.00	0.00	0.00	620.03	620.03	0.00	620.03
20+00.000	0.00	0.00	0.00	0.00	0.00	620.03	620.03	0.00	620.03
22+00.000	23.60	87.39	87.39	0.00	0.00	707.42	707.42	0.00	707.42

Volume Report

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Alignment: CUT PB-41
Sample Line Group: SLG-7
Start Sta: 0+00.000
End Sta: 6+81.000

Station	Cut Area (Sq.ft.)	Cut Volume (Cu.yd.)	Reusable Volume (Cu.yd.)	Fill Area (Sq.ft.)	Fill Volume (Cu.yd.)	Cum. Cut Vol. (Cu.yd.)	Cum. Reusable Vol. (Cu.yd.)	Cum. Fill Vol. (Cu.yd.)	Cum. Net Vol. (Cu.yd.)
0+00.000	22.21	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2+00.000	0.00	82.25	82.25	0.00	0.00	82.25	82.25	0.00	82.25
4+00.000	0.00	0.00	0.00	0.00	0.00	82.25	82.25	0.00	82.25
6+00.000	0.00	0.00	0.00	0.00	0.00	82.25	82.25	0.00	82.25
6+81.000	0.00	0.00	0.00	0.00	0.00	82.25	82.25	0.00	82.25

BENTHIC ASSESSMENT AND RESOURCE SURVEY ASSOCIATED WITH POTENTIAL ICWW CHANNEL DEEPENING DREDGE ACTIVITIES PALM BEACH COUNTY, FLORIDA

FINAL

22 November 2016

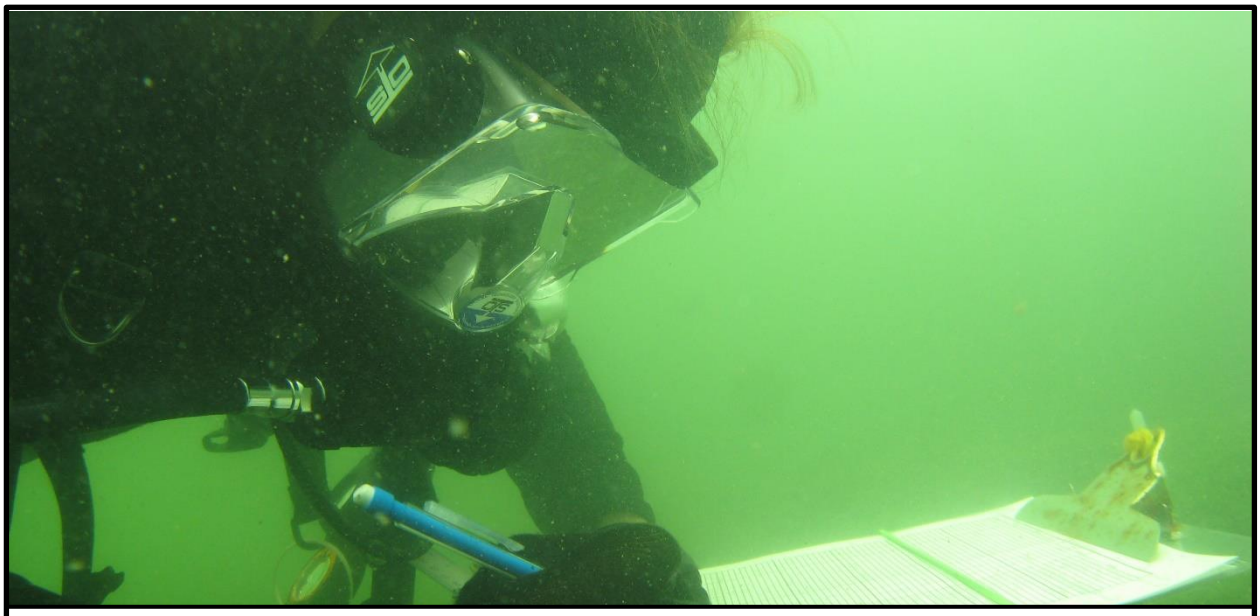

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

Pinnacle Ecological, Inc. (Pinnacle) was contracted by Florida Inland Navigation District (FIND) to conduct a benthic assessment and resource survey in support of permit requirements associated with potential channel deepening dredge activities in the Intracoastal Waterway (ICWW) and the Palm Beach Channel (also referred to as East Secondary Channel) through portions of Lake Worth Lagoon in Palm Beach County, Florida. **Figure 1** is an index for **Figures 2** and **3** which provide an overview of the survey area in Lake Worth Lagoon. The survey area included a primary area located along the ICWW starting south of Peanut Island and extending 7.7 kilometers (4.8 miles) south past Royal Park Bridge near downtown West Palm Beach, Florida. The secondary survey area included the Palm Beach Channel which parallels the west shoreline of Palm Beach Island from the Port of Palm Beach south 2,575 meters (1.6 miles) where it reconnects with the ICWW adjacent to the Rybovich Boat Yard and Superyacht Marina. Due to its overall length, the ICWW survey area was divided into separate northern and southern areas to better detail the differences observed in water quality and the presence and/or absence of resources occurring along the ICWW. The survey area included the federal channel and a 30.5-meter (100-foot) buffer area positioned on either side of the channel extending 30.5 meters (100 feet) from the navigational channel design template equilibrium top of slope (**Figure 4**). The objective of the benthic assessment and resource survey was to delineate and map benthic habitats throughout the entire survey area including seagrass and hardbottom habitats, to identify and quantify resources occurring in these habitats, and to collect stony coral specific size data. Stony corals were identified and mapped on hardbottom habitats to determine their size and location relative to the ICWW channel and Palm Beach Channel, channel slope, and a minimum of 3.0 meters (10 feet) beyond the equilibrium top of slope. Additionally, Pinnacle's team of marine scientists conducted *in situ* identifications of marine flora and fauna observed during the benthic assessment survey with the intention of producing a comprehensive list of species observed during the field study. The benthic assessment survey identified benthic habitats and associated marine resources in vicinity of the proposed project which could be impacted by dredging and dredging related activities; including dredge pipeline placement, anchor placement, vessel operations, and/or excessive turbidity. The benthic assessment and resource surveys were conducted from 13 June through 8 July 2016 with additional field surveys conducted from 1 through 13 September 2016 specifically to further document the presence of stony corals in delineated hardbottom habitat. The following report provides a summary of survey and sampling methods used during field activities. Additionally, the report presents the survey results and a discussion of qualitative and quantitative observations collected during the benthic assessment and resource survey. Representative photos have been provided in the **ATTACHMENT**. Navigational data including shapefiles of mapped resources and copies of video and still photographic data collected during in-water surveys have been provided on separate digital media devices.

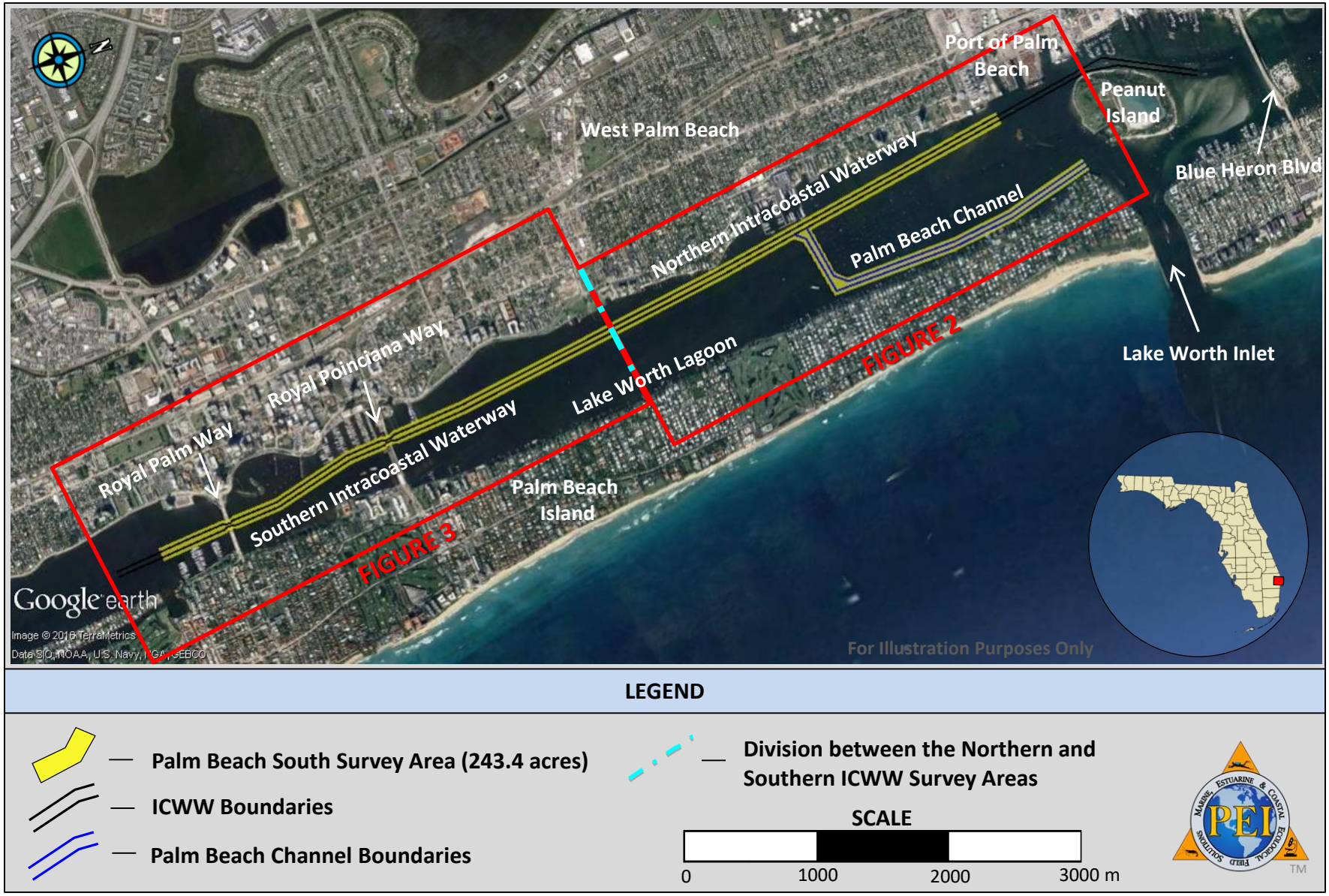

Figure 1 An index for figures showing the location of the survey area for the Palm Beach South benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

Figure 2 Location of the Palm Beach Channel and Northern ICWW survey areas for the Palm Beach South benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

Figure 3 Location of the Southern ICWW survey area for the Palm Beach South benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

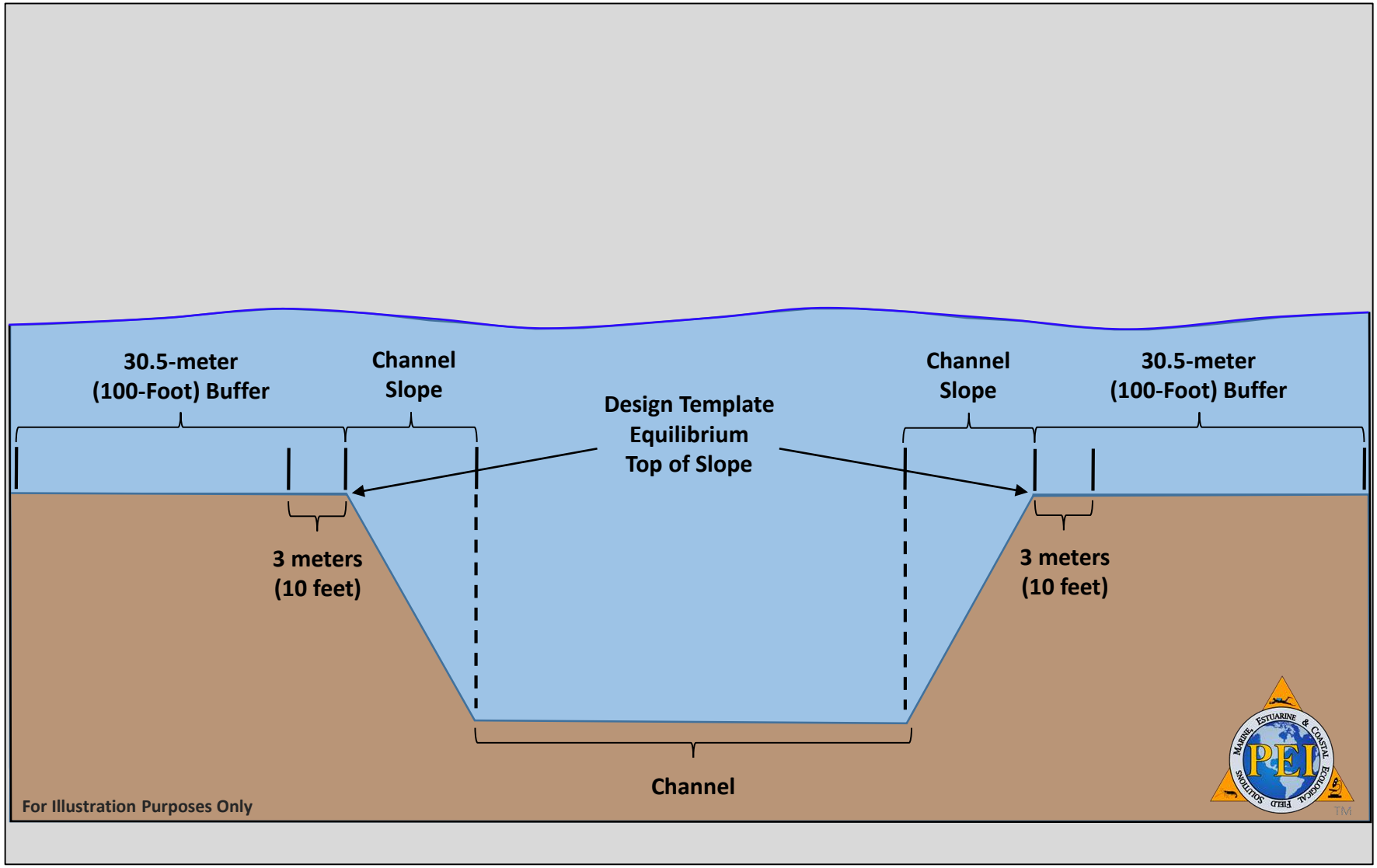

Figure 4. Representative diagram of the ICWW channel showing different channel features and areas adjacent to the channel covered during the benthic assessment survey.

2.0 BACKGROUND

Lake Worth Lagoon is an important estuarine resource in the coastal ecosystem of Palm Beach County and South Florida. Historically, Lake Worth Lagoon was a predominantly freshwater embayment with no permanent oceanic connections, except for seasonal and episodic events from periodic storm surge creating ephemeral inlets. In 1877, the first permanent and navigable inlet was created opening the Lagoon to the tidal influence of saline oceanic water. In 1910, the ICWW was extended from Lake Worth Lagoon to Biscayne Bay. Today, FIND and the United States Army Corp. of Engineers (USACE) are responsible for maintaining the Federal navigation channel (ICWW) between Jacksonville and Miami, Florida. After reviewing historical records, Paul DeMarco (USACE) (personal communication, 23 August 2016) reported that the ICWW in vicinity of FIND's potential channel deepening dredge project area located in Lake Worth Lagoon from the Port of Palm Beach south 7.7 kilometers (4.8 miles) past Royal Park Bridge near down town West Palm Beach, was dredged between 1961 and 1966. Additional maintenance dredging occurred near the north end of the project area within Cuts P-36 and P-37 in 1968 and 1988, respectively.

Seagrass communities play an important role in the marine ecosystems of Florida. The range of seagrass growth is limited by light availability, and typically occurs in water less than 10-15 meters (32.8-49.2 feet) in depth (Zieman, 1982). Seven species of seagrass have been identified in Lake Worth Lagoon, including shoal grass (*Halodule wrightii*), turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), paddle grass (*Halophila decipiens*), and Johnson's seagrass (*Halophila johnsonii*) (Yarbro and Carlson, 2011). Three of these species; shoal grass (*H. wrightii*), paddle grass (*H. decipiens*), and Johnson's seagrass (*H. johnsonii*) were found in a previous survey located in the vicinity of the proposed dredging area (Scheda and Pinnacle, 2012). Seagrasses are sensitive to environmental changes including decreases in light availability and dredging of sandy and muddy bottoms (Fourqurean et al., 2001). Seagrasses serve as essential habitat supporting diverse assemblages of recreational and commercially important fishes and invertebrates. They also provide habitat for the Florida manatee (*Trichechus manatus*), which is federally listed as an endangered species under the Endangered Species Act (ESA) and has been reported to occur in vicinity of the project area.

The Magnuson-Stephens Fishery Conservation and Management Act (MSFCMA) defines Essential Fish Habitat (EFH) as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." This includes substrate such as sediments supporting seagrass habitat, rock rubble and hardbottom with associated biological communities (National Marine Fisheries Service (NMFS), 1999). Conservation of EFH is essential to support local fish populations that utilize these areas throughout their life history. Hardbottom communities are made up of epibenthic fauna on exposed areas of rock or consolidated sediments. Areas of hardbottom can be found throughout coastal Florida. Communities are generally characterized by a combination of algae, sponges, octocorals, and stony corals. Hardbottom is used by a variety of fishes, sea turtles, and other species of special concern. Risks to hardbottom habitat include sediment accretion and damage from vessel groundings and anchors. Other environmental impacts to habitats and marine resources occurring in Lake Worth Lagoon include storm water drainage, pollution, dredging, shoreline alteration, and shoreline development.

3.0 TECHNICAL APPROACH

3.1 Survey Area

The survey area included a primary area located along the ICWW starting south of Peanut Island and extending 7.7 kilometers (4.8 miles) south past Royal Park Bridge near downtown West Palm Beach, Florida (**Figures 1**, **2** and **3**). The secondary survey area included the Palm Beach Channel which parallels the west shoreline of Palm Beach Island from the Port of Palm Beach south 2,575 meters (1.6 miles) where it reconnects with the ICWW adjacent to the Rybovich Boat Yard and Superyacht Marina. Due to its overall length, the ICWW survey area was divided into separate northern and southern areas to better detail the differences observed in water quality and the presence and/or absence of resources occurring along the ICWW. The survey area covered the navigation channel and channel slope with 30.5-meter (100-foot) buffer areas positioned on either side of the channel (**Figure 4**). A total of 985,158 meters^2 (243.4 acres) of benthic habitat was surveyed during the study. Pinnacle delineated and mapped seagrass and hardbottom habitats and quantified marine resources associated with each habitat. Stony corals were identified and mapped on hardbottom habitats to determine their location relative to the ICWW channel or Palm Beach Channel, channel slope, and a minimum distance of 3.0 meters (10 feet) beyond the equilibrium top of slope. Occasionally habitats and associated resources delineated in the survey area also extended across the survey area boundary. These habitats were mapped and characterized to provide as complete assessment of the habitat and associated resources as possible. When possible, field surveys were scheduled during high tide events to take advantage of clearer water and improved visibility. Periodically, conditions of low underwater visibility occurred in portions of the survey area. Precautions were exercised to avoid disturbing the silty/sand sediment in certain areas to prevent suspension of fine sediments causing increased turbidity and further reducing underwater visibility. Areas where conditions of low underwater visibility precluded safe diving operations or impaired the diver's ability to identify seagrass and hardbottom resources were revisited during periods of high tide with better visibility to complete the assessment survey in those areas.

3.2 Survey Methods

Pinnacle followed guidelines set forth by the NMFS (Karazsia, 2010 and NMFS, 2002), USACE, the Florida Department of Environmental Protection (FDEP) (Kosmynin et al., 2016), and the Florida Fish and Wildlife Conservation Commission (FWC) (FWC, 2011) for benthic assessments and seagrass surveys. The survey was conducted during seagrass growing season (i.e., June 1st through September 30th, Karazsia, 2010 and April 1st through August 31st, FWC, 2011). The benthic assessment was conducted by a survey team consisting of scientific divers with experience conducting resource assessments of habitats similar to those found in Lake Worth Lagoon. The survey was approached in two phases in accordance with recommendations by the NMFS (2002) recovery plan for Johnson's Seagrass. During Phase I, Pinnacle's scientific dive team conducted a thorough visual assessment of the survey area providing comprehensive coverage of the proposed project area to accurately delineate existing seagrass and hardbottom habitat boundaries. Phase II involved detailed qualitative and quantitative sampling of marine resources occurring in areas previously identified as seagrass and hardbottom habitat.

3.2.1 Phase I

Habitat and Resource Mapping

The first phase started with an initial reconnaissance of the survey area to identify and delineate existing marine resources including seagrass and hardbottom habitat. The survey area included the proposed dredging area and a 30.5-meter (100-foot) buffer area adjacent to each side of the channel. Pinnacle plotted a series of track-lines to ensure that the benthic assessment survey would provide comprehensive coverage of the survey area. Track-lines were aligned parallel to the ICWW or Palm Beach Channel and designed with 14 to 30.5-meter (46 to 100-foot) line spacing. **Figure 5** is an index for **Figures 6** and **7** which provide an overview of the track-lines used to conduct the delineation and mapping survey. Line-spacing between track-lines allowed for full visual coverage of benthic resources in most areas with adequate underwater visibility. Additional track-lines were added in areas where seagrass and hardbottom habitat was observed more frequently and in areas with low underwater visibility. Seven track-lines with 14 to 18-meters (46 to 59-foot) line spacing were utilized to survey the northwest portion of the survey area to more accurately delineate and map marine resources. This approach provided adequate coverage to identify and delineate marine resources in the proposed dredging area and surrounding 30.5-meter (100-foot) buffer area. The total area surveyed was over 985,158 meters^2 (243.4 acres).

The resource delineation and mapping surveys were conducted by employing a modified line-intercept method. The survey was implemented by towing a scientific diver experienced at identifying seagrasses, particularly *Halophila* spp., under similar conditions, along each survey track-line. Divers were towed at speeds of 0.26 to 0.52 meters/second (0.5 to 1.0 knot) to provide maximum opportunity for divers to accurately identify and report the occurrence of marine resources. While traversing the survey area scientific divers wore full-faced masks equipped with wireless underwater telecommunications, which allowed the diver to report real-time observations and the occurrence of marine resources to surface support personnel. The scientific diver towed a surface buoy equipped with a Differential Global Positioning System (DGPS) navigation receiver antenna. The diver towed DGPS antenna provided an accurate and continual position of the diver throughout the survey. Divers reported observations to a team of surface support scientists who would record the location of observations to delineate habitat boundaries or mark areas for further investigation. Detailed navigational positions were recorded to document habitat boundaries observed along each survey track-line. Navigational positions were collected in Datum WGS-1984 with units of measure in US feet. Delineated habitats occurring adjacent to one another, but on separate track-lines were extrapolated and mapped as a contiguous habitat as long as the same species and environmental conditions were present at each location. Additional survey track-lines were added in some areas to provide more detail regarding the boundaries of specific habitats.

Additional information recorded from diver observations included descriptions of substrate, water depth, water temperature, underwater visibility and general water quality, and the general health of marine resources. Scientific divers reported all occurrences of seagrass and hardbottom habitats. In areas delineated as seagrass habitat, divers reported the species present, depth, relative abundance, and general health, when possible. When hardbottom habitat was encountered during the delineation survey the towed scientific diver further classified the habitat as hardbottom outcrop, emergent rock, scattered rock with sand, or isolated rock. Biota observed colonizing hardbottom habitat was identified to the lowest practical level. Representative habitats occurring in distinctly different substrate and/or water quality conditions were surveyed in more detail during Phase II of the field effort.

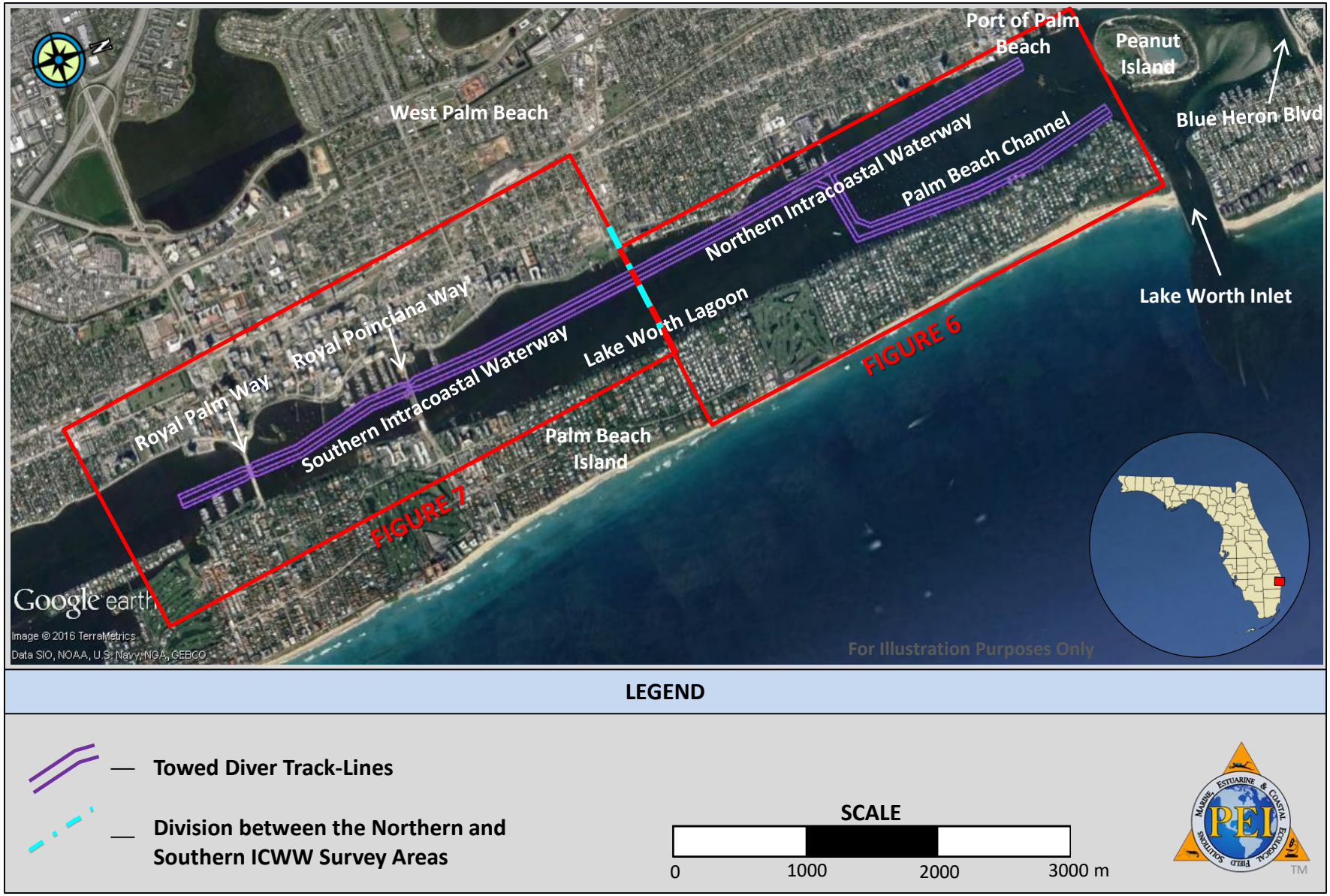

Figure 5 An index for figures showing the towed diver track-lines for the Palm Beach South benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

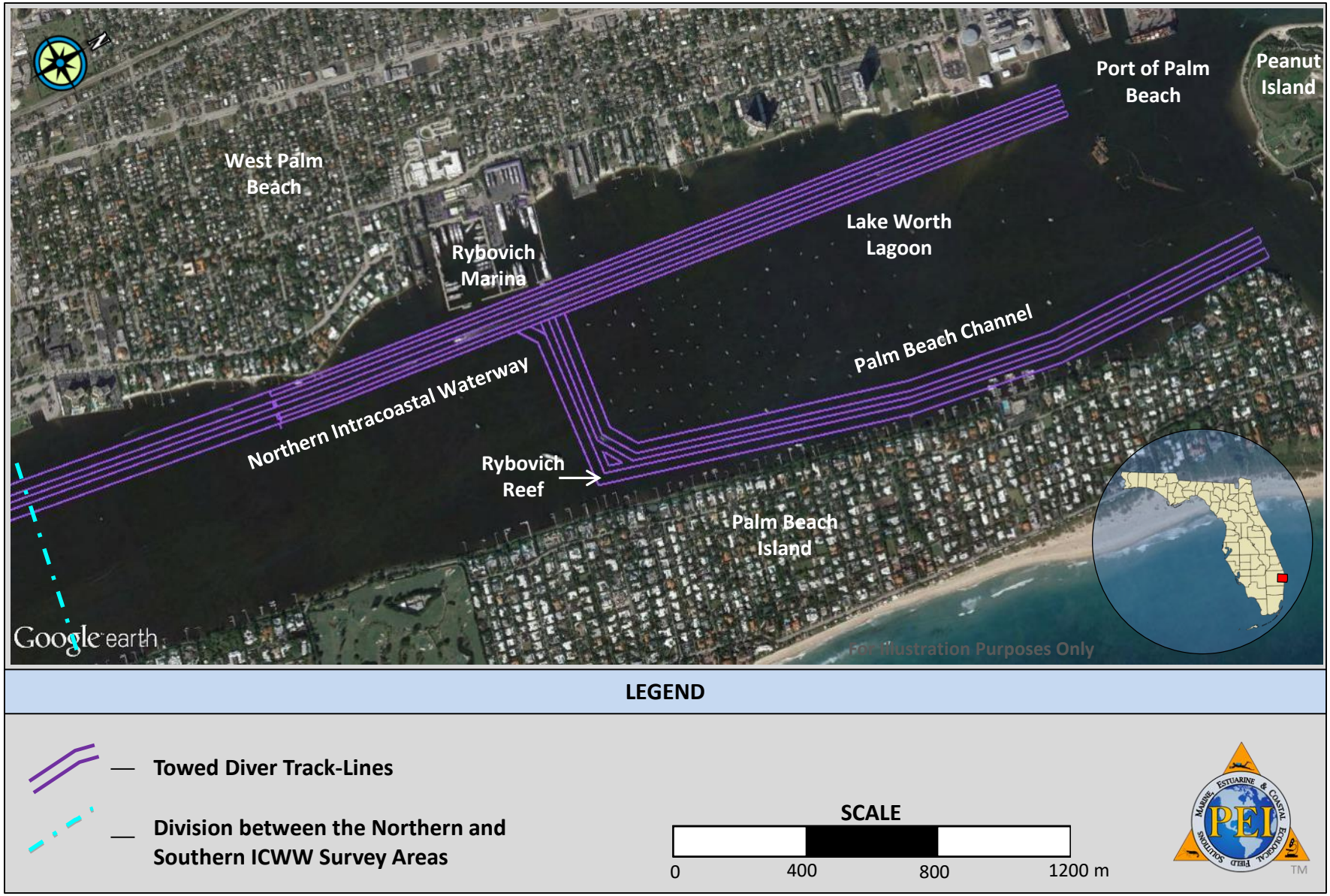

Figure 6 Towed diver track-lines for the Palm Beach Channel and Northern ICWW survey areas of the Palm Beach South benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

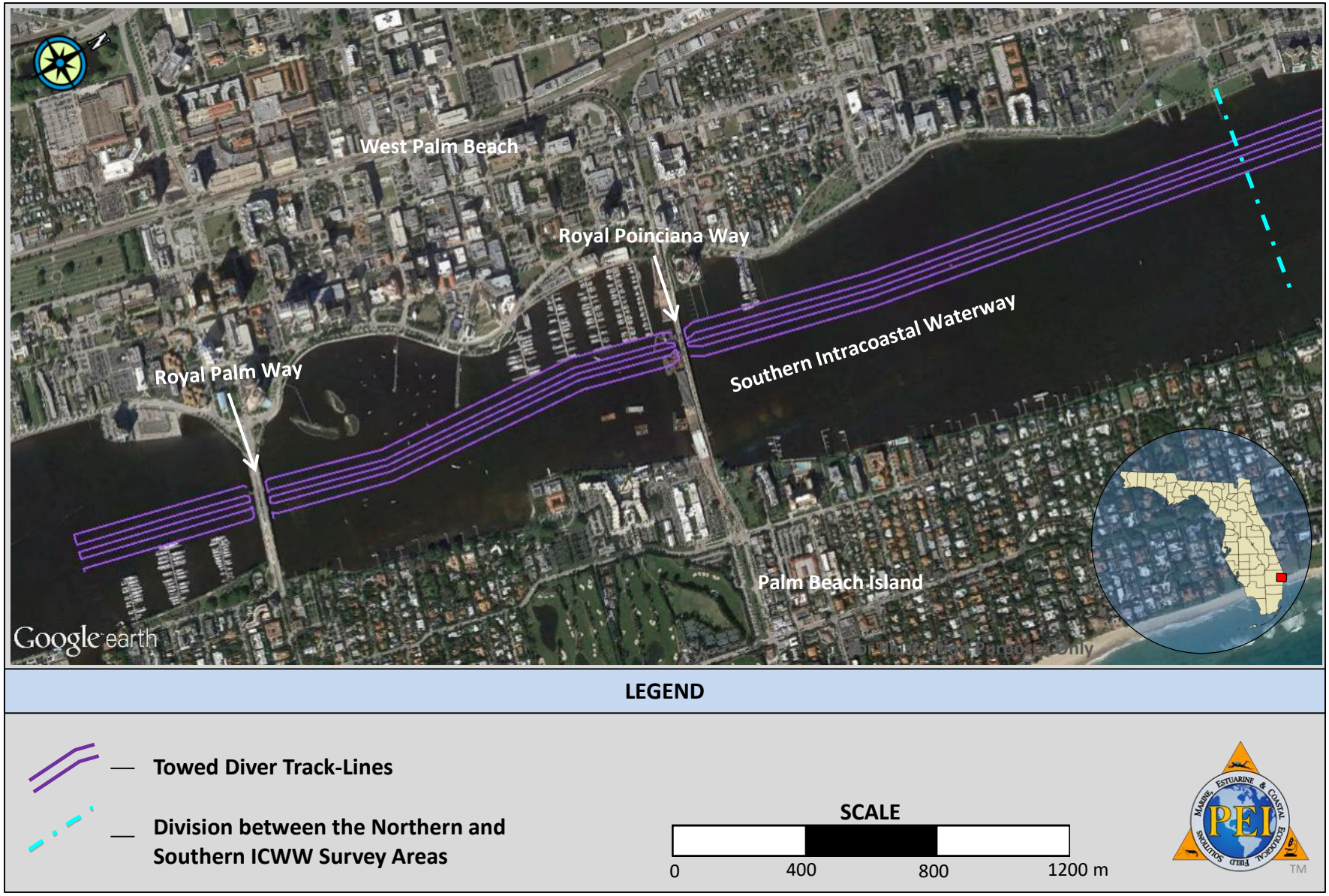

Figure 7 Towed diver track-lines for the Southern ICWW survey area of the Palm Beach South benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

3.2.2 Phase II

Quantitative Data Collection

The second phase was used to determine the percent cover, density (shoots/meter^2), and frequency of occurrence for seagrass and other marine resources using quantitative sampling methods. Quantitative data was collected along modified belt-transects deployed at sampling stations distributed across seagrass and hardbottom habitats previously delineated during Phase I. Specific sample quadrats were used during quantitative data collection in seagrass and hardbottom habitats. Quadrat sampling station locations were determined using a stratified random sampling design. Previously mapped seagrass and hardbottom habitats were stratified into seven (7) equally sized areas with a randomly selected sample station location positioned within each stratified area. A power of analysis was performed to determine the number of transects and quadrats sampled at each station necessary to sufficiently establish percent cover, density, and frequency of occurrence for marine resources occurring in seagrass and hardbottom habitats throughout the survey area.

Seagrass

At seagrass habitat locations modified belt-transects were conducted *in situ* by a scientific diver equipped with a 1.0-meter^2 (10.8-feet^2) quadrat. **Figure 8** provides an overview of a representative seagrass sample station. Two modified belt-transects, each consisting of a reel tape extending to 10 meters (32.8 feet), were deployed at each sample station location. Scientific dive teams deployed sample quadrats along each transect collecting percent cover, density, and frequency of occurrence data. A total of fourteen (14) transects were sampled with a total cover of 1.0 % of specific seagrass habitats observed during Phase I. Frequency of occurrence data was collected by recording the total number of 10 x 10-centimeter (3.9 x 3.9-inch) sub-cells containing seagrass within each 1.0-meter^2 (10.8-feet^2) quadrat. Scientific divers also collected species composition, shoot density (shoots/meter^2) and blade length while noting the presence of flowering and general health of seagrasses. Shoot density (shoots/meter^2) was collected from multiple randomly selected 10 x 10-centimeter (3.9 x 3.9-inch) sub-cells within each 1.0-meter^2 (10.8-feet^2) quadrat. Percent cover data for marine resources including seagrasses, macroalgae, corals, and sponges was recorded using the Braun-Blanquet scale of abundance (Braun-Blanquet, 1932; Fourqurean et al., 2001; Kenworthy and Schwarzchild, 1998). The percent cover values were based on the Braun-Blanquet (1932) scale of abundance: 0.0 = not present; 0.1 = solitary specimen; 0.5 = few with small cover; 1.0 = numerous but less than 5% cover; 2.0 = 5-25% cover; 3.0 = 25-50% cover; 4.0 = 50-75% cover; and 5.0 = 75-100% cover. In order to determine the percent cover per individual species, as well as total seagrass cover, the Braun-Blanquet scores by species and total cover were averaged for all the quadrats assessed. The scores were calculated based on an interpolation of the mid-point from the percentage ranges defined above. The scores were used to estimate biotic cover and general conditions of the seagrass habitat in the survey area.

Hardbottom

Dive teams collected quantitative still photographs along a 20 to 24-meter (65.6 to 78.7-feet) modified belt-transect. The camera was mounted on a framer at a fixed height of 40 centimeters (15.7 inches) above a 0.25-meter^2 (2.7-feet^2) quadrat. Data were collected along seven (7) 20 to 24-meter (65.6 to 78.7-feet) transects positioned at seven (7) randomly selected hardbottom sample stations. Non-overlapping photos were collected along the entire length of each transect.

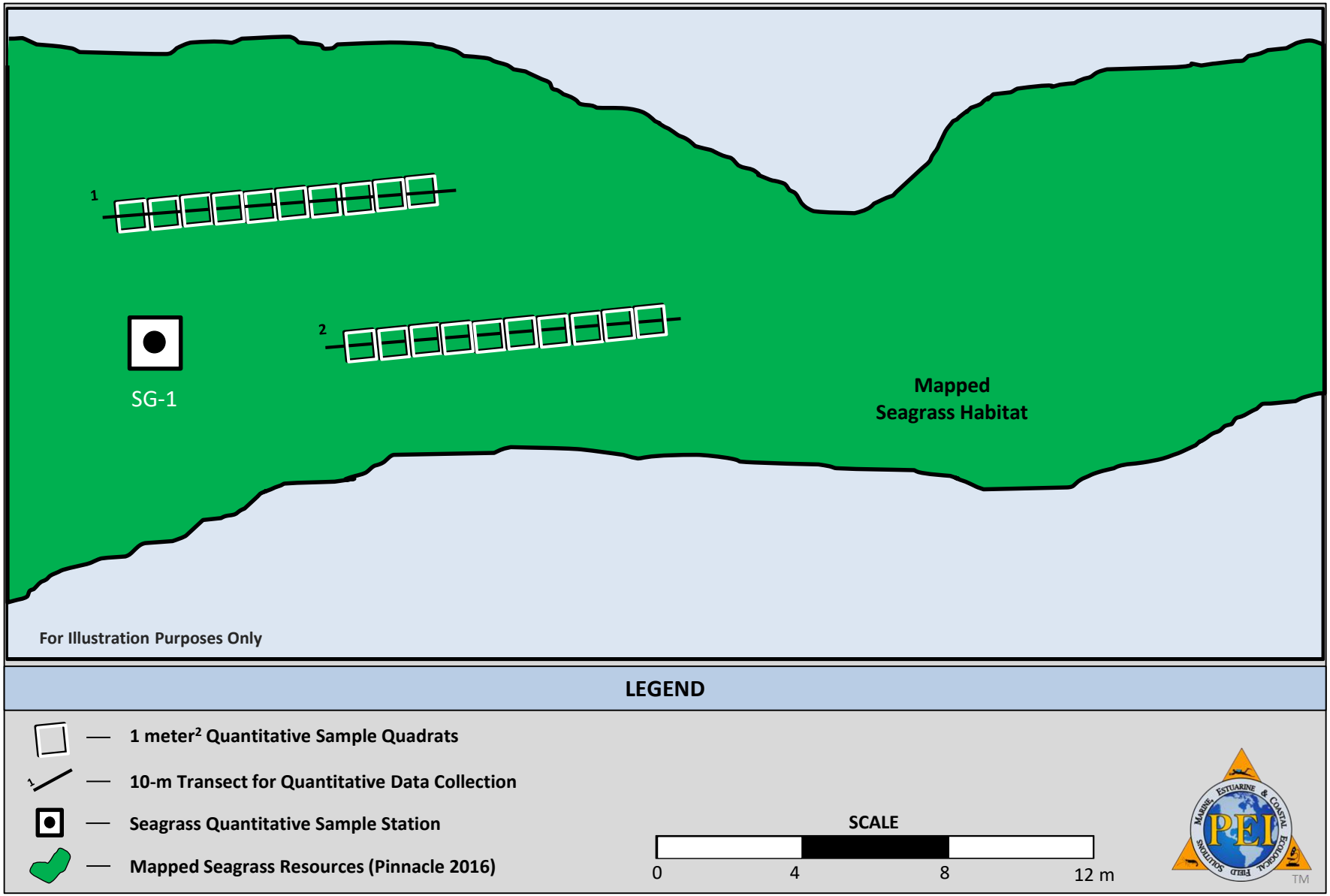

Figure 8. Representative seagrass sample station located in mapped seagrass habitat. Sample quadrats were deployed along each transect collecting percent cover, density and frequency of occurrence data.

Still photographic data were analyzed to determine percent cover of benthic resources in hardbottom habitat. Percent cover was estimated using random point count software and included stony corals, soft corals, macroalgae, sponges, seagrass, and other biota. Quantitative still photographic data were analyzed using Coral Point Count with Excel (CPCe) software version 4.1 (Kohler and Gill, 2006). The CPCe software was originally based on the random point method described by Bohnsack (1979) for accurately estimating percent coverage of benthic organisms and associated substrate from digital underwater images. A minimum of 40 non-overlapping still images were analyzed for each hardbottom sample station. The video frames were analyzed using 50 randomly generated points superimposed over each image. The biota or substrate beneath each point was identified to the lowest practical level, and data from the photo quadrats were incorporated into transect specific spreadsheets. Percent cover calculations were then made for biota identified along each transect.

In fulfillment of the project scope of work data were collected to characterize hard corals colonizing hardbottom habitat delineated throughout the survey area. Hard coral data collected during the survey included identification, location, and size of stony corals observed within hardbottom habitats delineated in survey areas including, but not limited to, the ICWW or Palm Beach Channels, channel slope, and a minimum distance of 3.0 meters (10 feet) beyond the equilibrium top of slope. Stony corals were mapped using a modified wish-bone mapping method (Hudson and Goodwin, 2001).

3.2.3 Qualitative Data Collection

Scientists conducted *in situ* identifications of biota observed during the benthic assessment survey. Representative still photographs and/or video were collected to document environmental conditions, substrate, and dominant biota observed in seagrass and hardbottom habitats occurring in the survey area. Photographs and video data collected during the field survey were also used to support identification of biota observed during the survey including stony corals, octocorals, macroalgae, sponges, and fishes. Sightings and encounters of species of special concern including marine mammals and sea turtles were documented during field activities. Additional data collected included species identification, location of sighting or encounter, size of animal and estimate of whether juvenile or adult, observed activity at the time of sighting, and direction of travel if determined.

4.0 RESULTS AND DISCUSSION

4.1 Habitat and Resource Mapping

Phase I of the benthic assessment survey was conducted to provide a general description of the proposed project area, delineate and map the presence of seagrass and hardbottom habitats, and identify associated marine resources in Lake Worth Lagoon. Classified as a Class III (M) body of water by FDEP, Lake Worth Lagoon can be described as an urban marine landscape with frequent commercial and recreational vessel traffic, commercial marinas, and private docks visible along the shoreline. Survey areas included the ICWW and the Palm Beach Channel, the channel slope, and 30.5-meter (100-foot) buffer areas positioned on either side of each channel.

The predominant substrates observed during the survey included sand, sand and shell, and silty-sand. Sand, coarse sand, and shell substrates were observed most frequently on the north end of the survey area closer to the port and inlet, in narrow areas of Lake Worth Lagoon and near bridges. Strong water currents resulting from tidal flow were encountered in narrow areas of Lake Worth Lagoon and near bridges. Dive teams reported observations of sand waves on the sediment surface in these areas which can be indicative of strong current conditions. Silty sediments were more commonly observed in wider and deeper areas of Lake Worth Lagoon where water currents were slower, allowing more deposition of finer sediments. Scientific dive teams exercised considerable care during survey operations in an effort to avoid disturbing bottom sediments in areas with more silt deposition to reduce resuspension of fine sediments and to preserve visibility. Underwater visibility during the field survey fluctuated with tide cycles, but ranged from 0.6 to 12.2 meters (2.0 to 40.0 feet). Visibility was better on the north end of the survey area near the inlet and during flood-tide conditions.

4.1.1 ICWW

The survey along the ICWW started south of Peanut Island and extended 7.7 kilometers (4.8 miles) south past Royal Park Bridge near downtown West Palm Beach, Florida. Due to its overall length, the ICWW survey area was divided into separate northern and southern areas to better detail the differences observed in water quality and the presence and/or absence of resources occurring along the ICWW. The Northern ICWW was 339,755 meters^2 (83.9 acres) of which 39% (131,253 meters^2 (32.4 acres)) occurred within the channel and channel slope and 61% (208,502 meters^2 (51.5 acres)) occurred within the 30.5-meter (100-foot) buffer area. The total area surveyed along the Southern ICWW was 384,708 meters^2 (95.1 acres) of which 39% (148,808 meters^2 (36.8 acres)) occurred within the channel and channel slope and 61% (235,900 meters^2 (58.3 acres)) occurred within the 30.5-meter (100-foot) buffer area. Water depths encountered during the assessment and mapping survey in the ICWW ranged from 0.8 to 6.7 meters (2.7 to 22.0 feet) with an average depth of 2.7 meters (8.9 feet).

Seagrass

Seagrass habitat was delineated in the Northern ICWW survey area. **Table 1** provides a list of delineated habitat classifications and the total area for each habitat. **Figure 9** is an index for **Figures 10** through **14** which provide maps of the habitats and marine resources delineated in the survey area along the ICWW. Although seagrasses were occasionally observed outside the survey area boundaries in the Southern ICWW, no seagrass was identified within the Southern ICWW survey area. The absence of seagrass from the Southern ICWW survey area may be due to low water quality, limited light availability and/or

Table 1. Delineated habitat classifications and habitat area documented along the ICWW and Palm Beach Channel in Lake Worth Lagoon, Palm Beach County, Florida. Note: No seagrass was observed within the boundaries of the Southern ICWW survey area.

Northern ICWW Habitat Classifications		Area Within Channel ŧ		Area Within 100-ft Buffer		Total Delineated Area	
		meter²	acres	meter²	acres	meter²	acres
Seagrass	*H. decipiens*	30,915.1	7.6	49,330.8	12.2	80,245.9	19.8
	H. johnsonii	-	-	2,128.0	0.5	2,128.0	0.5
	H. decipiens and *H. johnsonii*	1,546.5	0.4	9,704.9	2.4	11,251.4	2.8
	H. decipiens and *H. wrightii*	-	-	1,366.0	0.3	1,366.0	0.3
	H. decipiens, *H. johnsonii*, and *H. wrightii*	-	-	2,998.0	0.7	2,998.0	0.7
	Totals	32,461.6	8.0	65,527.7	16.2	97,989.3	24.2
Hardbottom	Emergent Rock Rubble w/Sand	2,595.8	0.6	3,434.2	0.9	6,030.0	1.5
	Hardbottom Outcrop w/ Scattered Rock	328.0	0.1	659.0	0.2	2,131.0*	0.5
	Hardbottom Ledge Habitat	395.0	0.1	292.0	0.1	687.0	0.2
	Totals	3,318.8	0.8	4,385.2	1.1	8,848.0	2.2
Southern ICWW Habitat Classifications		Area Within Channel ŧ		Area Within 100-ft Buffer		Total Delineated Area	
		meter²	acres	meter²	acres	meter²	acres
Hardbottom	Emergent Rock Rubble w/Sand	4,890.0	1.2	1,645.0	0.4	6,535.0	1.6
	Hardbottom Outcrop w/ Scattered Rock	57.7	0.01	-	-	57.7	0.01
	Totals	4,890.0	1.2	1,702.7	0.4	6,592.7	1.6
Palm Beach Channel Habitat Classifications		Area Within Channel ŧ		Area Within 100-ft Buffer		Total Delineated Area	
		meter²	acres	meter²	acres	meter²	acres
Seagrass	*H. decipiens*	12,048.7	3.0	33,475.9	8.3	45,524.6	11.2
	Totals	12,048.7	3.0	33,475.9	8.3	45,524.6	11.2
Hardbottom	Emergent Rock Rubble w/Sand	10,729.0	2.7	4,788.5	1.2	15,517.5	3.8
	Hardbottom Outcrop w/ Scattered Rock	44.0	0.01	1,428.0	0.4	1,688.0	0.42
	Hardbottom Ledge Habitat	-	-	368.0	0.09	368.0**	0.09
	Totals	10,773.0	2.7	6,584.5	1.6	17,573.5	4.3

* = Total delineated area includes 1,144 meters² (0.3 acres) delineated outside the survey area boundaries.
** = Total delineated area includes 216 meters² (0.1 acres) delineated outside the survey area boundaries.
ŧ = Channel refers to channel with slope.

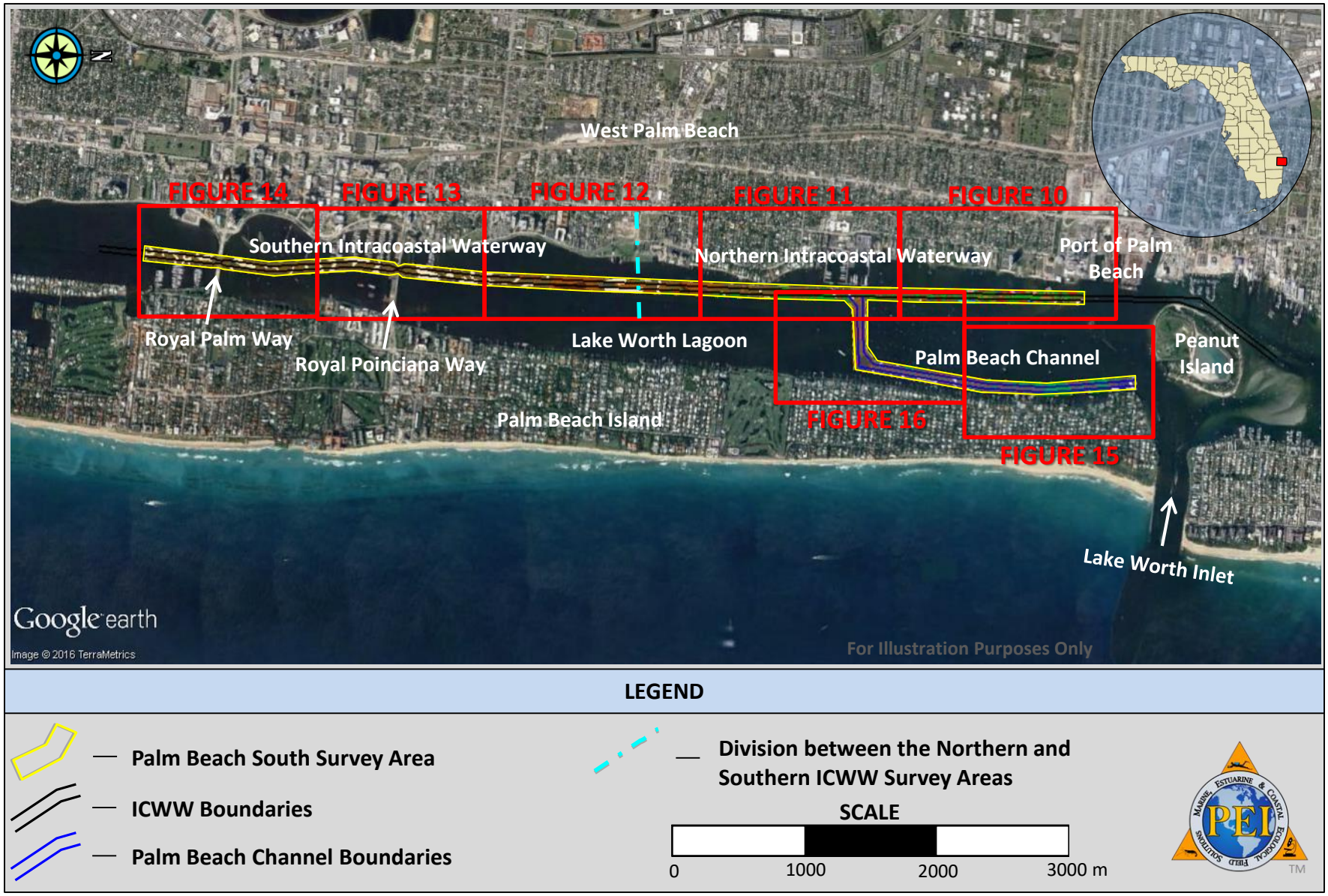

Figure 9 An index for figures showing the habitat and substrate types mapped during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

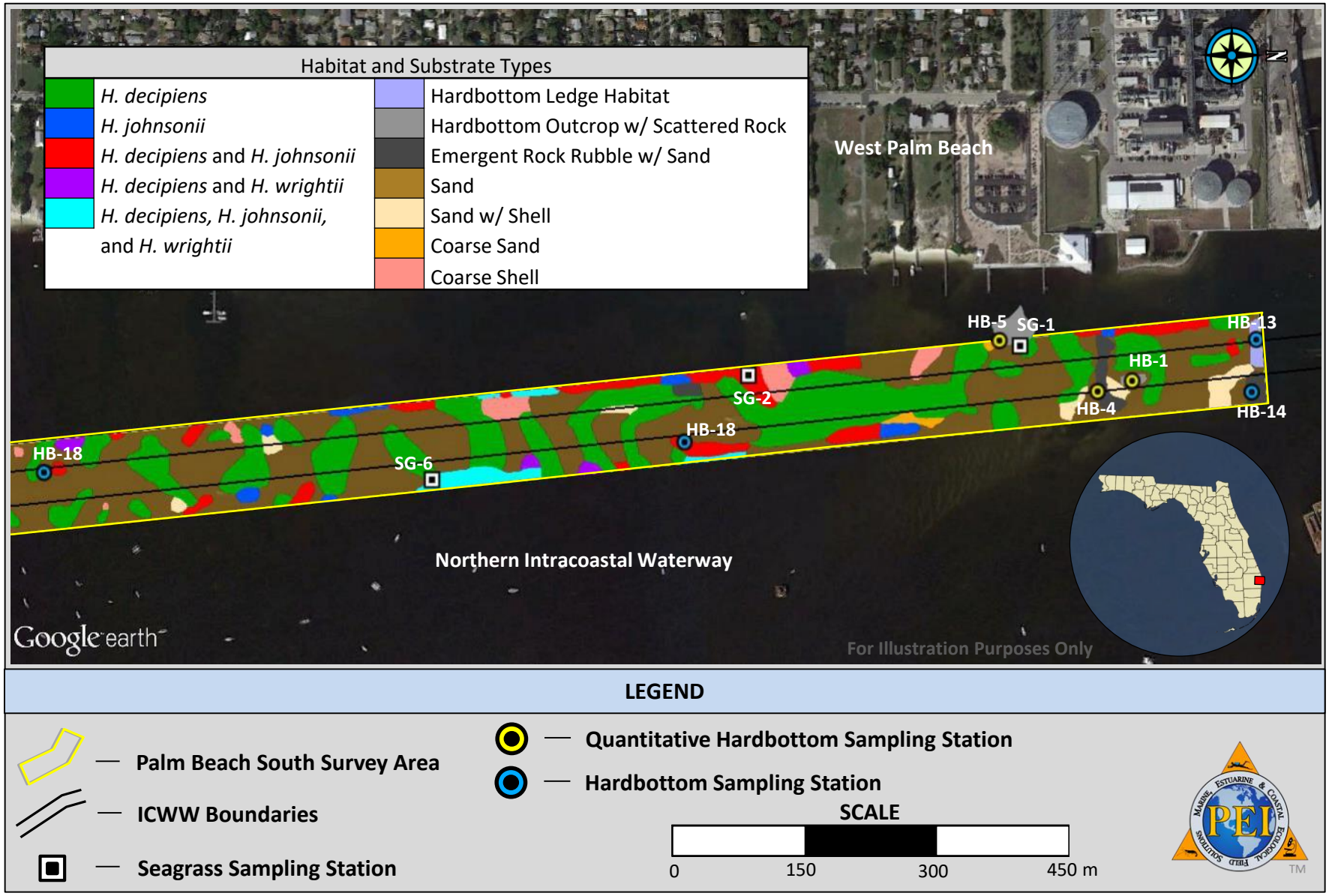

Figure 10 Seagrasses, hardbottom habitat, and substrate types mapped in the Northern ICWW survey area during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

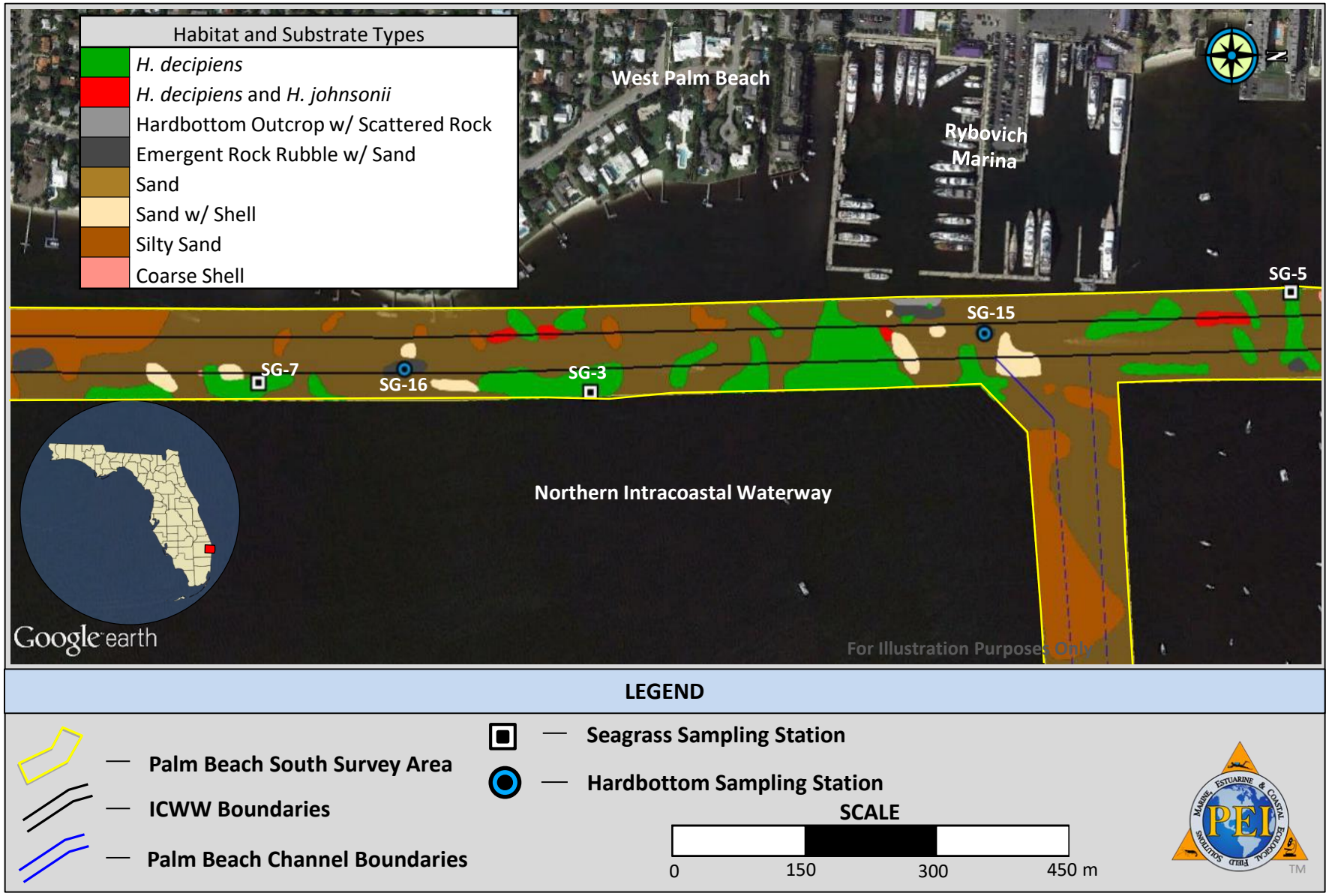

Figure 11 Seagrasses, hardbottom habitat, and substrate types mapped in the Northern ICWW survey area during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

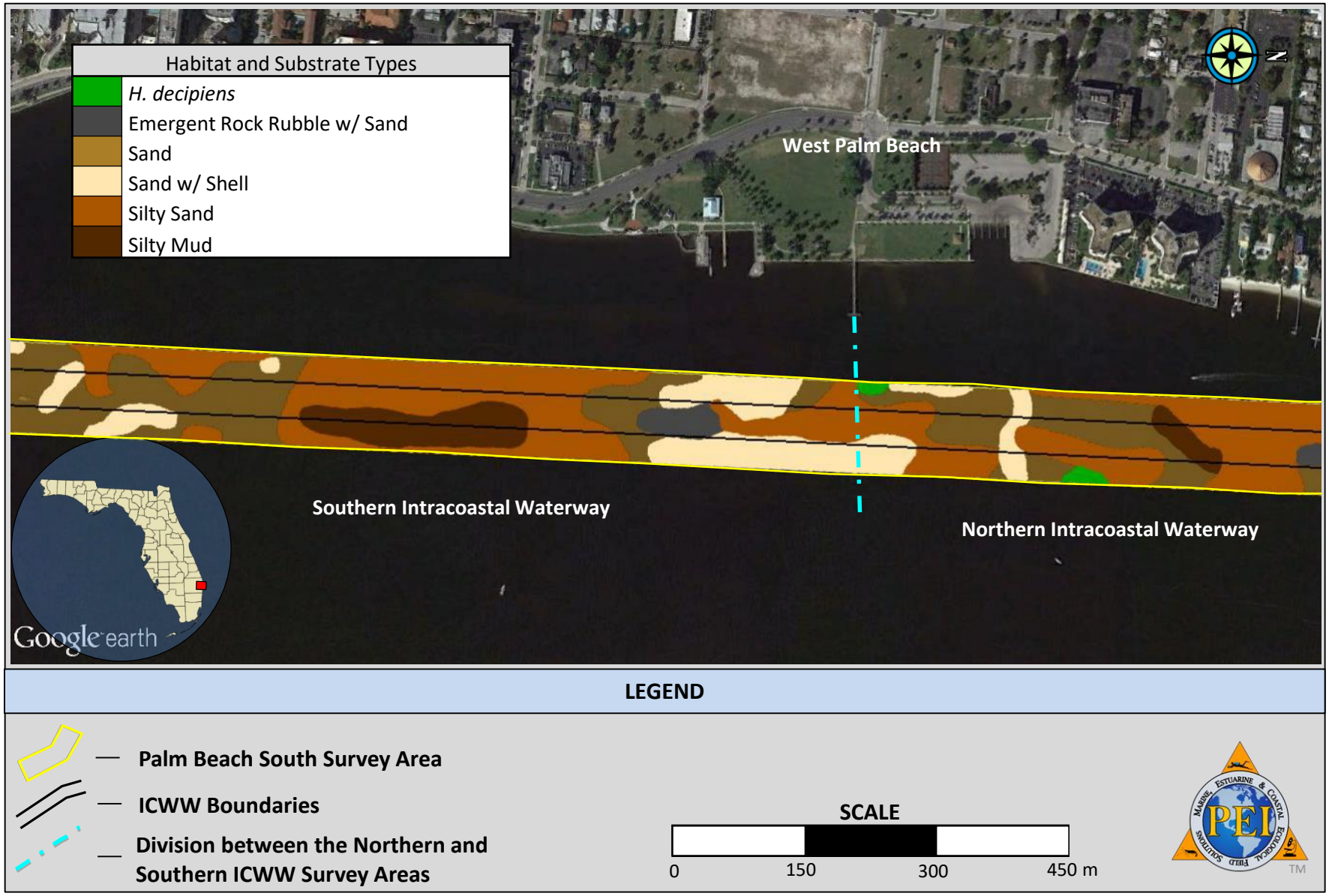

Figure 12 Seagrasses, hardbottom habitat, and substrate types mapped in the Northern and Southern ICWW survey areas during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

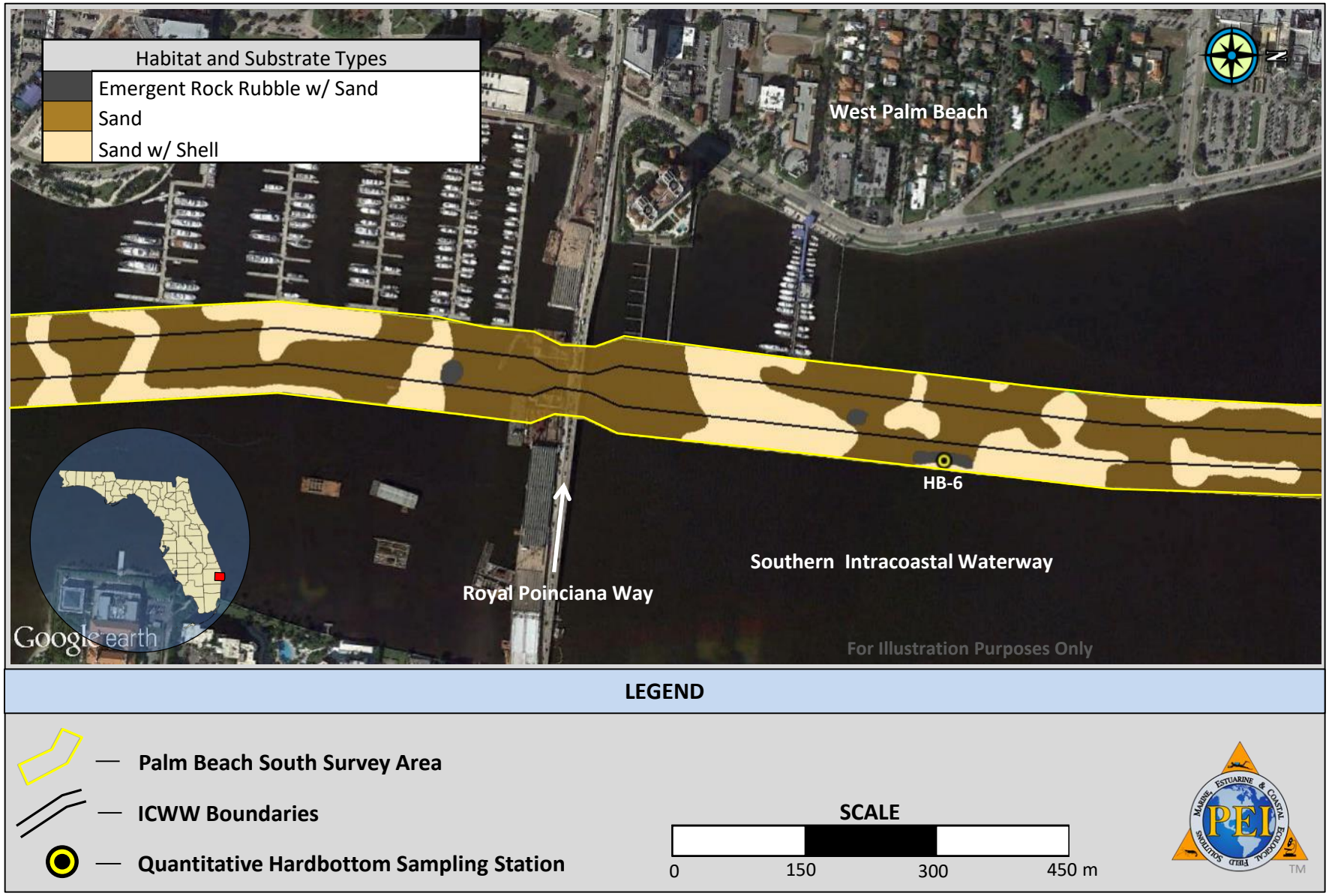

Figure 13 Hardbottom habitat and substrate types mapped in the Southern ICWW survey area during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

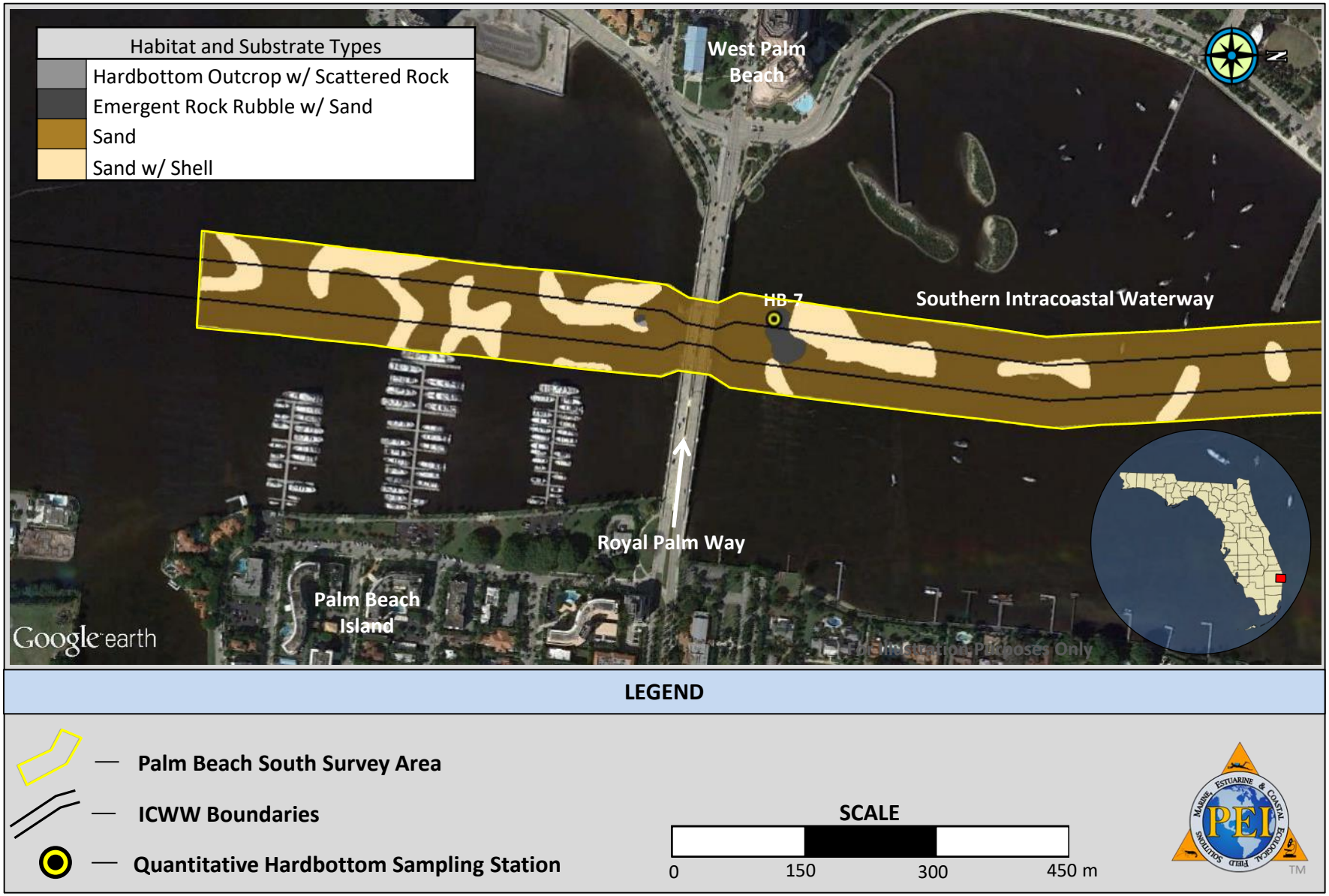

Figure 14 Hardbottom habitat and substrate types mapped in the Southern ICWW survey area during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

freshwater runoff. Seagrass (97,989.3 meters^2 (24.2 acres)) was the most common habitat delineated along the Northern ICWW with 67% (65,527.7 meters^2 (16.2 acres)) occurring in the 30.5-meter (100-foot) buffer area and 33% (32,461.6 meters^2 (8.0 acres)) occurring within the channel boundaries. More seagrass resources were observed in the Northern ICWW channel than in the Palm Beach Channel. This may be due in part to the deeper water depths that occur in Palm Beach Channel. Also, the section of ICWW surveyed during the benthic assessment has had a relatively low frequency of disturbance. This area of the ICWW was dredged between 1961 and 1966 with additional maintenance dredging occurring near the north end of the project area within Cuts P-36 and P-37 in 1968 and 1988, respectively (Paul DeMarco (USACE), personal communication, 23 August 2016). Seagrass density was low to moderate, depending on location, and occurred in both continuous and discontinuous patches. Three species of seagrass were identified along the Northern ICWW including paddle grass (*H. decipiens*), shoal grass (*H. wrightii*), and Johnson's seagrass (*H. johnsonii*). Seagrasses occurred in both single and mixed species beds/patches. Paddle grass (*H. decipiens*) was the dominant species occurring most frequently and with the largest total delineated area of 80,245.9 meters^2 (19.8 acres) of which 61.5% (49,330.8 meters^2 (12.2 acres)) was delineated in the 30.5-meter (100-foot) buffer area and 38.5% (30,915.1 meters^2 (7.6 acres)) was delineated within the channel. Paddle grass (*H. decipiens*) with Johnson's seagrass (*H. johnsonii*) was the next most common habitat classification with 11,251.4 meters^2 (2.8 acres) of which 86% (9,704.9 meters^2 (2.4 acres)) occurs within the 30.5-meter (100-foot) buffer area and 14% (1,546.5 meters^2 (0.4 acres)) occurs within the channel. Shoal grass (*H. wrightii*) was only observed in mixed seagrass habitats and comprised the lowest delineated areas when combined with paddle grass (*H. decipiens*) (1,366.0 meters^2 (0.3 acres)) and in combination with paddle grass (*H. decipiens*) and Johnson's seagrass (*H. johnsonii*) (2,998.0 meters^2 (0.7 acres)). Shoal grass (*H. wrightii*) was not observed within the channel.

Hardbottom

Scientists identified three (3) classifications for hardbottom habitat along the Northern ICWW and two (2) hardbottom classifications in the Southern ICWW. **Table 1** provides a list of delineated habitat classifications and the total area for each habitat. **Figure 9** is an index for **Figures 10** through **14** which provide maps of the habitats and marine resources delineated in the survey area along the ICWW. More hardbottom was delineated in the Northern ICWW (8,848.0 meters^2 (2.2 acres)) than the Southern ICWW (6,592.7 meters^2 (1.6 acres). Emergent Rock Rubble with Sand was the most common classification of hardbottom in the Northern ICWW with a total delineated area of 6,030.0 meters^2 (1.5 acres) with 57% (3,434.2 meters^2 (0.9 acres)) occurring in the 30.5-meter (100-foot) buffer area and 43% (2,595.8 meters^2 (0.6 acres)) occurring within the channel. Hardbottom Outcrop with Scattered Rock was the second most abundant hardbottom habitat classification with a total delineated area of 2,131.0 meters^2 (0.5 acres) of which 31% (659.0 meters^2 (0.2 acres)) occurred in the 30.5-meter (100-foot) buffer area and 15% (328.0 meters^2 (0.1 acres)) was delineated within the channel. The remaining 54% (1,144.0 meters^2 (0.3 acres)) was part of a hardbottom habitat that started within the 30.5-meter (100-foot) buffer area and continued beyond the ICWW survey area boundaries (**Figure 10**). Hardbottom outcrops were comprised of semi-contiguous coquinoid limestone rock with scattered rocks, sand, and shell materials. The least abundant hardbottom classification in the Northern ICWW survey area was Hardbottom Ledge Habitat with a total delineated area of 687.0 meters^2 (0.2 acres) with 43% (292.2 meters^2 (0.1 acres)) occurring in the 30.5-meter (100-foot) buffer area and 57% (395.0 meters^2 (0.1 acres)) occurring within the channel. Hardbottom Ledge Habitat was only observed at the north end of the ICWW, just south of the Port of Palm Beach. Emergent Rock Rubble with Sand was the most common classification of hardbottom in the Southern ICWW with a total delineated area of 6,535.0 meters^2 (1.6 acres) with 25% (1,645.0 meters^2 (0.4 acres)) occurring in the 30.5-meter (100-foot) buffer area and 75% (4,890.0 meters^2 (1.2 acres)) occurring within the channel. The only other hardbottom classification identified in the Southern ICWW was

Hardbottom Outcrop with scattered rock, 100% (57.7 meters^2 (0.01 acres)) of which occurred within the Southern ICWW Channel. Representative photos have been provided in the **ATTACHMENT**.

4.1.2 Palm Beach Channel

The secondary survey area included the Palm Beach Channel which parallels the west shoreline of Palm Beach Island from the Port of Palm Beach south 2,575 meters (1.6 miles) where it reconnects with the ICWW adjacent to the Rybovich Boat Yard and Superyacht Marina (**Figure 2**). The total area surveyed along Palm Beach Channel including the channel and channel slope with 30.5-meter (100-foot) buffer areas positioned on either side of the channel was 260,695 meters^2 (64.4 acres), of which 60% (156,646 meters^2 (38.7 acres)) occurred within the 30.5-meter (100-foot) buffer area and 40% (104,049 meters^2 (25.7 acres)) occurred within the channel and channel slope. The exact date of the most recent maintenance dredge in Palm Beach Channel is unknown, but the channel was deeper than the ICWW with water depths ranging from 2.7 to 8.8 meters (9.0 to 29.0 feet) and an average depth of 5.7 meters (18.6 feet). Substrate consisted of a combination of sand, silty-sand, coarse sand, sand with shell, and coarse shell. During the benthic assessment field survey, Pinnacle's field team observed less vessel traffic in Palm Beach Channel than in the adjacent ICWW Channel.

Seagrass

Both seagrasses and hardbottom habitats were delineated during the assessment survey along Palm Beach Channel. **Table 1** provides a list of delineated habitat classifications and the total area for each habitat. **Figure 9** is an index for **Figures 15** and **16** which provide maps of habitats delineated along the Palm Beach Channel. Seagrass density was low to moderate and occurred in both continuous and discontinuous patches. Paddle grass (*H. decipiens*) was the only seagrass species observed along the Palm Beach Channel with a total delineated area of 45,524.6 meters^2 (11.2 acres) of which 74% (33,475.9 meters^2 (8.3 acres)) occurred in the 30.5-meter (100-foot) buffer area and 26% (12,048.7 meters^2 (3.0 acres)) occurred within the channel. Delineated seagrass habitat along Palm Beach Channel was 53% less than the total seagrass resources documented along the ICWW. In addition to the larger survey area along the ICWW, other potential contributing factors for lower delineated seagrass habitats along the Palm Beach Channel may include deeper water depths, more recent dredge activities, or a combination of these factors.

Hardbottom

Three (3) classifications for hardbottom habitat were identified along Palm Beach Channel: Hardbottom outcrops with Scattered Rock, Emergent Rock Rubble with Sand, and Hardbottom Ledge Habitat. A portion of the Rybovich Artificial Reef was delineated in the 30.5-meter (100-foot) buffer area near the south end of Palm Beach Channel, but was not included with the hardbottom habitat classifications. **Table 1** provides a list of delineated habitat classifications and the total area for each habitat. **Figure 9** is an index for **Figures 15** and **16** which provide maps of habitats delineated along the Palm Beach Channel. Emergent Rock Rubble with Sand was the most common classification with a total delineated area of 15,517.5 meters^2 (3.8 acres) of which 31% (4,788.5 meters^2 (1.2 acres)) occurred in the 30.5-meter (100-foot) buffer area and 69% (10,729.0 meters^2 (2.7 acres)) occurred within the channel. Hardbottom Outcrop with Scattered Rock was the second most abundant habitat classification with a total delineated area of 1,688.0 meters^2 (0.4 acres) of which 85% (1,428 meters^2 (0.4 acres)) occurred in the 30.5-meter (100-foot) buffer area and 3% (44.0 meters^2 (0.01 acres)) occurred within the channel. The remaining 216 meters^2 (0.1 acres) was part of a hardbottom habitat at Sample Station HB-10 that started within the 30.5-meter (100-foot) buffer area and continued beyond the Palm Beach Channel survey area boundaries (**Figure 15**). Hardbottom

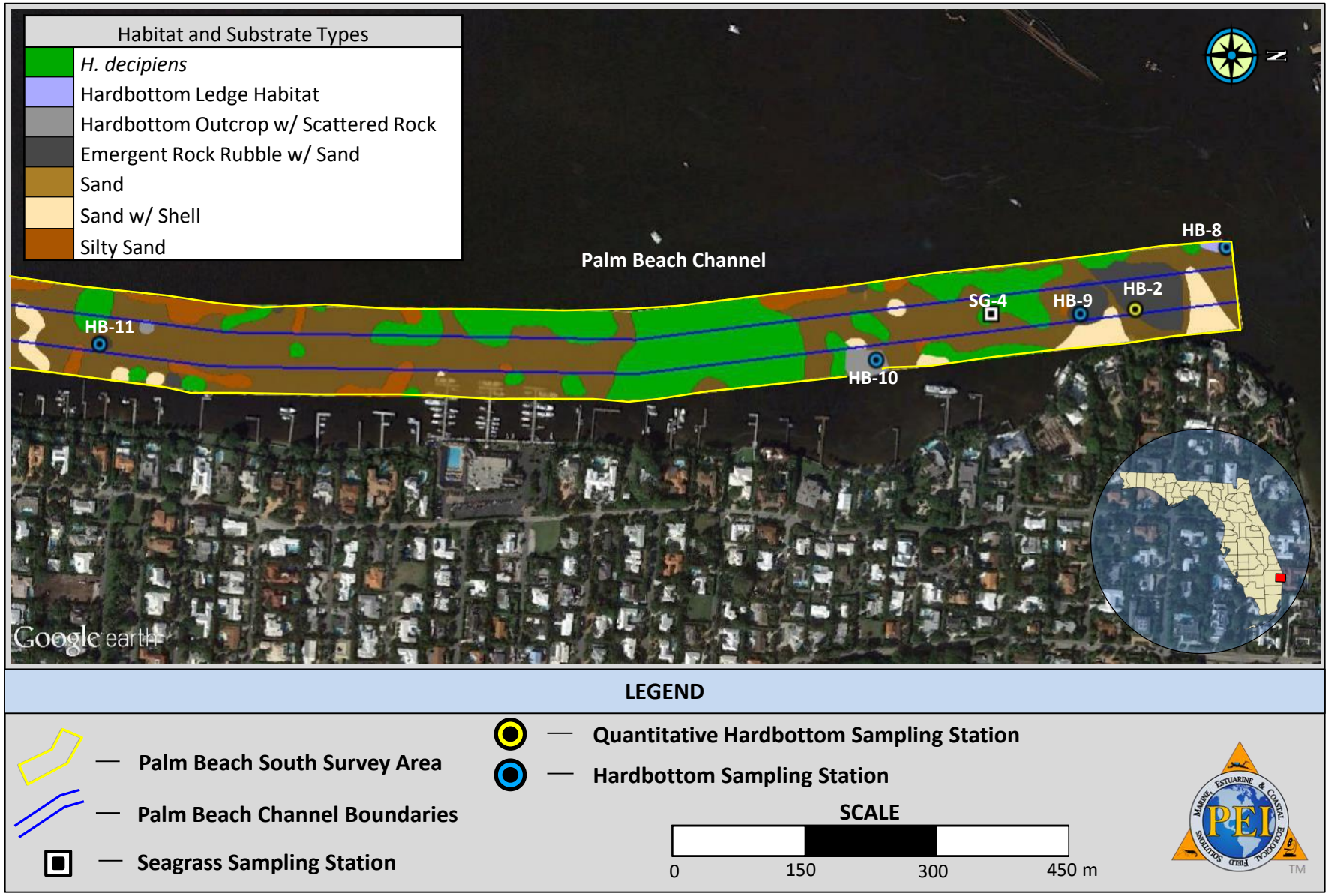

Figure 15 Seagrass, hardbottom habitat, and substrate types mapped in the Palm Beach Channel survey area during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

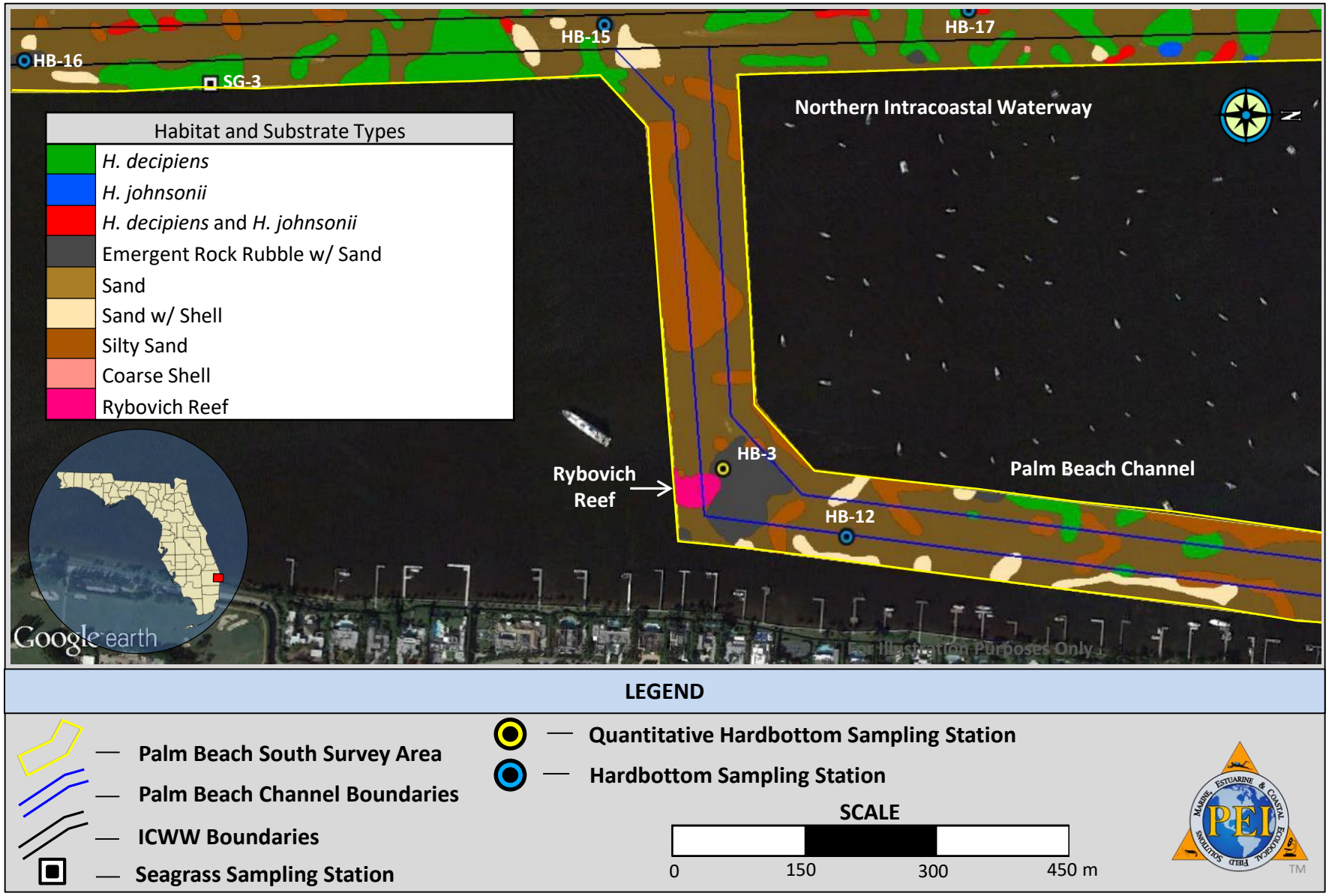

Figure 16 Seagrass, hardbottom habitat, and substrate types mapped in the Palm Beach Channel and Northern ICWW survey areas during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

Ledge Habitat (368.0 meters^2 (0.09 acres) was identified in the 30.5-meter (100-foot) buffer area near the north end of Palm Beach Channel and adjacent to the Port of Palm Beach. The exposed hardbottom ledge was likely uncovered when the Port was originally dredged. Hardbottom outcrops were comprised of semi-contiguous coquinoid limestone rock with scattered rocks, sand, and shell materials. Hardbottom habitats were generally colonized with macroalgae, sponges, hydroids, and corals. A portion (1,700.0 meters^2 (0.4 acres)) of the artificial reef identified in the 30.5-meter (100-foot) buffer area along Palm Beach Channel is constructed of various anthropogenic materials including concrete road barriers, a sunken barge, and miscellaneous concrete debris. It is unknown whether the reef was constructed as mitigation for a specific project. Carman Vare (Palm Beach County Environmental Resource Management (PBCERM) - Artificial Reefs Division) reported that a portion of the Rybovich Reef may have been constructed to mitigate a project for the Town of Palm Beach (personal communication, 2 August 2016). Representative photos have been provided in the **ATTACHMENT**.

4.2 Quantitative Data

4.2.1 Seagrass

Quantitative data collected during Phase II was used to determine seagrass percent cover, frequency of occurrence, density (shoots/meter^2), and blade length. Data were collected *in situ* along two (2) modified belt-transects, each consisting of a reel tape extending to 10 meters (32.8 feet), deployed at seven (7) randomly selected sample stations (**Figure 8**). Percent cover was determined using a modified Braun-Blanquet (1932) method. Frequency of occurrence was determined by counting the number of sub-cells in each sample quadrat containing seagrass. Seagrass densities were determined using a shoot count method and blade lengths were measured in millimeters.

During quantitative sampling along the ICWW three (3) species of seagrass were identified: paddle grass (*H. decipiens*), Johnson's seagrass (*H. johnsonii*), and shoal grass (*H. wrightii*). Paddle grass (*H. decipiens*) was the most common seagrass species observed and was documented at all six (6) ICWW sample stations. Johnson's seagrass was frequently observed outside of and adjacent to the survey area, but was present at only two (2) of the ICWW quantitative sample stations. Shoal grass (*H. wrightii*) was observed in low numbers and was observed at only one (1) sample station. Seagrass percent cover values at the remaining sample stations were below the average percent cover for the entire survey area. Two (2) of the highest occurrences of seagrass percent cover were documented at ICWW seagrass Sample Stations SG-6 and SG-3 (**Table 2**: 29.35% and 28.5%). Sample stations exhibiting the highest percentage of seagrass cover had substrate consisting predominantly of sand and/or silty-sand. Seagrass habitats were limited in areas with a combination of strong tidal currents and loose sand material due to sediment transport. Sand waves, indicative of strong tidal currents and moving sediment, were occasionally encountered in the south portion of the ICWW survey area where no seagrasses were identified. Paddle grass (*H. decipiens*) was the only seagrass species identified along Palm Beach Channel. Sample Station SG-4 had the lowest percent cover with 5.0%. Seagrass at Sample Station SG-4 appeared healthy and had relatively clear water conditions during incoming and high tidal cycles.

Scientists determined seagrass frequency of occurrence by examining each quadrat and counting the total number of 10 x 10-centimeter (3.9 x 3.9-inch) sub-cells within each 1.0-meter^2 (10.8-feet^2) quadrat containing seagrass. An average frequency of occurrence (%) for all quadrats sampled at each station has been provided in **Table 3**. Seagrass frequency of occurrence was highest along the ICWW at Sample Stations SG-3 (95.3%) and SG-6 (86.7%) and reflects the percent cover data collected from each of these

Table 2. Seagrass percent cover data collected during the benthic assessment and resource survey along the ICWW and Palm Beach Channel (PBC) in Lake Worth Lagoon, Palm Beach County, Florida. Note: No seagrass was observed within the boundaries of the Southern ICWW survey area.

Station		Percent Cover (%)					
		Halophila decipiens	*Halophila johnsonii*	*Halodule wrightii*	Macroalgae	Sponge	Invertebrates
Northern ICWW	SG-1	13.74	-	-	1.68	-	0.89
	SG-2	14.43	0.43	-	8.33	-	1.48
	SG-3	28.50	-	-	1.65	0.10	1.10
	SG-5	8.40	-	-	1.30	0.10	0.80
	SG-6	29.35	2.25	0.90	1.60	-	1.05
	SG-7	10.85	-	-	1.20	-	0.80
Northern ICWW Average		17.54	1.34	0.90	2.63	0.10	1.02
PBC	SG-4	5.00	-	-	1.40	0.05	1.60
Total Combined Survey Area Average		15.76	1.34	0.90	2.50	0.04	1.11

Table 3. Average seagrass frequency, density (shoots/meters^2), and blade length data collected during the benthic assessment and resource survey along the ICWW and Palm Beach Channel (PBC) in Lake Worth Lagoon, Palm Beach County, Florida. Note: No seagrass was observed within the boundaries of the Southern ICWW survey area.

Station		Frequency of Occurrence (%)				Density (shoots/meters^2)				Blade Length (millimeters)		
		Hd	*Hj*	*Hw*	*total*	*Hd*	*Hj*	*Hw*	*total*	*Hd*	*Hj*	*Hw*
Northern ICWW	SG-1	59.50	-	-	59.50	5.12	-	-	5.12	15.83	-	-
	SG-2	72.50	4.70	-	73.10	8.72	0.62	-	4.67	15.90	15.06	-
	SG-3	95.30	-	-	95.30	11.90	-	-	11.90	21.50	-	-
	SG-5	68.90	-	-	68.90	3.80	-	-	3.80	14.77	-	-
	SG-6	86.70	3.40	0.40	88.10	15.30	0.66	0.14	5.37	18.37	17.78	107.17
	SG-7	56.90	-	-	56.90	7.16	-	-	7.16	19.50	-	-
Northern ICWW Average		73.30	4.05	0.40	73.63	8.67	0.64	0.14	6.34	17.64	16.42	107.17
PBC	SG-4	22.90	-	-	22.90	1.50	-	-	1.50	17.20	-	-
Total Combined Survey Area Average		66.91	1.19	0.06	67.21	7.84	0.19	0.02	2.68	17.58	16.42	107.17

Hd = Halophila decipiens
Hj = Halophila johnsonii
Hw = Halodule wrightii

stations. Higher frequencies at Sample Stations SG-1 (59.5%), SG-2 (72.5%), SG-5 (68.9%), and SG-7 (56.9%) may reflect the sparse yet wide distribution of seagrasses at these stations. The average frequency at Sample Station SG-4 (22.9%) in Palm Beach Channel was relatively low and somewhat reflective of percent cover and density values.

Seagrass densities in the Northern ICWW and Palm Beach Channel survey areas were relatively low, but generally reflect the overall conditions in Lake Worth Lagoon. Paddle grass (*H. decipiens*) had the two (2) highest densities observed in the Northern ICWW survey area with 11.9 shoots/meter^2 at Sample Station SG-3 and 15.3 shoots/meter^2 at SG-6 (**Table 3**). Johnson's seagrass (*H. johnsonii*) had low densities and occurred at Sample Stations SG-2 (0.62 shoots/meter^2) and SG-6 (0.66 shoots/meter^2). Shoal grass (*H. wrightii*) was observed in the ICWW 30.5-meter (100-foot) buffer area at Sample Station SG-6 with a density of 0.14 shoots/meter^2. The lowest density for *H. decipiens* occurred in Palm Beach Channel at Sample Station SG-4 with 1.5 shoots/meter^2.

Blade lengths were collected from seagrass occurring in each quadrat and recorded in millimeters. Average blade length measurements had little variation within species (**Table 3**). The longest average blade length for paddle grass (*H. decipiens*) occurred at Sample Station SG-3 with a length of 21.50 millimeters. The shortest average blade length for paddle grass (*H. decipiens*) occurred at Sample Station SG-5 with a length of 14.77 millimeters. Blade lengths may have been influenced by environmental conditions including silty sedimentation, water quality and low light availability, epiphytic growth on seagrass blades and fluctuations in salinity with freshwater input from heavy rains and discharges from drainage canals.

Potential Environmental Factors Influencing Seagrass Habitat

The low percent cover, frequency of occurrence, and density values for seagrass in Palm Beach Channel and specifically at Sample Station SG-4 may be due, in-part, to the deeper water depth at that particular sample station (8.8 meters (29 feet)). Water depths can be a limiting factor for seagrass growth by reducing ambient light levels reaching the substrate surface (Short, 1987 and Koch, 2001). Other factors which may influence lower seagrass percent cover values may include differences in substrate quality, blade-shading via epiphytes, water quality and/or turbidity in the water column and fresh water runoff (Gallegos et al., 2009 and Koch, 2001). Pinnacle (2012) conducted seagrass studies in Lake Worth Lagoon immediately prior to and following Tropical Cyclone Isaac in August 2012 and documented impacts to seagrasses that may have resulted from large discharges of freshwater during the storm. Freshwater discharges were more than normal during the 2013 wet season and estimates of seagrass cover had declined from previous years (Orlando et al., 2016). Orlando et al. (2016) provided a summary of seagrass mapping in Lake Worth Lagoon that suggested frequent discharges of large amounts of freshwater into coastal estuaries following heavy rainfall in South Florida during the winter and spring of 2016 may have contributed to the lower seagrass cover observed during the benthic assessment and resource survey. Several freshwater drainage canals (i.e., C-51, West Palm Beach; C-16, Boynton Canal; and C-17, Earman River) empty directly into Lake Worth Lagoon. The C-51 canal is located 6.1 kilometers (3.8 miles) south of the southernmost end of the survey area. Water levels and discharges through the C-51 canal are controlled by the USACE and the South Florida Water Management District. The canals also deposit muck and pollution that contribute to lower water quality conditions in Lake Worth Lagoon.

4.2.2 Hardbottom

Quantitative data was collected at sample station locations in hardbottom habitat delineated during Phase I data collection. Data included still photographs appropriate for quantitative analysis of hardbottom community composition and structure collected along modified belt-transects ranging in length from 20 meters (65.5 feet) to 24 meters (78.7 feet). The camera was mounted on a framer at a fixed height of 40 centimeters (15.7 inches) above a 0.25-meter^2 (2.7-feet^2) quadrat. Non-overlapping photos were collected along the entire length of each transect at seven (7) randomly selected hardbottom sample stations. **Figure 9** is an index for **Figures 10** through **16** which show the location of quantitative hardbottom stations sampled during the benthic assessment survey. Photos were analyzed using CPCe software to determine the percent cover of benthic resources colonizing hardbottom habitat in the survey area. Percent cover data has been presented in **Table 4**. Hydroids were identified as the most common biota colonizing hardbottom habitat in the ICWW and Palm Beach Channel survey areas (**Table 4**: 8.68% and 8.86%). Macroalgae was the second most abundant marine resource colonizing hardbottom in the ICWW (3.18%) and Palm Beach Channel (5.07%) survey areas. Percent cover values for sponges in the ICWW ranged from 0.21 to 5.54% and in Palm Beach Channel from 2.85 to 11.21%. The highest sponge cover (11.21%) occurred on Emergent Rock Rubble with Sand at Sample Station HB-2. This sample station was positioned close to the Lake Worth Inlet and frequented by strong tidal currents. Stony corals (scleractinia) were observed colonizing hardbottom habitats in the Northern ICWW and Palm Beach Channel survey areas, but with low percent cover. No stony corals were identified in the Southern ICWW survey area. Of the two octocoral species that were identified during the survey the white telesto (*Carijoa riisei*) was the most common with 0.38% cover. Hardbottom communities are considered EFH and important for benthic colonizers including corals, sponges, macroalgae, and other marine resources. Hardbottom is also important for fish spawning, breeding, feeding, and protection from predators.

Stony corals were identified and mapped at all hardbottom habitats delineated throughout the entire survey area. Data collected for corals included species identification, colony size, and location (**Table 5**). **Figure 17** is an index for **Figures 18** through **23** which show the location of mapped corals occurring in potential dredge impact areas including: the channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope. Coral data (**Tables 6** and **7**) was organized according to species and colony size classification. A total of 15 stony coral species and two octocoral species were identified during the benthic survey. The most common species of stony coral identified during the survey was in the genus *Siderastrea* and included both *S. siderea* and *S. radians*. White telesto (*Carijoa riisei*) was the most common octocoral identified during the survey. Stony corals were further categorized according to specific size classifications including less than five (5) centimeters, five (5) to 10 centimeters, and greater than 10 centimeters (**Tables 6** and **7**). Most corals (73%) were classified as less than five (5) centimeters. A total of 24% of corals fit into the five (5) to 10 centimeter size classification and 3% of corals had colony dimensions greater than 10 centimeters. A total of four (4) stony corals with colony sizes greater than 10 centimeters were identified within the potential direct impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) of the northern ICWW (**Figures 22** and **23**).

Palm Beach Channel had nearly 75% more corals than the Northern ICWW survey area. This may be because the total delineated hardbottom in the Northern ICWW ((8,848.0 meters^2 (2.2 acres)) was roughly half of the hardbottom habitat in Palm Beach Channel ((17,573.5 meters^2 (4.3 acres)). Of the corals identified in the Palm Beach Channel survey area 72% were less than five (5) centimeters, 25% were five (5) to 10 centimeters and 3% were greater than 10 centimeters. The largest stony coral colonies identified

Table 4. Percent cover data determined from Coral Point Count (CPCe) analysis of photo quadrats collected on hardbottom habitat located along the ICWW and Palm Beach Channel (PBC) in Lake Worth Lagoon, Palm Beach County, Florida.

Category		Percent Cover by Station (%)								
		Northern ICWW			Southern ICWW		ICWW Average	PBC		PBC Average	Combined Average
		HB-1	HB-4	HB-5	HB-6	HB-7		HB-2	HB-3		
Biota	Ascidian	0.74	1.06	1.41	-	-	1.07	2.54	0.21	1.38	1.19
	Carijoa riisei	-	-	0.54	0.21	-	0.38	-	-	-	0.38
	Hydroid	7.09	14.47	13.09	7.29	1.48	8.68	3.81	13.91	8.86	8.73
	Macroalgae	5.82	3.09	0.33	3.48	-	3.18	5.07	5.06	5.07	3.81
	Oculina diffusa	-	-	0.65	-	-	0.65	-	0.11	0.11	0.38
	Siderastrea radians	-	0.11	0.11	-	-	0.11	-	-	-	0.11
	Sponge	1.06	0.21	5.54	2.96	2.33	2.42	11.21	2.85	7.03	3.74
Substrate	Emergent Rock Rubble with Sand	-	33.83	-	40.76	18.41	31	18.82	24.55	21.69	27.27
	Hardbottom Outcrop with Scattered Rock	56.93	-	38.87	-	-	47.9	-	-	-	47.90
	Sand	28.36	47.23	38.65	45.30	77.78	47.46	58.56	53.32	55.94	49.89

Table 5. A list of stony corals and octocorals identified at hardbottom habitats delineated within the ICWW and Palm Beach Channel survey areas.

Taxa	Northern ICWW Stations									Southern ICWW Stations		Palm Beach Channel Stations						
	HB-1	HB-4	HB-5	HB-13	HB-14	HB-15	HB-16	HB-17	HB-18	HB-6	HB-7	HB-2	HB-3	HB-8	HB-9	HB-10	HB-11	HB-12
Octocorals																		
C. riisei	NP	P	P	NP	NP	NP	NP	NP	NP	P	NP	P	P	NP	NP	NP	NP	NP
Leptogorgia sp.	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	NP	P	NP	NP	NP	NP	NP
Stony Corals																		
C. arbuscula	No stony corals observed	NP	P	NP	NP	No stony corals observed	No stony corals observed	NP	No stony corals observed	No stony corals observed	No stony corals observed	P	NP	NP	NP	P	No stony corals observed	No stony corals observed
D. labyrinthiformis		NP	P	NP	NP			NP				P	NP	NP	NP	P		
F. fragum		NP	NP	NP	NP			NP				NP	NP	NP	NP	P		
M. cavernosa		NP	P	NP	NP			NP				P	NP	NP	NP	NP		
O. diffusa		P	P	P	P			P				P	P	NP	P	P		
P. americana		P	P	P	NP			NP				P	P	P	P	P		
P. astreoides		NP	P	NP	NP			NP				NP	NP	NP	NP	NP		
P. clivosa		NP	NP	NP	NP			NP				NP	NP	NP	NP	P		
P. strigosa		NP	P	NP	NP			NP				NP	NP	NP	NP	P		
S. radians		P	P	P	P			NP				P	P	P	P	P		
S. siderea		NP	P	P	NP			NP				P	P	NP	P	P		
Siderastrea sp.		NP	P	NP	NP			NP				P	NP	NP	NP	NP		
S. bournoni		NP	P	NP	NP			NP				P	NP	NP	NP	P		
S. intersepta		NP	P	P	NP			NP				P	P	NP	NP	NP		
T. coccinea		NP	NP	NP	NP			NP				P	NP	P	P	NP		

P = Present

NP = Not Present

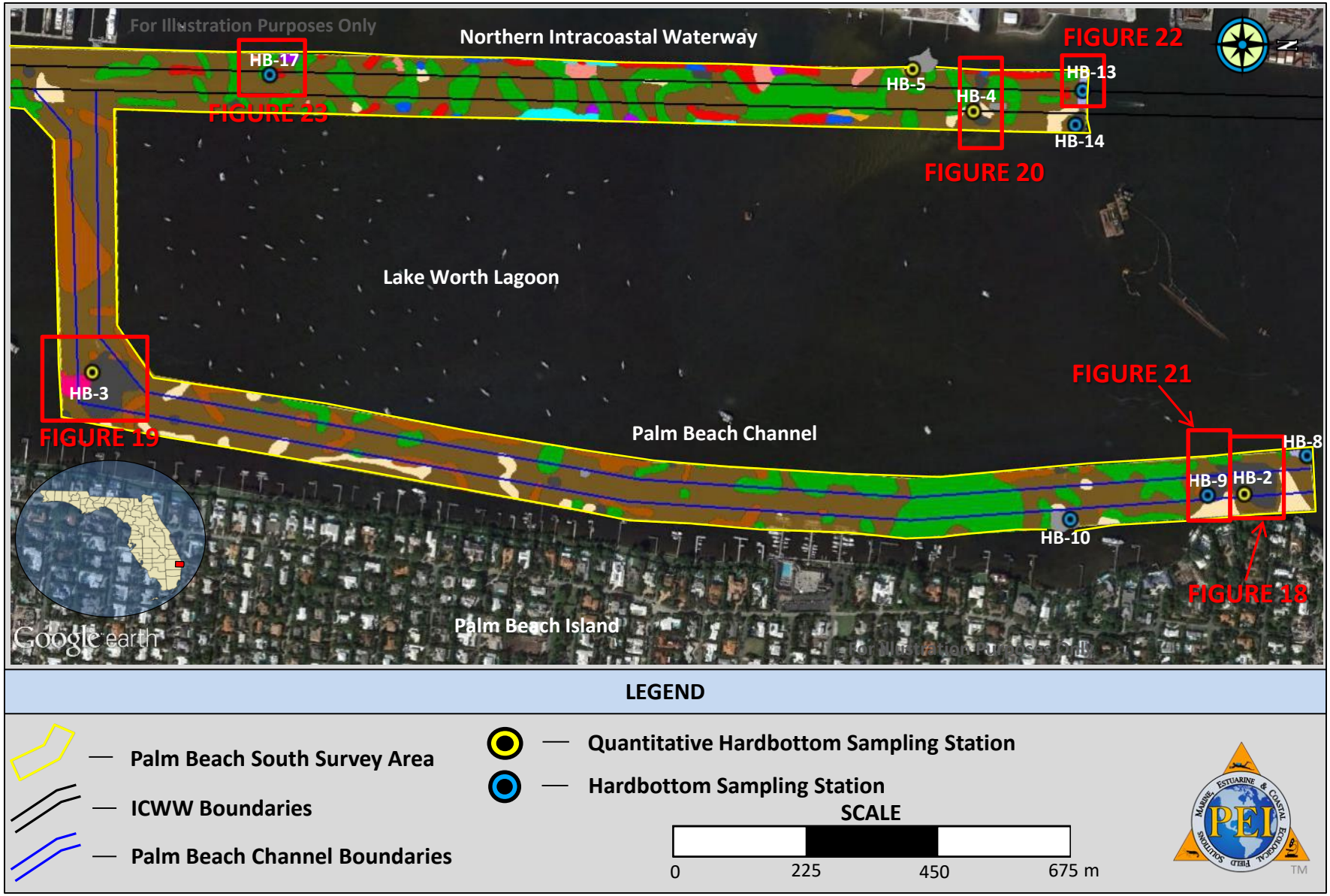

Figure 17 An index for figures showing hardbottom habitats where hard corals were observed and mapped in the Palm Beach Channel and Northern ICWW survey areas during in the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

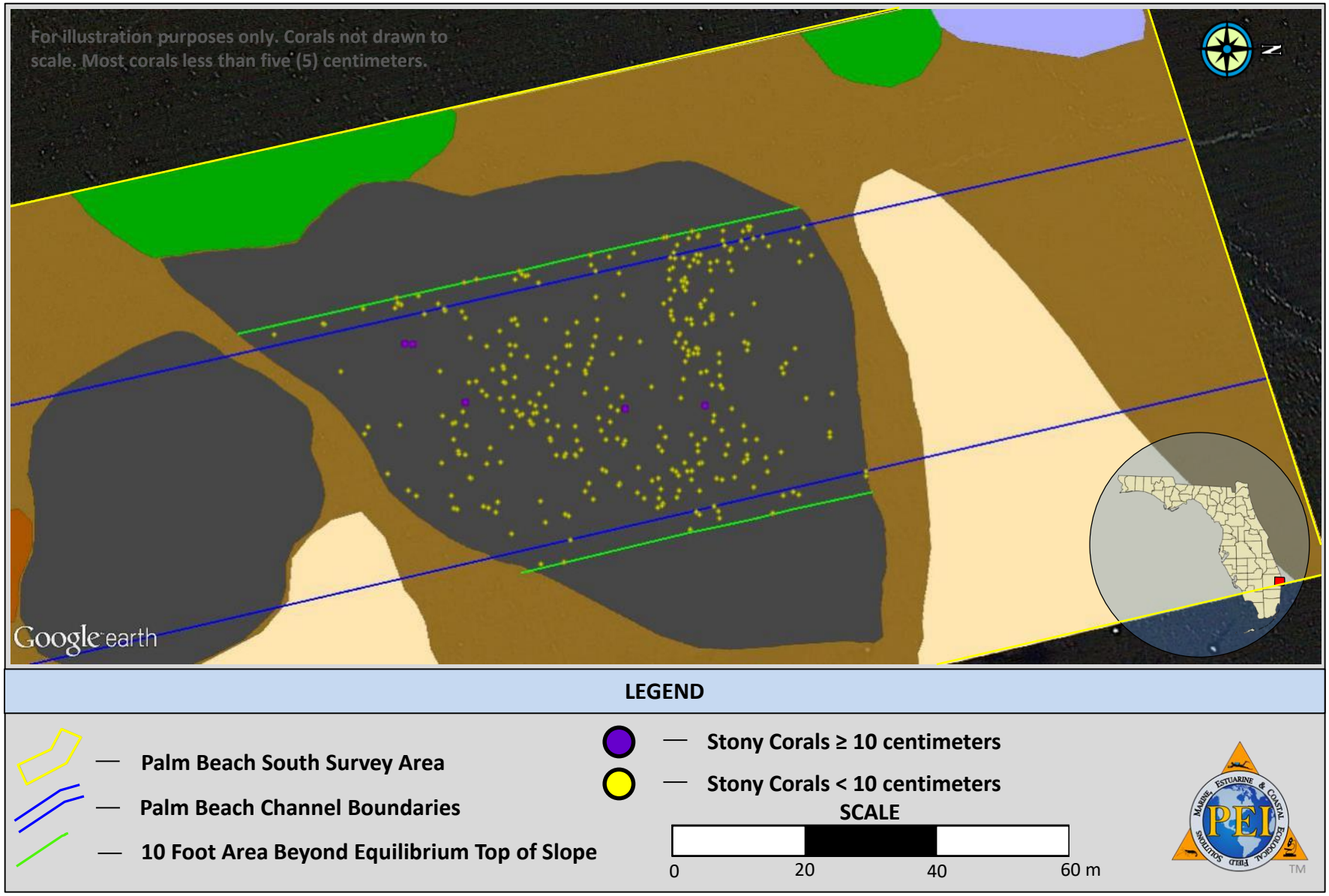

Figure 18 Stony corals occurring in the potential impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) at Sample Station HB-2 during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

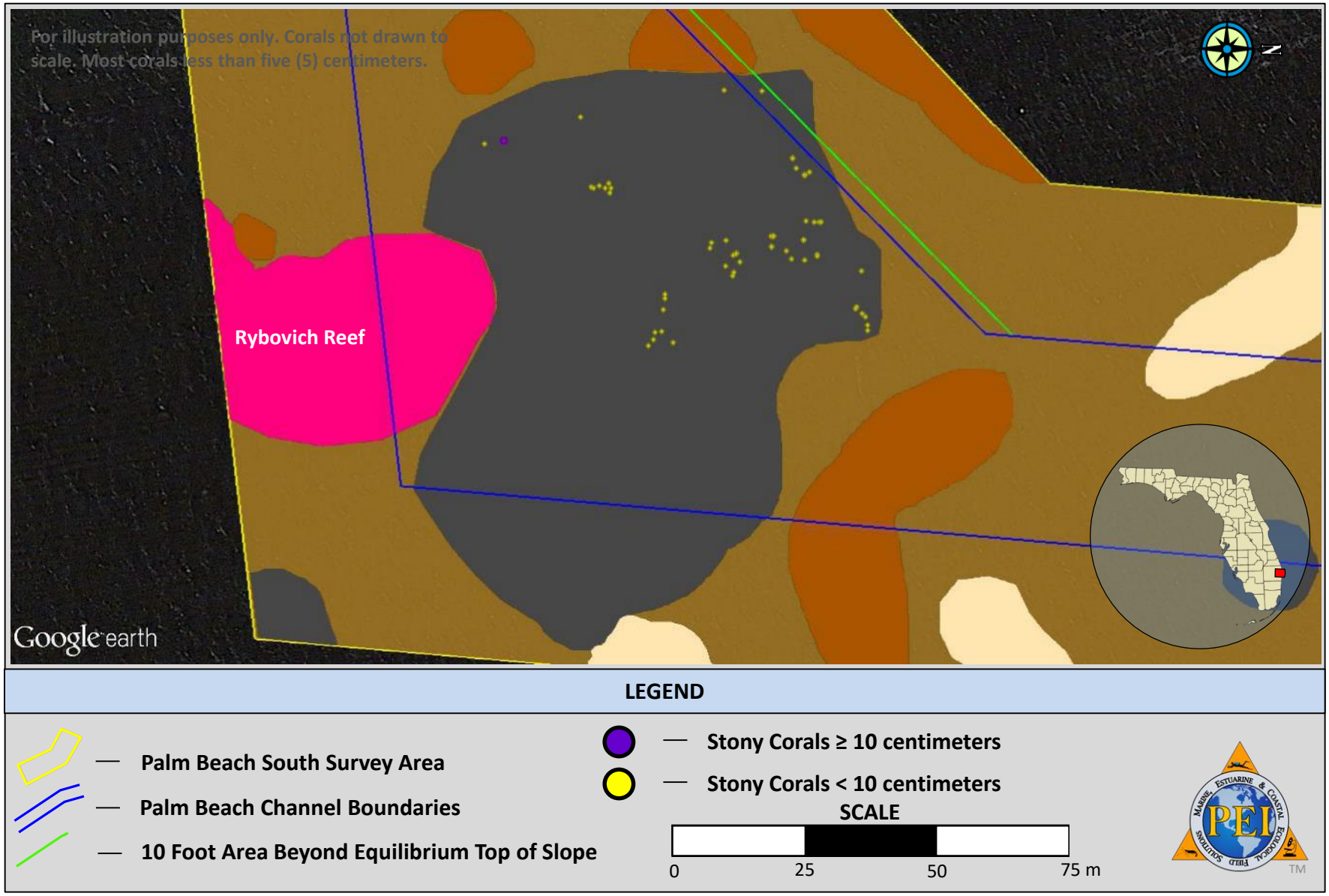

Figure 19 Stony corals occurring in the potential impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) at Sample Station HB-3 during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

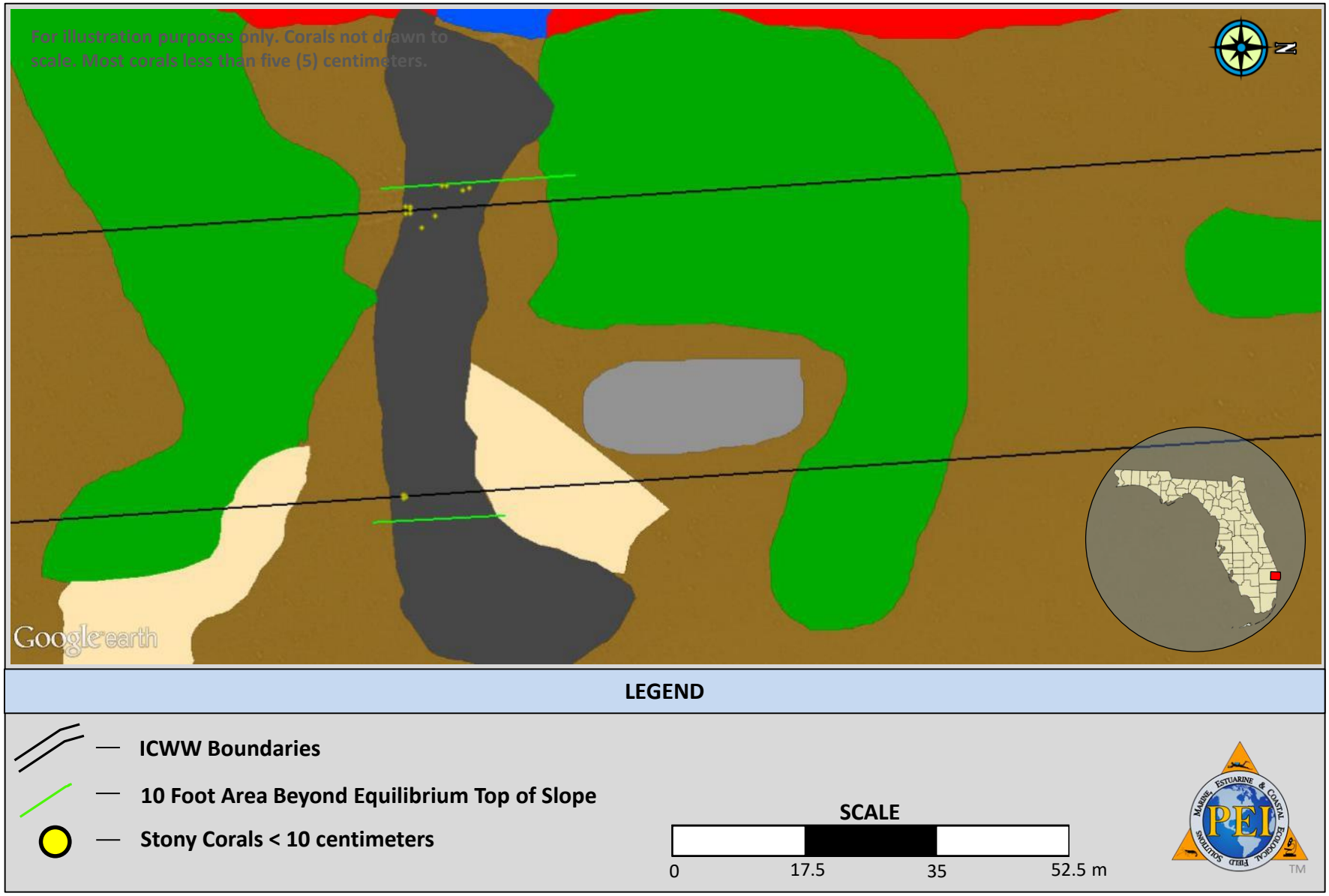

Figure 20 Stony corals occurring in the potential impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) at Sample Station HB-4 during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

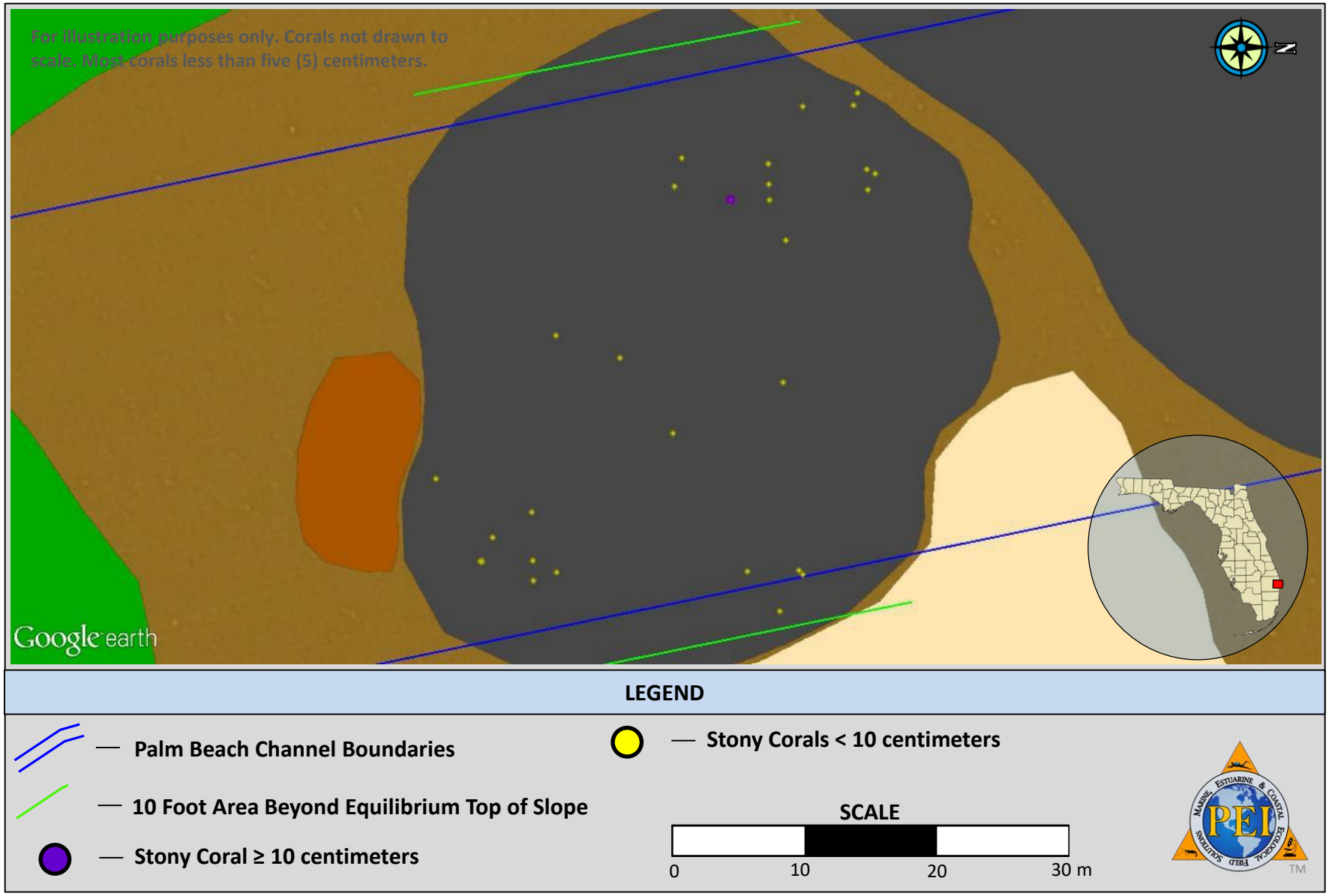

Figure 21 Stony corals occurring in the potential impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) at Sample Station HB-9 during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

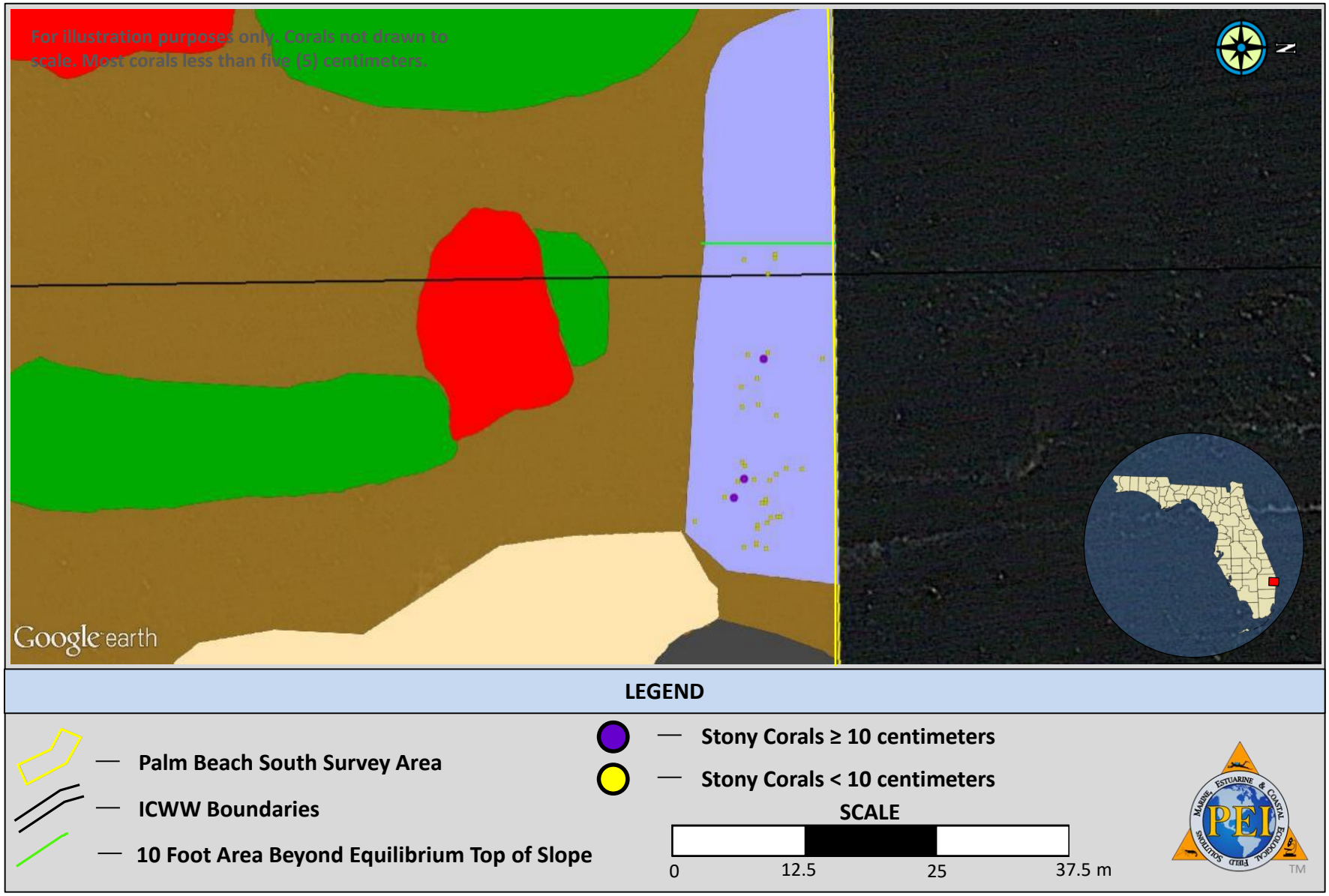

Figure 22 Stony corals occurring in the potential impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) at Sample Station HB-13 during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

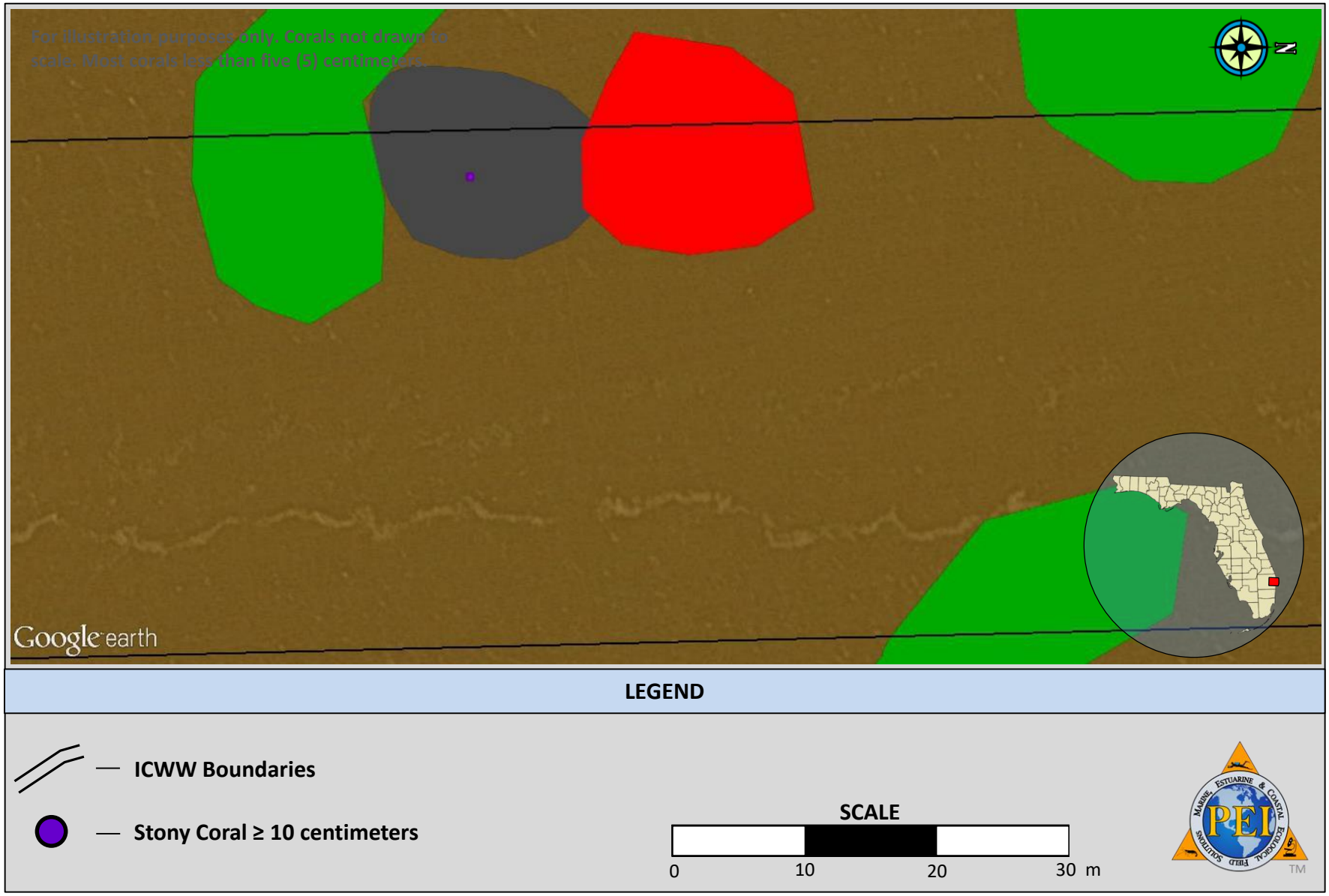

Figure 23 Stony coral occurring in the potential impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) at Sample Station HB-17 during the benthic assessment and natural resource survey in Lake Worth Lagoon near West Palm Beach, Florida. Image credit: Google Earth, 2016

Table 6. Stony coral identification and size classification for hardbottom habitat in the ICWW survey area. Note: stony corals were only observed in the Northern ICWW survey areas.

Taxa	ICWW Stations												
	Channel*				10-ft Buffer				100-ft Buffer				Outside Survey Area
Stony Corals	Size Class				Size Class				Size Class				
	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	
ICWW Station HB-4													
O. diffusa	NP				NP				0	2	0	142.09	NP
P. americana	1	0	0	12.56	NP				NP				NP
S. radians	7	0	0	40.04	8	4	0	182.18	14	6	1	437.36	NP
ICWW Station HB-5													
C. arbuscula	No Stony Corals Present in Channel				No Stony Corals Present in 10-ft Buffer				NP				P
D. labyrinthiformis									NP				P
M. cavernosa									NP				P
O. diffusa									1	1	2	573.84	P
P. americana									2	0	0	13.35	P
P. astreoides									NP				P
P. strigosa									NP				P
S. radians									2	0	0	15.70	P
S. siderea									0	3	0	77.72	P
Siderastrea sp.									8	1	0	68.15	P
S. bournoni									1	2	0	76.02	P
S. intersepta									0	1	0	28.26	P

P = Present
NP = Not Present
* Includes channel and channel slope

Table 6. Continued.

Taxa	ICWW Stations												
	Channel*				10-ft Buffer				100-ft Buffer				Outside Survey Area
Stony Corals	Size Class				Size Class				Size Class				
	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	
ICWW Station HB-13													
O. diffusa	1	1	2	292.81	NP				NP				NP
P. americana	1	0	0	1.77	NP				1	0	0	0.79	NP
S. radians	32	2	1	313.41	4	0	0	17.66	7	3	0	101.66	NP
S. siderea	1	0	0	4.91	NP				2	0	0	13.35	NP
S. intersepta	2	0	0	25.12	NP				NP				NP
ICWW Station HB-14													
O. diffusa	No Stony Corals Present in Channel				No Stony Corals Present in 10-ft Buffer				0	1	0	28.26	NP
S. radians									4	3	0	144.44	NP
ICWW Station HB-17													
O. diffusa	0	0	1	314.00	NP				NP				NP

P = Present
NP = Not Present
* Includes channel and channel slope

Table 7. Stony coral identification and size classification for hardbottom habitat in the Palm Beach Channel survey area.

Taxa	Palm Beach Channel Stations												
	Channel*				10-ft Buffer				100-ft Buffer				Outside Survey Area
Stony Corals	Size Class				Size Class				Size Class				
	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	
PBC Station HB-2													
C. arbuscula	1	0	0	3.14	NP				NP				NP
D. labyrinthiformis	1	0	0	12.56	NP				1	1	0	36.31	NP
M. cavernosa	NP				0	1	0	22.05	NP				NP
O. diffusa	9	9	2	679.13	1	0	0	3.14	1	3	0	165.05	NP
P. americana	13	5	0	277.55	NP				6	0	0	28.53	NP
S. radians	151	42	0	2167.15	31	11	0	504.11	82	15	0	1055.68	NP
S. siderea	57	6	1	843.73	7	2	0	160.01	3	2	0	109.60	NP
Siderastrea sp.	4	0	0	3.14	NP				NP				NP
S. bournoni	0	0	2	568.34	NP				0	0	1	153.86	NP
S. intersepta	1	0	0	15.90	NP				NP				NP
T. coccinea	NP				4	8	0	298.50	1	1	0	35.33	NP
PBC Station HB-3													
O. diffusa	4	4	0	144.05	NP				NP				NP
P. americana	13	0	0	31.20	1	0	0	0.79	1	0	0	3.14	NP
S. radians	23	3	1	294.77	NP				NP				NP
S. siderea	10	2	0	94.23	NP				NP				NP
S. intersepta	2	0	0	19.04	NP				NP				NP
PBC Station HB-8													
P. americana	No Stony Corals Present in Channel				No Stony Corals Present in 10-ft Buffer				2	0	0	19.63	NP
S. radians									2	1	0	42.39	NP
T. coccinea									0	1	0	19.63	NP

P = Present
NP = Not Present
* Includes channel and channel slope

Table 7. Continued.

Taxa	Palm Beach Channel Stations												
	Channel*				10-ft Buffer				100-ft Buffer				Outside Survey Area
Stony Corals	Size Class				Size Class				Size Class				
	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	< 5 cm	5 - 10 cm	> 10 cm	Area cm^2	
PBC Station HB-9													
O. diffusa	1	2	0	63.78	NP				NP				NP
P. americana	1	0	0	12.56	1	0	0	4.91	NP				NP
S. radians	16	1	0	200.96	NP				0	1	0	19.63	NP
S. siderea	4	3	0	127.37	NP				NP				NP
T. coccinea	2	0	1	232.27	NP				NP				NP
PBC Station HB-10													
C. arbuscula	No Stony Corals Present in Channel				No Stony Corals Present in 10-ft Buffer				1	3	0	146.55	NP
D. labyrinthiformis									1	0	0	15.90	NP
F. fragum									2	0	0	30.65	NP
O. diffusa									34	46	15	4869.30	P
P. americana									21	1	0	158.13	NP
P. clivosa									NP				P
P. strigosa									2	1	1	165.23	P
S. radians									138	0	0	709.80	P
S. siderea									28	38	0	1420.34	P
S. bournoni									2	3	0	93.81	NP

P = Present
NP = Not Present
* Includes channel and channel slope

during the survey included two (2) ivory bush corals (*Oculina diffusa*), each measuring 21.0 centimeters in diameter. A total of 7 corals with dimensions greater than 10 centimeters were mapped within the potential direct impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) of Palm Beach Channel (**Figures 18**, **19**, and **21**).

Some contiguous hardbottom habitats delineated during the survey were observed extending through multiple channel features including the potential direct impact area (i.e., channel, channel slope, and the three (3) meter (10 foot) area beyond the equilibrium top of slope) and the 30.5-meter (100-foot) buffer area. These habitats were mapped and characterized to provide as complete assessment of the habitat and associated resources as possible. Hardbottom habitat at sample station HB-2 extended across the width of the Palm Beach Channel and into portions of the adjacent 30.5-meter (100-foot) buffer area (**Figure 18**). Occasionally habitats and associated resources delineated in the survey area also extended across the survey area boundary. Hardbottom habitat at Sample Station HB-5 overlapped the border and continued outside of the 30.5-meter (100-foot) buffer area. The biological communities associated with these habitats were characterized and quantified with stony corals identified, measured and mapped. Coral resources occurring within the area of potential direct impact (i.e., the channel, channel slope and the 3 meter (10 foot) area beyond the equilibrium top of slope) have been presented in the report figures.

Potential Environmental Factors Influencing Hardbottom Habitat

The Gulf Stream Current flows northward carrying tropical nutrient-rich oceanic water northward along the South Florida Coast. The Gulf Stream is contributed, in part, to the presence of corals colonizing the relic reefs offshore Palm Beach County by transporting coral gametes and planula larvae. The Gulf Stream Current meanders like a river and is periodically close enough to Lake Worth Inlet to allow clear ocean water to enter Lake Worth Lagoon during diurnal flood tides. As the clear ocean water enters Lake Worth Lagoon it is constantly mixing with brackish tannin-rich water discharged via freshwater drainage canals. The further the tide penetrates the estuary the more mixing occurs. The clearest water with adequate salinity occurs closer to the Inlet which is near the Northern ICWW survey area. The clear ocean water provides favorable conditions for coral growth with adequate light availability and salinity conditions. Clear ocean water, however rarely reaches the Southern ICWW survey area. The absence of stony corals in the Southern ICWW survey area may be due, in-part, to lower water quality, increased nutrient levels and other pollutants, limited light availability through the water column, prolonged salinity fluctuations resulting from stormwater runoff or any combination of these factors. Freshwater discharges into coastal estuaries following heavy rainfall in South Florida and the resulting effects on seagrass and other marine biota have been documented in Lake Worth lagoon (Orlando et al., 2016). Several freshwater drainage canals (i.e., C-51, West Palm Beach; C-16, Boynton Canal; and C-17, Earman River) empty directly into Lake Worth Lagoon. The C-51 canal is located 6.1 kilometers (3.8 miles) south of the southernmost end of the survey area. Water levels and discharges through the C-51 canal are controlled by the USACE and the South Florida Water Management District. The canals also deposit muck and pollution that contribute to lower water quality conditions in the Lagoon and sedimentation loads on corals.

4.3 Qualitative Data

During the benthic assessment and resource survey scientific divers conducted *in situ* identifications to the lowest practical identification level (**Table 8**). General biota identified *in situ* included macroalgae such as green algae (*Caulerpa sertularioides, Caulerpa prolifera, Acetabularia* sp., *Halimeda* sp., and *Udotea* sp.), red algae (*Gracilaria* sp., *Acanthaphora* sp., and Rhodophyta [turf algae]), and brown algae (*Dictyota* sp.). Additional benthic resources include multiple sponges (*Ircinia* sp., *Cliona* sp., *Aplysina* sp., and

Niphates sp.), stony corals (*Siderastrea siderea*, *Siderastrea radians,* and *Solenastrea bournoni*), stone crab (*Menippe mercenaria*), spiny lobster (*Panulirus argus*), and echinoderms (*Oreaster reticulatus*, *Diadema antillarum*, and *Isostichopus bandionotus*). A total of forty (40) fish species were identified during the survey including common snook (*Centropomus undecimalis*), French angelfish (*Pomacanthus paru*), hogfish (*Lachnolaimus maximus*), mangrove snapper (*Lutjanus griseus*), and rock hind (*Epinephelus adscensionis*). Sightings of bottlenose dolphins (*Tursiops truncatus*) were common during the survey. Two species of sea turtle were observed during the field survey: green turtles (*Chelonia mydas*) and loggerhead turtles (*Caretta caretta*). Representative photos have been provided in the **ATTACHMENT**.

Table 8. Comprehensive list of marine resources observed during the benthic assessment and resource survey along the ICWW and Palm Beach Channel (PBC) in Lake Worth Lagoon, Palm Beach County, Florida.

Common Name	Scientific Name	ICWW Stations											PBC Stations			Survey Area
		Northern									Southern					
		SG-1	SG-2	SG-3	SG-5	SG-6	SG-7	HB-1	HB-4	HB-5	HB-6	HB-7	SG-4	HB-2	HB-3	
Algae																
Green Algae	**Chlorophyta**															
Green Algae	*Caulerpa* sp.				x		x				x	x				x
Green Algae	*Penicillus sp.*															x
Green Blade Algae	*Caulerpa prolifera*	x	x		x	x	x						x			x
Green Calcareous Algae	*Halimeda sp.*				x											
Green Fan Algae	*Udotea* spp.															x
Green Feather Algae	*Caulerpa sertularioides*	x	x		x											x
Green Fibrous Algae	*Caulerpa verticilata*															x
Mermaid's wineglass	*Acetabularia sp.*				x											
Brown Algae	**Phaeophyta**															
Brown Branching Algae	*Dictyota* sp.		x	x		x								x	x	
Red Algae	**Rhodophyta**															
Filamentous Red Alage	Rhodophyta	x	x	x		x										
Red Alage	*Acanthophora*sp.		x	x	x											
Red Algae	*Gracilaria* sp.	x	x	x	x	x							x			
Red Turf Algae	Rhodophyta			x	x	x					x		x			
Marine Plants																
Johnson's Seagrass	*Holophila johnsonii*		x			x										
Paddle Grass	*Holophila decipiens*	x	x	x	x	x	x						x			
Shoalgrass	*Halodule wrightii*					x										
Porifera																
Barrel Sponge	*Xestospongia* sp.									x						
Black Ball Sponge	*Ircinia* sp.									x				x		
Boring Sponge	*Cliona* sp.							x	x	x				x		
Chicken Liver Sponge	*Chondrilla* sp.									x	x			x		
Encrusting Sponge	*Placospongia* sp.									x				x	x	
Green Finger Sponge	*Iotrochota birotulata*													x		
Orange Boring Sponge	*Cliona delitrix*									x					x	
Rope Sponge	*Aplysina* sp.														x	
Rope Sponge	*Niphates* sp.							x	x	x	x			x	x	x
Unidentified Branching Sponge	Porifera		x	x												
Unidentified Encrusting Sponge	Porifera											x				

X = Present

Table 8. (Continued).

Common Name	Scientific Name	ICWW Stations											PBC Stations			Survey Area
		Northern									Southern					
		SG-1	SG-2	SG-3	SG-5	SG-6	SG-7	HB-1	HB-4	HB-5	HB-6	HB-7	SG-4	HB-2	HB-3	
Cnidaria																
Hydrozoa																
Algae Hydroids	*Thyroscyphus* sp.							x	x		x			x	x	x
Hydroids (multiple species)	Hydrozoa	x	x	x	x			x	x		x		x	x	x	x
Anthozoa																
Burrowing Anemone	Ceriantharia	x	x					x							x	x
Corkscrew Anemone	*Bartholomea annulata*		x							x						x
Giant Anemone	*Condylactis gigantea*													x		x
Octocorallia																
Sea Whip	*Leptogorgia* sp.														x	
White Telesto	*Carijoa riisei*								x	x	x			x	x	x
Zoanthidae																
Mat Zoanthid	*Zoanthus* sp.									x				x		
Sponge Zoanthid	*Parazoanthus parasiticus*									x						
Scleractinia																
Blushing Star Coral	*Stephanocoenia intersepta*									x						x
Golf Ball Coral	*Favia fragum*															x
Great Star Coral	*Montastrea cavernosa*									x				x		
Grooved Brain Coral	*Diploria labyrinthiformis*									x				x		x
Hidden Cup Coral	*Phyllangia americana*									x					x	x
Ivory Bush Coral	*Oculina diffusa*									x				x	x	x
Knobby Brain Coral	*Pseudodiploria clivosa*															x
Lesser Starlet Coral	*Siderastrea radians*								x	x						x
Massive Starlet Coral	*Siderastrea siderea*									x				x	x	x
Mustard Hill Coral	*Porites astreoides*									x						
Orange Cup Coral	*Tubastraea coccinea*													x		x
Smooth Star Coral	*Solenastrea bournoni*									x				x		
Starlet Coral	*Siderastrea* sp.									x						
Symmetrical Brain Coral	*Pseudodiploria strigosa*									x						x
Tube Coral	*Cladocora arbuscula*									x				x		x
Ctenophora																
Comb Jelly	*Mnemiopsis leidyi*		x								x					

X = Present

Table 8. (Continued).

Common Name	Scientific Name	ICWW Stations											PBC Stations			Survey Area
		Northern									Southern					
		SG-1	SG-2	SG-3	SG-5	SG-6	SG-7	HB-1	HB-4	HB-5	HB-6	HB-7	SG-4	HB-2	HB-3	
Annelida																
Bearded Fireworm	*Hermodice carunculata*	x						x		x			x	x		x
Christmas Tree Worm	*Spirobranchus* sp.									x				x		
Feather Duster Worm	Sabellidae	x	x		x			x	x		x	x			x	x
Horseshoe Worm	Phoronida	x	x			x	x						x			
Tube Worms (multiple species)	Polychaeta			x	x									x	x	
Arthropoda																
Banded Coral Shrimp	*Stenopus hispidus*									x						
Caribbean Spiny Lobster	*Panulirus argus*							x		x				x		x
Florida Stone Crab	*Menippe mercenaria*							x		x				x		x
Giant Hermit Crab	*Petrochirus diogenes*							x		x				x		
Hermit Crabs (multiple species)	Paguroidea		x							x			x	x		
Horseshoe Crab	*Limulus polyphemus*									x						x
Mantis Shrimp	Stomatopoda			x						x			x			
Shrimp	Caridea	x	x													
Swimming Crab	*Achelous* sp.	x										x				x
Swimming Crab	Portunidae									x						
Crabs (multiple species)	Brachyura											x				x
Yellowline Arrow Crab	*Stenorhynchus seticornis*							x	x				x		x	
Ectoprocta																
Branching Bryozoans	Cheilostomata									x					x	
Encrusting Bryozoans	Cheilostomata									x				x	x	
Bryozoans (multiple species)	Cheilostomata												x			
Mollusca																
Florida Fighting Conch	*Strombus alatus*		x			x							x			x
Helmet Conch	*Cassis* sp.															x
Horse Conch	*Pleuroploca gigantea*															x
Rough Fileclam	*Lima scabra*									x						
Snails (various Species)	Gastropoda			x			x									

X = Present

Table 8. (Continued).

Common Name	Scientific Name	ICWW Stations											PBC Stations			Survey Area
		Northern									Southern					
		SG-1	SG-2	SG-3	SG-5	SG-6	SG-7	HB-1	HB-4	HB-5	HB-6	HB-7	SG-4	HB-2	HB-3	
Echinodermata																
Brittle Stars (multiple species)	Ophiuroidea	x	x			x										
Cushion Sea Star	*Oreaster reticulatus*			x				x						x	x	x
Lined Sea Star	*Luidia clathrata*		x													x
Long-spined Sea Urchin	*Diadema antillarum*													x		x
Pencil Urchin	*Eucidaris tribuloides*									x			x	x		
Purple-spined Sea Urchin	*Arbacia punctulata*									x			x	x		
Sea Cucumber	*Holothoria* sp.							x							x	
Sea Cucumber	*Isostichopus bandionotus*							x							x	x
Urchin	Echinoidea												x			x
West Indian Sea Egg	*Tripneustes ventricosus*									x						x
Chordata																
Black Tunicate	*Ascidia nigra*							x	x	x	x	x		x	x	x
Bulb Tunicate	*Clavelina* sp.									x				x		
Colonial Ascidians	*Eudistoma* spp.									x						x
Fishes																
Atlantic Spadefish	*Chaetodipterus faber*									x	x				x	x
Atlantic Guitarfish	*Rhinobatos lentiginosus*															x
Bandtail Puffer	*Sphoeroides spengleri*							x	x	x	x	x		x	x	x
Barjack	*Caranx ruber*									x					x	x
Blenny	Clinidae	x	x		x	x		x	x	x		x	x	x	x	x
Blue Angelfish	*Holcanthus bermudensis*														x	x
Bluehead Wrasse	*Thalassoma bifasciatum*									x						
Cardinalfish	Apogonidae									x						
Checkered Puffer	*Sphoeroides testudineus*														x	x
Common Snook	*Centropomus undecimalis*									x					x	x
Cubbyu	*Equetus umbrosus*													x		x
Doctor Fish	*Acanthurus chinrugus*									x				x		x
Dusky Damselfish	*Stegastes fuscus*									x				x		
French Angelfish	*Pomacanthus paru*							x		x	x			x		x
French Grunt	*Haemulon flavolineatum*							x		x						x

X = Present

Table 8. (Continued).

Common Name	Scientific Name	ICWW Stations											PBC Stations			Survey Area
		Northern									Southern					
		SG-1	SG-2	SG-3	SG-5	SG-6	SG-7	HB-1	HB-4	HB-5	HB-6	HB-7	SG-4	HB-2	HB-3	
Fishes (continued)																
Goby (multiple species)	Gobiidae									x				x	x	
Great Barracuda	*Sphyraena barracuda*							x		x				x	x	x
Grey Angelfish	*Pomacanthus arcuatus*							x	x					x	x	x
Gray Triggerfish	*Balistes capriscus*								x	x	x					x
Hogfish	*Lachnolaimus maximus*									x				x		
Jawfish	*Opistognath* sp.					x									x	
Jacknife fish	*Equetus lanceolatus*													x		x
Lane Snapper	*Lutjanus synagris*							x			x	x				x
Lionfish	*Pterois volitans*							x						x	x	
Mangrove Snapper	*Lutjanus griseus*										x					x
Nurse Shark	*Ginglymostoma cirratum*										x					
Ocean Surgeonfish	*Acanthurus bahianus*										x			x		
Pipefish	Syngnathidae					x	x									
Porkfish	*Anisotremus virginicus*							x	x	x	x	x		x	x	x
Rock Hind	*Epinephelus adscensionis*							x	x	x	x	x		x	x	x
Sergeant Major	*Abudefduf saxatilis*							x		x						x
Scorpionfish	*Scorpaena* sp.							x	x	x					x	
Shark	Carcharhinidae															x
Sheepshead	*Archosargus probatcephalus*									x	x	x			x	x
Slippery Dick	*Halichoeres bivittatus*										x	x			x	x
Spanish Hogfish	*Bodianus rufus*									x					x	x
Spotfin Butterflyfish	*Chaetodon ocellatus*							x		x					x	
Spottail Pinfish	*Diplodus holbrookii*									x						x
Spotted Eagle Ray	*Aetobatus narinari*													x		x
Spotted Moray	*Gymnothorax moringa*									x						
Tomtate	*Haemulon aurolineatum*									x		x				x
White grunt (juvenile)	*Haemulon plumieri*									x						x
Yellow Stingray	*Urobatis jamaicensis*	x						x		x						x
Marine Mammals and Turtles																
Common Bottlenose Dolphin	*Tursiops truncatus*															x
Green Turtle	*Chelonia mydas*															x
Loggerhead Turtle	*Caretta caretta*															x

X = Present

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ATTACHMENT

REPRESENTATIVE PHOTOS

Photo 1. During Phase I of the assessment survey, divers equipped with underwater communications identified seagrass and hardbottom resources while being towed behind a surface support vessel.

Photo 2. A view of the surface support vessel and the survey area, located along the Intracoastal Waterway (ICWW) in Lake Worth Lagoon.

Photo 3. A 1-meter^2 quadrat set up along a 10-meter transect, used to collect quantitative seagrass data including frequency of occurrence, density, and percent cover .

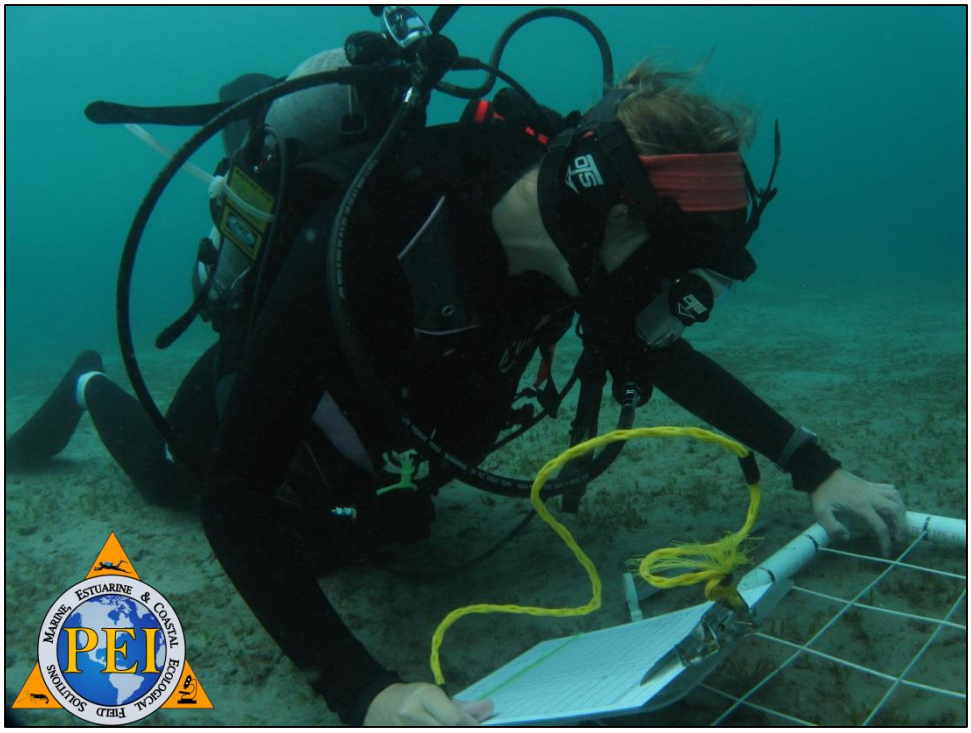

Photo 4. A scientist collects Braun-Blanquet data at Sample Station SG-1.

Photo 5. A close-up of paddle grass (*Halophila decipiens*) at Sample Station SG-1.

Photo 6. Quantitative data was collected for two 10-meter transects at each seagrass sampling station.

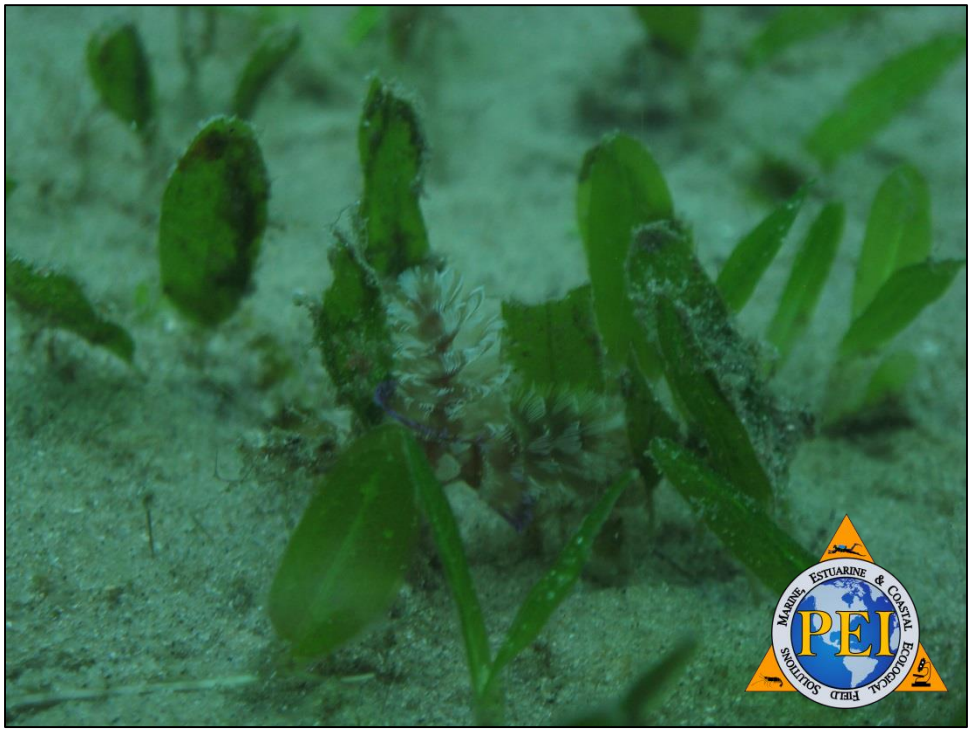

Photo 7. A horseshoe worm (Phoronida) located amongst blades of paddle grass (*Halophila decipiens*) at Sample Station SG-1.

Photo 8. A bearded fireworm (*Hermodice caruncalata*) observed while collecting quantitative seagrass data at Sample Station SG-4.

Photo 9. A scientist counts seagrass shoots to determine seagrass density (shoots/meter^2) at Sample Station SG-5.

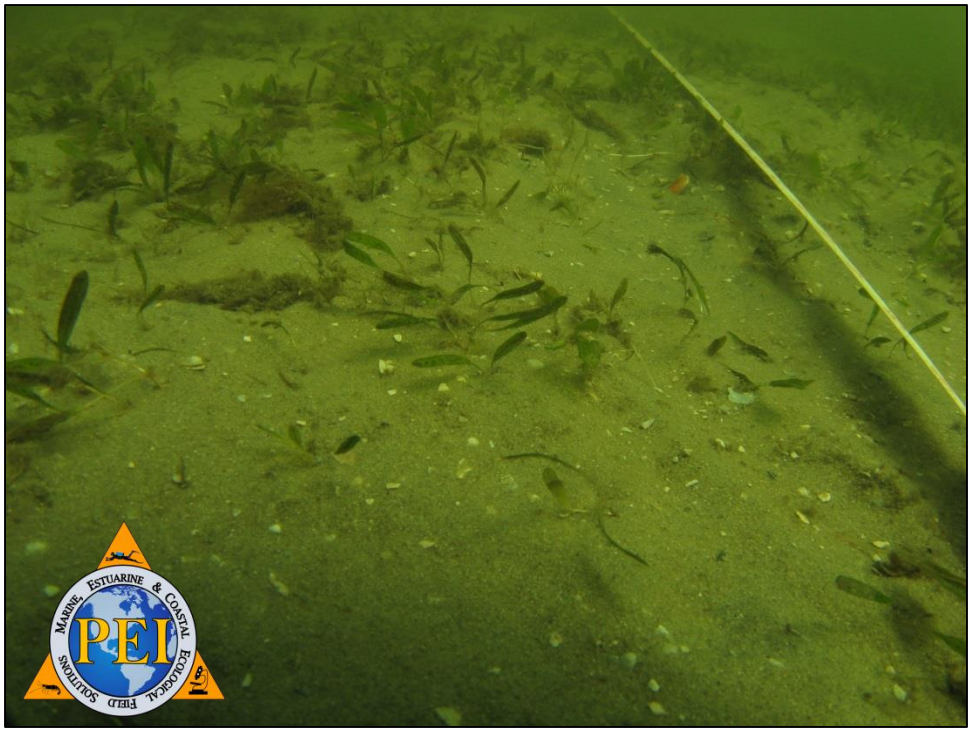

Photo 10. Johnson's seagrass (*Halophila johnsonii*) at Sample Station SG-6.

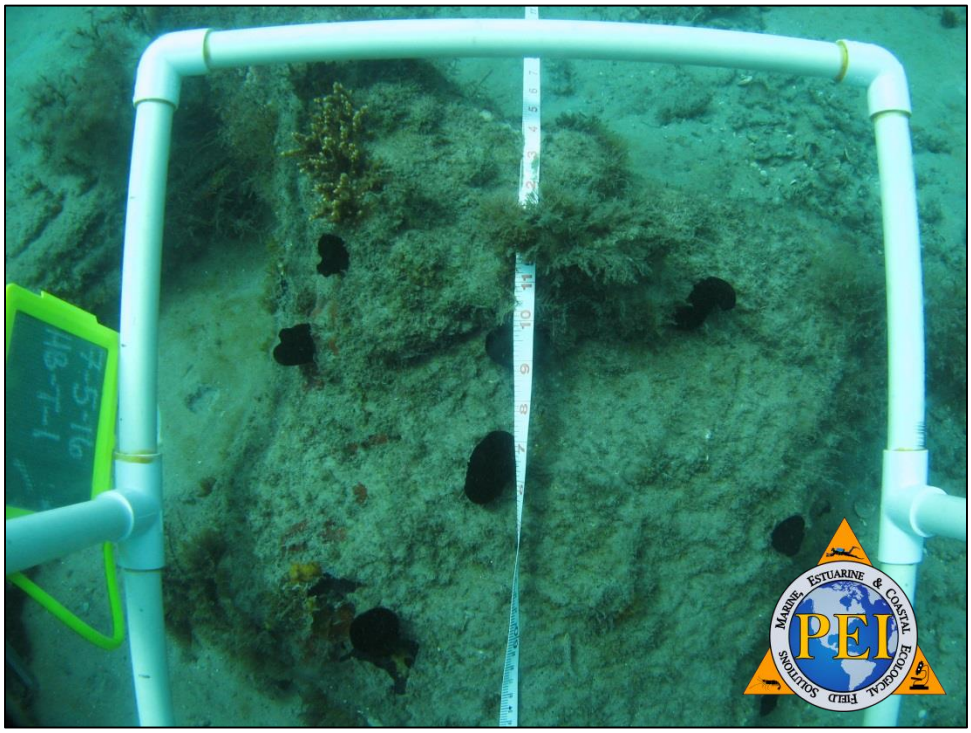

Photo 11. A 0.25-meter^2 quadrat was used to take photographs at a fixed distance above the substrate along hardbottom transcuts. Photographs were then analyzed using CPCe software to determine percent cover of substrate and biota.

Photo 12. Overview of hard bottom topography at Sample Station HB-1.

Photo 13. Black tunicates (*Ascidia nigra)* within photo quadrat on hard bottom at Sample Station HB-1.

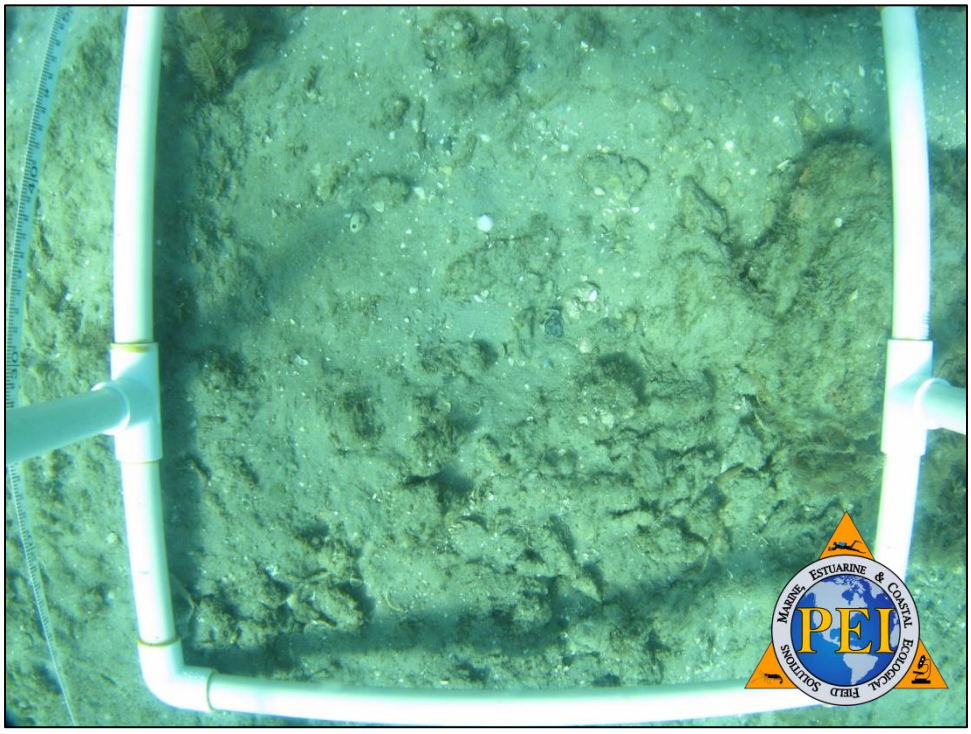

Photo 14. Emergent rock and rubble within photo quadrat at Sample Station HB-4.

Photo 15. Sponges, hydroids, and tunicates colonized hard bottom at Sample Station HB-4. A scientist points out juvenile lesser starlet corals (*Siderastrea radians*).

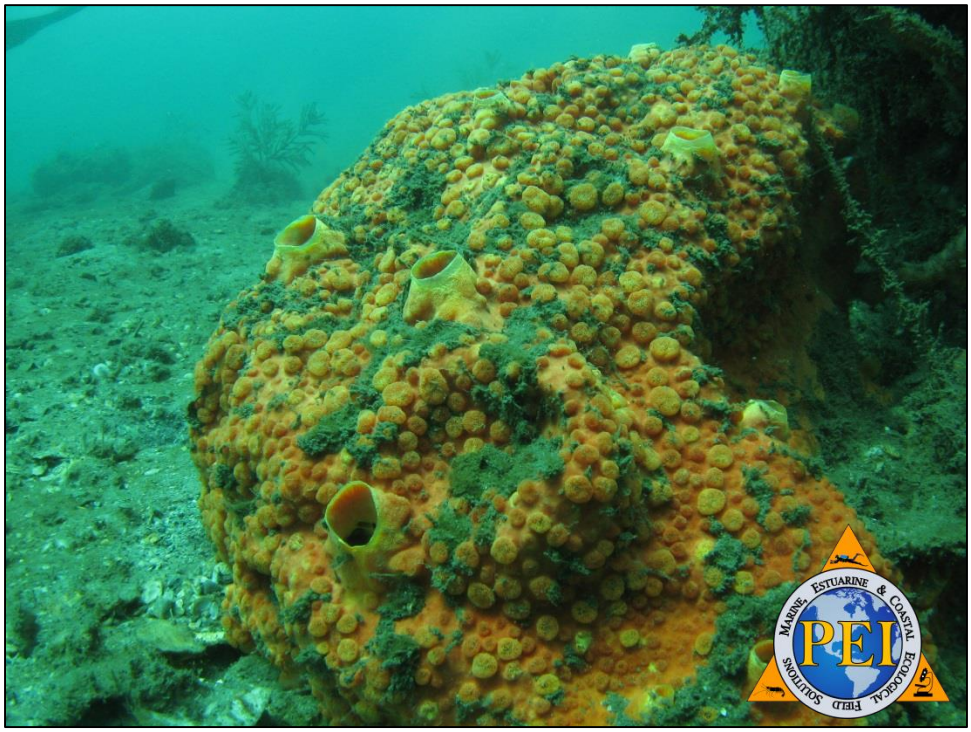

Photo 16. A close-up of the red boring sponge (*Cliona delitrix*) at Sample Station HB-3.

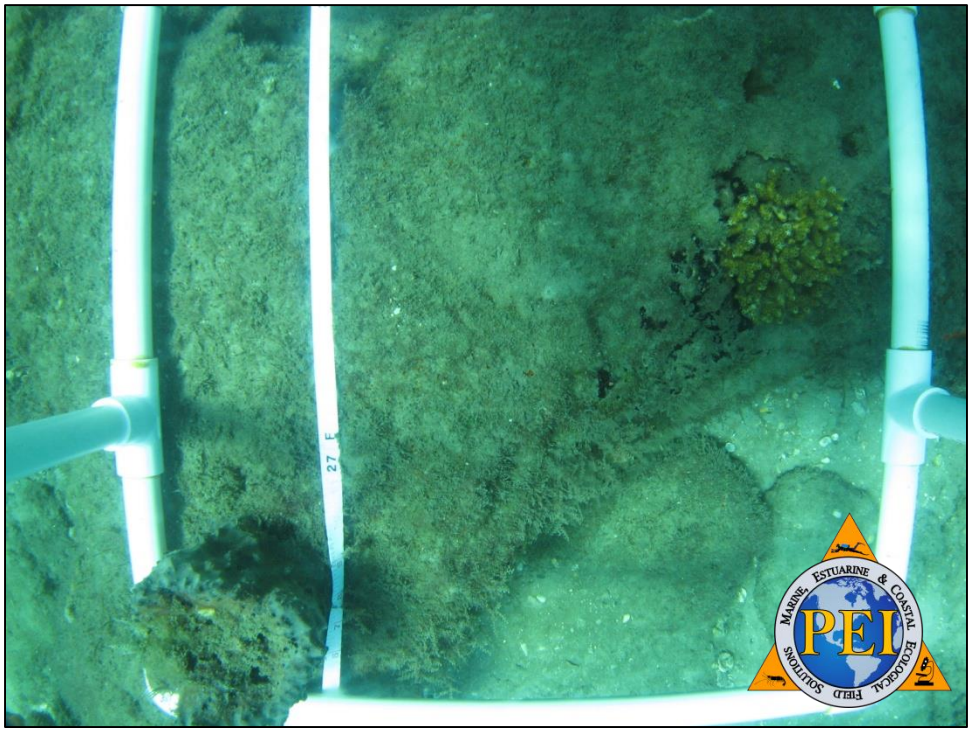

Photo 17. Ivory bush coral (*Oculina diffusa*) and ball sponge (*Ircinia* sp.) observed in photo quadrat at Sample Station HB-5.

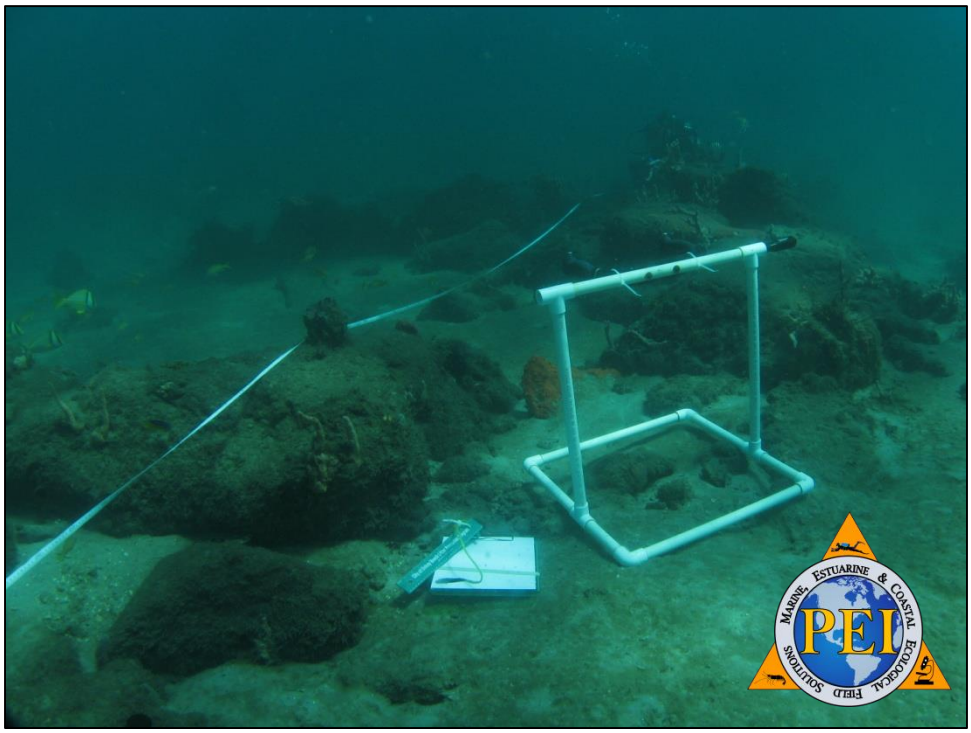

Photo 18. Representation of transect and photo quadrat set-up within Sample Station HB-5.

Photo 19. A scientist measures an ivory bush coral (*Oculina diffusa)* colony at Sample Station HB-5.

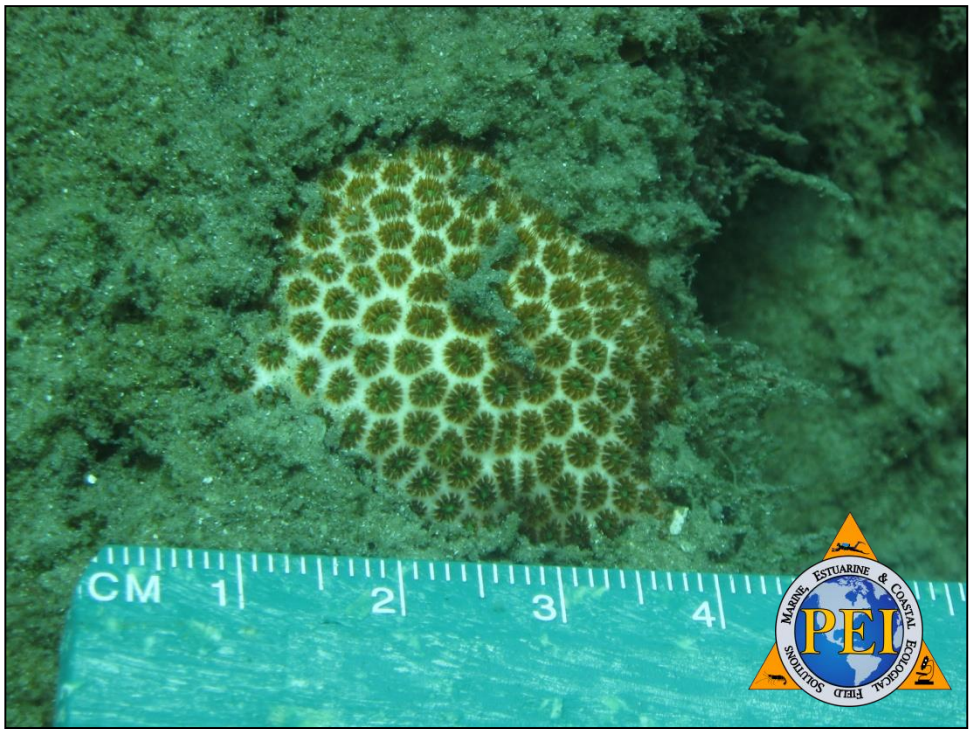

Photo 20. A blushing star coral (*Stephanocoenia intersepta*) observed at Sample Station HB-5.

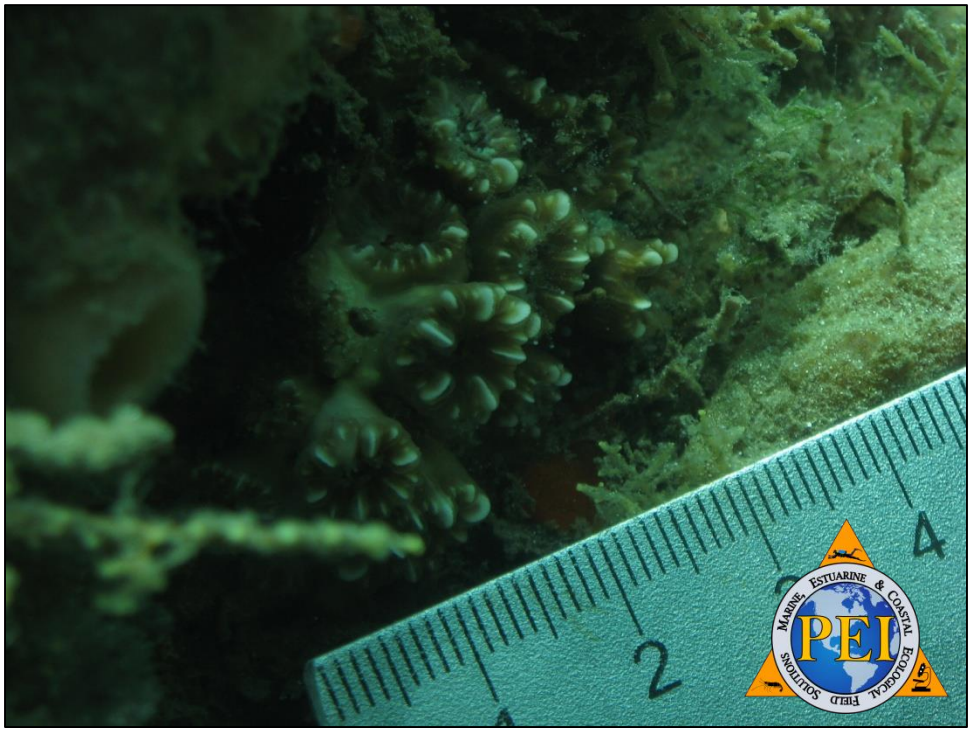

Photo 21. Scientist measuring hidden cup coral (*Phyllangia americana*) at Sample Station HB-5.

Photo 22. Yellow stingray (*Urobatis jamaicensis*) and West Indian sea egg (*Tripneutes ventricosus*) observed along the benthic habitat at Sample Station HB-5.

Photo 23. Aggregations of porkfish (*Anisotremus virginicus)* and sergeant majors (*Abudefduf saxatilis*) were observed at Sample Station HB-5.

Photo 24. View of quantitative transect and quadrat set-up at Sample Station SG-4.

Photo 25. A scientist collects quantitative seagrass data at Sample Station SG-4.

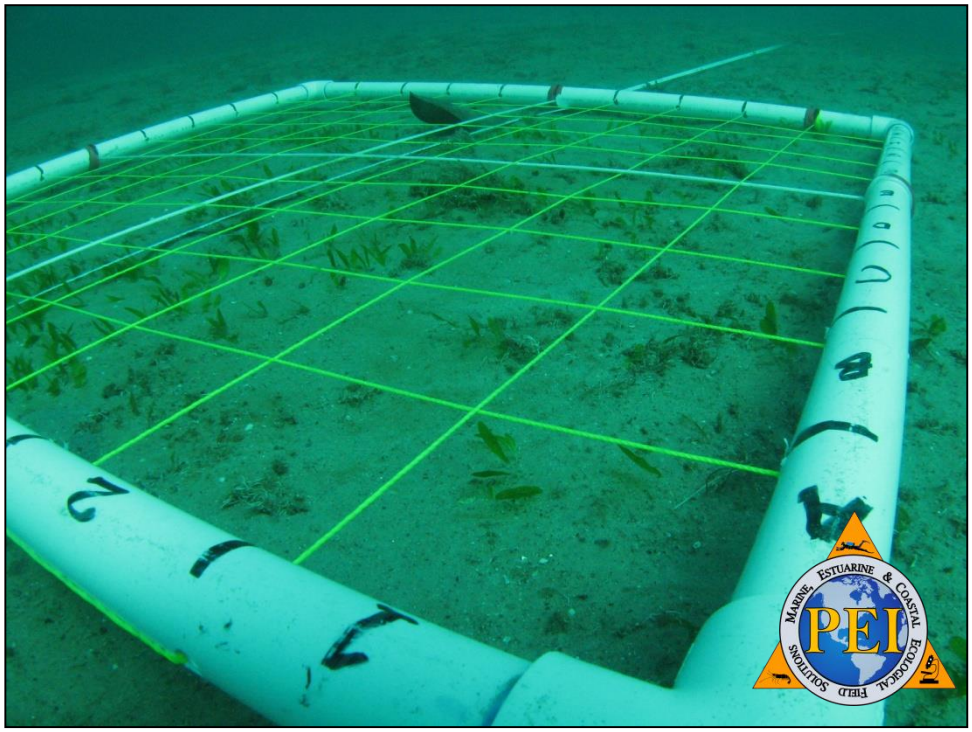

Photo 26. Close up view of quantitative seagrass survey quadrat with paddle grass (*Halophila decipiens*) at Sample Station SG-4.

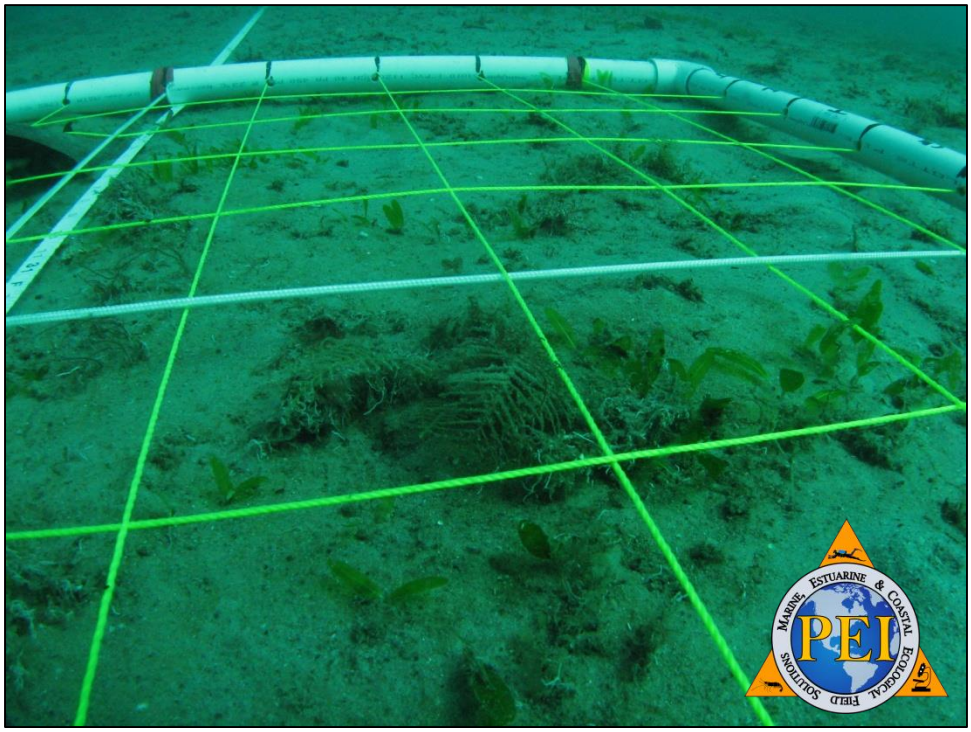

Photo 27. Paddle grass (*Halophila decipiens*) and hydroids at Sample Station SG-4.

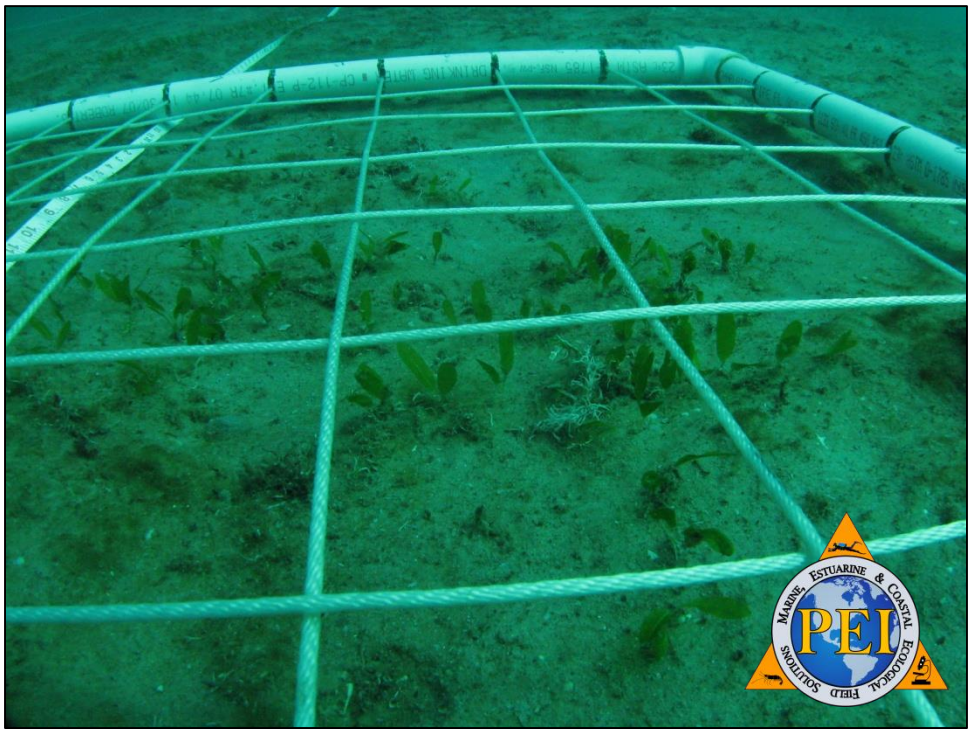

Photo 28. Paddle grass *(Halophila decipiens*) within a quantitative seagrass quadrat at Sample Station SG-6.

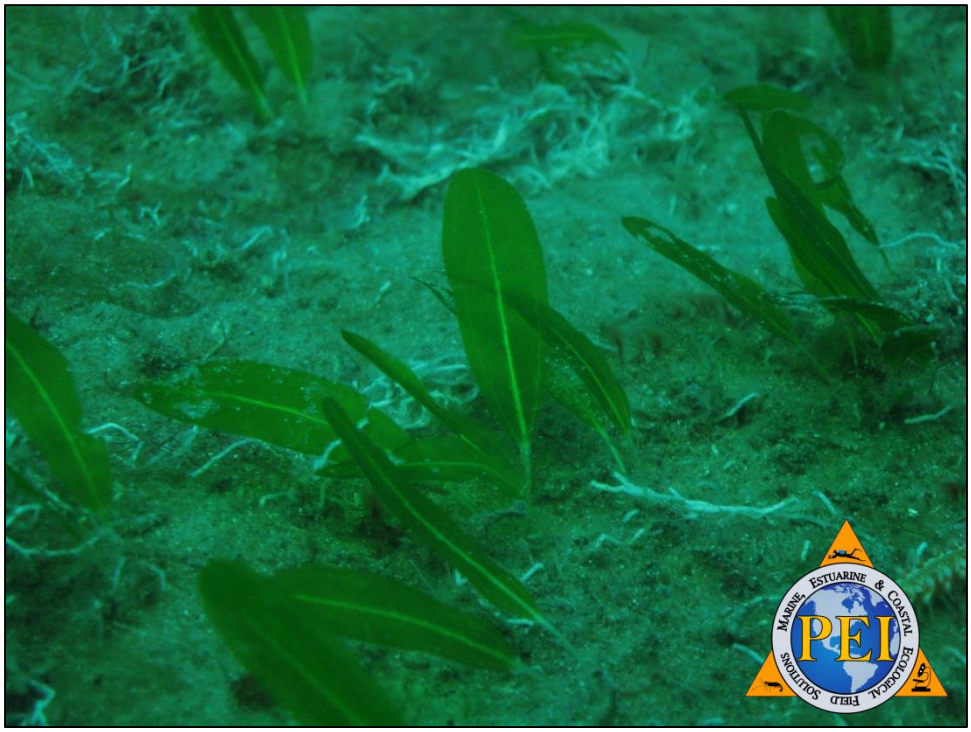

Photo 29. Close up view of paddle grass (*Halophila decipiens)* at Sample Station SG-4.

Photo 30. Rock and rubble with a shell/sand substrate at Sample Station HB-2.

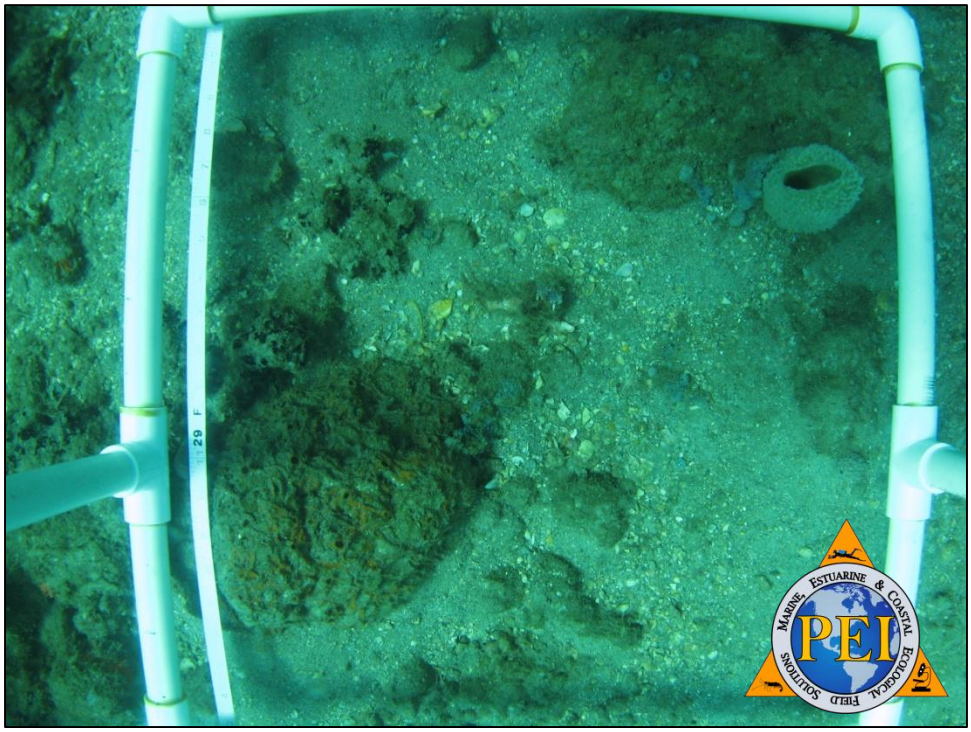

Photo 31. Encrusting sponge and vase sponge observed within a photo quadrat at Sample Station HB-2.

Photo 32. Rope sponges and small juvenile massive starlet coral (*Siderastrea siderea*) observed at Sample Station HB-2.

Photo 33. Adult grey angelfish (*Pomacanthus arcuatus)* and juvenile French angelfish (*Pomacanthus paru*) observed along with a variety of sponges colonizing Emergent Rock Rubble with Sand habitat at Sample Station HB-2.

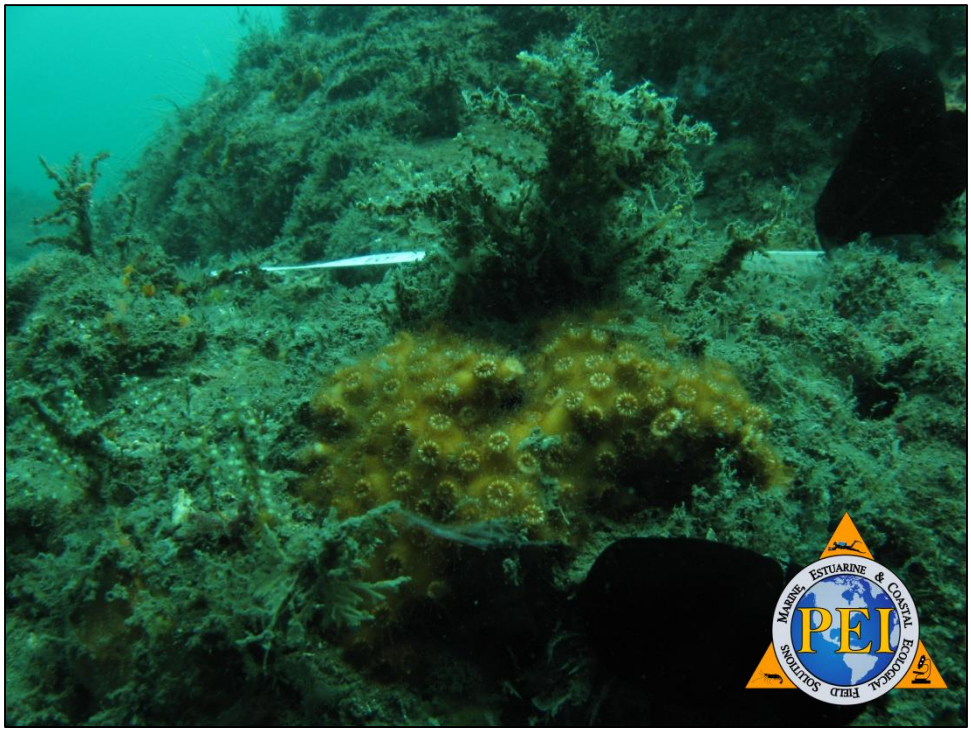

Photo 34. Ivory bush coral (*Oculina diffusa)* observed at Sample Station HB-3.

Photo 35. Overview of benthic topography at Sample Station HB-3.

Photo 36. Multiple rope sponge species were observed colonizing rubble at Sample Station HB-3.

Photo 37. Sand and shell substrate at Sample Station HB-3.

Photo 38. Cushion sea star (*Oreaster reticulatus*) observed at Sample Station HB-3.

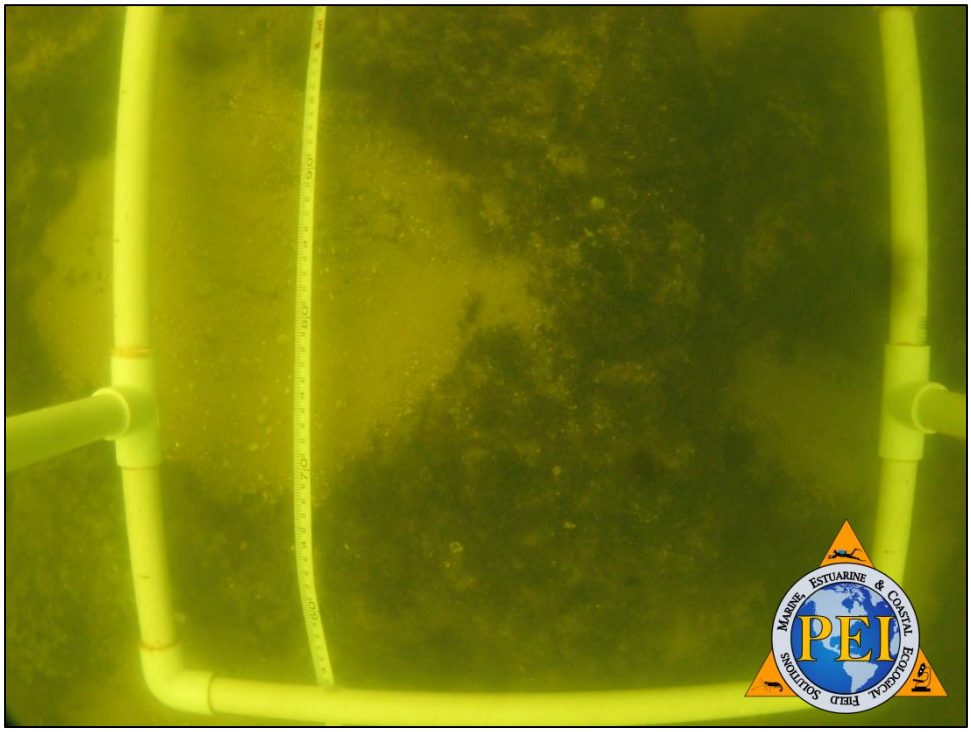

Photo 39. Hardbottom outcrop at Sample Station HB-6.

Photo 40. Sponge communities observed at Sample Station HB-6.

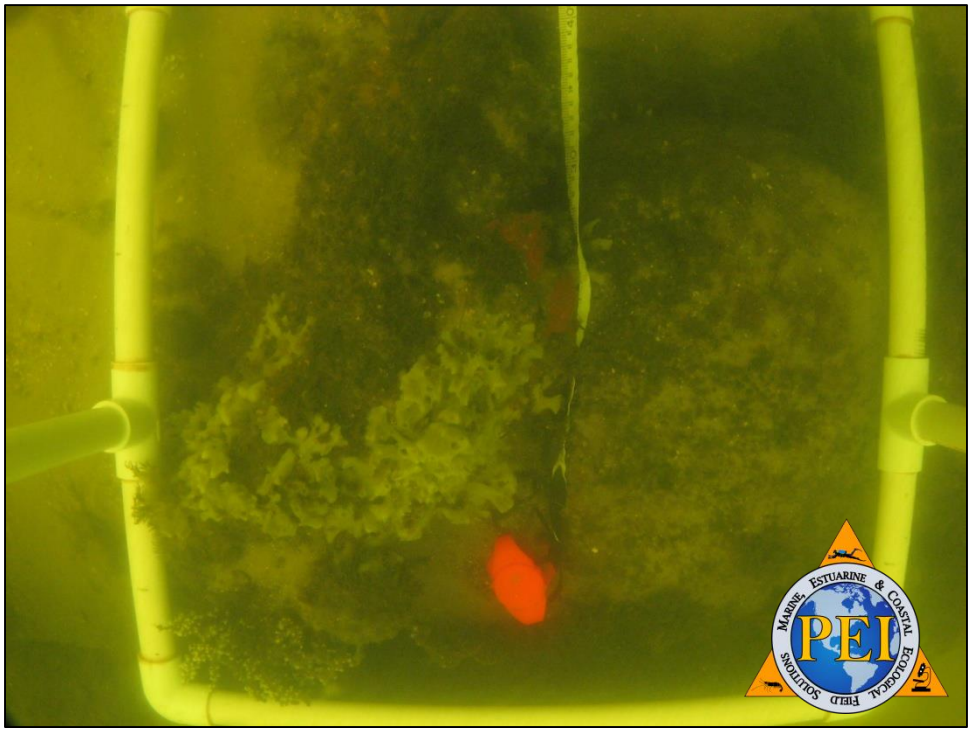

Photo 41. Sponge and hydroid communities observed at Sample Station HB-6.

Photo 42. Rock and rubble substrate at Sample Station HB-7.

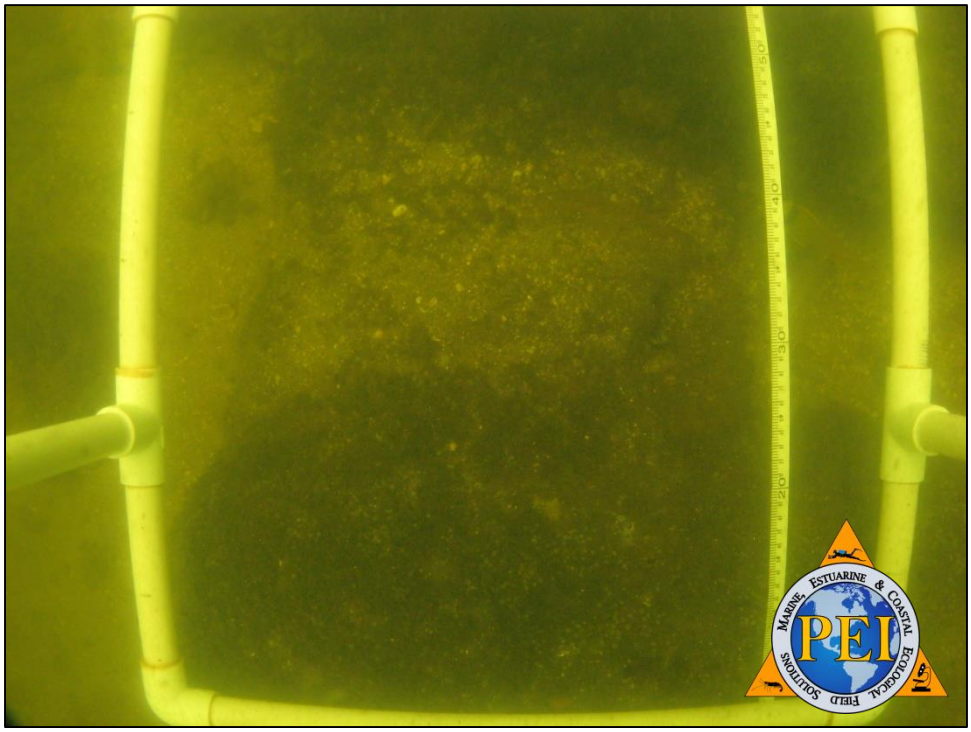

Photo 43. Rock and rubble substrate at Sample Station HB-7.

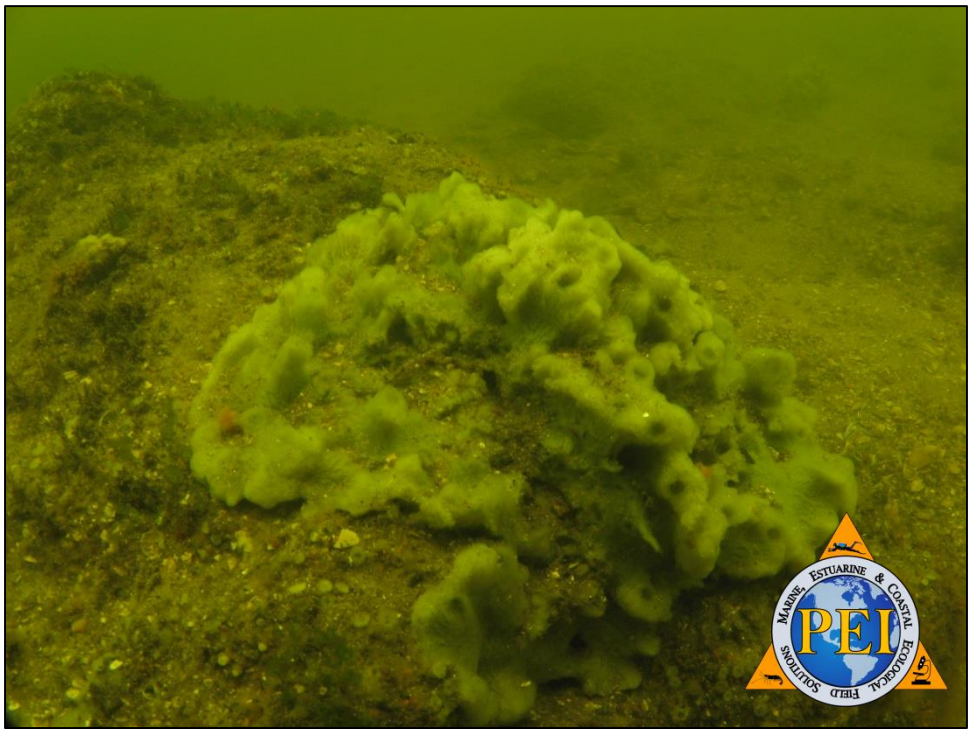

Photo 44. Sponge observed colonizing rock rubble at Sample Station HB-7.