INDIAN RIVER COUNTY
SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT – PHASE II
IRC PROJECT NO. 2109

CONSTRUCTION SPECIFICATIONS

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INDIAN RIVER COUNTY
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SUPPLEMENTAL
GENERAL PROVISIONS
JULY 2021

INDIAN RIVER COUNTY
SECTOR 3 DUNE REPAIR PROJECT
PHASE II

CONSTRUCTION SPECIFICATIONS

PART I – SUPPLEMENTAL GENERAL PROVISIONS

GP-1 SCOPE OF WORK

The Work covered by this section consists of furnishing all plant, labor, equipment, supplies and material, and of performing all operations and surveys in connection with excavating and/or hauling, transporting, placing, dressing, and grading dune fill and supplying, installing, and monitoring dune vegetation as indicated in the Plans and in accordance with the Contract Documents. The Work shall be completed either via use of a hydraulic pipeline (directly to the shore or via scow or hopper dredge), truck haul method, or a combination of the two methods of sand placement. A mechanical (clamshell) dredge will not be allowed.

The General Provisions provided herein are applicable to both sand placement methods. In the event that the Contractor elects to place fill material via dredging the offshore borrow area (solely or in combination with truck haul sand placement), the Offshore Borrow Area Technical Provisions (Part 2) shall be applicable to all aspects of sand placement associated with this method. In the event that the Contractor elects to place fill material via truck haul methods (solely or in combination with dredging sand placement), the Upland Sand Source Technical Provisions (Part 3) shall be applicable to all aspects of sand placement associated with this method.

1.1 **Permits:** Florida Department of Environmental Protection (FDEP) and U.S. Army Corps of Engineers (USACE) permits for the project have been obtained by the COUNTY prior to award of a construction contract. The COUNTY has received permits from FDEP (Appendix A) and the USACE (Appendix B). These Technical Provisions cite conditions within the FDEP permit and USACE permit. The CONTRACTOR shall comply with the Technical Provisions and the FDEP and USACE permits.

1.2 **Other Permits:** The CONTRACTOR is solely responsible for obtaining, at his/her own cost, all other approvals for the excavation and transportation of fill and all other material to the project site. This includes, but is not limited to, any and all roadway permits, customs clearances, offsite storage and staging areas, and business licenses required to deliver material to the site.

1.3 **Commencement, Prosecution, and Completion of Work:** The CONTRACTOR shall commence Work under the contract within fourteen (14) days after the Notice to Proceed has been issued by the COUNTY and shall complete all works within ~~two-hundred and ten (210)~~ one hundred and fifty (150) days of the issuance of the Notice to Proceed or by April 30, 2022, whichever comes first. The time stated for completion shall include all aspects of the Work including grading, leveling of escarpments in the beach, tilling the beach, dune planting, final clean-up of the premises, and all repairs or restorations of facilities, structures, work areas, staging areas, vegetation, submerged marine resources, or any other items damaged by the CONTRACTOR or their subcontractors as a result of the project construction activities, and complete demobilization from the project site.

1.4 Construction Window: Permits for the project restrict Work conducted on the beach associated with the placement of beach and dune fill and the installation of dune vegetation to the period from November 1, 2021 through April 30, 2022. The permit requires sea turtle nest surveys be completed each morning if construction occurs in November, March or April. No Work may be conducted on the beach outside of these construction windows. Any approved time extension shall occur within the following construction window.

GP-2 PROJECT DESCRIPTION

The project is located on the east coast of Florida bordering the Atlantic Ocean within Indian River County. Indian River County is located approximately 150 miles north of Miami and 100 miles southeast of Orlando. The total project area encompasses approximately ~~6.6~~ 2.9 miles of coastline in Wabasso Beach, Indian River Shores, and unincorporated Indian River County. The total fill volume to be placed within the beach and dune construction templates is approximately ~~670,600~~ 280,000 cubic yards of beach quality sand <u>from R-40 to R-55</u>. The total volume available in the offshore borrow area is estimated to be 1,419,000 cubic yards to the Design Elevation shown in two sub-areas shown on the Plans. Salt-tolerant dune vegetation (approximately ~~352,120~~ 302,820 plantings) will be planted on the restored dunes.

The staging and access areas are located at Wabasso Beach Park, Sea Grape Beach Access, and Turtle Trail Beach. Only the approved access points within the construction footprint are to be utilized during project construction. The project will be constructed using beach sand from the offshore borrow area, an approved upland sand source, or a combination of the two. It is assumed that the sand will have a relationship of 1.5 tons/cy for sand delivery from an upland source and volume computations. The equivalent fill volume is estimated to be ~~1,005,900~~ 420,000 tons.

The CONTRACTOR shall be expressly aware of the beach location and dynamic nature of this project site. This beach is a major tourist attraction and is highly utilized by tourists and residents throughout the year. Throughout the project, the CONTRACTOR shall put forth the utmost care and attention to public safety by maintaining a clean and organized site free from the accumulation of debris, and by restricting public access to the Work and staging areas.

GP-3 DELAYS AND EXTENSIONS OF TIME

3.1 Notice of Delays: Whenever the CONTRACTOR experiences any delay in the prosecution of the Work, the CONTRACTOR shall, immediately upon the occurrence of any event giving rise to a delay, and in any event no later than 72 hours after the onset of the delay, notify the ENGINEER in writing of the occurrence of such delay and its cause and probable length in order that the ENGINEER may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work are to be delayed thereby. The notice must also demonstrate that the CONTRACTOR will or has used all reasonable means to minimize the delay and contain an estimate of the probable effect that such delay will have on the progress and final completion

of the Work. Notification of occurrence of delay will not be considered unless submitted IN WRITING. Delays due to ocean conditions shall not apply to land-based work.

3.2 **Remedies for Avoidable Delays:** If (a) the Work called for under this Contract is not finished and completed by the CONTRACTOR in accordance with all requirements, and within the time specified for completion in the Contract Documents, including authorized Change Orders or suspensions of Work not due to the CONTRACTOR's failure to perform according to the Contract Documents; or, (b) if at any time prior to the expiration of said time it should appear to the COUNTY that the CONTRACTOR will be unable to finish and complete said Work as aforesaid within said time, then in that event the COUNTY may terminate this Contract as provided in the COUNTY's Standard Terms and Conditions; or in the exercise of its sole and absolute discretion, allow the CONTRACTOR to complete the Work, providing permits and approvals may be modified to extend the Work period, but charge to CONTRACTOR and deduct from the final payment due to the Work, engineering, construction observation, legal and/or administrative expenses computed on the basis equal to the amount of Liquidated Damages specified herein per day until completion of the Work. Any remobilization/demobilization necessary to complete the Work will be done at the CONTRACTOR's expense. Notwithstanding an election made pursuant to this paragraph, the COUNTY may thereafter terminate the Contract, as provided in the COUNTY's Standard Terms and Conditions, if the COUNTY is not adequately assured of prompt completion.

3.3 **Time Extension for Delays for Weather or Sea State which Prevent Work From Being Accomplished:** The CONTRACTOR shall become familiar with the weather and sea conditions for the project site prior to submitting a bid for the Work and shall include appropriate downtime based on the equipment being proposed to execute the Work within the contractual time for completion. Time extension for delays for unusual weather or sea state which prevent Work from being accomplished by the CONTRACTOR will be granted if:

(a) Project permits allow the Work to continue, or time extension to be granted;
(b) A request is made in writing within 72 hours of the delay;
(c) The delay is substantiated, in writing and with wave or weather data, within 72 hours of the onset of the delay;
(d) The wave or weather data indicates that the dredge or other similarly critical equipment had to be removed from the project area for safety reasons;
(e) If steps (b), (c) and (d) are not addressed or could not be proven, the COUNTY may not grant an extension of time to complete the project.

3.4 **Permit Time Extensions:** If construction is not completed within the time frame of the permits, the COUNTY may seek modification of permits to allow construction past the permit deadline for construction completion. If the COUNTY attempted to extend the permits deadlines and is unsuccessful in obtaining an extension of time in the permits to complete construction, or if the time extension granted

to the COUNTY is not sufficient to complete construction, then the COUNTY may take one of the following actions:

(a) Terminate the Contract and compensate the CONTRACTOR for fill placed within the construction template(s) and for demobilization from the project site in accordance with Contract Documents.

(b) Negotiate with the CONTRACTOR to seek an acceptable agreement allowing for project completion when (if) permits and regulatory agencies allow for the resumption of project construction activities at a later date.

(c) Require the CONTRACTOR to remobilize, at the CONTRACTOR's own expense, to complete the project as permit conditions and time frames allow if it is determined by the COUNTY that the CONTRACTOR failed to complete the project by the end of the construction period as identified in the Contract Documents or the permits due to the negligence of the CONTRACTOR.

GP-4 LIQUIDATED DAMAGES

In case of failure on the part of the CONTRACTOR to complete the Work including hydraulic filling and/or truck haul sand placement of the construction templates and demobilization from the beach within the time fixed in the Contract Documents, the CONTRACTOR will be liable for Liquidated Damages (LD) for each and every day's delay over and above the number of calendar days prescribed for completing the Work. Refer to the County's standard general conditions for terms and conditions associated with Liquidated Damages.

GP-5 PERFORMANCE OF WORK BY CONTRACTOR

Please refer to the COUNTY's Standard Terms and Conditions in addition to the following:

5.1 **Contractor Participation:** Refer to the County's standard conditions for minimum Contractor participation requirements.

5.2 **Continuous Construction:** The CONTRACTOR and his/her subcontractors shall continuously maintain at the project site and on the job, the dredge, materials, equipment and adequate personnel required to continuously construct the project. Under no circumstances will the CONTRACTOR remove the dredge, equipment, materials, subcontractors, and adequate numbers of personnel from the project site without the written consent of the COUNTY unless one or more of the following occurs: the project is determined by the COUNTY to be complete; weather or sea state conditions require movement from the project site; a condition exists which threatens the safety and welfare of personnel or threatens equipment; or the time frame provided for project construction in the Contract Documents, the State of Florida or Federal permits has expired. Removal of equipment, personnel, materials, or subcontractors from the project site which interrupts Work progress, without valid reason, prior to the completion of the project, will result in the imposition of liquidated damages.

5.3 **Capacity:** The CONTRACTOR shall meet the standards for capacity, productivity, and ability to maintain it throughout the time allotted for construction.

GP-6 SUBCONTRACTORS

Please refer to the COUNTY's Standard Terms and Conditions in addition to the following:

6.1 **Subcontractor Qualifications:** The CONTRACTOR shall furnish within the bid documents the names of subcontractors proposed for any portion of the Work and provide appropriate information in the bid, such as company experience, personnel experience, equipment, and references to verify the qualifications of the subcontractor to complete the assigned portion of the Work. The CONTRACTOR may use the subcontractors listed in the bid to conduct the Work, and shall identify the Work to be performed by the subcontractor.

6.2 **List of Subcontractors:** A complete list of Subcontractor's shall be provided in writing to the COUNTY and ENGINEER fourteen (14) days prior to the Pre-Construction Conference.

6.3 **Subcontractor Insurance Coverage:** Refer to the COUNTY's Standard Terms and Conditions.

6.4 **Statues, Laws and Regulations:** The CONTRACTOR hereby agrees and shall be solely responsible for ensuring that the CONTRACTOR and any subcontractors fully comply with the requirements of any applicable ordinances, statutes, laws or regulations which may affect this project or the CONTRACTOR's/subcontractor's Work under this project. The CONTRACTOR further agrees that neither the COUNTY nor its ENGINEER shall be responsible for ensuring compliance or notification on any changes or modifications to any such applicable ordinances, laws, statutes, rules or regulations.

GP-7 SUPERINTENDENT

7.1 **Superintendent Qualifications:** The CONTRACTOR shall propose, in writing to the ENGINEER and COUNTY, the name and qualifications of the superintendent(s) whom will be on site for the duration of the beach nourishment project, who will be the CONTRACTOR's job site representative, and will control project construction for the CONTRACTOR. The name and qualifications of the superintendent(s) shall be submitted to the ENGINEER and COUNTY fourteen (14) days prior to the Pre-Construction Conference. The COUNTY and/or ENGINEER may reject the superintendent proposed by the CONTRACTOR. If the proposed superintendent is rejected, the CONTRACTOR will propose an alternate superintendent as soon as possible and without additional cost to the COUNTY.

7.2 **Requirements:** Refer to the COUNTY's Standard Terms and Conditions.

GP-8 ENGINEER

8.1 Technical Issues: The ENGINEER shall decide all technical issues of whatever nature may arise relative to the interpretation of the technical portions of the Contract Documents, the Plans, surveys and beach fill volume measurement, and prosecution and fulfillment of this Contract, and as to the character, quality, amount, and value of any Work done and materials furnished under this Contract.

8.2 Engineer Access to the Dredge and Work Site: The ENGINEER shall have unlimited access to the dredge, beach nourishment construction site and all CONTRACTOR vessels. The CONTRACTOR shall furnish, at the request of the ENGINEER, safe and suitable transportation from the shore to and from the various pieces of equipment, including the dredge, barges, to and from the spoil site (beach fill area), or as required to administer the Contract Documents. The presence or absence of the ENGINEER shall not relieve the CONTRACTOR of the responsibility for the proper execution of the Work in accordance with the Contract Documents.

GP-9 TECHNICAL DISPUTE RESOLUTION

The CONTRACTOR shall perform the Work as specified by the Contract Documents. The ENGINEER will interpret the requirements of the technical portion of the Work, as specified in the Technical Provisions and Plans of the Contract Documents. If the CONTRACTOR objects to the ENGINEER's decision, the CONTRACTOR shall, within 48 hours of receiving the ENGINEER’s decision, notify the ENGINEER in writing of the CONTRACTOR's objection thereto. The CONTRACTOR and ENGINEER will mutually attempt to resolve the issue; nevertheless, the ENGINEER’s decision will be binding upon the CONTRACTOR.

GP-10 MEETINGS

10.1 Pre-Bid Meeting: See Invitation for Bid.

10.2 Contract Pre-Construction Conference: A mandatory pre-construction conference will be held at the COUNTY’s offices with the ENGINEER, COUNTY, and CONTRACTOR. After the Contract is awarded and before construction operations commence, the CONTRACTOR shall meet with the ENGINEER and COUNTY at the COUNTY's office to discuss the quality control requirements, the permits, and the project. This shall be referred to as a Contract pre-construction conference. The meeting shall develop mutual understanding relative to details of the system, including the forms to be used for recording the quality control operations, inspections, daily reports, applications for payment, administration of the system and the interrelationship of the CONTRACTOR, ENGINEER and COUNTY and their respective personnel. During the meeting, the CONTRACTOR shall present their proposed means of construction, including methodology for building the construction template, to the COUNTY and ENGINEER.

10.3 Permit Pre-Construction Conference: A mandatory pre-construction meeting will be held at the COUNTY's offices with the ENGINEER, COUNTY, CONTRACTOR, marine turtle license holder, shorebird monitor, appropriate State and Federal agencies, and any other individuals as required in compliance with project permit requirements, to discuss permit conditions. This meeting is separate from the pre-construction conference described above, which will also be held in Indian River County. These two meetings may be coordinated to occur at the same location, and/or on the same day, pending agency availability.

10.4 Weekly Progress Meetings: Mandatory weekly progress meetings will be by teleconference or in-person at the COUNTY's offices during construction with the ENGINEER, COUNTY, and CONTRACTOR to discuss project progress.

GP-11 SUBMITTALS AND NOTIFICATIONS

The CONTRACTOR shall submit the following items to the ENGINEER at the appropriate times:

11.1 Construction Schedule and Methods: A minimum of seven (7) days prior to the contract pre-construction conference, the CONTRACTOR shall prepare and submit to the ENGINEER, for approval, a practicable construction schedule and methodology statement for construction of each portion of the Work. The order of Work may be modified at the contract pre-construction meeting to accommodate local priorities. The project schedule shall indicate, at a minimum, start of Work, construction period, fill placement (and/or dredging) completion date, beach tilling, and completion of all Work. The CONTRACTOR shall propose the order in which the Work will be performed, including the anticipated progression of fill placement in the project area. The project schedule shall be updated weekly during construction and submitted at each progress meeting so that local property owners can plan for the CONTRACTOR's activity, if needed. No Work on site shall begin until the schedule is provided to the ENGINEER. Approval by the ENGINEER indicates an acknowledgement and not an endorsement of the CONTRACTOR's means and methods. The methodology statement shall include a description of the CONTRACTOR's sequence of dredging the borrow area, direction of Work, turbidity control plan, and utilization of construction accesses if sand placement will occur via dredging. The methodology statement shall include a description of the CONTRACTOR's truck ticket tracking system, direction of the Work, and utilization plan of the construction accesses if sand placement will occur via truck haul.

11.2 Material and Equipment Transport, Storage, and Access: At least seven (7) days prior to the contract pre-construction conference, the CONTRACTOR shall provide to the ENGINEER a description of the routes and areas he intends to use to transport and store material and equipment during the project. The description shall also describe how the CONTRACTOR intends to access the Work area. All transport routes, Work areas, storage areas, access areas, and facilities are subject to review by the ENGINEER and COUNTY for compliance with the Plans and Specifications.

11.3 **Contact List:** At least seven (7) days prior to the contract pre-construction conference, the CONTRACTOR shall submit a list of project personnel, including subcontractors, and their telephone, e-mail address, telefax, and other numbers by which key personnel can be reached for purposes of notification and other matters discussed in these Specifications. Nevertheless, the CONTRACTOR remains responsible for all Work and shall be the point of contact and in responsible charge of the subcontractor for the duration of the Work.

11.4 **Daily Quality Control Reports:** The CONTRACTOR shall submit daily reports that summarize the Work completed at the end of each workday. Daily Quality Control Reports shall be submitted every contract day during the construction period (even when no Work is done) between the time at which the Notice to Proceed is issued and the time of final acceptance. Reports shall be submitted by 12:00 p.m. to the ENGINEER on a daily basis via e-mail. The reports shall include all Work activity including, but not limited to, the location (coordinates or stationing) of Work, daily and cumulative quantities of sand placed, placement surveys, weather conditions, turbidity reports, personnel, materials, and on-site equipment. A copy of the required daily report is included in Appendix A of the Specifications. The CONTRACTOR shall either use the Offshore Borrow Area or Upland Sand Source daily report, or a combination of the two depending on the method of sand placement employed. If the Offshore Borrow Area sand source is utilized by the CONTRACTOR, dredge positioning data shall be submitted with the CONTRACTOR's daily report.

11.5 **Unsuitable Material:** The ENGINEER or COUNTY will provide daily observations and take samples from trucks at the mine, sediment pipeline outfall location, and/or at the beach. This does not alleviate the CONTRACTOR from any responsibilities for unsuitable materials. It is the CONTRACTOR's responsibility to ensure fill material placed on the beach/dune template meets or exceeds project specifications. The CONTRACTOR shall notify the ENGINEER immediately upon the discovery of any unsuitable material delivered to or within the fill area. Further actions to be taken upon encountering unsuitable materials are defined in the Sediment QA/QC Plan provided in Appendices D and E.

11.6 **Surveys:** The CONTRACTOR shall provide pay surveys (pre- and post-placement) for review by the ENGINEER.

11.7 **Maintenance of Traffic:** The CONTRACTOR shall provide a Traffic Control Plan at least seven (7) days prior to the contract pre-construction conference. The Plan shall outline the signage and methods the CONTRACTOR will use to minimize disturbance to normal traffic flows in the project area as part of the Plan. The CONTRACTOR shall utilize flagmen when unloading materials and mobilizing or demobilizing equipment from the construction site. The ENGINEER or COUNTY may request modifications to the Plan.

11.8 Pre-/Post-Construction Condition: The CONTRACTOR shall provide copies of the pre-construction video and/or photography at least one (1) day prior to the start of construction documenting the condition of the project site including, but not limited to, construction accesses, staging areas, infrastructure, and vegetation. In addition to documenting project site conditions, the CONTRACTOR shall document beach conditions at least one (1) day prior to the start of construction and immediately after construction using an Unmanned Aircraft System (UAS). The path of the pre-construction and post-construction UAS flight shall be within the fill template at a sufficient elevation to capture the entire dry beach. Post-construction video and/or photography shall be provided after completion of Work to allow for final payment.

11.9 Grade Stake Recovery Plan & Log: This Plan applies if grade stakes are used. Within seven (7) days of Notice to Proceed, the CONTRACTOR shall submit a Grade Stake Recovery Plan acceptable to the ENGINEER and the COUNTY. The Plan shall outline the steps that the CONTRACTOR will implement to recover all the stakes used on the project as required. This Plan shall include the use of an inventory log that will be made available for review by the ENGINEER. Upon completion of the project, the CONTRACTOR shall furnish a final grade stake log to the COUNTY.

11.10 Name and Qualifications of Turbidity Monitor: As required by permits, the CONTRACTOR shall submit the name and qualifications of all turbidity monitors to be used on the project within the bid package as described in the Technical Provisions, and as a pre-requisite for an FDEP Notice to Proceed. The turbidity meter calibration shall also be submitted.

11.11 General Plans and Information: The CONTRACTOR shall provide the following additional submittals at least seven (7) days prior to commencement of the Work:

(a) Quality Control Plan
(b) Accident Prevention Plan
(c) Environmental Protection Plan
(d) Hurricane and Severe Storm Plan
(e) Transport, Storage, and Access Plan

11.12 General Notifications: The CONTRACTOR shall provide the following notifications at the appropriate times, if applicable:

(a) Notification of Plans/Specifications Discrepancy
(b) Notification of Cultural Resource Discovery
(c) Notification of Misplaced Material
(d) Notification of Occurrence of Delays in Work
(e) Claims and Disputes
(f) Reports of All Inspections, Surveys, and Tests and Remedial Actions

Further details on submittals and notifications, including their due dates, are provided in the contract and herein. A schedule of submittals required in the General Provisions is provided in **Table 1**.

Table 1: Schedule of Submittals Required by the General Provisions

SPEC REFERENCE	DELIVERABLE	SUBMITTAL
GP - 8.3	List of Subcontractors	14 days prior to Contract Pre-Construction Conference
GP - 10.1	Names and Qualifications of Superintendent(s)	14 days prior to Contract Pre-Construction Conference
GP - 13.1	Pre-Bid Meeting	Non-Mandatory Attendance; but strongly encouraged. See Invitation for Bid
GP - 13.2	Contract Pre-Construction Conference	Prior to Construction
GP - 13.3	Permit Pre-Construction Conference	Prior to Construction
GP - 14.1	Construction Schedule and Methods	Minimum of 7 days prior to Contract Pre-Construction Conference
GP - 14.2	Material and Equipment Transport, Storage, and Access	Minimum of 7 days prior to Contract Pre-Construction Conference
GP - 14.3	Contact List	Minimum of 7 days prior to Contract Pre-Construction Conference
GP - 14.7	Maintenance of Traffic	Minimum of 7 days prior to Contract Pre-Construction Conference
GP - 14.8	Pre-/Post-Construction Condition (Imagery)	Minimum of 1 day prior to the start of construction and prior to final payment
GP - 14.9	Grade Stake Recovery Plan and Log	Within 7 days of the Notice to Proceed
GP - 14.10	Name and Qualifications of Turbidity Monitor	To be Submitted with Bid Package
GP - 14.11(a)	Quality Control Plan	Minimum of 7 days prior to commencement of the Work
GP - 14.11(b)	Accident Prevention Plan	Minimum of 7 days prior to commencement of the Work
GP - 14.11(c)	Environmental Protection Plan	Minimum of 7 days prior to commencement of the Work
GP - 14.11(d)	Hurricane and Severe Storm Plan	Minimum of 7 days prior to commencement of the Work
GP - 14.11(e)	Transport, Storage, and Access Plan	Minimum of 7 days prior to commencement of the Work
GP - 14.12(a)	Notification of Plans/Specifications Discrepancy	Appropriate Times
GP - 14.12(b)	Notification of Cultural Resource Discovery	Appropriate Times
GP - 14.12(c)	Notification of Misplaced Material	Appropriate Times
GP - 14.12(d)	Notification of Occurrence of Delays in Work	Appropriate Times
GP - 14.12(e)	Claims and Disputes	Appropriate Times
GP - 14.12(f)	Reports of All Inspections, Surveys, and Tests and Remedial Actions	Appropriate Times
GP - 15.1	Order of Work and Project Schedule	Minimum of 7 days prior to Contract Pre-Construction Conference
GP - 21.1.1	Notification of Intended Mobilization Date	At least 4 days prior to the Intended Mobilization Date
GP - 21.1.2	Notification of the Establishment of Survey Control	At least 2 days prior to the Establishment of Survey Control
GP - 21.1.3	Notification of the Intended Commencement of Dredging/Sand Placement	At least seven (7) days prior to the commencement of dredging and trans-porting sand from the offshore borrow area or at least seven (7) days prior to the commencement of truck hauls transporting sand from an upland source

GP - 21.1.4	Notification of Pre-Construction and As-Built Surveys	At least three (3) days prior to conducting pre-construction and as-built surveys for the offshore borrow area, dune fill and dune vegetation
GP - 21.1.5	Notification of Substantial Completion - Sand Fill	At least three (3) days prior to the date of expected substantial completion of sand fill placement
GP - 21.1.6	Notification of Substantial Completion - Dune Vegetation	At least three (3) days prior to the date of expected substantial completion of installation of dune vegetation
GP - 21.1.7	Notification of Final Completion	At least three (3) days prior to the date of expected final completion of the entire Work
GP - 31	Notice to Mariners	Immediately after the Notice to Proceed has been received and prior to the movement of floating equipment into the project area

GP-12 PHYSICAL DATA

Information and data furnished or referred to in the contract documents are furnished for informational purposes only and may not be representative of conditions at the time of construction and shall not be solely relied upon for estimating and/or prosecution of the Work. It is expressly understood that the ENGINEER or COUNTY will not be responsible for any interpretation or conclusion drawn therefrom by the CONTRACTOR. Likewise, the ENGINEER or COUNTY will not be responsible for any information provided to the CONTRACTOR by any information agency or other party.

GP-13 WEATHER CONDITIONS

The project area may be affected by tropical storms and hurricanes primarily from June through November, and by stormy and/or rainy weather, including severe thunderstorms, during any time of the year. Wave activity can occur at any time. The CONTRACTOR shall be responsible for obtaining information concerning rain, wind, and wave conditions that could influence safety and construction operations prior to making a bid.

GP-14 SURVEY STANDARDS AND SURVEYOR QUALIFICATIONS

The CONTRACTOR'S surveying personnel shall be duly qualified and experienced to perform all required surveys in a manner satisfactory to the COUNTY. A surveyor registered in the State of Florida shall be responsible for and certify all survey work under their direction. The registered surveyor is not obligated to actually perform the surveys. All surveys shall be in accordance with professional standards and practices. Hydrographic surveys shall be performed in accordance with EM 1110-2-1003 dated November 30, 2013 entitled "HYDROGRAPHIC SURVEYING" and the Florida Standards of Practice as presented in 5J-17 FAC. Survey notes shall be reduced to elevations, be neat, legible, and in accordance with accepted practices and shall include the date performed, weather conditions, bench marks or monument used, name and title of each member of the survey party, and the name of COUNTY’s representative present. Survey notes lacking information, illegible, or in error, will be returned to the CONTRACTOR for correction. Surveying instruments shall be checked for adjustment at least once per week and such checks shall be recorded in survey notes and on the quality control sheet.

The commencement point for each profile shall follow the control listed within the Plans. Topographic and bathymetric surveys shall use FDEP Division of Water Resource Management "A" monuments or other National Geodetic Survey (NGS) published 2nd order or higher marks as a basis for survey control. Tabular listings of all horizontal and vertical control on all existing "A" monuments shall be obtained through either the FDEP website or directly from the FDEP office.

All GPS base station control or range/azimuth system control shall be established or recovered from FDEP control monuments (typically "A" stations) and shall meet or exceed Geospatial Positioning Accuracy Standards, Range VIII. Designation, stamping, description, horizontal position, horizontal RMSE, elevation (in NAVD) and elevation RMSE shall be provided to the ENGINEER for all established base station control. Even if the FDEP R-monuments have been recently verified using “A” monuments, they should be re-verified by the CONTRACTOR. New or replaced FDEP and intermediate monuments shall be based on “A” monuments.

GP-15 ACCEPTANCE SECTIONS

Acceptance sections are defined as the portion of the restored beach lying between two immediately adjacent pay profile lines. Once fill placement begins in an acceptance section, it must be completed before moving to the adjacent acceptance section, unless otherwise authorized by the ENGINEER. Pay profiles will be established by the CONTRACTOR according to the Plans. The CONTRACTOR shall establish intermediate profiles in addition to those shown in the Plans to construct the project in accordance with plan view layout. The CONTRACTOR may submit the intermediate profiles for payment subject to review and approval by the ENGINEER.

GP-16 ACCESS, WORK AREAS, AND STORAGE AREAS

16.1 General: The general location and extent of the construction access areas, staging areas, and work areas are indicated in the Plans. Access points should be minimized as much as practicable. Unless otherwise directed in writing by the COUNTY, the CONTRACTOR is responsible for removing existing vegetation, fencing, and other impediments, as necessary, to allow equipment access and material deliveries to the work area. The CONTRACTOR shall landscape and restore those areas where access routes and staging areas are developed. The cost of preparing and maintaining the project area shall be included in the unit price cost for Supply/Deliver/Place Sand or Beach and Dune Fill; the cost of restoring the project area shall be included in the lump sum cost for Site Restoration & Grading.

16.2 Construction Access:

16.2.1 Land Access to the Project Site. Land access to the project area is through three (3) construction access locations shown in the Plans. The accesses include Wabasso Beach Park (R-39.5), Sea Grape Trail (R-47.5), and Turtle Trail (R-51.5). Only the approved access points within the construction footprint are to be utilized during project construction. The use of these accesses must be coordinated with the COUNTY to reduce disruption to the public’s use of these areas and congestion of the local traffic. The

CONTRACTOR is responsible for adhering to all weight and traffic regulations on all roadways.

16.2.2 Water Access to the Project Site:

16.2.2.1 The CONTRACTOR may deliver equipment, materials, and personnel by barge. The CONTRACTOR shall not leave the barge unattended.

16.2.2.2 Boat traffic in the near vicinity of the project site will consist primarily of pleasure or commercial fishing boats. Ocean-going cargo vessels may be encountered offshore of the project site.

16.2.2.3 The CONTRACTOR will be required to operate in compliance with any and all U.S. Coast Guard regulations and to conduct the Work in such a manner as to minimize any obstruction to navigation. If the CONTRACTOR's barge or other floating equipment so obstructs any navigation channel as to make navigation difficult or endanger the passage of vessels, said equipment shall be promptly moved on the approach of any vessel to such an extent as may be necessary to afford a practicable passage. Upon completion of the Work, the CONTRACTOR shall promptly remove the equipment, as well as ranges, buoys, piles and other marks or objects placed in navigable waters or onshore.

16.2.2.4 Hardbottom resources exist offshore of and the length of the project area. The CONTRACTOR shall avoid impacting and damaging hardbottom during construction operations. The CONTRACTOR shall report any contact or impacts to hardbottom to the COUNTY and ENGINEER immediately. The CONTRACTOR shall be responsible for all assessment of impacts, remediation, mitigation, fines, etc. resulting from damages to the hardbottom.

16.3 Construction Access and Staging Area: Construction access and staging areas provided by the COUNTY are shown in the Plans. The CONTRACTOR shall cordon off and/or fence the area to secure the area from the public. In an attempt to reduce impacts to public recreation and use of the beach, the CONTRACTOR shall consolidate construction activities, equipment, and materials to limit the number of construction access and staging areas being utilized at a given time. Coordination with the COUNTY and ENGINEER will be required. All costs associated with restoring the construction access and staging areas upon project completion shall be included in the CONTRACTOR’s lump sum cost for site restoration. If additional staging areas are required, they shall be procured and permitted by, and at the expense of, the CONTRACTOR.

16.4 Exclusion of Public: The CONTRACTOR will be required to exclude the public for safety purposes from the staging area and work areas in the immediate vicinity of the fill placement areas under active construction, transport operations, or any other area that may be dangerous to the public. The CONTRACTOR will minimize the areas closed to the public.

16.5 Pipeline Corridors: Six (6) pipeline corridors are shown in the Plans. The corridors extend across the nearshore hardbottom that persists offshore and the length of the fill placement area. Only the approved pipeline corridors within the construction footprint are to be utilized during project construction. The CONTRACTOR's submerged pipeline extending from offshore to the fill placement area shall be located within these corridors. The CONTRACTOR shall employ pipeline collars or a similar type of device to support the pipeline across existing hardbottom to minimize impacts to hardbottom. The approximate seaward edge of hardbottom, based on available data from 2016 and 2019, is shown in the Plans for informational purposes only. The pipeline corridors extend offshore beyond the -30 feet NAVD contour based on beach profile surveys conducted in February 2020. The CONTRACTOR shall be responsible for locating and avoiding impacts to hardbottom during construction. The CONTRACTOR shall be responsible for all assessment of impacts, remediation, mitigation, fines, etc. resulting from unauthorized impacts to the hardbottom. The CONTRACTOR shall be responsible for the pre-, during, and post-construction monitoring of the pipeline corridors in accordance with the FDEP approved Biological Monitoring Plan dated July 13, 2020 (ftp://ftp.dep.state.fl.us/pub/ENV-PRMT/indian_r/issued/0285993_IRC_Sector_3/009-JC/Final%20Order/).

16.6 Subaqueous Cable Crossings: The CONTRACTOR shall be responsible for verifying the locations and depths of all utility crossings and take precautions against damages that might result from his operations, including without limitation, the sinking of dredge spuds and/or anchors into the bottom, in the vicinity of utility crossings. If any damage occurs as a result of his operations, the CONTRACTOR will be required to suspend dredging until the damage is repaired and approved by the ENGINEER. Costs of such repairs and downtime of the dredge and attendant plant shall be at the CONTRACTOR's expense.

GP-17 PERMISSIBLE WORKDAYS AND HOURS

17.1 Upland Sand Source Project Time: Due to the sea turtle protection requirements in the project permits, construction activities related to sand fill placement for the Project must be conducted outside of the turtle nesting season between November 1, 2021 and April 30, 2022. Construction activities related to planting dune vegetation for the Project must be completed between November 1, 2021 and April 30, 2022. Upland construction activities (beach dressing, grading, and truck hauls) are allowed from 7 am to 6:30 pm only, five (5) days a week. Allowed construction hours and days may be increased at the discretion of the COUNTY based upon need. Other activities occurring at the beach access are allowed during daylight

hours. Daylight is that period defined as from dawn until dusk. The CONTRACTOR is strongly encouraged to conduct as much required beach work as possible during daylight hours. The CONTRACTOR shall minimize noise so as not to disturb residents living along the beach in the Project area.

17.2 **Offshore Sand Source Project Time:** Offshore construction activities are allowed twenty-four (24) hours per day, seven (7) days a week. CONTRACTOR shall utilize the minimum lighting that is necessary to accomplish the Work and comply with all OSHA requirements. The CONTRACTOR shall shield or orient the lights to minimize the amount of light that reaches the upland area and comply with restrictions on lighting imposed by permit conditions for sea turtle protection. The CONTRACTOR must comply with all local noise ordinances during their operations.

17.3 **Holidays:** Unless otherwise requested by the COUNTY, the CONTRACTOR is permitted to Work on all holidays. However, special consideration shall be made by the CONTRACTOR to avoid planned events and potential conflicts with the public, business owners, and Disney's Vero Beach Resort. The CONTRACTOR will be responsible for overtime payment of the County inspector.

GP-18 NOTIFICATION & INSPECTION

18.1 **Notification.** The CONTRACTOR shall specifically notify the ENGINEER:

18.1.1 at least four (4) days prior to the CONTRACTOR's intended date of commencement of mobilization to the project site;

18.1.2 at least two (2) days prior to the establishment of horizontal and vertical control work;

18.1.3 at least seven (7) days prior to the commencement of dredging and transporting sand from the offshore borrow area or at least seven (7) days prior to the commencement of truck hauls transporting sand from an upland source;

18.1.4 at least three (3) days prior to conducting pre-construction and as-built surveys for the offshore borrow area, dune fill and dune vegetation;

18.1.5 at least three (3) days prior to the date of expected substantial completion of sand fill placement;

18.1.6 at least three (3) days prior to the date of expected substantial completion of installation of dune vegetation;

18.1.7 at least three (3) days prior to the date of expected final completion of the entire Work.

GP-19 CHANGES AND EXTRAS

19.1 Changes in the Work: The COUNTY shall have the right, within the general scope of the Work and without notice to any surety or sureties of the CONTRACTOR, to make changes in the Work, including but not limited to changes in the Plans, General Provisions, Technical Provisions, and Environmental Provisions pertaining to beach width, beach elevation, beach volume, beach length, environmental protection, Contract time, Contract price, in or to the method or manner of performance of the Work, in or to equipment, materials, service or site, in or to the mode or manner of payment for the Work, or directing a change in the rate of performance of the Work. All changes shall, except in the case of emergencies endangering the safety of personnel or property, be made by modification of the Contract Documents or by written Change Order/Work Change Directive duly executed by the COUNTY, ENGINEER, and CONTRACTOR. Work necessary in connection with emergency changes in the Work shall be strictly limited to the minimum necessary to alleviate the immediate emergency; Work beyond such minimum shall be undertaken only pursuant to a properly issued Change Order/ Work Change Directive received from the ENGINEER. The CONTRACTOR shall promptly comply with any and all written Change Orders/ Work Change Directives issued by the ENGINEER, notwithstanding any disputes. No such Change Order/ Work Change Directive shall be deemed to invalidate the Contract.

19.2 No Adjustment of Unit Price: The volume of material to be placed on the beach is based on beach surveys conducted prior to the construction of the project. It is almost a certainty that the forces of wind and waves have altered the beach since development of the estimated fill volume for the project. No adjustment shall be made in any Unit Price of the Contract for changes ordered by the COUNTY that cause an increase or decrease equal to, or less than twenty-five percent (25%) in the amount of the Work, or by the estimated volume provided in the bid documents of dredged material that is to be placed within fill templates. It is further provided, however, that no adjustments shall be made in the Contract price or time of performance for either lump sum or unit price work if the change is expressly or reasonably implied by the Contract Drawings and Specifications or is incidental thereto, or if the Work becomes more difficult than the bid price and Contract Documents would reflect, or if the CONTRACTOR failed to protest, negotiate, comment or otherwise call to the COUNTY's attention, in writing, any omissions, ambiguities or conflicts in the Contract Documents that the CONTRACTOR could have discovered prior to the submission of its bid or execution of the Contract.

GP-20 STATE AND FEDERAL PERMITS, EASEMENTS AND LICENSES

The CONTRACTOR shall comply with all requirements set out in all permits applicable to the Work. Copies of project permits and relevant project attachments are provided as appendices to these Construction Specifications and are considered part of the Contract Documents. Specifically, the CONTRACTOR will familiarize himself with general and specific conditions contained in the Florida Department of Environmental Protection permit (FDEP) Permit No. 0285993-009-JC, and

the U.S. Army Corps of Engineers (USACE) Permit No. SAJ-2007-1645, and other State and Federal approvals for the project, including public easements, use of sovereign submerged lands and referenced attachments. The CONTRACTOR shall follow the applicable Terms and Conditions in the following Biological Opinions (BO) that are incorporated by reference in the USACE Permit: U.S. Fish and Wildlife Service (USFWS) Statewide Programmatic Biological Opinion (SPBO) for sea turtles, dated July 9, 2015; USFWS Programmatic Piping Plover Biological Opinion (P^3BO) for piping plovers and red knots, dated May 22, 2013; and the National Marine Fisheries Service (NMFS) South Atlantic Regional Biological Opinion (SARBO). The SARBO can be found at this link: https://www.fisheries.noaa.gov/content/endangered-species-act-section-7-biological-opinions-southeast. Additionally, the CONTRACTOR shall follow and implement the Florida Fish and Wildlife Conservation Commission's (FWC) Standard Manatee Conditions for In-Water Work (FWC, 2011) and the minimization measures outlined for manatees in the 2015 USFWS SPBO. Any other licenses or approvals required for the prosecution of the Work shall be secured and paid for by the CONTRACTOR.

GP-21 CONTRACTOR QUALITY CONTROL

21.1 Responsibilities of the CONTRACTOR: The CONTRACTOR is responsible for quality control and shall provide and maintain an effective quality control plan that is received by the COUNTY and ENGINEER seven (7) days prior to the pre-construction conference. For dredging and fill placement operations, the CONTRACTOR shall follow the FDEP approved Sediment QA/QC Plan provided in the appendices.

21.2 Daily Quality Control Reports: The CONTRACTOR is required to prepare a Daily Quality Control Report (QCR), and copies shall be furnished to the ENGINEER on a daily basis without exception, by 12:00 p.m. of the following day. Electronic submittal of the Daily QCR is acceptable. Daily QCRs will be provided from the Notice to Proceed issuance to the last day of demobilization, including site clean-up. Reports shall be required for each and every day, regardless of whether Work is accomplished. An example copy of the Daily QCR is appended to these Construction Specifications. Likewise, the CONTRACTOR's Water Quality Monitoring reports must be submitted daily along with the QCR. The CONTRACTOR may substitute their own quality control report format if: (1) it contains, at minimum, all of the information required by the format example in the Construction Specifications and (2) the CONTRACTOR'S quality control report format is approved by the ENGINEER.

21.3 Quality Control: The CONTRACTOR shall establish a quality control system to perform sufficient inspections and tests of all items of Work, including that of their subcontractors, and to ensure conformance to applicable provisions of the Contract Documents and Plans with respect to the materials, workmanship, construction, finish, and functional performance. This control will be established for all construction except where the Contract provides for specific COUNTY or ENGINEER control by observation, tests or other means. The CONTRACTOR's control system will

specifically include the surveillance and tests required in the Construction Specifications.

21.4 The CONTRACTOR's quality control system is the means by which the CONTRACTOR is assured that the construction complies with the requirements of the Contract Documents, including all project permits. The controls shall be adequate to cover all construction operations and shall be keyed to the proposed construction sequence.

21.5 The CONTRACTOR's job supervisory staff may be used for quality control, supplemented as necessary by additional personnel for surveillance, by special technicians, or by testing facilities with the expertise to provide for the controls required by the Construction Specifications.

21.6 All compliance inspections will be recorded on the Daily QCR, including, but not limited to, the specific items required in each technical section of the specifications. This form shall include records of corrective action taken.

21.7 If reoccurring deficiencies in an item or items indicate that the quality control system is not adequate, or reports are not being provided in a timely manner, the CONTRACTOR shall undertake such corrective actions as necessary to meet all Contract requirements.

21.8 No separate payment will be made for CONTRACTOR quality control or Daily QCR.

21.9 **Delay of Payment:** Failure to provide Daily QCR to the ENGINEER may result in delay in payments to the CONTRACTOR until all due Daily QCR are received and are acceptable to the ENGINEER.

21.10 The CONTRACTOR shall be responsible for making such inspections, surveys and tests as may be necessary to assure compliance with all the requirements of the Contract Documents and applicable permits. Reports of all inspections, surveys and tests and remedial actions shall be submitted to the ENGINEER in writing.

21.11 The ENGINEER reserves the right to utilize the CONTRACTOR's control testing laboratory, survey and other equipment to make random tests and surveys, and to check the CONTRACTOR's testing and survey procedures, techniques, and results (where applicable).

GP-22 WATER QUALITY MONITORING BY THE CONTRACTOR

22.1 The CONTRACTOR shall be bound and obligated to maintain the quality of the State's waters as stipulated in project permits and in the Florida Administrative Code Rule 62-3.121 as they pertain to the Class III waters of this Contract. The

CONTRACTOR will be required to make inspections, measurements and observations required by those regulations and the FDEP permit in the vicinity of the dredge (if dredging methods are employed), and the sand placement site (beach). This includes, but is not limited to, daily turbidity sampling with reports to the ENGINEER following procedures stated in Florida Department of Protection permit appended to the Construction Specifications. If it is determined that the quality of the State's waters is not being maintained, the CONTRACTOR will, without delay, follow the procedures provided in the FDEP permit. The water quality monitoring measurements, procedures to maintain water quality and reporting costs will be incorporated into the unit cost for Supply/Deliver/Place Sand or Beach and Dune Fill in the bid documents.

22.2 Construction at the project site shall be monitored closely by an experienced, independent third party with qualifications that meet FDEP requirements hired by the CONTRACTOR to assure that turbidity levels do not exceed the compliance standards established in the state permit. An individual familiar with beach construction techniques and turbidity monitoring shall be present at all times when fill material is discharged onto the beach. This individual shall have authority to alter construction techniques or shut down the dredging or beach construction operations if turbidity levels exceed the compliance standards established in this permit. The names and qualifications of those individuals performing these functions shall be submitted with the CONTRACTOR's bid as required in the General Provisions.

GP-23 MISPLACED MATERIAL, PLANT MACHINERY, EQUIPMENT OR APPLIANCE

Should the CONTRACTOR, during the progress of the Work, lose, discard, throw overboard, sink, or misplace any material, plant, machinery, equipment, or appliance, the CONTRACTOR shall recover and remove the same with the utmost dispatch. The CONTRACTOR shall also give immediate notice to the ENGINEER, with description and location of such material, plant, machinery, equipment, or appliance. Should the ENGINEER discover such material, plant, machinery, equipment, or appliance, the ENGINEER will locate through electronic means or buoy the material, plant, machinery, equipment, or appliance, and notify the CONTRACTOR of its location. Removal of the material, plant, machinery, equipment, or appliance, shall be the responsibility of the CONTRACTOR and cost of the removal will be paid for by the CONTRACTOR. Should the CONTRACTOR refuse, neglect, or delay compliance with the above requirements, such material, plant, machinery, equipment, or appliance may be removed by the COUNTY, and the cost of such removal may be deducted from any money due or to become due to the CONTRACTOR or may be recovered under their bond.

GP-24 SITE CLEAN-UP

24.1 **General:** It is the intent of the COUNTY that the Work be accomplished with minimum disturbance to the natural resources adjacent to the work area (specifically, the adjacent upland, lawns, landscaping, trees, dunes and nearshore areas), and that the immediate and general vicinity of the work area remain in its pre-project state

subsequent to completion of the Work. All materials utilized by the CONTRACTOR during construction shall be removed from the site; including survey stakes, flagging and other temporary survey controls. All rock fragments greater than 0.75 inches in any dimension shall be removed from the beach and construction access areas. The CONTRACTOR shall not create circumstances that may result in extensive clean-up that is incidental to the Contract work to be performed. All accesses to the beach shall be restored to the topographic and vegetative conditions that existed prior to construction. No direct payment for the cost of site clean-up shall be made. All costs associated with these activities shall be included in the unit price for Supply/Deliver/Place Sand or Beach and Dune Fill and the lump sum price for site restoration.

24.2 **Lost Material:** Should the CONTRACTOR during the progress of the Work, lose, dump, sink, or misplace any material or equipment, the CONTRACTOR shall recover and remove same within twenty-four (24) hours of receipt of said notice at no additional cost to the COUNTY.

24.3 **Road Debris:** The CONTRACTOR shall immediately have those streets or access roadways used for transport of construction materials swept of spilled material that resulted from the carriage of material for this Work. Collected material shall be disposed of in a legal manner and at his own expense.

24.4 **Work Area:** The CONTRACTOR shall continually inspect the work areas to ensure that all debris left by the CONTRACTOR’s and subcontractor’s workers has been removed from the work areas and properly disposed of. This includes, for example, lunch bags, soda cans, drink cups, etc.

24.5 **Final Site Clean-Up:** Final clean-up shall include the removal of the CONTRACTOR's plant and all equipment and materials, and all debris, either for disposal or reuse. Unless otherwise approved in writing by the COUNTY, the CONTRACTOR will not be permitted to abandon stakes, pipelines, cables, pipeline supports, pontoons, or other equipment or materials in the disposal area, pipeline access areas, water areas, underwater in the Atlantic Ocean, passes or inlets, on the beach or other areas adjacent to the work site. Any stakes or other markers placed by the CONTRACTOR must be removed as a part of the final clean-up. All stakes, including grade stakes, placed during the fill operation shall be completely removed and shall not be left buried in the fill. All debris shall be removed from the beach. Final payment will be delayed until all grade stakes are removed from the beach area.

GP-25 SIGNAL LIGHTS

The CONTRACTOR shall display signal lights and conduct their operations in accordance with the most recent and current General Regulations of the Department of the Army and of the U.S. 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 pipes or in submarine or bank protection operations, lights to be displayed on dredge pipeline and day signals to be displayed by vessels moored or anchored in a fairway or channel and the passing by other vessels or floating plant working navigable channels, as approved by the Secretary of the Army and Commandant, U.S. Coast Guard (33 C.F.R. 80.18 - 8-31a: 33 C.F.R. 95.51 - 95.66; 33 C.F.R. 9.22 - 90.36; 33 C.F.R. 82 and C.G. Pub. 169, Navigation Rules, International-Inland dated May 1 1977) (DAR 7-603.33), or more recently prescribed by applicable regulations.

GP-26 NOTICE TO MARINERS

The CONTRACTOR shall issue a Notice to Mariners regarding the dredging and disposal operation immediately after the Notice to Proceed has been received and prior to the movement of floating equipment into the project area. A copy of the Notice to Mariners shall be provided to the ENGINEER prior to the commencement of Work, including mobilization of equipment to the project site.

Should the CONTRACTOR, during dredging operations, encounter any objects on the ocean bottom that could be a hazard to navigation, he/she will notify the U.S. Coast Guard, any other pertinent agencies, and the ENGINEER immediately as to the location of said object and any other pertinent information necessary for the CONTRACTOR to put out a Notice to Mariners.

GP-27 UNDERWATER CABLES, PIPELINES, OUTFALL LINES, ETC.

The CONTRACTOR shall be responsible for verifying the locations and depths of all underwater cables, pipelines, outfall lines, etc. and take precautions against damage which might result from their operations, including without limitation, the placement of dredge spuds and/or anchors which may damage the underwater facilities. If any damage occurs as a result of the CONTRACTOR's operations, the CONTRACTOR will be required to suspend dredging until the damage is repaired and approved by the ENGINEER. Costs of such repairs and downtime of the dredge and attendant plan shall be at the CONTRACTOR's expense.

GP-28 LEGAL RESTRICTIONS AND TRAFFIC PROVISIONS

The CONTRACTOR shall conform to all applicable laws, regulations, or ordinances with regard to labor equipment certification, laws, hours of work and their general operations. The CONTRACTOR shall conduct their operations so that navigation shall not block or close any thoroughfare nor interfere in any way with traffic on railway, highways, or on water, without the consent of the proper authorities. The regulations the CONTRACTOR shall adhere to are those established by, but not necessarily limited to, the Department of the Navy, U.S. Coast Guard, Department of the Army, American Bureau of Shipping, all environmental agencies, Florida Department of Environmental Protection, Florida Department of Transportation, and Indian River County.

The CONTRACTOR shall conduct his operations in accordance with safe practices, and all applicable local, State, and Federal regulations pertaining to marine transport and construction activities, so as not to impede navigation and/or maintenance of the waterway and create a navigation

hazard within the waterway. The CONTRACTOR shall be responsible for all notifications required for his marine activities undertaken in regard to construction of the Work, including but not limited to, possible coordination with the U.S. Coast Guard (including publication of a Notice-to-Mariners), the State of Florida, and the COUNTY, as may be required. Copies of all Notice to Mariners shall be submitted to the ENGINEER.

The CONTRACTOR is responsible for complying with all Department of Transportation, County, and other local regulations regarding weight limits for bridges and roads utilized for transport. The CONTRACTOR is likewise responsible for complying with all applicable traffic, safety and speed laws. Repeated failure of the CONTRACTOR to comply with applicable load and traffic regulations will result in suspension of transport operations until the CONTRACTOR demonstrates to the satisfaction of the ENGINEER that the CONTRACTOR has taken sufficient steps to ensure compliance with these regulations. The CONTRACTOR shall notify, and coordinate with, local law enforcement and highway agencies regarding transport activities that shall be undertaken for the Work.

GP-29 ELECTRICITY AND OTHER UTILITIES

All electric current and other utilities required by the CONTRACTOR shall be furnished at the CONTRACTOR's own expense.

GP-30 ASSIGNMENT

Neither party to the Contract shall assign the Contract or sublet it as a whole without the written consent of the other nor shall the CONTRACTOR assign any monies due or to become due to him hereunder, without the previous written consent of the COUNTY.

GP-31 PROTECTION OF PROPERTY AND WORK

31.1 **CONTRACTOR Responsibility:** The CONTRACTOR will not be responsible for maintenance of beach sections previously accepted by the ENGINEER, unless the beach is eroded or damaged due to the activities of the CONTRACTOR.

31.2 **Risk of Weather Events:** All loss or damage arising out of the nature of the Work, or from the action of the elements, or from weather events, hurricanes, tropical storms, adverse sea state or from any unusual obstruction or difficulty, or any other natural or existing circumstances either known or unforeseen, that may be encountered in the prosecution of the Work, shall be sustained and borne by the CONTRACTOR at its own cost and expense, including all fill placement that has not been accepted by the ENGINEER for payment.

31.3 **Beach Erosion:** The CONTRACTOR shall be aware of the dynamic nature of the project site and account for the potential of a change in beach conditions including, but not limited to, beach erosion and accretion, sediment migration and shoaling, and changes to the volume available in the borrow area (if applicable) and/or required by the project fill template. Based on the CONTRACTOR’s pre-placement

surveys, the ENGINEER will evaluate the conditions and make a determination regarding adjustments to the Work as prescribed in these Contact Documents. The CONTRACTOR is not responsible for naturally-occurring erosion of any section of the beach fill after it has been accepted for payment by the ENGINEER; however, the CONTRACTOR is responsible for maintaining the beach fill until it is accepted by the ENGINEER and to avoid preventable damage to sections that have been accepted by the ENGINEER. The CONTRACTOR is also responsible to grade and eliminate all beach scarps or cliffs in either of the project fill areas regardless of ENGINEER acceptable, prior to being considered complete and eligible for final payment.

GP-32 PROTECTION OF EXISTING STRUCTURES FROM CONSTRUCTION ACTIVITY

32.1 General: Bulkheads, revetments, utilities, upland structures, anchor points, and other structures within the Work area shall be protected by the CONTRACTOR to prevent damage thereto by the CONTRACTOR'S operations.

32.2 Documentation: The CONTRACTOR shall be responsible for determining and documenting the pre-construction condition of existing structures within the project area, inclusive of all staging and access areas. The CONTRACTOR shall take appropriate measures to prevent damage to any structures during construction, and for performing a post-construction verification inspection of those structures previously inspected. Pre-construction structure condition documentation by the CONTRACTOR shall include video and/or photographic documentation. Copies of the pre-construction structure condition video and/or photography will be provided to the ENGINEER prior to the start of construction. The CONTRACTOR shall assume all responsibility for damages to existing structures within and bordering the project boundaries as a result of construction activities. This includes, but is not limited to, damages as a result of equipment impact and vibration due to operation of equipment close to existing structures.

32.3 Underground Utilities: CONTRACTOR shall call "SUNSHINE" 1-800-432-4770 before beginning any Work at the project site and familiarize himself with any nearby utilities.

GP-33 PRESERVATION OF HISTORICAL, ARCHEOLOGICAL, AND CULTURAL RESOURCES

If during project construction the CONTRACTOR observes items that may have historical, cultural, or archeological value, the CONTRACTOR shall immediately cease all activities that may result in the destruction of these resources and shall prevent his employees and subcontractors from trespassing on, removing, or otherwise damaging such resources. Such observations shall be reported immediately to the COUNTY and ENGINEER so that the appropriate authorities may be notified, a determination made as to their significance and what, if any, special disposition of the finds should be made. The CONTRACTOR shall report any observed unauthorized removal or

destruction of such resources by any person to the COUNTY and ENGINEER and appropriate State of Florida authorities. The CONTRACTOR shall relocate construction activities and resume construction of the project, and not return to the site in question, until State authorities have rendered judgment concerning the artifacts of interest.

GP-34 OTHER INSURANCE

Insurance required to be maintained by the CONTRACTOR is specified in the COUNTY's Standard Terms and Conditions. In addition, unless more specifically required by the COUNTY, Maritime Coverage (Jones Act) and Longshore and Harbor Workers' Compensation Act (LHWCA) coverage shall be maintained where applicable to the completion of the Work.

GP-35 AS-BUILT DRAWINGS

The CONTRACTOR shall submit to the ENGINEER, for approval, the surveyed profile data of the Work in addition to a surveyed plan view of the Work. The profile and plan view information must be submitted to the ENGINEER within fourteen (14) calendar days of the completion of the site Work.

35.1 The profile and plan view data shall be that described in the Technical Provisions for the Offshore Borrow Area or shall be that described in the Technical Provisions for Upland Sand Source, or a combination thereof, if applicable.

35.2 Upon completion of the Work, the CONTRACTOR shall sign the as-built drawings in the following manner: "I CERTIFY THAT THESE DRAWINGS INDICATE CONSTRUCTION AS ACTUALLY PERFORMED AND ARE AN ACCURATE REPRESENTATION OF THE SPECIFIED WORK." The COUNTY reserves the right to withhold final payment until acceptable as-built drawings have been submitted.

END OF PART I – SUPPLEMENTAL GENERAL PROVISIONS

PART II – TECHNICAL PROVISIONS OFFSHORE BORROW AREA

TP-1 SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT

The Work covered by this section consists of furnishing all plant, labor, equipment, supplies and material, and of performing all operations and surveys in connection with excavating, transporting, placing, dressing, and grading dune fill and supplying, installing, and monitoring dune vegetation as indicated in the Plans and in accordance with the Contract Documents. The fill material shall be excavated and transported by the use of a hydraulic pipeline (directly to shore or via scow or hopper dredge) from the offshore borrow area located in the Atlantic Ocean as approved under the Florida Department of Environmental Protection (FDEP) and the U.S. Army Corps (USACE) permits. A mechanical (clamshell) dredge will not be allowed. The total fill volume to be placed within the beach and dune construction templates is approximately ~~670,600~~ 280,000 cubic yards of beach quality sand. The total volume available in the offshore borrow area is estimated to be 1,419,000 cubic yards to the Design Elevation in the two sub-areas as shown on the Plans. Salt-tolerant dune vegetation (approximately ~~352,120~~ 302,820 plantings) will be planted on the restored dunes.

These Technical Provisions are only applicable to construction utilizing the offshore borrow area. See the Technical Provisions for Upland Sand Sources (Part 3) if construction utilizes the alternate approved upland sand sources.

TP-2 CONTRACTOR QUALIFICATIONS

The CONTRACTOR shall provide the dredge and all support vessels, labor, equipment, supplies, and materials to perform all operations in connection with excavating, transporting, placing, grading and tilling the beach fill, debris removal, and returning the project site to its pre-construction condition as required by the Contract Documents. In order for the CONTRACTOR to be deemed qualified and responsive, the following must be provided with the bid under cover labeled "BIDDER QUALIFICATIONS" or similar title:

a) Bidder's proposed method of construction and overall schedule to demonstrate understanding of the Work and completion within the Contract time.
b) The additional equipment proposed to complete this project, to include barges, scows, boosters, cranes, bulldozers, loaders, excavators, etc., including the size and type of the dredge(s) proposed for the Work that meets the minimum requirements provided in **TP-3** if construction method utilizes offshore borrow area.
c) Qualifications and prior experience of bidder's key personnel, to include proposed project manager, superintendent, dredge operator, site engineer, etc.
d) Experience with open water Atlantic Ocean dredging.
e) Description of last dredging project of this nature that the bidder completed.
f) References for at least three (3) similar beach nourishment works within the previous five (5) years.
g) Turbidity monitor experience and qualifications for compliance with project permits.
h) Scope of Work and resumes for the independent third party turbidity monitoring to demonstrate that the staff and equipment is available to conduct the monitoring in accordance with the project permits.

TP-3 DREDGE REQUIREMENTS

3.1 Dredge Capacity: The CONTRACTOR shall keep on the job a dredge of sufficient capacity to construct the project in a timely manner, with beach fill placement completed no later than stipulated in these Contract Documents. The COUNTY will allow booster pumps that are located a minimum of 1,000 feet from the shoreline. If booster pumps are used, the CONTRACTOR shall provide adequate muffler systems and erect a sound barrier to deflect noise in the seaward direction and away from buildings. The CONTRACTOR shall also retain, at the project site, all related dredge equipment of sufficient capacity to meet the requirements of the Work. The dredge shall be in satisfactory operating condition, shall be reliable in its performance, and capable of safely and efficiently performing the Work as set forth in the Contract Documents. The dredge shall be of sufficient size and capacity to complete the Work in a timely manner, meeting or exceeding Contract Document requirements for the construction time period. At a minimum, the dredge shall be suitable for dredging in exposed areas such as the open water borrow area in the Atlantic Ocean as shown in the Plans. The CONTRACTOR and CONTRACTOR's employees shall have experience with the dredge being proposed, or similarly used for dredging in exposed areas such as in the Atlantic Ocean. The CONTRACTOR may be required to demonstrate and certify the production capacity of the dredge, demonstrating its capability to construct the project within the time limitations, recognizing there will be periods of inactivity due to weather, sea state, etc. If the dredge, in the ENGINEER's opinion, is not of sufficient capacity to complete the Work in the Contract time period, the ENGINEER may direct the CONTRACTOR to replace the dredge with a greater production capacity dredge. Periods of inactivity shall be factored into the consideration of dredge capability to construct the project within Contract time limits. No reduction in the capacity of the dredge employed on the Work shall be made except by written permission of the COUNTY.

3.2 American Bureau of Shipping Certification for Open Ocean Operation: It is the CONTRACTOR's responsibility to obtain any and all American Bureau of Shipping (A.B.S.) and U.S. Coast Guard dredge certifications and/or approvals required for the project described herein, to allow for the open ocean operation of the dredge that will be used to complete the Work. A copy of the legal certifications and associated approvals must be provided to the COUNTY and ENGINEER at the time of bid, demonstrating that the plant (dredge) proposed for use on the project is licensed and certified to conduct open water (Atlantic Ocean) work. Notwithstanding the requirements or allowances in these Contract Documents, the Contractor is solely responsible for the ocean-going capacity and required certifications of all marine equipment utilized on the project.

3.3 Pipelines: Pipe and pipelines utilized for the project will be in good working order, free of defects. All pipelines, both above and below water, must be kept in good condition at all times. All pipelines shall be maintained free of leaks and deposition of sediment or creation of turbidity. Any leaks or breaks along their length must be promptly and properly repaired. The CONTRACTOR shall cease operations and promptly repair the pipeline to the satisfaction of the ENGINEER in the event of

leaks or pipeline breaks. All pipelines from the borrow area to the fill placement area will be placed in accordance with the Plans and permits, and shall avoid all vegetation and established shorebird protection areas. Use of the pipelines on the beach shall not result in the deposition of rust pieces or deposits that may discolor the beach or present a potential hazard to beach visitors. The CONTRACTOR shall clean the beach of any rust pieces or rust color deposits, and clean the beach of all materials used to seal seams between the connected pipeline segments.

TP-4 CONSTRUCTION ON THE BEACH

The CONTRACTOR shall limit construction activities to the fill area shown on the Plans or as otherwise approved by the ENGINEER. The CONTRACTOR shall exercise caution when accessing and driving on the beach. Sections of the beach are heavily used by people during all periods of the year.

TP-5 PRE-PLACEMENT AND POST-PLACEMENT SURVEYS – BEACH AND DUNE FILL

Pre-placement and post-placement surveys shall be conducted by the CONTRACTOR. Surveys may be required to be conducted in the presence of the ENGINEER or a representative, at the option of the ENGINEER. The CONTRACTOR shall provide at least three (3) working days advance notice to the ENGINEER prior to conducting surveys.

5.1 **Survey Components:** The CONTRACTOR shall measure and submit to the ENGINEER plan and profile surveys of the beach/dune depicting the following:

a) Pre-placement conditions of the beach/dune.
b) Design template and fill tolerances for the beach/dune fill.
c) Post-placement (immediate post-construction) conditions of the beach/dune.

5.2 **Survey Timeframes:** The CONTRACTOR shall conduct and submit pre-placement surveys for the entire fill placement area or sections thereof to the ENGINEER no more than twenty-eight (28) days prior and at least seven (7) days before to the commencement of beach and dune fill placement within the specific fill sections surveyed. This will allow the ENGINEER to prepare updated cross-sections for the fill templates and assess volumetric requirements based on the pre-construction conditions. The CONTRACTOR shall not commence fill placement until cross-sections, based upon the pre-placement surveys, have been prepared by the ENGINEER. The ENGINEER will provide to the CONTRACTOR the revised template at each project profile in a spreadsheet or cross section format; the Plans will not be updated and/or reissued. Placement of fill in an area prior to completion and review of the pre-construction surveys is at the CONTRACTOR's risk and may or may not be approved for payment. The CONTRACTOR shall conduct post-placement surveys within seven (7) days upon the completion of fill placement and grading within an acceptance section. The CONTRACTOR shall submit as-built surveys to the ENGINEER within seven (7) days following the completion of each survey and at least seven (7) days prior to submittal of an Application for Progress

Payment and the Final Application for Payment. If CONTRACTOR fails to submit an as-built survey to the ENGINEER within seven (7) days of the completion date for that survey, a mandatory meeting will occur the next day between the COUNTY, the ENGINEER, and the CONTRACTOR to discuss the overdue as-built survey. If the CONTRACTOR does not present the as-built survey during the meeting, all construction operations must cease until the survey is provided.

5.3 **Survey Requirements:** All profile surveys shall be conducted by RTK (real time kinetic) GPS or conventional survey techniques. Loop closures shall be performed on all profile control. The closure shall be less than 0.04 feet. If a fathometer is used to survey the offshore portion of the profile, the bathymetric survey and rod survey shall overlap a minimum of fifty (50) feet.

5.4 **Profile Spacing:** The pre-placement and post-placement surveys shall be measured along the project profiles defined in the Plans. The spacing between profiles is on average 100 feet. The profiles shall be surveyed at an azimuth of 70° clockwise from grid north as shown in the Plans. The coordinates for the project profiles listed in the Plans represent the project baseline. On each profile, the baseline shall be referenced as Range 0+00. Data points collected east of the baseline shall be reported as a positive offset while data points west of the baseline shall have a negative offset.

5.5 **Collection of Survey Points:** A sufficient number of points shall be taken along each profile to ensure adequate description of topographic features, such as the dune crest, foreshore, slope breaks, and intersections of the fill with the existing grade. Data points shall be taken at a spacing of not more than ten (10) feet with a maximum elevation difference of approximately one (1) foot between adjacent points. All topographic points shall be within ten (10) feet horizontally of the established profile line. All hydrographic points shall be within twenty-five (25) feet horizontally of the established profile line. Surveys shall extend a minimum of fifty (50) feet landward of the landward toe of fill and offshore to at least the -5 foot, NAVD contour. The product shall be a continuous line representing the entire fill template of the beach and dune.

5.6 **Submission Requirements:** All survey data should be submitted in electronic ASCII x,y,z format. All survey data shall also be submitted in graphical form with the pre-project conditions, design templates, allowable tolerances, and post-project conditions depicted. All cross-sections shall include the data and the identifying baseline station number. All survey information submitted, and included in any depiction, shall include the date of the survey. Vertical elevations shall be in feet referenced to the NAVD 1988 datum, Geoid 2012a. Horizontal distances shall be in feet. Locations shall be specified in Florida State Plane grid coordinates, East zone, NAD 1983/90 datum. Survey drawings shall be at an appropriate scale with the horizontal scale equal to the vertical scale. All field notes, survey and volume computations, and the records used by the CONTRACTOR to compute the CONTRACTOR's estimate of payment fill quantity shall be furnished to the ENGINEER with the Application for Progress Payment and Final Application for

Payment.

5.7 **Personnel:** All surveys shall be performed under the direction of an independent Florida licensed professional surveyor and mapper (P.S.M.). All surveys shall meet minimum technical standards.

TP-6 PRE- AND POST-CONSTRUCTION SURVEYS – OFFSHORE BORROW AREA

Pre-construction and post-construction bathymetric surveys of the offshore borrow area will be conducted by the COUNTY. The COUNTY will provide survey information to CONTRACTOR, if requested.

TP-7 AS-BUILT SURVEYS – DUNE VEGETATION

7.1 **Survey Components:** The CONTRACTOR shall measure and submit to the ENGINEER plan view surveys of the installed dune vegetation depicting the foot-print of the planting.

7.2 **Survey Timeframes:** The CONTRACTOR shall submit as-built surveys to the ENGINEER at least seven (7) days prior to submittal of an Application for Progress Payment and the Final Application for Payment.

7.3 **Survey Requirements:** The CONTRACTOR shall survey the perimeter of the installed dune vegetation within each Acceptance Section by RTK (real time kinetic) GPS or conventional survey techniques. Data points shall be taken at a spacing of not more than ten (10) feet and at inflection points within the planting layout. The result shall be a continuous line along the perimeter of the dune vegetation installed within an Acceptance Section. The CONTRACTOR shall count and report the number and type of plants installed within an Acceptance Section.

7.4 **Submission Requirements:** All survey data should be submitted in electronic ASCII x,y,z format. All survey data shall also be submitted in graphical form (plan view) with the dune fill construction template, project profiles, number of plants installed in each Acceptance Section, the date that planting was complete within each Acceptance Section and as-built extents of the installed dune vegetation depicted. All survey information submitted, and included in any depiction, shall include the date of the survey. Horizontal distances shall be in feet. Locations shall be specified in Florida State Plane grid coordinates, East zone, NAD 1983/90 datum. Survey drawings shall be at an appropriate scale to depict the project features. All field notes and the records used by the CONTRACTOR to compute the CONTRACTOR's estimate of the number of plants installed shall be furnished to the ENGINEER with the Application for Progress Payment and Final Application for Payment.

TP-8 SURVEY LAYOUT AND CONTROL

8.1 **Control Data:** Descriptions of the monument control in the vicinity of the project area are furnished in the Plans.

8.2 **Horizontal and Vertical Limits:** The CONTRACTOR shall establish their survey control for the Work. The CONTRACTOR shall layout the horizontal and vertical limits of the Work from the tabulated control provided in the Plans. The CONTRACTOR shall be responsible for maintaining the accurate alignment and layout of the beach and dune fill templates during construction. The CONTRACTOR shall not scale dimensions from the Plans for the purposes of work layout. The CONTRACTOR shall be responsible for all measurements that may be required for the execution of the Work to the location and limit marks prescribed in the Plans and in these specifications. Based on the pre-placement survey, the ENGINEER reserves the right to modify the locations and elevations of the dune fill template as may be required to meet changes to existing conditions. If the CONTRACTOR discovers a conflict during layout of the Work, the CONTRACTOR shall notify the ENGINEER.

8.3 **Temporary Benchmarks:** If the CONTRACTOR elects to establish temporary benchmarks through the work site, they shall be established by a closed loop of levels from a permanent benchmark or a line of levels between two permanent benchmarks. Any such temporary benchmark shall be located upon fixed objects such as utilities, roadways, driven stakes, etc. to assure reliability through the duration of the Work.

8.4 **Tides:** The CONTRACTOR shall use measured tides for all hydrographic surveying (predicted tides are not acceptable). Measured tides shall be along the open coast of the project area and not within either adjacent navigation channels unless a tide study conducted by the CONTRACTOR and accepted by the ENGINEER supports the use of tide gages in the navigation channels.

8.5 **Construction Stakes:** The CONTRACTOR shall furnish, at his own expense, such stakes, templates, platforms, equipment, tools and material, and all labor as may be required in laying out any part of the Work from the monuments, control data and elevations. The CONTRACTOR shall maintain and preserve the established stakes and other marks. If such marks are destroyed by the CONTRACTOR, they may be replaced by the ENGINEER at his discretion, and the expense of replacement will be deducted from any amounts due or to become due. Work may be suspended at any time when location and limit marks established by the CONTRACTOR are not adequate to permit checking of the Work. All marking stakes (including grade stakes) placed by the CONTRACTOR must be a metal material and must be completely removed upon completion of the Project unless otherwise specifically accepted in writing by the ENGINEER. The CONTRACTOR shall also maintain a grade stake recovery log.

8.6 **No Fill Areas:** The CONTRACTOR shall be responsible for delineating no-fill areas and preventing the placement of fill in such areas. No-fill areas include but are not limited to areas which easements have not been procured. The CONTRACTOR shall not operate equipment or allow operations within the designated no fill areas.

8.7 **Drawing Modification:** All levels and measurements as given on the drawings are binding for the CONTRACTOR. The ENGINEER reserves the right to modify the locations and elevations of the limit marks as may be required to meet changed conditions or as a result of necessary modifications to the Contract work. Modifications to the drawings will not form the basis for a change in unit price unless the modifications increase or decrease the quantity of work by twenty-five percent (25%) or more.

TP-9 PAY PROFILES

9.1 **General:** The surveys required to supplement construction and payment shall be taken at pay profile locations indicated in the Plans. The CONTRACTOR shall establish intermediate profiles in addition to those shown in the Plans to construct the project in accordance with plan view layout. The CONTRACTOR may submit the intermediate profiles for payment subject to review and approval by the ENGINEER. The CONTRACTOR shall survey between the +13, +14, or +15 foot NAVD contour (depending on profile location) or 50 feet landward of the landward edge of fill to 100 feet beyond the seaward toe of fill or to the -5 foot contour, whichever is more seaward. The landward edge of fill is located at the edge of vegetation, seawall, or the +13, +14, or +15 foot NAVD contour intersection with the existing beach. The pay profiles shall be labeled as their distance along the project baseline.

Payment for beach fill placement will be based on the cubic yards of sand placed within the fill template and allowable tolerances as computed and verified by comparison of the pre- and post-placement surveys conducted on the dressed beach and certified by the CONTRACTOR's surveyor. The ENGINEER will verify the pay quantities provided by the CONTRACTOR, based on the comparison of pre- and post-placement surveys conducted by the CONTRACTOR's surveyor and accepted by the ENGINEER. Surveys will be performed by a surveyor employed by, or a subcontractor of, the CONTRACTOR. The CONTRACTOR shall notify the ENGINEER a minimum of three (3) days prior to when the surveys will be conducted so that the ENGINEER may observe the survey as it is conducted. The CONTRACTOR's surveyor shall certify all surveys and the ENGINEER must agree, based on submissions provided by the CONTRACTOR's surveyor, that the survey may be used for payment purposes. All survey work conducted by the CONTRACTOR for payment is subject to acceptance by the ENGINEER. The ENGINEER, at their discretion, may conduct surveys to verify surveys performed by the CONTRACTOR for payment purposes.

9.2 **Pre-Construction Survey:** The most-recent semiannual beach survey conducted by the COUNTY as part of the county-wide monitoring program, performed in June 2021, will be used as the pre-construction survey for this project to update fill volumes prior to the commencement of construction and to satisfy environmental permit requirements. Updated Construction plans will be provided via bid addendum.

9.3 Pre-Placement Survey: Pre-placement surveys shall be conducted by the CONTRACTOR at the spacing and location of pay profile lines as identified in the Plans, which are generally 100 feet apart. Pre-placement surveys shall be conducted to a minimum distance of 100 feet seaward of the construction toe of fill. The pre-placement survey will be used as the baseline for payment for the beach fill project. The CONTRACTOR shall not commence construction until the ENGINEER has received the certified (signed and sealed) pre-placement survey and has reviewed the survey for use as the pre-placement survey. The fill template and volume may be revised at the ENGINEER's discretion using the pre-placement survey results, as the bid volume may vary since the design and pre-construction survey.

9.4 Post-Placement Survey: Post-placement surveys shall be conducted by the CONTRACTOR at the same spacing and location as the pre-placement surveys. Post-placement surveys shall not be conducted until the beach has been dressed to provide a level and uniform beach surface, removing all depressions, gullies, or other features in the beach which may affect the accuracy of the survey and the volume computation. The post-placement pay survey shall be conducted prior to tilling the beach.

9.5 Post-Construction Survey: The COUNTY's surveyor will conduct the post-construction survey as part of the county-wide monitoring program to satisfy environmental permit requirements.

9.6 Survey Field Notes Submittal: The CONTRACTOR shall submit survey field notes to the ENGINEER upon completion of each pre-placement or post-placement survey to expedite review of each survey. All field notes, survey and volume computations, and the records used by the CONTRACTOR to compute the payment fill quantity shall be furnished to the ENGINEER with the application for progress or final payment. Failure to provide the specified information will delay recommendation and payment.

9.7 Survey Error or Volume Computation Discrepancy: If there is an error or discrepancy in the survey conducted by the CONTRACTOR which affects the payment volume, the CONTRACTOR and the ENGINEER's surveyors will attempt to resolve the survey discrepancy or error. If the discrepancy or error cannot be resolved, the ENGINEER will compute the fill volume for payment purposes. Likewise, if there is an error or discrepancy concerning the payment volume computation, the ENGINEER and CONTRACTOR will attempt to resolve the issue. Nevertheless, the volume determined to be correct by the ENGINEER shall be the volume used for payment purposes.

9.8 Fill Section Rejection: The notification of rejection of a fill section will be based on notification to the CONTRACTOR from the ENGINEER. After the survey data has been received by the ENGINEER, the ENGINEER will have seven (7) days to review the data and prepare a written response if a section has been rejected, and the reason for rejection.

9.9 Beach Fill Pay Profile Lines: The pre- and post-placement surveys shall be conducted at the intervals and locations as indicated in the Plans and shall extend offshore a minimum distance of 100 feet seaward of the termination of the construction toe of fill. Profiles to be used for payment purposes are strictly limited to profiles specifically defined by the project baseline in the Plans. For example, Station 10+00 (FDEP R-monument profile line R-20) will be the first payment station, with payment profile lines spaced generally at 100 foot intervals to the south except at the location of the FDEP monuments where the spacing varies to include the FDEP profile location. Pay quantity verification calculations will utilize the distance between adjacent pay profile lines as shown in the Plans.

9.10 Survey Requirements: All beach profile surveys shall be conducted by either differential leveling techniques or with RTK-GPS technology to a minimum distance of 100 feet seaward of the termination of the construction toe of fill. The CONTRACTOR shall close all level loops; the closure shall be less than 0.04 feet. All onshore points shall be within ± ten (10) feet of the established profile line.

9.11 Profile Line Azimuth and Measurements: Profile line surveys shall be conducted along the azimuth indicated in the Plans. A sufficient number of points will be taken along each line to ensure adequate measurements of the entire profile line including topographic features, major breaks in slope, beach berms, foreshore, and intersection of the fill with the bottom, with a maximum elevation difference of approximately one (1) foot between adjacent points. Data points shall be taken at a spacing of not more than ten (10) feet. The product shall be a continuous line representing the entire beach fill profile plus a minimum of 100 feet seaward of the construction toe of fill.

9.12 Beach Survey Deliverables to the Engineer: Deliverables to the ENGINEER shall include processed and tide corrected survey data of easting, northing, and elevation (XYZ) from each of the pay stations in ASCII format provided digitally (via email, FTP, flash drive, or on a compact disk (CD)) and illustrated in cross-sections on digital or hardcopy plots. Cross-section plots shall show the survey, the construction template, the upper and lower tolerance, and the mean high water line. Additional information to be provided to the ENGINEER shall include any corrections and field notes.

9.13 Survey Documentation: All survey work shall be documented and copies supplied to the ENGINEER. The surveys may be conducted in the presence of the ENGINEER or their representative, at the option of the ENGINEER. The CONTRACTOR shall provide one (1) day advance notice to the ENGINEER prior to conducting surveys for payment.

TP-10 CHARACTER OF BEACH FILL MATERIAL

10.1 Fill Material: The CONTRACTOR shall provide clean, debris-free, rock-free, beach compatible sand from the offshore borrow area permitted for construction of the Project. Based on limited geotechnical analysis and information, the sources are

capable of producing the quality and quantity of sand for this Project. Based on available core boring information, in general, the material found within the borrow areas primarily consists of poorly sorted, medium-grained quartz sand with approximately 2% gravel content. The characteristics of the materials in the borrow areas are as generally indicated by the vibracore boring logs and grain size distribution curves as reported by Applied Technology Management, Inc. (ATM) in the "Indian River County Geotechnical Investigation of Offshore Sand Sources" in November 2001. This report is available from the COUNTY. Nevertheless, the CONTRACTOR should be aware that it is possible for material of differing characteristics to be present in the borrow area. All excavation shall be performed within the horizontal and vertical limits of the permitted borrow areas shown in the Plans.

10.2 Characteristics of Fill Material: It is the responsibility of the CONTRACTOR to supply beach compatible material. The material should be beach quality, quartz sand material. The material shall be clean, non-organic, cohesionless, free of deleterious substances, and free of elongated or flat particles, which are susceptible to degradation. No material that is inconsistent with the samples provided or that originates from sources other than those permitted for construction may be used. The material shall meet the requirements cited in Table 2 of the Sediment QA-QC Plan for Offshore Sand Source (Appendix D).

10.3 Potential Differing Borrow Area Characteristics: The characteristics of the materials in the borrow areas may be as generally indicated by the sediment boring logs and grain size distribution curves within the Applied Technology Management, Inc. (ATM) report "Indian River County Geotechnical Investigation of Offshore Sand Sources", November 2001. The material found in each of the borrow area sediment core borings (vibracores) is indicative only of the sand at that discrete location. The CONTRACTOR should be aware that it is possible for material of differing characteristics to be present in the borrow areas, including material differing from that contained in the vibracores.

10.4 Material Testing: It is the responsibility of the CONTRACTOR to supply beach compatible material in accordance with Sediment QA-QC Plan for Offshore Sand Source (Appendix D). Samples of the fill at the placement area will be collected, tested, and reported by the CONTRACTOR throughout the construction as required by the Sediment QA-QC Plan for Offshore Sand Sources. All samples collected by the CONTRACTOR shall be stored at the CONTRACTOR's expense for a minimum of 120 days after Final Acceptance of the Project. The ENGINEER reserves the right to perform independent sampling and testing of fill material.

10.5 Unacceptable Material, Rock, Rubble, or Debris: In the event that unsuitable material is encountered during dredging, the CONTRACTOR shall immediately cease pumping operations and raise the elevation of the suction head or cutter head a minimum of 0.5 feet or relocate to another portion of the borrow area and observe the quality of the material being excavated at that point. The CONTRACTOR shall

immediately notify the COUNTY or ENGINEER verbally, and report the encounter with the rock, rubble or debris on the quality control form, providing location in State Plane Coordinates of the area of rock, rubble or debris. The CONTRACTOR's QC Plan shall also address sediment quality compliance procedures.

Any unacceptable material that is excavated and placed on the beach may be required to be removed from the dune fill by the CONTRACTOR, at the CONTRACTOR's expense. If the CONTRACTOR fails to remove the rock, rubble or debris, to the satisfaction of the COUNTY and ENGINEER, such debris may be removed by the COUNTY and the cost of such removal may be deducted from any money due, or to become due, to the CONTRACTOR or may be recovered under his bond.

10.6 **Sediment QA/QC Plan:** FDEP has developed a Sediment QA/QC Plan for the offshore sand source that applies to this project. This plan must be applied to maintain the quality of the beach nourishment project and extensive testing is an integral part of the plan. The material shall be observed by the CONTRACTOR at the project site. The CONTRACTOR shall collect a minimum of 1 representative sand sample from the project area at no less than 200-foot intervals of newly constructed berm to visually assess grain size, Munsell color, shell content, and silt content. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). The samples shall be tested at a Licensed Testing Laboratory. The CONTRACTOR shall continuously visually monitor the sediment being placed on the beach to assess grain size, silt content, gravel content, and Munsell color. Additional details relative to observations, sampling, and testing are presented in the Sediment QA/QC Plan (Appendix D). Post-construction sediment sampling and testing will be completed by the ENGINEER. Sediment Compliance parameters are shown in **Table 2**.

Table 2: **Sediment Compliance Specifications**

Sediment Parameter	Parameter Definition	Compliance Value
Mean Grain Size	Calculated by moment method*	0.33 mm – 0.55 mm
Max. Silt Content	Passing #230 sieve	2%
Max. Shell Content*	Retained on #4 sieve	2%
Munsell Color	Moist Hue	10 YR, 2.5Y, or 5Y
	Moist Value	≥ 6
	Moist Chroma	≤ 2
The beach fill material shall not contain construction debris, toxic material, or other foreign matter.		

*Determined using the sieves listed in the QA/QC Plan

TP-11 DREDGE MOBILIZATION/DEMOBILIZATION TO THE PROJECT SITE

11.1 Mobilization/demobilization to and from the Project area shall occur from and to deep water navigable corridors.

11.2 Mobilization and demobilization to and from the Project site will be controlled by the CONTRACTOR to avoid contact with any and all hardbottom formations. The CONTRACTOR may utilize available data, which includes mapping of some hardbottom formations to avoid passing over hardbottom formations with any equipment. Avoidance of damage to hardbottom is the responsibility of the CONTRACTOR. The CONTRACTOR shall initiate the use of the electronic positioning system, including plots, when the dredge is within two (2) miles of the borrow site or within two (2) miles of the coastline during Project mobilization and demobilization. Position fixes is in Florida State Plane grid coordinates, East zone, NAD 1983/90 datum at 10 second intervals will be provided along with graphic plots while mobilizing or demobilizing to the Project site, with any and all equipment. The positioning and recording equipment shall remain functioning during demobilization until the dredge is two (2) miles from the borrow area or two (2) miles offshore of the coastline.

11.3 The CONTRACTOR shall directly PUSH the dredge when within two (2) miles of the shoreline to avoid potential cable drags. THE CONTRACTOR SHALL NOT TOW THE DREDGE WITHIN TWO (2) MILES OF THE SHORELINE. The CONTRACTOR shall directly push or tow with polypropylene (floating) lines all other equipment that is not self-propelled when within two (2) miles of the shoreline. No cables, equipment or other objects shall hang over the side of the dredge, any barges or tugs, or any other vessels, floating pipelines, pontoons or floating equipment. There shall be no anchoring of the dredge or any attendant equipment (vessels, barges, etc.) outside of the limits of the borrow area. These measures are required to avoid hardbottom damage from sagging cables or other objects.

11.4 The CONTRACTOR must notify the ENGINEER of the date the dredge and other equipment will be mobilized and demobilized to and from the Project area. The CONTRACTOR shall also advise the ENGINEER at least (3) days prior to pushing or towing the dredge within two (2) miles of the borrow site and or two (2) miles of the coastline. The ENGINEER reserves the right to have a representative on site and/or onboard the dredge to observe mobilization and demobilization of the dredge. Under no circumstances will the CONTRACTOR mobilize or demobilize to within two (2) miles of the coastline without verbal approval from the ENGINEER. The CONTRACTOR will allow sufficient time for the ENGINEER to reach the Project site prior to the CONTRACTOR's mobilization to the borrow area or coastline.

TP-12 BORROW AREA EXCAVATION

12.1 Borrow Area Excavation Limits: All excavation shall be performed within the horizontal and vertical limits of the borrow area shown in the Plans. The borrow area has been further divided into two sub-areas. Under no circumstances shall equipment exceed the “equipment disturbance elevation” shown in the Plans. The material located below the indicated “Design Elevation”, may not be suitable for placement. The CONTRACTOR will be required to certify in each Daily Contractor Quality Control Report that the excavation has occurred within the limits of the

Plans. If excavation occurs outside of the permitted borrow area, or below the vertical limits as shown in the Plans, the CONTRACTOR shall pay any and all permit fines for the permit violation. If the CONTRACTOR does not pay any costs, fines, or other expenses related to dredging outside of the borrow area limits and/or for permit violations, the COUNTY will withhold retainage from payments due to the CONTRACTOR or may be recovered from the CONTRACTOR's bond to cover all costs, fines, or expenses related to excavating outside of the borrow area limits and/or deeper than allowed within the borrow area. The ENGINEER may deduct quantities of material dredged outside of and/or below the allowable dredge depths from pay quantities.

12.2 Uniform Excavation: To the greatest extent practicable, all excavation shall be performed in a uniform and continuous manner so as to avoid creating multiple holes, valleys, or ridges within the borrow area. The borrow area shall be dredged to maximize the removal of suitable material from one sub-area before relocating to the next sub-area.

12.3 Continuous Electronic Positioning on the Dredge: The CONTRACTOR is required to have in continuous operation on the dredge electronic positioning equipment that will accurately and continuously compute and plot the position of the dredge. A geographic positioning system, Differential Global Positioning System (DGPS), or equivalent, shall be used to maintain precise positioning of the dredge. Whenever dredging operations are underway, the location of the dredge shall be continuously monitored and its position recorded in Florida State Plane grid coordinates, East zone, NAD 1983/90 datum, at intervals not to exceed thirty (30) seconds. The CONTRACTOR shall be running a dredge location and management program, such as DREDGEPACK or equivalent. The ENGINEER shall have unrestricted access to the bridge GPS and depth recording units to enable onboard real time review at any time during construction. Plotters shall also record the X, Y, Z (with respect to NAVD, Geiod 2012a) position of the dredge's cutterhead or drag heads at intervals not to exceed thirty (30) seconds). If the CONTRACTOR elects to use a hopper dredge, the slurry velocity through the dragheads shall be submitted along with the X,Y,Z data. Such fixes (T,X,Y,Z), and the accompanying plots depicting the horizontal and vertical borrow area limits with respect to the fixes, shall be furnished to the ENGINEER daily, by 12:00 p.m. the following day, in an electronic format as part of the Daily Contractor Quality Control Reports. All vertical measurements shall be tide corrected, using tides measured along the open coast, and reported in feet NAVD, Geiod 2012a; predicted tides will not be accepted. The dredge operator shall have visual controls that depict the location and depth of the dredge's excavation device within the specified borrow area. The electronic positioning equipment shall be calibrated, maintained, and operated so that the maximum error for the fixes recorded do not exceed the tolerances in the horizontal position (±3 feet) or vertical position (±0.1 foot). The location of the master antenna on the dredge and the distance and direction from the master antenna to the dredge's excavation device shall be reported in the Daily Contractor Quality Control Reports. A ten percent (10%) retainage will be withheld from each of the monthly application of progress payments until this information is provided to the

ENGINEER.

12.4 **Tides:** The CONTRACTOR shall use measured tides for all hydrographic surveying and tidal corrections of cutterhead or drag heads (predicted tides are not acceptable). Measured tides shall be along the open coast of the project area and not within either adjacent navigation channels unless a tide study conducted by the CONTRACTOR and accepted by the ENGINEER supports the use of tide gages in the navigation channels.

12.5 **Transportation of Fill to the Project Site:** The method of transporting the fill from the borrow area to the fill area shall be proposed by the CONTRACTOR at the time of the bid on the plant and equipment schedule. The method of transport will be a CONTRACTOR decision; however, construction and performance of the Work must comply with all Project permits, production, and environmental requirements cited in the Contract Documents and these Specifications. No overflow or spillage of fill shall be permitted during transport from the borrow area to the Project area. If the CONTRACTOR fails to prevent spillage during transport, the CONTRACTOR shall suspend transport operations and promptly repair equipment or change operations so as to prevent spillage prior to resumption of transport operations.

If a pipeline is used, the pipeline shall be submerged except at the dredge, monobuoy, and boosters. A total of six (6) pipeline corridors are shown on the Plans. The CONTRACTOR shall utilize a maximum of four (4) of the six (6) pipeline corridors, at the CONTRACTOR's discretion. Only the approved pipeline corridors within the construction footprint are to be utilized during project construction. Pipelines shall be placed by the CONTRACTOR so as to minimize impacts to hardbottom and/or emergent hardbottom communities. During the pre-placement survey, the Contractor's divers shall install surface buoys provided by the CONTRACTOR to delineate the placement corridor. The proposed location(s) of the submerged pipeline must be as shown on the Plans or otherwise as approved by the ENGINEER prior to placement of the pipeline. Pipeline placement and operation shall adhere to FDEP Permit #0285993-009-JC special conditions. The CONTRACTOR shall maintain a tight discharge pipeline at all times. The joints shall be so constructed as to preclude spillage and leakage and will be periodically inspected by divers. Leaks shall be promptly repaired, and the dredge shall be shut down until complete repair has been made to the satisfaction of the ENGINEER. The CONTRACTOR will transport the ENGINEER to the leak repair site for visual inspection if so requested by the ENGINEER. Failure to repair leaks or change the method of operation that is resulting in significant leakage will result in suspension of dredging operations and require prompt repair or change of operation to prevent leakage as a pre-requisite to the resumption of dredging. Significant leakage shall be such that it exceeds turbidity and water quality standards or results in loss of material as may be considered significant by the ENGINEER. The CONTRACTOR will ensure that the hardbottom outcropping is protected throughout the area of operations and remains undamaged as a result of emplaced equipment. The CONTRACTOR will use stand-off/collar devices that will support the

pipe above the hardbottom in order to prevent the pipe from embedding into the hardbottom and creating a furrow along the entirety of hardbottom extent along the pipeline corridor. CONTRACTOR shall prepare and submit Shop Drawings for ENGINEER's review depicting materials and methods proposed to satisfy the requirement above related to protecting hardbottom from damage by submerged pipelines. The CONTRACTOR shall be responsible for locating and avoiding impacts to hardbottom during construction. The CONTRACTOR shall be responsible for all assessment of impacts, remediation, mitigation, fines, etc. resulting from damages to the hardbottom.

12.6 Hardbottom Communities: In addition to the requirements identified in Environmental Protection Provisions, permits, and the Contract Documents, the CONTRACTOR will utilize divers and/or any and all other means necessary to locate existence of hardbottom in the Work area and ensure that there will be no impact to hardbottom formations in the area prior to placing pipes (except as may be designated on the Plans), spuds, anchors, cables, drag arms or any other objects on the bottom. The CONTRACTOR shall be responsible for locating and avoiding impacts to hardbottom during construction. The CONTRACTOR shall be responsible for all assessment of impacts, remediation, mitigation, fines, etc. resulting from damages to the hardbottom.

12.7 Endangered Species and Sea Turtle Protection Requirements: In the event that a hopper dredge is utilized for sand excavation, the CONTRACTOR shall comply with all provisions provided in EP-8. These provisions specify that the CONTRACTOR shall provide trained NOAA Fisheries-approved sea turtle observers onboard the dredge vessel(s) at all times during excavation of fill material. Requirements and duties of the NOAA observers are provided in EP-8.1. Dredge Equipment and Operations requirements in regard to sea turtle protection are provided in EP-8.2. Relocation Trawling requirements are provided in EP-8.3.

12.8 Signal Lights: The CONTRACTOR shall display signal lights and conduct his operations in accordance with the General Regulations of the Department of the Army and of the U.S. 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 pipes or in submarine or bank protection operations, lights to be displayed on dredge pipeline 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 or floating plant working navigable channels, as approved by the Secretary of the Army and Commandant, U.S. Coast Guard. (33 C.F.R. 80.18 - 8-31a: 33 C.F.R. 95.51 - 95.66; 33 C.F.R. 9.22 - 90.36; 33 C.F.R. 82 and C.G. Pub. 169, Navigation Rules, International-Inland dated May 1, 1977) (DAR 7-603.33).

12.9 Notice to Mariners: The CONTRACTOR shall issue a Notice to Mariners regarding the dredging and disposal operation immediately after the Notice to Proceed has been received. A copy of the Notice to Mariners shall be provided to the ENGINEER. Should the CONTRACTOR, during dredging operations, encounter

any objects on the ocean bottom which could be a hazard to navigation, he will notify the ENGINEER immediately as to the location of said object and any other pertinent information necessary for the CONTRACTOR to put out a Notice to Mariners.

12.10 Crane and Dragline Safety Requirements: All cranes used in performing the Work set forth in these Specifications shall be equipped with geared boom hoists that require the application of power to raise and lower the boom or shall be otherwise equipped with mechanisms that will prevent the booms from being lowered by gravity. Cranes that are equipped with booms that can be lowered by either gravity or by power shall have the mechanisms for operating the booms by gravity made inoperative so that the booms cannot be lowered by gravity. The booms of all cranes and draglines shall also be equipped with shock absorbing type backstops to prevent them from overtopping.

12.11 Pumping of Bilges: The CONTRACTOR is cautioned that pumping oil or bilge water containing oil into navigable water or into areas which would permit the oil to flow into such waters, is prohibited by Section 13 of the Rivers and Harbors Act of 1899 approved March 3, 1899 (30 Stat. 1152; 33 U.S.C. 407). Violation of this prohibition is subject to penalties provided for under the referenced acts.

12.12 Diving Plan: The CONTRACTOR shall submit as part of his written Accident Prevention Plan a diving plan if diving is planned as a part of the operations. The intent of this requirement is to assure safe diving and particularly when emergencies, marine maintenance, or underwater problems occur requiring diving. Additionally, the CONTRACTOR is to determine that placement of spuds, anchors, pipes, etc. will not impact hardbottom or seagrass communities; a procedure which may require diving. All diving shall be conducted in accordance with the requirements of the following documents:

12.12.1 U.S. Navy Diving Manual, Volume I and II (NAVSEA 0994-LP-001-9010 and NAVSEA 0094-LP-001-9020).

12.12.2 U.S. Army Corps of Engineers' Safety and Health Requirements Manual, EM 385-1-1. Section 30.

12.12.3 U.S. Army Corps of Engineers, Jacksonville District Regulation CESAJR 385-1-1, Appendix P, "Contract Diving Operations." 29 CFR, Part 1910, Subpart T, OSHA Regulations.

TP-13 BEACH AND DUNE FILL PLACEMENT

13.1 General: All sand excavated from the offshore borrow area and transported to the Project area shall be deposited on the beach within the lines, grades and cross sections shown on the Plans. The CONTRACTOR shall maintain and protect the fill in a satisfactory condition at all times until final completion and acceptance of the Work. CONTRACTOR shall receive no payment for any fill sand that is <u>not</u> (a)

contained within the limits of the fill area shown in the Plans; (b) contiguous to the fill template and above the pre-construction profile. The CONTRACTOR must place a minimum of 95% of the design volume between project profile lines and achieve the minimum fill tolerance in order to be considered for payment of that acceptance section, unless otherwise accepted by the ENGINEER in writing.

13.2 Removal of All Debris from the Fill Area: Prior to placement of fill, the CONTRACTOR shall remove from the site all trash, snags, driftwood, and similar debris lying within the foundation limits of the dune fill section. All materials removed shall be taken from the beach area and disposed of in an appropriate and legal manner and at the expense of the CONTRACTOR. Grading and other construction equipment will not be permitted outside the project limits as shown in the Plans except for ingress or egress to and from the site. Under no circumstances will construction equipment be allowed on the beach farther than 800 feet from either end of the Project area without written consent from the ENGINEER.

13.3 Transportation of Fill on the Beach: The CONTRACTOR shall transport and place fill only between the "Landward Limit of Fill" and the "Construction Toe of Fill" as shown on the Plans unless restricted by easements. It is anticipated that the CONTRACTOR will need to transport and place fill in front of structures, along narrow sections of the Project, and to areas with low template fill densities. The method of transporting the fill alongshore to the fill area shall be proposed by the CONTRACTOR at the time of the bid on the plant and equipment schedule. The method of transport will be a CONTRACTOR decision; however, construction and performance of the Work must comply with all Project permits, production, and environmental requirements cited in the Contract Documents.

13.4 Fill Placement Requirements: The material shall be placed and brought to rest on the beach to the lines, grades, and cross-sections indicated on the Plans, unless otherwise provided for herein or directed by the ENGINEER. The beach/dune is subject to changes and the elevations on the beach/dune at the time the Work is done may vary from the elevations shown in the Plans. The CONTRACTOR is to place the fill on the beach in such a manner as to establish a uniform dune between adjacent profile lines as indicated in the Plans. The ENGINEER reserves the right to require minor grading of the placed fill to provide smooth transitions of the dunes and to prevent unstable fill configurations. Site specific field adjustments to the construction template (i.e. modifications to the grade elevations, slopes, and/or dimensions) may be required by the ENGINEER to rework fill placed to facilitate pedestrian access at beach access points.

13.5 Fill Placement Restrictions: The fill shall extend landward to the existing elevation contour that matches the dune/berm crest elevation shown in the Plans unless features (e.g. dunes, vegetation, or structures) prohibit fill placement or fill placement is restricted by easements. If a feature extends to the design berm elevation or above, the fill shall terminate at the seaward face of the feature. If the top of structure is below the dune/berm crest elevation, then the fill shall taper landward using a one (1) foot vertical to five (5) feet horizontal slope to one (1) foot below the crest

of the structure to prevent burial or overtopping with sediment. If a dune vegetation line is below the dune/berm crest elevation, then the fill shall taper landward using a one (1) foot vertical to five (5) feet horizontal slope to the edge of the vegetation.

Fill placed immediately landward of a seawall shall extend a minimum of one (1) foot below the top of the structure.

The ENGINEER shall direct the CONTRACTOR how to place fill at existing dune walkovers. This direction includes but is not limited to in-field directives by the ENGINEER and written directives supplied to the CONTRACTOR by the ENGINEER.

Beach fill shall only be placed above MHW from R-51.3 to R-55 to be in compliance with Chapter 161 of Florida Statutes. The CONTRACTOR shall coordinate with the ENGINEER during the pre-construction/placement surveys to adjust the final design to be in compliance with this provision.

13.6 Control of Fill: The CONTRACTOR shall make every attempt to retain placed fill within the dune fill template until the Work is accepted. The CONTRACTOR shall maintain and protect the fill in a satisfactory condition at all times until final completion and acceptance of the Work.

The CONTRACTOR shall retain placed fill within the fill template until acceptance of each acceptance section. The CONTRACTOR shall construct temporary containment dikes and at their discretion may utilize spreader and pocket pipes to direct the slurry from the discharge point longitudinally longshore to prevent gullying and erosion of the beach and dune fill, to retain the hydraulic fill on the beach within the limits of the template cross-section, and to control water turbidity. Temporary containment dikes shall be constructed and maintained such that they extend at least three hundred (300) feet from the pipeline discharge point. The ENGINEER may direct the CONTRACTOR to extend dikes, if necessary, to control turbidity or erosion of the existing beach and placed fill. The pipeline discharge shall be located no closer than twenty-five (25) feet from any structure and at a minimum distance deemed safe by the CONTRACTOR to avoid potentially undermining the structure. Secondary dikes shall be constructed above mean high water as necessary to direct the slurry longitudinally along the beach to avoid transverse gullying directly from the discharge point to the Atlantic Ocean, and to build the dune to achieve the design grade. Total containment of fill is not allowed.

13.7 Uniform Beach: The filled beach between the construction profiles shall be graded, dressed, and uniform in dimension. Beach sections between construction profiles shall be filled to a minimum of ninety-five (95%) percent of the volume based on the fill templates shown in the fill template cross-sections in the Plans, and to the minimum tolerance everywhere unless restricted by easements. The constructed beach contour lines between construction profiles, including the beach berm break, will be approximately parallel and straight, indicating that the CONTRACTOR constructed a uniform (non-cuspate) beach.

13.8 Under filling Between Accepted Profile Lines: If the ENGINEER observes or thinks they have observed underfilling of the dune between project profile lines, the ENGINEER may request an additional survey be conducted by the CONTRACTOR at the CONTRACTOR's expense. If found to be deficient, the CONTRACTOR shall place additional fill until the dune is uniform in appearance and dimensions between project profile lines, provides the shapes depicted in the Plans, provides a minimum of 95% of the design fill volume and meets the minimum tolerance at all locations in the acceptance section in order to qualify for payment of that section. Fill will not be obtained from adjacent areas of the beach or dune to remedy under filling.

13.9 Grading and Dressing the Dune Fill: Upon completion of all filling operations within an acceptance section, and prior to surveying for payment, the fill shall be graded and dressed with a dragged pipe so as to eliminate any undrained pockets, ridges, and depressions in the beach fill surfaces. The CONTRACTOR is to grade and dress the fill on the beach in such a manner as to establish a uniform berm width and slope between adjacent pay profile lines with a positive seaward slope between the seaward toe of dune and seaward berm crest within the vertical tolerance specified in Section 13.11. The bank or scarp caused by wave erosion shall be graded down to a slope not steeper than one (1) foot vertical to eight (8) feet horizontal to the water's edge. The CONTRACTOR shall grade down any and all beach scarps or sand cliffs in the entire restored beach that persist for longer than seven (7) days until the CONTRACTOR has demobilized from the project site. The project site will not be considered complete, nor the CONTRACTOR eligible for final payment, until all beach scarps in the entire project area are graded.

13.10 Right to Vary Beach Design Dimensions: The ENGINEER reserves the right to vary the width or grade of the dune from the lines and grades shown on the Plans or observed at the Project site in order to establish a uniform beach between adjacent project profile lines or for the entire length of the Project. The dune fill cross-sections shown in the Plans are for the purpose of estimating the amount of fill needed and will be used by the ENGINEER in making any change in the lines and grades.

13.11 Tolerances: The vertical tolerance is +/- 0.5 feet from the design template. Fill placement must at least meet the 0.5 feet tolerance below the template everywhere in the fill, and the minimum fill volume requirement. Any material placed more than 0.5 feet above the template may be left in place at the discretion of the ENGINEER and will be deducted from the pay quantity. The CONTRACTOR shall refill any deficient section of beach to at least meet the below template tolerance, and 95% of the fill volume within the acceptance section. The COUNTY will withhold payment for those sections of dune that do not meet the minimum fill requirements until the appropriate fill placement, grading, and dressing has been completed by the CONTRACTOR.

Fill tolerances are provided to facilitate construction. Fill placed above the template and above the upper tolerance will not be eligible for payment. Fill placed above

the template and within the upper tolerance will not be used to offset underfilling of the template elsewhere within the template.

13.12 Sand Ramps: The CONTRACTOR is required to build and maintain sand ramps fifteen (15) feet wide over the shore pipe at two hundred (200) foot intervals to allow pedestrian access to the ocean. Sand ramps will also be required at the beach access points, lifeguard towers, and at each "Construction Access and Staging Area" employed by the CONTRACTOR.

13.13 Misplaced Materials: If any material is deposited other than in places designated or approved, the CONTRACTOR may be required to remove such misplaced material and redeposit it where directed by the ENGINEER, at the CONTRACTOR's expense.

13.14 Restrictive Barrier: The CONTRACTOR shall erect, maintain, and move as necessary, a restrictive fencing, barricades, warning signs, and/or flagmen to ensure public safety. If the CONTRACTOR is not able to keep and maintain the public at a safe distance from the active construction activity, the CONTRACTOR is to notify the COUNTY and request assistance in controlling public access to the construction site. For the purposes of this section, active construction activity is defined as all equipment staging/access areas and 500 feet north of south of the dredge discharge pipe.

13.15 Dedicated Safety and Flag Person: The CONTRACTOR shall have a dedicated safety and flag person(s) on site at all times, whose sole responsibility is preventing the public from entering the Work area and to prevent unsafe traffic conditions at the sand delivery locations. The CONTRACTOR shall provide and maintain barricades, warning signals and flagmen as required by Federal, State or local regulations and the CONTRACTOR'S traffic control plan. Any costs associated with this requirement shall be included in the unit cost for Beach and Dune Fill.

13.16 Unsuitable Material: The CONTRACTOR shall notify the ENGINEER in the event that unsuitable material was placed in the dune fill template. The unsuitable material shall be removed from the beach at the CONTRACTOR's expense. Unsuitable material is defined within the FDEP and USACE permits and sediment quality control plan (Appendices A, B, and D).

13.17 Daily Reports: The CONTRACTOR, and their subcontractor (if any), shall submit daily reports that summarize the sand fill work completed at the end of each day. Quality Control Report Form shall be submitted every working day during the construction period (even when no Work is performed) between the time at which the Notice to Proceed is issued and the time of Final Acceptance. A copy of the required daily report is included in Appendix C. The CONTRACTOR shall submit Daily Reports by 12:00 P.M. the following day to the COUNTY and ENGINEER.

TP-14 BEACH TILLING AND ESCARPMENT LEVELING

14.1 Escarpment Elimination: The CONTRACTOR shall inspect the entire beach project area for the formation of sand escarpments. Any escarpments which persists for longer than seven (7) days and exceeds and 12 inches in height (on average), independent of the length, shall be leveled or smoothed to eliminate the escarpment. The ENGINEER will observe the beach after leveling of escarpments to ensure that the ENGINEER agrees that all escarpments have been leveled in compliance with the permits and Contract Documents. The CONTRACTOR shall level any escarpments found by the ENGINEER or COUNTY, at their request.

14.2 Beach Tilling: Following the completion of beach filling, dressing, and payment survey, the CONTRACTOR will till the constructed portion of the beach to loosen the compaction of the placed material. Tilling will be to a minimum depth of 36 inches throughout the newly placed beach seaward to the visible high water mark to the landward extent of fill placement. The tilling shall be by use of a tracked vehicle (bulldozer, loader, or equivalent) by pulling (rear mount) or pushing (front mount) a rake with the tines of a length appropriate to achieve a tilling depth of 36 inches. Tines will be spaced 15 to 18 inches apart. The CONTRACTOR shall conduct additional tilling as necessary to ensure all of the beach fill above the mean high water line has a compaction of less than 500 cone penetrometer units, as determined by the ENGINEER. Following tilling, the beach shall again be dressed by dragging a pipe (or similar) lengthwise over the beach. The pipe may be positioned immediately behind the tilling tines to allow for a single operation of tilling and dressing. All tilling and dressing will be conducted during daylight hours only.

TP-15 CHARACTER OF DUNE VEGETATION MATERIAL

15.1 General: The CONTRACTOR shall supply, deliver, and place approximately ~~352,120~~ 302,820 plants of native salt tolerant dune vegetation as specified in the contract documents. The actual number of plants required and installed may vary depending upon the dimensions of the fill template based on the pre-construction survey and the as-built dimensions of the fill placed by the CONTRACTOR. The plants shall be installed on the dune crest of the constructed dune as depicted by the typical cross section shown in the Plans.

15.2 Source of Plant Material: Acceptable plants for the purpose of this contract are nursery grown plants produced vegetatively from first generation foundation material and/or plants produced vegetatively as accessional generations from foundation materials. Plants shall originate from the Florida peninsula. The contracting nursery shall acclimate plant materials by growing plants in full sun conditions for at least thirty (30) days before planting (i.e., not inside greenhouse, under glass, under shade cloth, etc.). Plants shall be available for inspection at the nursery by the ENGINEER. The CONTRACTOR shall provide written documentation as to the source of the planting units. Certification shall be provided that all plant materials have been produced in accordance with all applicable Federal and State laws. The CONTRACTOR shall secure all permits required for the transportation, collection,

and propagation of nursery stock. A copy of all permits required shall be provided to the ENGINEER. Documentation shall include collection permits or contracts from a State, the U.S. Department of Agriculture, or other comparable documents.

15.3 **Plant Size and Containers:** The liners for both grasses species shall be no less than 12" tall from the top of the root ball to the tip of the longest leave. The liners for all three species of ground covers shall be no less than 6" tall from the top of the root ball to the tip of the longest leave. Plants not meeting the minimum size requirement will be rejected.

The root ball for both grasses species shall be no less than 1" x 1" x 2.5" depth. The root ball for the three ground cover species shall be no less than 1.5" x 1.5" x 2.5" depth. The plants shall have a fully developed root ball, with white or light beige roots.

Uniola paniculata liners shall be multi-stemmed plants (at least 2 stems). Ipomoea pes-caprae liners shall be multi-stemmed plants (at least 2 stems). Helianthus debilis liners shall be multi-stemmed plants (at least 2 stems). Panicum amarum liners can be single-stemmed plants. The plant material in each liner constitutes one dune grass plant, regardless of the number of viable stems in the liner.

15.4 **Plants:** Plants species shall include sea oats (*Uniola paniculata*), bitter panicgrass (*Panicum amarum*), railroad vine (*Ipomoea pes-caprae*), and dune sunflower (*Helianthus debilis*). Approximately ~~352,120~~ 302,820 plants are required for this Project. The COUNTY may adjust the quantity of plants based on field adjustments to the landward limit of fill at the time of construction. The estimated quantities and proportion of plants for the four (4) species used shall be as summarized in **Table 3**. The COUNTY reserves the right to adjust or modify the quantities of plants by up to ±25%. The actual number of plants required and installed may vary depending upon the dimensions of the fill template based on pre-construction surveys and the as-built dimensions of the fill placed by the CONTRACTOR. The percentage distributions shall be achieved regardless of the number of plants installed and within each acceptance section.

Table 3: **Dune Vegetation Distribution**

Plant Type	**Distribution**	**Estimated Quantity**
Sea Oats	80% - 85%	~~281,696~~ 242,256
Bitter Panicgrass	10% - 15%	~~35,212~~ 30,282
Railroad Vine	5% - 8%	~~17,606~~ 15,141
Dune Sunflower	5% - 8%	~~17,606~~ 15,141
Total:	**100%**	**~~352,120~~ 302,820**

15.5 **Plant Condition:** All plants shall be "healthy and vigorous" according to horticultural standards. Their roots shall be disease free, moist, and milky white at the time of delivery and installation. The plants shall have a fully developed root ball, with white or light beige roots. Brown, black, or rotting root balls shall be rejected. The

plants shall be free of defects, disfiguring, sun scalding, diseases, insects, insect eggs, borers, or other forms of infections or infestation. Plants showing signs of stress, either from drought, pest infestation, disease, or any visible mishandling shall be rejected and shall be replaced at the CONTRACTOR's expense. Plants rejected under this Specification will not be considered as delivered to the site and, therefore, not eligible for payment under the unit cost schedule applying to planting units.

TP-16 DUNE VEGETATIVE PLANTINGS

16.1 **General:** Following the placement and acceptance of fill within an acceptance section, dune vegetation shall be installed on the constructed dune crest. The plants shall be installed by accessing the dune crest from the beach to avoid damaging existing vegetation.

16.2 **Transportation and Delivery:** All plants shall be specifically protected in such a manner as to ensure adequate protection against climatic, seasonal, mechanical, or other injury during transit, loading and unloading, holding, and planting. Special care shall be taken for prompt delivery and careful handling in loading and unloading. Plants shall be transported in an enclosed truck or trailer. Stems cannot be broken, nor physically damaged during transportation. Damaged plants will be rejected and shall be removed immediately at the CONTRACTOR's expense. The CONTRACTOR shall submit in writing the method of transporting plants from the nursery to the delivery site and from the delivery site to the planting site to the ENGINEER for approval.

16.3 Each individual shipment of plants to the delivery site shall be accompanied by a delivery slip indicating the following information: 1) source of plant material (nursery name), 2) species (scientific and common name if applicable), 3) plant size, 4) quantity being delivered, and 5) date of delivery. Shipping slips are to be signed by the CONTRACTOR. Copies of the slips shall be provided with the daily quality control reports. The COUNTY and ENGINEER shall be notified three (3) days prior to any and each plant delivery to allow for plant count.

16.4 **Planting Layout:** The specific location of planting boundaries, rows, and baselines shall be marked on site by the CONTRACTOR. The COUNTY and ENGINEER reserve the right to alter the boundaries, rows, and plant spacings, if necessary. Planting shall only occur after the dune within an Acceptance Section has been constructed and accepted by the COUNTY and ENGINEER.

Planting shall be as prescribed on the Plans except at locations seaward of existing seawalls where minimal fill is proposed. These seawall locations are listed in the **Table 4** below.

Table 4: Seawalls with No Planting Prescribed

Seawall Location	Length (feet)
R-27+300 to R-27+850	550
R-33 to R-33+750	750
R-37+625 to R-39+600	1,950

16.5 Planting Installation:

16.5.1 The specific location of planting boundaries, rows, and baselines shall be marked on site by the CONTRACTOR. The plants shall be installed 9" on center in staggered shore-parallel rows 9" apart.

16.5.2 Unvegetated areas for pedestrian access across dunes shall be roped off by the CONTRACTOR to prevent trampling of plants. The CONTRACTOR shall furnish and install rope and wood posts at the expense of the CONTRACTOR.

16.5.3 Plants shall be planted on the same day they are delivered to the site if possible. Plants shall not become stressed prior to planting. Plants shall retain their stem and leaf rigidity at all times indicating adequate moisture is being received. Plants shall be watered within the salinity ranges they were grown, if needed. The CONTRACTOR must take the necessary precautions to ensure that plant materials receive adequate water during all phases of the contract prior to actual planting. Plants appearing discolored, shriveled, dehydrated, or otherwise stressed shall be rejected.

16.5.4 All containerized plants shall be planted in a dug hole. The plant shall be removed from the container immediately prior to planting and placed into the hole. The depth of the hole shall be at least six (6) inches below normal ground. A minimum of 8 oz. of pre-hydrated gel shall be added prior to plant installation so that the root ball, not the stems, is in contact with the gel. A pre-hydrating water gel, such as stockosorb, or equivalent, shall be used for all planting units per gel manufacturer specifications. Once the gel is added and plant installed, the distance from the top of the root ball to the sand surface shall be no less than four (4) inches.

For each planting unit, slow release fertilizer shall be added to the gel prior to planting unit installation. A minimum of 2.5 grams of slow release fertilizer shall be included with each plant. The slow release (90-day) pelletized Osmocote or approved equivalent fertilizer shall have an N.P.K. ratio of 18.6.12 with trace elements.

16.5.5 At the end of each work day, all debris, trays, buckets, etc. must be removed from the working areas.

16.5.6 The CONTRACTOR's daily quality control report shall document the number of plants delivered and installed, watering methods, and other pertinent information.

16.6 Planting Irrigation and Fertilization:

16.6.1 The CONTRACTOR will be allowed to water-in (initially irrigate) all newly installed planting units according to a CONTRACTOR prepared and ENGINEER approved irrigation schedule. The CONTRACTOR will be responsible for all aspects of the irrigation including compliance with all environmental permitting regulations, requirements and conditions stated in the permits which address maintenance irrigation and installation activities.

The CONTRACTOR will be responsible for the provision of all irrigation water required under this bid. Freshwater (potable only) shall be provided by the CONTRACTOR and applied to the planting zones using a non-scouring spray applicator. The CONTRACTOR shall make all necessary arrangements with the appropriate local agencies if the use of local hydrants in the area is desired.

16.6.2 The CONTRACTOR will be allowed to maintenance irrigate the installed planting units according to the CONTRACTOR prepared and ENGINEER approved irrigation schedule. The CONTRACTOR will be responsible for all aspects of the maintenance irrigation including compliance with all environmental permitting regulations, requirements and conditions stated in the permits which address maintenance irrigation and installation activities.

16.6.3 The application of maintenance fertilization during the 90-day warranty period may be undertaken by the CONTRACTOR at the CONTRACTOR's discretion. The cost of any and all fertilization shall be included in the per planting unit cost in the bid documents. Maintenance fertilization, if employed, will be undertaken in a manner which complies with all environmental permits applicable to the Project site. The CONTRACTOR will be allowed to maintenance fertilize the installed planting units according to the CONTRACTOR prepared and ENGINEER approved fertilization schedule. Whether the CONTRACTOR chooses to maintenance fertilize or not, compliance with all provisions of the Specifications including, but not limited to, the survival guaranty and replanting sections of the Specifications, shall be met.

16.6.4 The cost of maintenance irrigation and fertilization events anticipated by the CONTRACTOR shall be included in the per planting unit cost in the bid documents.

16.6.5

16.7 Planting Survivability:

16.7.1 The CONTRACTOR shall maintain 100% survival for an establishment period of fourteen (14) days after planting during the maintenance period. If replanting is necessary due to death, stress, etc., with the exception of those plants lost due to conditions beyond the control of the CONTRACTOR, the CONTRACTOR is responsible for the replacement of the affected plants within five (5) days following notice of delinquency. Replanting shall be performed by the CONTRACTOR at no cost to the COUNTY. The replacement planting units will be covered under the CONTRACTOR'S warranty bond.

16.7.2 The CONTRACTOR shall also be responsible for controlling weeds and prevention of invasive exotic and/or nuisance species encroachment within the planting area for the duration of the contract. At the end of the contract, the CONTRACTOR shall provide the ENGINEER with written instructions for the continued watering, if necessary, and care of the plants.

16.7.3 This survival criterion may be waived, at the discretion of the ENGINEER, in areas where it can be documented that plant survival has been adversely affected by unexpected pedestrian traffic, wind erosion, or overwash.

16.8 Planting Warranty Period:

16.8.1 The CONTRACTOR shall obtain a warranty bond to cover all costs associated with dune plants for a warranty period of 90 days. During this warranty period, for each of the planting areas a minimum survival rate of 80% of all planting units installed for all species shall be met. Within planting areas of questionable growth/success results, the ENGINEER or a representative reserve the right to inspect root penetration for possible replant by the CONTRACTOR. Thirty (30) plants within each questionable planting area may be randomly selected to be dug up for root growth inspection. Eighty (80%) percent of selected plants shall have achieved root penetration of 9" or greater for both grass species. The planting survival shall be deemed a success if both individual planting unit survival and root penetration are met. The CONTRACTOR shall provide a schedule of planting dates within seven (7) days of planting in order to determine warranty period.

16.8.2 If any of the above success criteria are not met, as determined by the ENGINEER, the CONTRACTOR shall replant non confirming units with viable (and within Specifications) planting units of the same type in all areas considered to be deficient according to the planting unit success criteria. The CONTRACTOR will provide continuing service to the COUNTY for the duration of the 90 day warranty period. The replanting of planting units will be the sole responsibility of the CONTRACTOR and will be completed

at no additional cost to the COUNTY. All original maintenance, warranty, and survival Specifications and requirements shall apply to replanted planting units.

16.8.3 The success criterion during the warranty period may be waived, at the discretion of the ENGINEER, in areas where it can be documented that plant survival has been adversely affected by unexpected pedestrian traffic, wind erosion or overwash.

TP-17 PAYMENT FOR MOBILIZATION AND DEMOBILIZATION

17.1 **General:** The Work specified in this section consists of the preparatory work and operations in mobilizing for beginning Work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, and for the establishment of temporary offices, buildings, utilities, traffic control, safety equipment, first aid supplies, sanitary, and other facilities, as required by these Specifications, the special provisions, and applicable laws and regulations. The costs of bonds and any required insurance, and any other pre-construction expense necessary for the start of the Work, excluding the cost of construction materials, shall also be included in this section.

17.2 **Mobilization:** All costs connected with the mobilization and demobilization of all the CONTRACTOR's equipment and personnel will be paid for at the contract lump sum price for this item. Sixty percent (60%) of the lump sum price will be paid to the CONTRACTOR after the placement of a quantity of, at minimum five-thousand (5,000) cubic yards of material on the beach and placed within the beach fill template. The remaining forty percent (40%) will be included in the final payment for Work under this contract. Payments for mobilization and all payment except for the final payment will be subject to a retainage until final acceptance of the project by the COUNTY per the COUNTY's Standard Terms and Conditions.

17.3 **Cost Review:** In the event that the cost for the mobilization and demobilization does not bear a reasonable relation to the cost of the entire Work in this contract, then the ENGINEER may require the CONTRACTOR to produce cost data to justify this portion of the bid. The ENGINEER will utilize previously bid projects of a similar nature as a guideline to evaluate the mobilization and demobilization costs. Failure to justify such price to the satisfaction of the ENGINEER will result in payment of mobilization costs, as estimated by the ENGINEER at the completion of mobilization, and payment of the remainder of this item in the final payment under this contract.

TP-18 PAYMENT FOR ENVIRONMENTAL COMPLIANCE – BEACH FILL SITE

Payment for labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with environmental compliance at the beach fill site shall be paid for at the lump sum price on the Bid Schedule for "Environmental Compliance". Progress payments will be made based upon the percent of beach fill work completed and accepted during each month. All costs associated with

environmental compliance of the Work shall be included in the lump sum price for Environmental Compliance. Acceptance of the Work will be determined from review by the ENGINEER of monthly activities and CONTRACTOR reporting.

TP-19 PAYMENT FOR ENVIRONMENTAL COMPLIANCE – SEA TURTLE MONITORING

In the event that the CONTRACTOR utilizes a hopper dredge, payment for labor, materials, equipment, and all other appropriate costs in connection with environmental compliance – sea turtle monitoring shall be paid for at the lump sum price on the Bid Schedule for "Environmental Compliance". Progress Payments shall be made based upon the percent of beach fill work completed and accepted during each month. Acceptance of the Work will be determined from review by the ENGINEER of monthly activities and CONTRACTOR reporting.

TP-20 PAYMENT FOR ENVIRONMENTAL COMPLIANCE – SEA TURTLE RELOCATION TRAWLING

The CONTRACTOR is required to conduct relocation trawling while using the hopper dredge under the conditions of the USACE permit. Requirements are summarized in the USACE permit and Terms and Conditions from the NMFS Biological Opinion contained in Appendix B to the Contract Documents. The amount of relocation trawling cannot be predicted beforehand, therefore, fifty (50) days are included in the bid to establish a daily rate. In the event that the CONTRACTOR utilizes a hopper dredge, payment for labor, materials, equipment, and all other appropriate costs in connection with environmental compliance – sea turtle relocation trawling shall be paid for at the lump sum price on the Bid Schedule for "Environmental Compliance". Progress Payments shall be made based upon the percent of beach fill work completed and accepted during each month. Acceptance of the Work will be determined from review by the ENGINEER of monthly activities and CONTRACTOR reporting.

TP-21 PAYMENT FOR BEACH AND DUNE FILL

21.1 General: Other than costs for mobilization, demobilization, environmental compliance, dune vegetation, site restoration and grading, pre-placement and post-placement surveying, and pre-construction and as-built borrow area surveying, all other costs associated with the beach nourishment project including but not limited to, debris removal, site cleanup and preparation, laboratory testing, site repairs, maintenance of traffic, sand transport, staging, and placement shall be included in the contract unit price per cubic yard on the bid form. The unit price shall also include all other items of overhead, profit, labor, material, and any other costs incidental to performing the Work.

21.2 Basis of Volume Computation Measurement: The basis of the volume computation for payment purposes will be the comparison of the post-beach dressing surveyed as-filled post-placement pay profiles to the pre-placement pay profiles, and the volume within the templates. The quantity (volume) of fill material lying within the construction template, addressed in the Contract Documents and shown in the Plans, will be the basis for payment. The CONTRACTOR shall conduct the pre-

placement and post-placement surveys, and prepare computations of volume within the templates as are necessary and as indicated in the Contract Documents in order to determine the quantities placed within the fill acceptance sections between payment profile lines. The CONTRACTOR's methodology to achieve desired fill volumes shall be presented at the pre-construction conference.

21.3 Requests for Payment: The CONTRACTOR may request payment for beach and dune fill placement on a monthly basis, and at completion of the project, upon final acceptance by the ENGINEER of the completed beach nourishment sections. The CONTRACTOR will be eligible for progress payments when fill sections have been filled to a minimum of 95% of the total beach fill section volume. The beach fill volume for a section is the volume to completely fill the approximate 100 foot section along the project baseline to the construction template requirements shown on the Plans. The CONTRACTOR may conduct surveys for payment purposes after completion and dressing of five (5) adjacent fill sections. For all payments, the beach and dune fill shall be graded, dressed, and level between profiles, and approved for payment by the ENGINEER. The CONTRACTOR shall submit to the COUNTY and ENGINEER for review on a monthly basis, an Application for Progress Payment filled out and signed by the CONTRACTOR covering the Work completed as is required by the Contract Documents and accompanied by such supporting documentation as is required by the Contract Documents and also as the ENGINEER may reasonably require. All payments will be subject to retainage per the COUNTY's Standard Terms and Conditions until final acceptance of the project.

21.4 Fill Tolerances: Payment shall be for beach and dune fill placed within the construction template with a construction berm elevation as shown on the Plans. Payment shall also be provided for fill placed in the upper 0.5 feet beach berm tolerance. The minimum vertical tolerance below the template is 0.5 feet and shall be achieved everywhere within areas filled and for which payment has been requested. Notwithstanding these fill placement tolerances, beach and dune fill placement must at least meet the 0.5 foot tolerance below the construction template everywhere on the constructed beach berm from the north project limit to the south project limit shown on the Plans, and the minimum requirement of 95% of the fill volume for each acceptance section must be met. The CONTRACTOR shall fill any deficient section of beach to, at minimum, meet the lower template tolerance everywhere on the constructed beach berm, and to a minimum of 95% of the fill volume for the acceptance section. The COUNTY will withhold payment for acceptance sections that do not meet the minimum required beach and dune fill requirements until the required hydraulic fill placement and dressing has been completed by the CONTRACTOR.

21.5 Computation of Payment Volumes: Quantities of beach and dune fill satisfactorily placed and meeting beach and dune fill design template requirements and volumes will be computed for payment by use of the average end-area method. The distance between each profile line to be used for fill computation is the perpendicular distance between each profile line along the project baseline shown on the

Plans. The CONTRACTOR shall account for this method of fill volume calculation when estimating the bid prices. Payment will be provided for fill contained within the payment profile construction templates (and tolerances), as shown in the Plans. No payment will be provided for fill placed above the upper tolerance. The CONTRACTOR's bid shall account for any costs associated with the payment profile requirement, the azimuth of profile lines, the profile measurement technique, survey requirements, potential loss of sand before section survey and acceptance, and the payment volume calculation methodology.

21.6 Compensatory Slope Adjustment: During placement of fill, wave conditions may adjust the slope of the placed fill beyond the fill template. In recognition of this natural phenomena, fill located seaward of the fill template slope may qualify for payment where such placed fill is (a) within the limits of the fill project area shown in the Plans, (b) below the mean high water line, (c) contiguous to the fill template, (d) above the pre-placement profile survey, and (e) measured within the post-placement profile survey. Compensatory slope volumes will be applied only to compensate for lost volume from the template slope below the mean high water line. This volume will not be used to compensate for volume deficiencies within the fill template on the beach berm located landward of the mean high water elevation on the template slope, or along other fill profiles identified on the Plans. This clause does not relieve the CONTRACTOR from grading the beach berm and slope as shown on the Plans. Compensatory fill volume shall not quality for payment other than that portion of the volume which was relocated by natural forces seaward beyond the template slope shown in the Plans.

TP-22 PAYMENT FOR DUNE VEGETATIVE PLANTINGS

22.1 General: Payment for mobilization, demobilization, labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with dune vegetation, including but not limited supplying, transporting, and installation of plants, and monitoring of planting success during the maintenance and warranty periods, shall be included in the lump sum price for Dune Vegetative Plantings. The cost shall also include overhead, profit, labor, material and any other costs incident to installing dune vegetation.

22.2 Basis for Payment of Dune Vegetation: Payment for dune vegetation will be based upon the number of plants installed within the required limits of the layout area. To be eligible for payment, the CONTRACTOR shall document planting dates, quantities supplied, quantities installed, species type, survival rates, and conduct post-installation surveys of the perimeter of dune plantings. The planting shall achieve a 100% survival rate after the fourteen (14) day maintenance period and 80% planting survival rate after the 90-day warranty period from the date of initial planting. One-hundred percent (100%) of the unit price for Dune Vegetative Plantings shall be paid upon successful demonstration of the survival rate after the fourteen (14) day maintenance period. Any defective Work or plants that do not meet the 90-day warranty period covered by the warranty bond will be replaced at no

cost to the COUNTY. The Dune Vegetative Plantings quantities shall be determined based on quantities delivered to the project site and verified by post-installation surveys conducted by the CONTRACTOR.

22.3 **Progress Payments:** Monthly progress payments shall be based on the number of plants installed within a completed acceptance sections, which have been approved by the ENGINEER. The CONTRACTOR will be eligible for the initial progress payment when a minimum of five (5) acceptance sections have been completed and approved by the ENGINEER. Progress payments will not be made for partially completed acceptance sections. It should be noted that due to the dune fill placement areas and dimensions not all acceptance sections will require dune vegetation.

TP-23 PAYMENT FOR SITE RESTORATION AND GRADING

Payment for mobilization, demobilization, labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with site restoration, including tilling and scarp leveling of the restored beach, shall be included in the lump sum price for Site Restoration & Grading. No partial payments will be made for this Work. Acceptance of the Work shall be determined by visual inspection performed by the ENGINEER or COUNTY.

TP-24 PAYMENT FOR PRE-PLACEMENT AND POST-PLACEMENT SURVEYS

Payment for mobilization, demobilization, labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with the pre- and post-placement surveys shall be included in the lump sum price for Pre-Placement & Post-Placement Surveys. Progress payments will be made based upon the percent of beach fill work completed and accepted during each month. Acceptance of the Work will be determined from review by the ENGINEER of monthly activities and CONTRACTOR reporting.

TP-25 RIGHT TO REFUSE RECOMMENDATION FOR PAYMENT

The ENGINEER may refuse to recommend the whole or any part of any payment if, in their opinion, such representations to the COUNTY would be inaccurate. The ENGINEER may also refuse to recommend any payment because of subsequently discovered evidence or the results of subsequent observations, measurements, or tests, nullify any such payment previously recommended to such extent as may be necessary in the ENGINEER's opinion to protect the COUNTY from loss because:

(a) The Work is defective, inconsistent with the Plans and Specifications, or completed Work not accepted by the ENGINEER has been damaged requiring correction or replacement;

(b) Written claims have been made against the COUNTY or liens have been filed in connection with the Work;

(c) The contract price has been reduced because of modifications;

(d) The COUNTY has been required to correct defective Work or complete the Work;

(e) The CONTRACTOR has not performed the Work in accordance with the contract documents;

(f) The CONTRACTOR has failed to make payment to subcontractors, for labor, materials, or equipment;

(g) The CONTRACTOR is claiming additional placement of fill volume for payment beyond that measured and calculated using the procedure established in the contract documents for computation of fill quantities for payment purposes;

(h) The CONTRACTOR is claiming additional payment for any reason not previously agreed to by the COUNTY; or

(i) The CONTRACTOR has not repaired damages caused by the CONTRACTOR's operation to the satisfaction of the COUNTY and/or affected private property owner.

TP-26 FINAL ACCEPTANCE AND PAYMENT

26.1 Beach Escarpment Elimination before Final Payment: At the completion of the entire fill placement and beach tilling, and prior to final payment, the CONTRACTOR will inspect the entire beach project area for the formation of sand escarpments. Any escarpments in the project area, independent of the escarpment height or the length, will be leveled or smoothed to eliminate the escarpment by the CONTRACTOR. The ENGINEER, upon request by the CONTRACTOR, will observe the beach after leveling of escarpments.

26.2 Road and Infrastructure Repair before Final Payment: Roads, beach access, and infrastructure impacted by the CONTRACTOR's operation shall be repaired to a level acceptable to the COUNTY prior to final payment. Mobilization/Demobilization operations may cause impacts needing repairs, unless infrastructure is protected during construction.

26.3 Engineer's Recommendation for Final Payment: The ENGINEER’s recommendation of final payment for the project will constitute a representation by the ENGINEER to the COUNTY that, in the ENGINEER's opinion, the conditions precedent to the CONTRACTOR's being entitled to final payment as set forth in the contract documents have been fulfilled.

26.4 Completion of Work: Upon written notice from the CONTRACTOR that the Work is substantially complete, the ENGINEER or COUNTY will observe the Work within seven (7) days of the receipt of the written notice from the CONTRACTOR and, if required, will notify the CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. All incomplete or defective work items will be placed on the Final Punch List. The CONTRACTOR shall immediately take such measures as are necessary to remedy

such deficiencies.

26.5 Application for Final Payment: After the CONTRACTOR has completed all such corrections to the satisfaction of the ENGINEER and COUNTY, and delivered any required quality control reports, water quality reports, data requested by the ENGINEER, guarantees, bonds, certificates of inspection, marked-up record documents, and all other documents as required by the contract documents or ENGINEER, and after the ENGINEER has indicated that the Work is acceptable to the ENGINEER and COUNTY, the CONTRACTOR may make application for final payment. The final application for payment shall be accompanied by all documentation called for in the contract documents and such other data and schedules as the ENGINEER may reasonably require, together with complete and legally effective releases or waivers (satisfactory to COUNTY) of all liens arising out of, or filed in connection with the Work. In lieu thereof and as approved by the COUNTY, the CONTRACTOR may furnish the following set of documents: 1) receipts or releases in full; 2) an affidavit of the CONTRACTOR providing warranties, covenants, and representations that the releases and receipts include all labor, services, material and equipment bills, and other indebtedness connected with the Work for which the COUNTY or the COUNTY's property might in any way be responsible; 3) proof that all charges have been paid or otherwise satisfied. If any subcontractor, manufacturer, fabricator, supplier, or distributor fails to furnish a release or receipt in full, the CONTRACTOR may furnish a bond or other collateral satisfactory to the COUNTY to indemnify the COUNTY against any lien.

26.6 Recommendation for Final Payment: If, on the basis of the ENGINEER's observation of the Work during construction and post-construction, and the ENGINEER's review of the final application for payment and accompanying documentation the ENGINEER is satisfied that the Work has been completed and the CONTRACTOR has fulfilled all of their obligations under the contract documents, the ENGINEER will, within seven (7) days after receipt of the final application for payment, indicate in writing their recommendation of payment and present the application to the COUNTY. If the application and accompanying documentation are acceptable as to form and substance, the COUNTY shall, within thirty (30) days after receipt of the ENGINEER's recommendation for final payment, pay the CONTRACTOR the amount recommended by the ENGINEER or other such amounts deemed appropriate by the COUNTY in consultation with the ENGINEER. If the ENGINEER is not satisfied that the Work is completed, the ENGINEER will return the application to the CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case the CONTRACTOR shall make the necessary corrections and resubmit the application.

26.7 Access to the Work: The COUNTY shall have the right to exclude the CONTRACTOR from the Work after the date of completion, but the COUNTY shall allow the CONTRACTOR reasonable access to complete or correct items as allowed by project permits.

26.8 Contractor's Obligation to Complete Work: The CONTRACTOR's obligation to perform and complete the Work in accordance with the contract documents shall be absolute. Neither recommendation of any payment by the ENGINEER, nor the issuance of any statement of certificate of completion or substantial completion, nor any payment by the COUNTY to the CONTRACTOR under the contract documents, nor any use of or occupancy of the Work of any part thereof by the COUNTY, nor any act of acceptance by the ENGINEER nor any failure to do so, nor the issuance of a notice of acceptability by the ENGINEER, nor any correction of defective work by the COUNTY shall constitute an acceptance of Work not in accordance with the contract documents or a release of the CONTRACTOR's obligation to perform the Work in accordance with the contract documents.

26.9 Making and Acceptance of Final Payment: The making and acceptance of final payment shall constitute:

a) A waiver of all claims by the COUNTY against the CONTRACTOR, except claims arising from unsettled liens, from defective work appearing after project completion, or from failure to comply with the contract documents or the terms of any guarantees specified therein; however, final payment shall not constitute a waiver by the COUNTY of any rights in respect to the CONTRACTOR's continuing obligations under the contract documents.

b) A waiver of all claims by the CONTRACTOR against the COUNTY other than those previously made in writing and still unsettled.

26.10 Defective Work:

26.10.1 One Year Correction Period: If within one (1) year after the date of completion or such longer period of time as may be prescribed by law or by the terms of any applicable guarantee required by the contract documents or by any specific provision of the contract documents, any Work is found to be defective, the CONTRACTOR shall promptly, without cost to the COUNTY and in accordance with the COUNTY's written instructions, either correct such defective work or, if it has been rejected by the COUNTY, remove it from the site and replace it with non-defective work. If the CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk or loss or damage, the COUNTY may have the defective work corrected or the rejected work removed and replaced. All costs associated with correction of defective work including compensation for additional professional services, shall be paid by the CONTRACTOR. The CONTRACTOR will not be held responsible for erosion of the beach fill after acceptance of completed fill segments by the ENGINEER. However, if unsuitable material including but not limited to rocks, debris, or construction materials placed as a result of the CONTRACTOR's operations are found within one (1) year of the project completion, the CONTRACTOR will be held responsible to correct this at no further cost to the COUNTY.

26.10.2 **Beach Erosion:** The CONTRACTOR will not be responsible for erosion of the accepted beach fill sections after final acceptance of fill sections by the ENGINEER. The CONTRACTOR shall remain responsible for beach fill sections until they are accepted for payment by the ENGINEER. The CONTRACTOR shall be responsible for the placement of material that is not beach compatible or does not meet State of Florida standards for beach material.

TP-27 SCHEDULE OF SUBMITTALS

Submittals required by the Technical Provisions for Offshore Borrow Area are provided in Table 5.

Table 5: Schedule of Submittals for Technical Provisions for Offshore Borrow Area

SPEC REFERENCE	DELIVERABLE	SUBMITTAL
TP - 2(a-h)	a) Bidder's proposed method of construction and overall schedule to demonstrate understanding of the Work and completion within the Contract time.	Submitted with Bid Documents under cover labeled "BIDDER QUALIFICATIONS"
	b) The additional equipment proposed to complete this project, to include barges, scows, boosters, cranes, bulldozers, loaders, excavators, etc.	
	c) Qualifications and prior experience of bidder's key personnel, to include proposed project manager, superintendent, dredge operator, site engineer, etc.	
	d) Experience with open water Atlantic Ocean dredging.	
	e) Description of last dredging project of this nature that the bidder completed.	
	f) References for at least three (3) similar beach nourishment works within the previous five (5) years.	
	g) Turbidity monitor experience and qualifications for compliance with project permits.	
	h) Scope of Work and resumes for the independent third party turbidity monitoring to demonstrate that the staff and equipment is available to conduct the monitoring correctly.	
	American Bureau of Shipping Certification for Open Ocean Operation	
TP - 5	Notification of Pre-/Post-Placement Surveys - Beach and Dune Fill	At least three (3) working days advance notice to the ENGINEER prior to conducting surveys
TP – 5.2	Pre-Placement Surveys - Beach and Dune Fill	Conduct at least seven (7) days prior to the commencement of beach and dune fill placement at any particular section
TP – 5.2	Post-Placement Surveys - Beach and Dune Fill	Conduct within seven (7) days upon the completion of fill placement and grading within an acceptance section; submit at least seven (7) days prior to submittal of an Application for Progress Payment and the Final Application for Payment

TP - 7	As-Built Surveys - Dune Vegetation	Submit at least seven (7) days prior to submittal of an Application for Progress Payment and the Final Application for Payment.
TP – 12.3	GPS Dredge Data	Submit in Daily Quality Control Reports
TP – 12.12	Diving Plan	Submitted prior to any operations (if needed)
TP – 13.17	Daily Quality Control Reports	Submitted by 12:00 PM the following day from the Notice to Proceed to Final Acceptance
TP – 16.3	Plant Delivery	Submit notice three (3) days prior to delivery

END OF PART II - TECHNICAL PROVISIONS OFFSHORE BORROW AREA

PART III – TECHNICAL PROVISIONS UPLAND SAND SOURCE

TP-1 SECTOR 3 BEACH AND DUNE RENOURISHMENT PROJECT

The Work covered by this section consists of furnishing all plant, labor, equipment, supplies and material, and of performing all operations and surveys in connection with excavating, transporting, placing, dressing, and grading beach and dune fill and supplying, installing, and monitoring dune vegetation as indicated in the Plans and in accordance with the Contract Documents. The fill material shall be excavated and transported from the permitted upland sand sources or other upland borrow sources that are subject to the approval of the ENGINEER, COUNTY, and State and Federal permitting agencies. The total fill volume to be placed within the beach and dune construction templates is approximately ~~670,600~~ 280,000 cubic yards (~~1,005,900~~ 420,000 Tons) of beach quality sand. Salt-tolerant dune vegetation (approximately ~~352,120~~ 302,820 plantings) will be planted on the restored dunes.

These Technical Provisions are only applicable to construction utilizing upland sand sources. See the Technical Provisions for Offshore Borrow Area (Part 2) if construction utilizes the alternate approved offshore borrow area.

TP-2 CONTRACTOR QUALIFICATIONS

The CONTRACTOR shall provide the labor, equipment, supplies, and materials to perform all operations in connection with supplying, transporting, placing, grading and tilling the beach fill, debris removal, and returning the project site to its pre-construction condition as required by the Contract Documents. In order for the CONTRACTOR to be deemed qualified and responsive, the following must be provided with the bid under cover labeled “BIDDER QUALIFICATIONS” or similar title:

a) Bidder’s proposed method of construction and overall schedule to demonstrate understanding of the Work and completion within the Contract time.
b) The additional equipment proposed to complete this project, to include bulldozers, loaders, excavators, etc.
c) Qualifications and prior experience of bidder’s key personnel, to include proposed project manager, superintendent, site engineer, etc.
d) Experience with beach and dune nourishment via truck hauling operations.
e) Description of last project of this nature that the bidder completed.
f) References for at least three (3) similar beach nourishment works within the previous five (5) years.
g) Turbidity monitor experience and qualifications for compliance with project permits.
h) Scope of Work and resumes for the independent third party turbidity monitoring to demonstrate that the staff and equipment is available to conduct the monitoring correctly.

TP-3 CONSTRUCTION ON THE BEACH

The CONTRACTOR shall limit construction activities to the fill area shown on the Plans or as otherwise approved by the ENGINEER. The CONTRACTOR shall exercise caution when accessing and driving on the beach. Sections of the beach are heavily used by people during all periods

of the year, and CONTRACTOR shall not trespass landward of MHW line in areas where easements have not been obtained

TP-4 PRE-PLACEMENT AND POST-PLACEMENT SURVEYS – SUPPLY/DELIVER/ PLACE SAND

Pre-placement and post-placement surveys shall be conducted by the CONTRACTOR. Surveys may be required to be conducted in the presence of the ENGINEER or a representative, at the option of the ENGINEER. The CONTRACTOR shall provide at least three (3) working days advance notice to the ENGINEER prior to conducting surveys.

4.1 **Survey Components:** The CONTRACTOR shall measure and submit to the ENGINEER plan and profile surveys of the beach/dune depicting the following:

a) Pre-placement conditions of the beach/dune.
b) Design template and fill tolerances for the beach/dune fill.
c) Post-placement (immediate post-construction) conditions of the beach/dune.

4.2 **Survey Timeframes:** The CONTRACTOR shall conduct and submit pre-placement surveys for the entire fill placement area or sections thereof to the ENGINEER no more than twenty-eight (28) days prior and at least seven (7) days before to the commencement of beach and dune fill placement within the specific fill sections surveyed. This will allow the ENGINEER to prepare updated cross-sections for the fill templates and assess volumetric requirements based on the pre-construction conditions. The CONTRACTOR shall not commence fill placement until cross-sections, based upon the pre-placement surveys, have been prepared by the ENGINEER. The ENGINEER will provide to the CONTRACTOR the revised template at each project profile in a spreadsheet or cross section format; the Plans will not be updated and/or reissued. Placement of fill in an area prior to completion and review of the pre-construction surveys is at the CONTRACTOR's risk and may or may not be approved for payment. The CONTRACTOR shall conduct post-placement surveys within seven (7) days upon the completion of fill placement and grading within an acceptance section. The CONTRACTOR shall submit as-built surveys to the ENGINEER within seven (7) days following the completion of each survey and at least seven (7) days prior to submittal of an Application for Progress Payment and the Final Application for Payment. If CONTRACTOR fails to submit an as-built survey to the ENGINEER within seven (7) days of the completion date for that survey, a mandatory meeting will occur the next day between the COUNTY, the ENGINEER, and the CONTRACTOR to discuss the overdue as-built survey. If the CONTRACTOR does not present the as-built survey during the meeting, all construction operations must cease until the survey is provided.

4.3 **Survey Requirements:** All profile surveys shall be conducted by RTK (real time kinetic) GPS or conventional survey techniques. Loop closures shall be performed on all profile control. The closure shall be less than 0.04 feet. If a fathometer is used to survey the offshore portion of the profile, the bathymetric survey and rod survey shall overlap a minimum of fifty (50) feet.

4.4 Profile Spacing: The pre-placement and post-placement surveys shall be measured along the project profiles defined in the Plans. The spacing between profiles is on average 100 feet. The profiles shall be surveyed at an azimuth of 70° clockwise from grid north as shown in the Plans. The coordinates for the project profiles listed in the Plans represent the project baseline. On each profile, the baseline shall be referenced as Range 0+00. Data points collected east of the baseline shall be reported as a positive offset while data points west of the baseline shall have a negative offset.

4.5 Collection of Survey Points: A sufficient number of points shall be taken along each profile to ensure adequate description of topographic features, such as the dune crest, foreshore, slope breaks, and intersections of the fill with the existing grade. Data points shall be taken at a spacing of not more than ten (10) feet with a maximum elevation difference of approximately one (1) foot between adjacent points. All topographic points shall be within ten (10) feet horizontally of the established profile line. All hydrographic points shall be within twenty-five (25) feet horizontally of the established profile line. Surveys shall extend a minimum of fifty (50) feet landward of the landward toe of fill and offshore to at least the -5 foot, NAVD contour. The product shall be a continuous line representing the entire fill template of the beach and dune.

4.6 Submission Requirements: All survey data should be submitted in electronic ASCII x,y,z format. All survey data shall also be submitted in graphical form with the pre-project conditions, design templates, allowable tolerances, and post-project conditions depicted. All cross-sections shall include the data and the identifying baseline station number. All survey information submitted, and included in any depiction, shall include the date of the survey. Vertical elevations shall be in feet referenced to the NAVD 1988 datum, Geoid 2012a. Horizontal distances shall be in feet. Locations shall be specified in Florida State Plane grid coordinates, East zone, NAD 1983/90 datum. Survey drawings shall be at an appropriate scale with the horizontal scale equal to the vertical scale. All field notes, survey and volume computations, and the records used by the CONTRACTOR to compute the CONTRACTOR's estimate of payment fill quantity shall be furnished to the ENGINEER with the Application for Progress Payment and Final Application for Payment.

4.7 Personnel: All surveys shall be performed under the direction of an independent Florida licensed professional surveyor and mapper (P.S.M.). All surveys shall meet minimum technical standards.

TP-5 AS-BUILT SURVEYS – DUNE VEGETATION

5.1 Survey Components: The CONTRACTOR shall measure and submit to the ENGINEER plan view surveys of the installed dune vegetation depicting the footprint of the planting.

5.2 **Survey Timeframes:** The CONTRACTOR shall submit as-built surveys to the ENGINEER at least seven (7) days prior to submittal of an Application for Progress Payment and the Final Application for Payment.

5.3 **Survey Requirements:** The CONTRACTOR shall survey the perimeter of the installed dune vegetation within each Acceptance Section by RTK (real time kinetic) GPS or conventional survey techniques. Data points shall be taken at a spacing of not more than ten (10) feet and at inflection points within the planting layout. The result shall be a continuous line along the perimeter of the dune vegetation installed within an Acceptance Section. The CONTRACTOR shall count and report the number and type of plants installed within an Acceptance Section.

5.4 **Submission Requirements:** All survey data should be submitted in electronic ASCII x,y,z format. All survey data shall also be submitted in graphical form (plan view) with the dune fill construction template, project profiles, number of plants installed in each Acceptance Section, the date that planting was complete within each Acceptance Section and as-built extents of the installed dune vegetation depicted. All survey information submitted, and included in any depiction, shall include the date of the survey. Horizontal distances shall be in feet. Locations shall be specified in Florida State Plane grid coordinates, East zone, NAD 1983/90 datum. Survey drawings shall be at an appropriate scale to depict the project features. All field notes and the records used by the CONTRACTOR to compute the CONTRACTOR's estimate of the number of plants installed shall be furnished to the ENGINEER with the Application for Progress Payment and Final Application for Payment.

TP-6 SURVEY LAYOUT AND CONTROL

6.1 **Control Data:** Descriptions of the monument control in the vicinity of the project area are furnished in the Plans.

6.2 **Horizontal and Vertical Limits:** The CONTRACTOR shall establish their survey control for the Work. The CONTRACTOR shall layout the horizontal and vertical limits of the Work from the tabulated control provided in the Plans. The CONTRACTOR shall be responsible for maintaining the accurate alignment and layout of the beach and dune fill templates during construction. The CONTRACTOR shall not scale dimensions from the Plans for the purposes of work layout. The CONTRACTOR shall be responsible for all measurements that may be required for the execution of the Work to the location and limit marks prescribed in the Plans and in these specifications. Based on the pre-placement survey, the ENGINEER reserves the right to modify the locations and elevations of the dune fill template as may be required to meet changes to existing conditions. If the CONTRACTOR discovers a conflict during layout of the work, the CONTRACTOR shall notify the ENGINEER.

6.3 **Temporary Benchmarks:** If the CONTRACTOR elects to establish temporary benchmarks through the work site, they shall be established by a closed loop of

levels from a permanent benchmark or a line of levels between two permanent benchmarks. Any such temporary benchmark shall be located upon fixed objects such as utilities, roadways, driven stakes, etc. to assure reliability through the duration of the Work.

6.4 **Tides:** The CONTRACTOR shall use measured tides for all hydrographic surveying (predicted tides are not acceptable). Measured tides shall be along the open coast of the project area and not within either adjacent navigation channels unless a tide study conducted by the CONTRACTOR and accepted by the ENGINEER supports the use of tide gages in the navigation channels.

6.5 **Construction Stakes:** The CONTRACTOR shall furnish, at his own expense, such stakes, templates, platforms, equipment, tools and material, and all labor as may be required in laying out any part of the Work from the monuments, control data and elevations. The CONTRACTOR shall maintain and preserve the established stakes and other marks. If such marks are destroyed by the CONTRACTOR, they may be replaced by the ENGINEER at his discretion, and the expense of replacement will be deducted from any amounts due or to become due. Work may be suspended at any time when location and limit marks established by the CONTRACTOR are not adequate to permit checking of the Work. All marking stakes (including grade stakes) placed by the CONTRACTOR must be a metal material and must be completely removed upon completion of the Project unless otherwise specifically accepted in writing by the ENGINEER. The CONTRACTOR shall also maintain a grade stake recovery log.

6.6 **No Fill Areas:** The CONTRACTOR shall be responsible for delineating no-fill areas and preventing the placement of fill in such areas. No-fill areas include but are not limited to areas which easements have not been procured. The CONTRACTOR shall not operate equipment or allow operations within the designated no fill areas.

6.7 **Drawing Modification:** All levels and measurements as given on the drawings are binding for the CONTRACTOR. The ENGINEER reserves the right to modify the locations and elevations of the limit marks as may be required to meet changed conditions or as a result of necessary modifications to the Contract work. Modifications to the drawings will not form the basis for a change in unit price unless the modifications increase or decrease the quantity of work by twenty-five percent (25%) or more.

TP-7 PAY PROFILES

7.1 **General:** The surveys required to supplement construction and payment shall be taken at pay profile locations indicated in the Plans. The CONTRACTOR shall establish intermediate profiles in addition to those shown in the Plans to construct the project in accordance with plan view layout. The CONTRACTOR may submit the intermediate profiles for payment subject to review and approval by the ENGINEER. The CONTRACTOR shall survey between the +13, +14, or +15 foot

NAVD contour (depending on profile location) or 50 feet landward of the landward edge of fill to 100 feet beyond the seaward toe of fill or to the -5 foot contour, whichever is more seaward. The landward edge of fill is located at the edge of vegetation, seawall, or the +13, +14, or +15 foot NAVD contour intersection with the existing beach. The pay profiles shall be labeled as their distance along the project baseline.

Payment for beach fill placement will be based on the quantity of sand placed within the fill template and allowable tolerances as computed and verified by comparison of the pre- and post-placement surveys conducted on the dressed beach and certified by the CONTRACTOR's surveyor. The ENGINEER will verify the pay quantities provided by the CONTRACTOR, based on the comparison of pre- and post-placement surveys conducted by the CONTRACTOR's surveyor and accepted by the ENGINEER. Surveys will be performed by a surveyor employed by, or a subcontractor of, the CONTRACTOR. The CONTRACTOR shall notify the ENGINEER a minimum of three (3) days prior to when the surveys will be conducted so that the ENGINEER may observe the survey as it is conducted. The CONTRACTOR's surveyor shall certify all surveys and the ENGINEER must agree, based on submissions provided by the CONTRACTOR's surveyor, that the survey may be used for payment purposes. All survey work conducted by the CONTRACTOR for payment is subject to acceptance by the ENGINEER. The ENGINEER, at their discretion, may conduct surveys to verify surveys performed by the CONTRACTOR for payment purposes.

7.2 **Pre-Construction Survey:** The most-recent semiannual beach survey conducted by the COUNTY as part of the county-wide monitoring program, performed in June 2021, will be used as the pre-construction survey for this project to update fill volumes prior to the commencement of construction and to satisfy environmental permit requirements. Updated Construction plans will be provided via bid addendum.

7.3 **Pre-Placement Survey:** Pre-placement surveys shall be conducted by the CONTRACTOR at the spacing and location of pay profile lines as identified in the Plans, which are generally 100 feet apart. Pre-placement surveys shall be conducted to a minimum distance of 100 feet seaward of the construction toe of fill. The pre-placement survey will be used as the baseline for payment for the beach fill project. The CONTRACTOR shall not commence construction until the ENGINEER has received the certified (signed and sealed) pre-placement survey and has reviewed the survey for use as the pre-placement survey. The fill template and volume may be revised at the ENGINEER’s discretion using the pre-placement survey results, as the bid volume may vary since the design and pre-construction survey.

7.4 **Post-Placement Survey:** Post-placement surveys shall be conducted by the CONTRACTOR at the same spacing and location as the pre-placement surveys. Post-placement surveys shall not be conducted until the beach has been dressed to provide a level and uniform beach surface, removing all depressions, gullies, or other features in the beach which may affect the accuracy of the survey and the volume computation. The post-placement pay survey shall be conducted prior to

tilling the beach.

7.5 Post-Construction Survey: The COUNTY's surveyor will conduct the post-construction survey as part of the county-wide monitoring program to satisfy environmental permit requirements.

7.6 Survey Field Notes Submittal: The CONTRACTOR shall submit survey field notes to the ENGINEER upon completion of each pre-placement or post-placement survey to expedite review of each survey. All field notes, survey and volume computations, and the records used by the CONTRACTOR to compute the payment fill quantity shall be furnished to the ENGINEER with the application for progress or final payment. Failure to provide the specified information will delay recommendation and payment.

7.7 Survey Error or Volume Computation Discrepancy: If there is an error or discrepancy in the survey conducted by the CONTRACTOR which affects the payment volume, the CONTRACTOR and the ENGINEER's surveyors will attempt to resolve the survey discrepancy or error. If the discrepancy or error cannot be resolved, the ENGINEER will compute the fill volume for payment purposes. Likewise, if there is an error or discrepancy concerning the payment volume computation, the ENGINEER and CONTRACTOR will attempt to resolve the issue. Nevertheless, the volume determined to be correct by the ENGINEER shall be the volume used for payment purposes.

7.8 Fill Section Rejection: The notification of rejection of a fill section will be based on notification to the CONTRACTOR from the ENGINEER. After the survey data has been received by the ENGINEER, the ENGINEER will have seven (7) days to review the data and prepare a written response if a section has been rejected, and the reason for rejection.

7.9 Beach Fill Pay Profile Lines: The pre- and post-placement surveys shall be conducted at the intervals and locations as indicated in the Plans and shall extend offshore a minimum distance of 100 feet seaward of the termination of the construction toe of fill. Profiles to be used for payment purposes are strictly limited to profiles specifically defined by the project baseline in the Plans. For example, FDEP R-monument profile line R-40 will be the first payment station, with payment profile lines spaced generally at 100 foot intervals to the south except at the location of the FDEP monuments where the spacing varies to include the FDEP profile location. Pay quantity verification calculations will utilize the distance between adjacent pay profile lines as shown in the Plans.

7.10 Survey Requirements: All beach profile surveys shall be conducted by either differential leveling techniques or with RTK-GPS technology to a minimum distance of 100 feet seaward of the termination of the construction toe of fill. The CONTRACTOR shall close all level loops; the closure shall be less than 0.04 feet. All onshore points shall be within ± ten (10) feet of the established profile line.

7.11 Profile Line Azimuth and Measurements: Profile line surveys shall be conducted along the azimuth indicated in the Plans. A sufficient number of points will be taken along each line to ensure adequate measurements of the entire profile line including topographic features, major breaks in slope, beach berms, foreshore, and intersection of the fill with the bottom, with a maximum elevation difference of approximately one (1) foot between adjacent points. Data points shall be taken at a spacing of not more than ten (10) feet. The product shall be a continuous line representing the entire beach fill profile plus a minimum of 100 feet seaward of the construction toe of fill.

7.12 Beach Survey Deliverables to the Engineer: Deliverables to the ENGINEER shall include processed and tide corrected survey data of easting, northing, and elevation (XYZ) from each of the pay stations in ASCII format provided digitally (via email, FTP, flash drive, or on a compact disk (CD)) and illustrated in cross-sections on digital or hard copy plots. Cross-section plots shall show the survey, the construction template, the upper and lower tolerance, and the mean high water line. Additional information to be provided to the ENGINEER shall include any corrections and field notes.

7.13 Survey Documentation: All survey work shall be documented and copies supplied to the ENGINEER. The surveys may be conducted in the presence of the ENGINEER or their representative, at the option of the ENGINEER. The CONTRACTOR shall provide one (1) day advance notice to the ENGINEER prior to conducting surveys for payment.

TP-8 CHARACTER OF BEACH FILL MATERIAL

8.1 Fill Material: The CONTRACTOR shall provide clean, debris-free, rock-free, beach compatible sand purchased from the FDEP approved upland sand sources permitted for construction of the Project. Based on limited geotechnical analysis and information, the sources are capable of producing the quality and quantity of sand for this project. Due to the project fill volumes, it is anticipated that multiple upland sources will be required to complete the Work. Additional geotechnical testing will be required prior to shipment. The "Construction Access and Staging Areas" identified in the Plans are available to the CONTRACTOR for the storage of materials and equipment consistent with these Specifications.

The CONTRACTOR shall take the necessary actions to ensure that material delivered to the project site is in compliance with the Contract Documents and Table 2 of the Sediment QA-QC Plan for Upland Sand Sources (Appendix E).

8.2 Characteristics of Fill Material: It is the responsibility of the CONTRACTOR to supply beach compatible material. The material should be beach quality, quartz sand material. The material shall be clean, washed, non-organic, cohensionless, free of deleterious substances, and free of elongated or flat particles, which are susceptible to degradation. No material that is inconsistent with the samples provided or that originates from sources other than those permitted for construction may be

used. The material shall meet the sediment compliance specifications cited in Table 1 of the Sediment QA-QC Plan for Upland Sand Sources (Appendix E).

8.3 **Material Testing**: It is the responsibility of the CONTRACTOR to supply beach compatible material in accordance with Sediment QA-QC Plan for Upland Sand Sources, included by reference as (Appendix E). Samples of the fill at the upland sources and at the placement area will be collected, tested, and reported by the CONTRACTOR throughout the construction as required by the Sediment QA-QC Plan for Upland Sand Sources. All samples collected by the CONTRACTOR shall be stored at the CONTRACTOR's expense for a minimum of 120 days after Final Acceptance of the Project. The ENGINEER reserves the right to perform independent sampling and testing of fill material at the upland sand sources and the placement area.

The COUNTY and ENGINEER may observe and sample fill material at the project site prior to being offloaded from each of the trucks originating from the mine. The CONTRACTOR shall provide the necessary equipment, personal, and safety protocols to facilitate the COUNTY and ENGINEERS' observations. This may include, but is not limited to, ladders, removing transport covers, and adjusting the traffic pattern of trucks.

8.4 **Unacceptable Material, Rock, Rubble, or Debris:** In the event that unsuitable material is detected as part of the CONTRACTOR's or the COUNTY and ENGINEER's material testing procedures, the CONTRACTOR will immediately stop providing such material and shall be responsible for immediately removing the unsuitable material prior to any further construction. If the CONTRACTOR fails to remove the unacceptable material, rock, rubble or debris, to the satisfaction of the ENGINEER, such debris may be removed by the COUNTY and the cost of such removal may be deducted from any money due, or to become due, to the CONTRACTOR or may be recovered under his bond.

8.5 **Sediment QA/QC Plan:** FDEP has developed a Sediment QA/QC Plan for the upland sand source that applies to this project. This Plan must be applied to maintain the quality of the beach nourishment project and extensive testing is an integral part of the Plan.

The CONTRACTOR shall have "Benchmark Sample" which is labeled with the permit number, date collected, site name, and information on where the sample was attained. The benchmark sample shall be material that has been deemed beach compatible in accordance with the specifications of Table 1 in the Sediment QA/QC plan (Appendix E). This sample shall be tested at a Licensed Testing Laboratory.

At the upland sand source or stockpile, the CONTRACTOR shall collect a sediment sample at not less than 4 sample for each 3,000 cubic yards or stockpiled material no less than 6 inches below the surface to visually assess the grain size, Munsell color, gravel content, and silt content against the benchmark sample. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). Sediment sampling

results shall be provided to COUNTY and ENGINEER prior to any portion of the 3,000 cubic yards of material represented by that sample being transported to the construction access/site.

The material shall be observed by the CONTRACTOR at the project site. The CONTRACTOR shall perform an assessment during placement at a minimum of once each hour. The assessment will consist of handling the fill material to ensure that it is predominantly sand and to note the physical characteristics, and assure the sediment meets the Sediment Compliance Specifications in Table 1 of the Sediment QA/QC Plan (Appendix E). If deemed necessary, quantitative assessment of the sand will be conducted.

Additional details relative to observations, sampling, and testing are presented in the Sediment QA/QC Plan. Post-construction sediment sampling and testing will be completed by the ENGINEER. Sediment Compliance parameters are shown in **Table 6**.

Table 6: **Sediment Compliance Specifications**

Sediment Parameter	Parameter Definition	Compliance Value
Median Grain Size	50% larger/smaller by weight*	0.30 – 0.55 mm
Mean Grain Size	Calculated by moment method*	0.33 mm – 0.55 mm
Max. Silt Content	Passing #230 sieve	2%
Max. Gravel Content	Retained on #4 sieve	2%
Munsell Color	Moist Hue	10 YR, 2.5Y, or 5Y
	Moist Value	≥ 7
	Moist Chroma	≤ 2
The beach fill material shall not contain construction debris, toxic material, or other foreign matter.		

*Determined using the sieves listed in the QA/QC Plan

TP-9 SUPPLY/DELIVER/PLACE SAND

9.1 **General:** All sand excavated from the upland sand sources and transported to the Project area shall be deposited on the beach within the lines, grades and cross sections shown on the Plans. The CONTRACTOR shall maintain and protect the fill in a satisfactory condition at all times until final completion and acceptance of the Work. CONTRACTOR shall receive no payment for any fill sand that is <u>not</u> (a) contained within the limits of the fill area shown in the Plans; (b) contiguous to the fill template and above the pre-construction profile. The CONTRACTOR must place a minimum of 95% of the design volume between project profile lines and achieve the minimum fill tolerance in order to be considered for payment of that acceptance section, unless otherwise accepted by the ENGINEER in writing.

9.2 Same Day Delivery: Truck loads shall be delivered to the project site the same days as they were loaded at the sand mine. Drivers that do not adhere to this guideline may be disqualified from continuing to work on this project. If there are extenuating circumstances that prevent a load from being delivered, the CONTRACTOR shall notify the COUNTY that day so that daily quantities may still be rectified.

9.3 Weight Ticket Reconciliation: Reconciliation of weight ticket quantities will occur daily between the COUNTY, ENGINEER or ENGINEER'S REPRESENTATIVE, and CONTRACTOR. Failure to provide weight tickets may result in a cease of operations at the CONTRACTOR's expense.

9.4 Removal of All Debris from the Fill Area: Prior to placement of fill, the CONTRACTOR shall remove from the site all trash, snags, and similar debris lying within the foundation limits of the dune fill section. All materials removed shall be taken from the beach area and disposed of in an appropriate and legal manner and at the expense of the CONTRACTOR. Grading and other construction equipment will not be permitted outside the project limits as shown in the Plans except for ingress or egress to and from the site. Under no circumstances will construction equipment be allowed on the beach farther than 800 feet from either end of the Project area without written consent from the ENGINEER.

9.5 Transportation to Project Site: The method of transporting construction equipment and materials to and from the work area shall be by truck. Expenses incurred by the CONTRACTOR relating to any pertinent road use and delivery expenses shall be paid by the CONTRACTOR. All necessary transportation easements, accesses, and permission must be obtained by the CONTRACTOR prior to mobilizing equipment to the project site.

The CONTRACTOR is responsible for complying with all Department of Transportation, County, and other local regulations regarding weight limits for bridges and roads utilized for transport. The CONTRACTOR is likewise responsible for complying with all applicable traffic, safety and speed laws. Repeated failure of the CONTRACTOR to comply with applicable load and traffic regulations will result in suspension of transport operations until the CONTRACTOR demonstrates to the satisfaction of the ENGINEER that the CONTRACTOR has taken sufficient steps to ensure compliance with these regulations. The CONTRACTOR shall notify, and coordinate with, local law enforcement and highway agencies regarding transport activities that shall be undertaken for the Work.

9.6 Transportation of Fill on the Beach: The CONTRACTOR shall transport and place fill only between the "Landward Limit of Fill" and the "Construction Toe of Fill" as shown on the Plans unless restricted by easements. It is anticipated that the CONTRACTOR will need to transport and place fill in front of structures, along narrow sections of the Project, and to areas with low template fill densities via off-road trucks. Stockpiled material shall be located within the footprint of the fill placement area and may not exceed an elevation of +20 feet, NAVD88. The method of transporting the fill alongshore to the fill area shall be proposed by the

CONTRACTOR at the time of the bid on the plant and equipment schedule. The method of transport will be a CONTRACTOR decision; however, construction and performance of the Work must comply with all Project permits, production, and environmental requirements cited in the Contract Documents.

9.7 **Fill Placement Requirements:** The material shall be placed and brought to rest on the beach to the lines, grades, and cross-sections indicated on the Plans, unless otherwise provided for herein or directed by the ENGINEER or restricted by easements. The beach/dune is subject to changes and the elevations on the beach/dune at the time the Work is done may vary from the elevations shown in the Plans. The CONTRACTOR is to place the fill on the beach in such a manner as to establish a uniform dune between adjacent profile lines as indicated in the Plans. The ENGINEER reserves the right to require minor grading of the placed fill to provide smooth transitions of the dunes and to prevent unstable fill configurations. Site specific field adjustments to the construction template (i.e. modifications to the grade elevations, slopes, and/or dimensions) may be required by the ENGINEER to rework fill placed to facilitate pedestrian access at beach access points.

9.8 **Fill Placement Restrictions:** The fill shall extend landward to the existing elevation contour that matches the dune/berm crest elevation shown in the Plans unless features (e.g. dunes, vegetation, or structures) or easements prohibit fill placement. If a feature extends to the design berm elevation or above, the fill shall terminate at the seaward face of the feature. If the top of structure is below the dune/berm crest elevation, then the fill shall taper landward using a one (1) foot vertical to five (5) feet horizontal slope to one (1) foot below the crest of the structure to prevent burial or overtopping with sediment. If a dune vegetation line is below the dune/berm crest elevation, then the fill shall taper landward using a one (1) foot vertical to five (5) feet horizontal slope to the edge of the vegetation.

Fill placed immediately landward of a seawall shall extend a minimum of one (1) foot below the top of the structure.

The ENGINEER shall direct the CONTRACTOR how to place fill at existing dune walkovers. This direction includes but is not limited to in-field directives by the ENGINEER and written directives supplied to the CONTRACTOR by the ENGINEER.

Beach fill shall only be placed above MHW from R-51.3 to R-55 to be in compliance with Chapter 161 of Florida Statutes. The CONTRACTOR shall coordinate with the ENGINEER during the pre-construction/placement surveys to adjust the final design to be in compliance with this provision.

9.9 **Control of Fill:** The CONTRACTOR shall make every attempt to retain placed fill within the dune fill template until the Work is accepted. The CONTRACTOR shall maintain and protect the fill in a satisfactory condition at all times until final completion and acceptance of the Work.

9.10 Uniform Beach: The filled beach between the construction profiles shall be graded, dressed, and uniform in dimension. Beach sections between construction profiles shall be filled to a minimum of ninety-five (95%) percent of the volume based on the fill templates shown in the fill template cross-sections in the Plans, and to the minimum tolerance everywhere unless restricted by easements. The constructed beach contour lines between construction profiles, including the beach berm break, will be approximately parallel and straight, indicating that the CONTRACTOR constructed a uniform (non-cuspate) beach.

9.11 Underfilling Between Accepted Profile Lines: If the ENGINEER observes or thinks they have observed underfilling of the dune between project profile lines, the ENGINEER may request an additional survey be conducted by the CONTRACTOR at the CONTRACTOR's expense. If found to be deficient, the CONTRACTOR shall place additional fill until the dune is uniform in appearance and dimensions between project profile lines, provides the shapes depicted in the Plans, provides a minimum of 95% of the design fill volume and meets the minimum tolerance at all locations in the acceptance section in order to qualify for payment of that section. Fill will not be obtained from adjacent areas of the beach or dune to remedy under filling.

9.12 Grading and Dressing the Dune Fill: Upon completion of all filling operations within an acceptance section, and prior to surveying for payment, the fill shall be graded and dressed with a dragged pipe so as to eliminate any undrained pockets, ridges, and depressions in the beach fill surfaces. The CONTRACTOR is to grade and dress the fill on the beach in such a manner as to establish a uniform berm width and slope between adjacent pay profile lines with a positive seaward slope between the seaward toe of dune and seaward berm crest within the vertical tolerance specified in Section 13.11. The bank or scarp caused by wave erosion shall be graded down to a slope not steeper than one (1) foot vertical to eight (8) feet horizontal to the water's edge. The CONTRACTOR shall grade down any and all beach scarps or sand cliffs in the entire restored beach that persist for longer than seven (7) days until the CONTRACTOR has demobilized from the project site. The project site will not be considered complete, nor the CONTRACTOR eligible for final payment, until all beach scarps in the entire project area are graded.

9.13 Right to Vary Beach Design Dimensions: The ENGINEER reserves the right to vary the width or grade of the dune from the lines and grades shown on the Plans or observed at the Project site in order to establish a uniform beach between adjacent project profile lines or for the entire length of the Project. The dune fill cross-sections shown in the Plans are for the purpose of estimating the amount of fill needed and will be used by the ENGINEER in making any change in the lines and grades.

9.14 Tolerances: The vertical tolerance is +/- 0.5 feet from the design template. Fill placement must at least meet the 0.5 feet tolerance below the template everywhere in the fill, and the minimum fill volume requirement. Any material placed more than 0.5 feet above the template may be left in place at the discretion of the

ENGINEER. The CONTRACTOR shall refill any deficient section of beach to at least meet the below template tolerance, and 95% of the fill volume within the acceptance section. The COUNTY will withhold payment for those sections of dune that do not meet the minimum fill requirements until the appropriate fill placement, grading, and dressing has been completed by the CONTRACTOR.

Fill tolerances are provided to facilitate construction. Fill placed above the template and within the upper tolerance will not be eligible for payment. Fill placed above the template and within the upper tolerance will not be used to offset underfilling of the template elsewhere.

9.15 **Misplaced Materials:** If any material is deposited other than in places designated or approved, the CONTRACTOR may be required to remove such misplaced material and redeposit it where directed by the ENGINEER, at the CONTRACTOR's expense.

9.16 **Restrictive Barrier:** The CONTRACTOR shall erect, maintain, and move as necessary, a restrictive fencing, barricades, warning signs, and/or flagmen to ensure public safety. If the CONTRACTOR is not able to keep and maintain the public at a safe distance from the active construction activity, the CONTRACTOR is to notify the COUNTY and request assistance in controlling public access to the construction site. For the purposes of this section, active construction activity is defined as all equipment staging/access areas and 500 feet north of and south of sand placement operations.

9.17 **Dedicated Safety and Flag Person:** The CONTRACTOR shall have a dedicated safety and flag person(s) on site at all times, whose sole responsibility is preventing the public from entering the Work area and to prevent unsafe traffic conditions at the sand delivery locations. The CONTRACTOR shall provide and maintain barricades, warning signals and flagmen as required by Federal, State or local regulations and the CONTRACTOR’S traffic control plan. Any costs associated with this requirement shall be included in the unit cost for Beach and Dune Fill.

9.18 **Unsuitable Material:** The CONTRACTOR shall notify the ENGINEER in the event that unsuitable material was placed in the beach/dune fill template. The unsuitable material shall be removed from the beach at the CONTRACTOR’s expense. Unsuitable material is defined within the FDEP and USACE permits and sediment quality control plan (Appendices A, B, and E).

9.19 **Daily Reports:** The CONTRACTOR, and their subcontractor (if any), shall submit daily reports that summarize the sand fill work completed at the end of each day. Quality Control Report Form shall be submitted every working day during the construction period (even when no Work is performed) between the time at which the Notice to Proceed is issued and the time of Final Acceptance. A copy of the required daily report is included in Appendix C. The CONTRACTOR shall submit Daily Reports by 12:00 P.M. the following day to the COUNTY and ENGINEER.

TP-10 BEACH TILLING AND ESCARPMENT LEVELING

10.1 Escarpment Elimination: The CONTRACTOR shall inspect the entire beach project area for the formation of sand escarpments. Any escarpments which persists for longer than seven (7) days and exceeds and 12 inches in height (on average), independent of the length, shall be leveled or smoothed to eliminate the escarpment. The ENGINEER will observe the beach after leveling of escarpments to ensure that the ENGINEER agrees that all escarpments have been leveled in compliance with the permits and Contract Documents. The CONTRACTOR shall level any escarpments found by the ENGINEER or COUNTY, at their request.

10.2 Beach Tilling: Following the completion of beach and dune filling, dressing, and payment survey, the CONTRACTOR will till the constructed portion of the beach to loosen the compaction of the placed material. Tilling will be to a minimum depth of 36 inches throughout the newly placed beach seaward to the visible high water mark to the landward extent of fill placement. The tilling shall be by use of a tracked vehicle (bulldozer, loader, or equivalent) by pulling (rear mount) or pushing (front mount) a rake with the tines of a length appropriate to achieve a tilling depth of 36 inches. Tines will be spaced 15 to 18 inches apart. The CONTRACTOR shall conduct additional tilling as necessary to ensure all of the beach fill above the mean high water line has a compaction of less than 500 cone penetrometer units, as determined by the ENGINEER. Following tilling, the beach shall again be dressed by dragging a pipe (or similar) lengthwise over the beach. The pipe may be positioned immediately behind the tilling tines to allow for a single operation of tilling and dressing. All tilling and dressing will be conducted during daylight hours only.

TP-11 CHARACTER OF DUNE VEGETATION MATERIAL

11.1 General: The CONTRACTOR shall supply, deliver, and place approximately ~~352,120~~ 302,820 plants of native salt tolerant dune vegetation as specified in the contract documents. The actual number of plants required and installed may vary depending upon the dimensions of the fill template based on the pre-construction survey and the as-built dimensions of the fill placed by the CONTRACTOR. The plants shall be installed on the dune crest of the constructed dune as depicted by the typical cross section shown in the Plans.

11.2 Source of Plant Material: Acceptable plants for the purpose of this contract are nursery grown plants produced vegetatively from first generation foundation material and/or plants produced vegetatively as accessional generations from foundation materials. Plants shall originate from the Florida peninsula. The contracting nursery shall acclimate plant materials by growing plants in full sun conditions for at least thirty (30) days before planting (i.e., not inside greenhouse, under glass, under shade cloth, etc.). Plants shall be available for inspection at the nursery by the ENGINEER. The CONTRACTOR shall provide written documentation as to the source of the planting units. Certification shall be provided that all plant materials have been produced in accordance with all applicable Federal and State laws. The CONTRACTOR shall secure all permits required for the transportation, collection,

and propagation of nursery stock. A copy of all permits required shall be provided to the ENGINEER. Documentation shall include collection permits or contracts from a State, the U.S. Department of Agriculture, or other comparable documents.

11.3 **Plant Size and Containers:** The liners for both grasses species shall be no less than 12" tall from the top of the root ball to the tip of the longest leave. The liners for all three species of ground covers shall be no less than 6" tall from the top of the root ball to the tip of the longest leave. Plants not meeting the minimum size requirement will be rejected.

The root ball for both grasses species shall be no less than 1" x 1" x 2.5" depth, the root ball for the three ground cover species shall be no less than 1.5" x 1.5" x 2.5" depth. The plants shall have a fully developed root ball, with white or light beige roots.

Uniola paniculata liners shall be multi-stemmed plants (at least 2 stems). Ipomoea pes-caprae liners shall be multi-stemmed plants (at least 2 stems). Helianthus debilis liners shall be multi-stemmed plants (at least 2 stems). Panicum amarum liners can be single-stemmed plants. The plant material in each liner constitutes one dune grass plant, regardless of the number of viable stems in the liner.

11.4 **Plants:** Plants species shall include sea oats (*Uniola paniculata*), bitter panicgrass (*Panicum amarum*), railroad vine (*Ipomoea pes-caprae*), and dune sunflower (*Helianthus debilis*). Approximately ~~352,120~~ 302,820 plants are required for this Project. The COUNTY may adjust the quantity of plants based on field adjustments to the landward limit of fill at the time of construction. The estimated quantities and proportion of plants for the four (4) species used shall be as summarized in **Table 7**. The COUNTY reserves the right to adjust or modify the quantities of plants by up to ±25%. The actual number of plants required and installed may vary depending upon the dimensions of the fill template based on pre-construction surveys and the as-built dimensions of the fill placed by the CONTRACTOR. The percentage distributions shall be achieved regardless of the number of plants installed and within each acceptance section.

Table 7: **Dune Vegetation Distribution**

Plant Type	Distribution	Estimated Quantity
Sea Oats	80% - 85%	~~281,696~~ 242,256
Bitter Panicgrass	10% - 15%	~~35,212~~ 30,282
Railroad Vine	5% - 8%	~~17,606~~ 15,141
Dune Sunflower	5% - 8%	~~17,606~~ 15,141
Total:	**100%**	**~~352,120~~ 302,820**

11.5 **Plant Condition:** All plants shall be "healthy and vigorous" according to horticultural standards. Their roots shall be disease free, moist, and milky white at the time of delivery and installation. The plants shall have a fully developed root ball, with white or light beige roots. Brown, black, or rotting root balls shall be rejected. The

plants shall be free of defects, disfiguring, sun scalding, diseases, insects, insect eggs, borers, or other forms of infections or infestation. Plants showing signs of stress, either from drought, pest infestation, disease, or any visible mishandling shall be rejected and shall be replaced at the CONTRACTOR's expense. Plants rejected under this Specification will not be considered as delivered to the site and; therefore, not eligible for payment under the unit cost schedule applying to planting units.

TP-12 DUNE VEGETATIVE PLANTINGS

12.1 **General:** Following the placement and acceptance of fill within an acceptance section, dune vegetation shall be installed on the constructed dune crest. The plants shall be installed by accessing the dune crest from the beach to avoid damaging existing vegetation.

12.2 **Transportation and Delivery:** All plants shall be specifically protected in such a manner as to ensure adequate protection against climatic, seasonal, mechanical, or other injury during transit, loading and unloading, holding, and planting. Special care shall be taken for prompt delivery and careful handling in loading and unloading. Plants shall be transported in an enclosed truck or trailer. Stems cannot be broken, nor physically damaged during transportation. Damaged plants will be rejected and shall be removed immediately at the CONTRACTOR's expense. The CONTRACTOR shall submit in writing the method of transporting plants from the nursery to the delivery site and from the delivery site to the planting site to the ENGINEER for approval.

12.3 Each individual shipment of plants to the delivery site shall be accompanied by a delivery slip indicating the following information: 1) source of plant material (nursery name), 2) species (scientific and common name if applicable), 3) plant size, 4) quantity being delivered, and 5) date of delivery. Shipping slips are to be signed by the CONTRACTOR. Copies of the slips shall be provided with the daily quality control reports. The COUNTY and ENGINEER shall be notified three (3) days prior to any and each plant delivery to allow for plant count.

12.4 **Planting Layout:** The specific location of planting boundaries, rows, and baselines shall be marked on site by the CONTRACTOR. The COUNTY and ENGINEER reserve the right to alter the boundaries, rows, and plant spacings, if necessary. Planting shall only occur after the dune within an Acceptance Section has been constructed and accepted by the COUNTY and ENGINEER.

Planting shall be as prescribed on the Plans except at locations seaward of existing seawalls where minimal fill is proposed. These seawall locations are listed in the **Table 8** below.

Table 8: Seawalls with No Planting Prescribed

Seawall Location	Length (feet)
R-27+300 to R-27+850	550
R-33 to R-33+750	750
R-37+625 to R-39+600	1,950

12.5 Planting Installation:

12.5.1 The specific location of planting boundaries, rows, and baselines shall be marked on site by the CONTRACTOR. The plants shall be installed 9" on center in staggered, shore-parallel rows 9" apart.

12.5.2 Unvegetated areas for pedestrian access across dunes shall be roped off by the CONTRACTOR to prevent trampling of plants. The CONTRACTOR shall furnish and install rope and wood posts at the expense of the CONTRACTOR.

12.5.3 Plants shall be planted on the same day they are delivered to the site if possible. Plants shall not become stressed prior to planting. Plants shall retain their stem and leaf rigidity at all times indicating adequate moisture is being received. Plants shall be watered within the salinity ranges they were grown. The CONTRACTOR must take the necessary precautions to ensure that plant materials receive adequate water during all phases of the contract prior to actual planting. Plants appearing discolored, shriveled, dehydrated, or otherwise stressed shall be rejected.

12.5.4 All containerized plants shall be planted in a dug hole. The plant shall be removed from the container immediately prior to planting and placed into the hole. The depth of the hole shall be at least six (6) inches below normal ground. A minimum of 8 oz. of pre-hydrated gel shall be added prior to plant installation so that the root ball, not the stems, is in contact with the gel. A pre-hydrating water gel, such as stockosorb, or equivalent, shall be used for all planting units per gel manufacturer specifications. Once the gel is added and plant installed, the distance from the top of the root ball to the sand surface shall be no less than four (4) inches.

For each planting unit, slow release fertilizer shall be added to the gel prior to planting unit installation. A minimum of 2.5 grams of slow release fertilizer shall be included with each plant. The slow release (90-day) pelletized Osmocote or approved equivalent fertilizer shall have an N.P.K. ratio of 18.6.12 with trace elements.

12.5.5 At the end of each workday, all debris, trays, buckets, etc. must be removed from the working areas.

12.5.6 The CONTRACTOR's daily quality control report shall document the number of plants delivered and installed, watering methods, and other pertinent

information.

12.6 Planting Irrigation and Fertilization:

12.6.1 The CONTRACTOR will be allowed to water-in (initially irrigate) all newly installed planting units according to a CONTRACTOR prepared and ENGINEER approved irrigation schedule. The CONTRACTOR will be responsible for all aspects of irrigation including compliance with all environmental permitting regulations, requirements and conditions stated in the permits which address maintenance irrigation and installation activities.

12.6.2 The CONTRACTOR will be responsible for the provision of all irrigation water required under this bid. Freshwater (potable only) shall be provided by the CONTRACTOR and applied to the planting zones using a non-scouring spray applicator. The CONTRACTOR shall make all necessary arrangements with the appropriate local agencies if the use of local hydrants in the area is desired.

12.6.3 The CONTRACTOR will be allowed to maintenance irrigate the installed planting units according to the CONTRACTOR prepared and ENGINEER approved irrigation schedule. The CONTRACTOR will be responsible for all aspects of the maintenance irrigation including compliance with all environmental permitting regulations, requirements and conditions stated in the permits which address maintenance irrigation and installation activities.

12.6.4 The application of maintenance fertilization during the 90-day warranty period may be undertaken by the CONTRACTOR at the CONTRACTOR's discretion. The cost of any and all fertilization shall be included in the per planting unit cost in the bid documents. Maintenance fertilization, if employed, will be undertaken in a manner which complies with all environmental permits applicable to the Project site. The CONTRACTOR will be allowed to maintenance fertilize the installed planting units according to the CONTRACTOR prepared and ENGINEER approved fertilization schedule. Whether the CONTRACTOR chooses to maintenance fertilize or not, compliance with all provisions of the Specifications including but not limited to, the survival guaranty and replanting sections of the Specifications, shall be met.

12.6.5 The cost of maintenance irrigation and fertilization events anticipated by the CONTRACTOR shall be included in the per planting unit cost in the bid documents.

12.7 Planting Survivability:

12.7.1 The CONTRACTOR shall maintain 100% survival for an establishment period of fourteen (14) days after planting during the maintenance period. If replanting is necessary due to death, stress, etc., with the exception of those

plants lost due to conditions beyond the control of the CONTRACTOR, the CONTRACTOR is responsible for the replacement of the affected plants within five (5) days following notice of delinquency. Replanting shall be performed by the CONTRACTOR at no cost to the COUNTY. The replacement planting units will be covered under the CONTRACTOR'S warranty bond.

12.7.2 The CONTRACTOR shall also be responsible for controlling weeds and prevention of invasive exotic and/or nuisance species encroachment within the planting area for the duration of the contract. At the end of the contract, the CONTRACTOR shall provide the ENGINEER with written instructions for the continued watering, if necessary, and care of the plants.

12.7.3 This survival criterion may be waived, at the discretion of the ENGINEER, in areas where it can be documented that plant survival has been adversely affected by unexpected pedestrian traffic, wind erosion, or overwash.

12.8 Planting Warranty Period:

12.8.1 The CONTRACTOR shall obtain a warranty bond to cover all costs associated with dune plants for a warranty period of 90 days. During this warranty period, for each of the planting areas a minimum survival rate of 80% of all planting units installed for all species shall be met. Within planting areas of questionable growth/success results, the ENGINEER or a representative reserve the right to inspect root penetration for possible replant by the CONTRACTOR. Thirty (30) plants within each questionable planting area may be randomly selected to be dug up for root growth inspection. Eighty (80%) percent of selected plants shall have achieved root penetration of 9" or greater for both grass species. The planting survival shall be deemed a success if both individual planting unit survival and root penetration are met. The CONTRACTOR shall provide a schedule of planting dates within seven (7) days of planting in order to determine warranty period.

12.8.2 If any of the above success criteria are not met, as determined by the ENGINEER, the CONTRACTOR shall replant non confirming units with viable (and within Specifications) planting units of the same type in all areas considered to be deficient according to the planting unit success criteria. The CONTRACTOR will provide continuing service to the COUNTY for the duration of the 90 day warranty period. The replanting of planting units will be the sole responsibility of the CONTRACTOR and will be completed at no additional cost to the COUNTY. All original maintenance, warranty, and survival Specifications and requirements shall apply to replanted planting units.

12.8.3 The success criterion during the warranty period may be waived, at the discretion of the ENGINEER, in areas where it can be documented that plant survival has been adversely affected by unexpected pedestrian traffic, wind

erosion or overwash.

TP-13 PAYMENT FOR MOBILIZATION/DEMOBILIZATION

13.1 General: The Work specified in this section consists of the preparatory work and operations in mobilizing for beginning work on the project, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies, and incidentals to the project site, and for the establishment of temporary offices, buildings, utilities, traffic control, safety equipment, first aid supplies, sanitary, and other facilities, as required by these Specifications, the special provisions, and applicable laws and regulations. The costs of bonds and any required insurance, and any other pre-construction expense necessary for the start of the Work, excluding the cost of construction materials, shall also be included in this section.

13.2 Mobilization: All costs connected with the mobilization and demobilization of all the CONTRACTOR's equipment and personnel will be paid for at the contract lump sum price for this item. Sixty percent (60%) of the lump sum price will be paid to the CONTRACTOR after the placement of a quantity of, at minimum five-thousand (5,000) cubic yards (seven-thousand five-hundred (7,500) tons) of material on the beach and placed within the beach fill template for a minimum of four (4) days. The remaining forty percent (40%) will be included in the final payment for Work under this contract. Payments for mobilization and all payment except for the final payment will be subject to a retainage until final acceptance of the project by the COUNTY per the COUNTY's Standard Terms and Conditions.

13.3 Cost Review: In the event that the cost for the mobilization and demobilization does not bear a reasonable relation to the cost of the entire Work in this contract, then the ENGINEER may require the CONTRACTOR to produce cost data to justify this portion of the bid. The ENGINEER will utilize previously bid projects of a similar nature as a guideline to evaluate the mobilization and demobilization costs. Failure to justify such price to the satisfaction of the ENGINEER will result in payment of mobilization costs, as estimated by the ENGINEER at the completion of mobilization, and payment of the remainder of this item in the final payment under this contract.

TP-14 PAYMENT FOR ENVIRONMENTAL COMPLIANCE – BEACH FILL SITE

Payment for labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with environmental compliance at the beach fill site shall be paid for at the lump sum price on the Bid Schedule for "Environmental Compliance – Beach Fill Site". Progress payments will be made based upon the percent of beach fill work completed and accepted during each month. All costs associated with environmental compliance of the Work shall be included in the lump sum price for Environmental Compliance. Acceptance of the Work will be determined from review by the ENGINEER of monthly activities and CONTRACTOR reporting.

TP-15 PAYMENT FOR SUPPLY/DELIVER/PLACE SAND

15.1 General: Other than costs for mobilization, demobilization, environmental compliance, dune vegetation, site restoration and grading, and pre-construction and as-built surveying, all other costs associated with the beach nourishment project including but not limited to, debris removal, site cleanup and preparation, laboratory testing, site repairs, maintenance of traffic, sand transport, staging, and placement shall be included in the contract unit price per cubic yard on the bid form. The unit price shall also include all other items of overhead, profit, labor, material, and any other costs incidental to performing the Work.

15.2 Basis of Payment: The basis of the payment will be the weight of sand delivered and placed on the beach within the design template, and the location and volume of placement will be verified by the pre- and post-placement surveys. Reconciliation of truck tickets created at the mine and collected at the beach stockpile is essential for accurate payments. The CONTRACTOR shall collect, log, and furnish PDF copies of all truck tickets at the project site prior to placement on the beach in accordance with the approved methodology statement described in TP-9. COUNTY inspectors will collect a copy of truck tickets at the beach delivery site. Sand removed from the beach and placed in the berm will not count towards the pay volume (tonnage). The CONTRACTOR shall not place or manipulate the sand to change its unit weight or volume prior to placement surveys. The CONTRACTOR's methodology to achieve desired fill volumes shall be presented at the pre-construction conference.

15.3 Requests for Payment: The CONTRACTOR may request payment for beach and dune fill placement on a monthly basis, and at completion of the project, upon final acceptance by the ENGINEER of the completed beach nourishment sections. The CONTRACTOR will be eligible for progress payments when fill sections have been filled to a minimum of 95% of the total beach fill section volume. The beach fill volume for a section is the volume to completely fill the approximate 100 foot section along the project baseline to the construction template requirements shown on the Plans. The CONTRACTOR may conduct surveys for payment purposes after completion and dressing of five (5) adjacent fill sections. For all payments, the beach and dune fill shall be graded, dressed, and level between profiles, and approved for payment by the ENGINEER. The CONTRACTOR shall submit to the COUNTY and ENGINEER for review on a monthly basis, an Application for Progress Payment filled out and signed by CONTRACTOR covering the Work completed as is required by the Contract Documents and accompanied by such supporting documentation as is required by the Contract Documents and also as the ENGINEER may reasonably require. All payments will be subject to retainage per the COUNTY's Standard Terms and Conditions until final acceptance of the project.

15.4 Fill Tolerances: Payment shall be for beach and dune fill placed within the construction template with a construction berm elevation as shown on the Plans. Payment shall also be provided for fill placed in the upper 0.5 feet beach berm tolerance. The minimum vertical tolerance below the template is 0.5 feet and shall be achieved everywhere within areas filled and for which payment has been requested. Notwithstanding these fill placement tolerances, beach and dune fill placement must at least meet the 0.5 foot tolerance below the construction template everywhere on the constructed beach berm from the north project limit to the south project limit shown on the Plans, and the minimum requirement of 95% of the fill volume for each acceptance section must be met. The CONTRACTOR shall fill any deficient section of beach to, at minimum, meet the lower template tolerance everywhere on the constructed beach berm, and to a minimum of 95% of the fill volume for the acceptance section. The COUNTY will withhold payment for acceptance sections that do not meet the minimum required beach and dune fill requirements until the required fill placement and dressing has been completed by the CONTRACTOR.

15.5 Computation of Payment Volumes: Computation of pay tonnage will be based on truck tickets collected for sand placed within the acceptance sections. Computations of volumes shall be made by the CONTRACTOR and ENGINEER using survey data provided by the CONTRACTOR to verify tonnage placed and to support regulatory requirements. Quantities of beach fill satisfactorily placed and meeting beach fill design template requirements and volumes will be computed for payment by use of the average end-area method. The distance between each profile line to be used for fill computation is the perpendicular distance between each profile line along the project baseline shown in the Plans. The CONTRACTOR shall account for this method of fill volume calculation when estimating the bid prices. Payment will be provided for fill contained within the payment profile construction templates, as shown in the Plans. No payment will be provided for fill placed above the tolerance, or outside of the template, except as indicated below. The CONTRACTOR's bid shall account for any costs associated with the payment profile requirements, the azimuth of profile lines, the profile measurement technique, survey requirements, potential loss of sand before section survey and acceptance, and the payment volume calculation methodology.

15.6 Compensatory Slope Adjustment: During placement of fill, wave conditions may adjust the slope of the placed fill beyond the fill template. In recognition of this natural phenomena, fill located seaward of the fill template slope may qualify for payment where such placed fill is (a) within the limits of the fill project area shown in the Plans, (b) below the mean high water line, (c) contiguous to the fill template, (d) above the pre-placement profile survey, and (e) measured within the post-placement profile survey. Compensatory slope volumes will be applied only to compensate for lost volume from the template slope below the mean high water line. This volume will not be used to compensate for volume deficiencies within the fill template on the beach berm located landward of the mean high water elevation on the template slope, or along other fill profiles identified on the Plans. This clause does not relieve the CONTRACTOR from grading the beach berm and slope as shown

on the Plans. Compensatory fill volume shall not quality for payment other than that portion of the volume which was relocated by natural forces seaward beyond the template slope shown in the Plans.

TP-16 PAYMENT FOR DUNE VEGETATIVE PLANTINGS

16.1 General: Payment for mobilization, demobilization, labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with dune vegetation, including but not limited supplying, transporting, and installation of plants, and monitoring of planting success during the maintenance and warranty periods, shall be included in the lump sum price for Dune Vegetative Plantings. The cost shall also include overhead, profit, labor, material and any other costs incident to installing dune vegetation.

16.2 Basis for Payment of Dune Vegetation: Payment for dune vegetation will be based upon the number of plants installed within the required limits of the layout area. To be eligible for payment, the CONTRACTOR shall document planting dates, quantities supplied, quantities installed, species type, survival rates, and conduct post-installation surveys of the perimeter of dune plantings. The planting shall achieve a 100% survival rate after the fourteen (14) day maintenance period and 80% planting survival rate after the 90-day warranty period from the date of initial planting. One hundred percent (100%) of the unit price for Dune Vegetative Plantings shall be paid upon successful demonstration of the survival rate after the fourteen (14) day maintenance period. Any defective work or plants that do not meet the 90-day warranty period covered by the warranty bond will be replaced at no cost to the COUNTY. The Dune Vegetative Plantings quantities shall be determined based on quantities delivered to the project site and verified by post-installation surveys conducted by the CONTRACTOR.

16.3 Progress Payments: Monthly progress payments shall be based on the number of plants installed within a completed acceptance sections, which have been approved by the ENGINEER. The CONTRACTOR will be eligible for the initial progress payment when a minimum of five (5) acceptance sections have been completed and approved by the ENGINEER. Progress payments will not be made for partially completed acceptance sections. It should be noted that due to the dune fill placement areas and dimensions not all acceptance sections will require dune vegetation.

TP-17 PAYMENT FOR SITE RESTORATION AND GRADING

Payment for mobilization, demobilization, labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with site restoration, including tilling and scarp leveling of the restored beach, shall be included in the lump sum price for Site Restoration & Grading. No partial payments will be made for this Work. Acceptance of the Work shall be determined by visual inspection performed by the ENGINEER or COUNTY.

TP-18 PAYMENT FOR PRE-PLACEMENT AND POST-PLACEMENT SURVEYS

Payment for mobilization, demobilization, labor, materials, equipment, fuel, oil, and all other appropriate costs in connection with the pre- and post-placement surveys shall be included in the lump sum price for Pre-Placement & Post-Placement Surveys. Progress payments will be made based upon the percent of beach fill work completed and accepted during each month. Acceptance of the Work will be determined from review by the ENGINEER of monthly activities and CONTRACTOR reporting.

TP-19 RIGHT TO REFUSE RECOMMENDATION FOR PAYMENT

The ENGINEER may refuse to recommend the whole or any part of any payment if, in their opinion, such representations to the COUNTY would be inaccurate. The ENGINEER may also refuse to recommend any payment because of subsequently discovered evidence or the results of subsequent observations, measurements, or tests, nullify any such payment previously recommended to such extent as may be necessary in the ENGINEER's opinion to protect the COUNTY from loss because:

a) The work is defective, inconsistent with the Plans and Specifications, or completed Work not accepted by the ENGINEER has been damaged requiring correction or replacement;

b) Written claims have been made against the COUNTY or liens have been filed in connection with the Work;

c) The contract price has been reduced because of modifications;

d) The COUNTY has been required to correct defective work or complete the Work;

e) The CONTRACTOR has not performed the Work in accordance with the contract documents;

f) The CONTRACTOR has failed to make payment to subcontractors, for labor, materials, or equipment;

g) The CONTRACTOR is claiming additional placement of fill volume for payment beyond that measured and calculated using the procedure established in the contract documents for computation of fill quantities for payment purposes;

h) The CONTRACTOR is claiming additional payment for any reason not previously agreed to by the COUNTY; or

i) The CONTRACTOR has not repaired damages caused by the CONTRACTOR's operation to the satisfaction of the COUNTY and/or affected private property owner.

TP-20 FINAL ACCEPTANCE AND PAYMENT

20.1 Beach Escarpment Elimination before Final Payment: At the completion of the entire fill placement and beach tilling, and prior to final payment, the CONTRACTOR will inspect the entire beach project area for the formation of sand escarpments. Any escarpments in the project area, independent of the escarpment height or the length, will be leveled or smoothed to eliminate the escarpment by the CONTRACTOR. The ENGINEER, upon request by the CONTRACTOR, will observe the beach after leveling of escarpments.

20.2 Road and Infrastructure Repair before Final Payment: Roads, beach access, and infrastructure impacted by the CONTRACTOR's operation shall be repaired to a level acceptable to the COUNTY prior to final payment. Mobilization/Demobilization operations may cause impacts needing repairs, unless infrastructure is protected during construction.

20.3 Engineer's Recommendation for Final Payment: The ENGINEER’s recommendation of final payment for the project will constitute a representation by the ENGINEER to the COUNTY that, in the ENGINEER's opinion, the conditions precedent to the CONTRACTOR's being entitled to final payment as set forth in the contract documents have been fulfilled.

20.4 Completion of Work: Upon written notice from the CONTRACTOR that the Work is substantially complete, the ENGINEER or COUNTY will observe the Work within seven (7) days of the receipt of the written notice from the CONTRACTOR and, if required, will notify the CONTRACTOR in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. All incomplete or defective work items will be placed on the Final Punch List. The CONTRACTOR shall immediately take such measures as are necessary to remedy such deficiencies.

20.5 Application for Final Payment: After the CONTRACTOR has completed all such corrections to the satisfaction of the ENGINEER and COUNTY, and delivered any required quality control reports, water quality reports, data requested by the ENGINEER, guarantees, bonds, certificates of inspection, marked-up record documents, and all other documents as required by the contract documents or ENGINEER, and after the ENGINEER has indicated that the Work is acceptable to the ENGINEER and COUNTY, the CONTRACTOR may make application for final payment. The final application for payment shall be accompanied by all documentation called for in the contract documents and such other data and schedules as the ENGINEER may reasonably require, together with complete and legally effective releases or waivers (satisfactory to COUNTY) of all liens arising out of, or filed in connection with the Work. In lieu thereof and as approved by the COUNTY, the CONTRACTOR may furnish the following set of documents: 1) receipts or releases in full; 2) an affidavit of the CONTRACTOR providing warranties, covenants, and representations that the releases and receipts include all labor, services, material and equipment bills, and other indebtedness connected with the Work for

which the COUNTY or the COUNTY's property might in any way be responsible; 3) proof that all charges have been paid or otherwise satisfied. If any subcontractor, manufacturer, fabricator, supplier, or distributor fails to furnish a release or receipt in full, the CONTRACTOR may furnish a bond or other collateral satisfactory to the COUNTY to indemnify the COUNTY against any lien.

20.6 Recommendation for Final Payment: If, on the basis of the ENGINEER's observation of the Work during construction and post-construction, and the ENGINEER's review of the final application for payment and accompanying documentation the ENGINEER is satisfied that the Work has been completed and the CONTRACTOR has fulfilled all of their obligations under the contract documents, the ENGINEER will, within seven (7) days after receipt of the final application for payment, indicate in writing their recommendation of payment and present the application to the COUNTY. If the application and accompanying documentation are acceptable as to form and substance, the COUNTY shall, within thirty (30) days after receipt of the ENGINEER's recommendation for final payment, pay the CONTRACTOR the amount recommended by the ENGINEER or other such amounts deemed appropriate by the COUNTY in consultation with the ENGINEER. If the ENGINEER is not satisfied that the Work is completed, the ENGINEER will return the application to the CONTRACTOR, indicating in writing the reasons for refusing to recommend final payment, in which case the CONTRACTOR shall make the necessary corrections and resubmit the application.

20.7 Access to the Work: The COUNTY shall have the right to exclude the CONTRACTOR from the Work after the date of completion, but the COUNTY shall allow the CONTRACTOR reasonable access to complete or correct items as allowed by project permits.

20.8 Contractor's Obligation to Complete Work: The CONTRACTOR's obligation to perform and complete the Work in accordance with the contract documents shall be absolute. Neither recommendation of any payment by the ENGINEER, nor the issuance of any statement of certificate of completion or substantial completion, nor any payment by the COUNTY to the CONTRACTOR under the contract documents, nor any use of or occupancy of the Work of any part thereof by the COUNTY, nor any act of acceptance by the ENGINEER nor any failure to do so, nor the issuance of a notice of acceptability by the ENGINEER, nor any correction of defective work by the COUNTY shall constitute an acceptance of Work not in accordance with the contract documents or a release of the CONTRACTOR's obligation to perform the Work in accordance with the contract documents.

20.9 Making and Acceptance of Final Payment: The making and acceptance of final payment shall constitute:

a) A waiver of all claims by the COUNTY against the CONTRACTOR, except claims arising from unsettled liens, from defective work appearing after project completion, or from failure to comply with the contract documents or the terms of any guarantees specified therein; however, final payment shall not constitute a

waiver by the COUNTY of any rights in respect to the CONTRACTOR's continuing obligations under the contract documents.

b) A waiver of all claims by the CONTRACTOR against the COUNTY other than those previously made in writing and still unsettled.

20.10 Defective Work:

20.10.1 One Year Correction Period: If within one (1) year after the date of completion or such longer period of time as may be prescribed by law or by the terms of any applicable guarantee required by the contract documents or by any specific provision of the contract documents, any Work is found to be defective, the CONTRACTOR shall promptly, without cost to the COUNTY and in accordance with the COUNTY's written instructions, either correct such defective work or, if it has been rejected by the COUNTY, remove it from the site and replace it with non-defective work. If the CONTRACTOR does not promptly comply with the terms of such instructions, or in an emergency where delay would cause serious risk or loss or damage, the COUNTY may have the defective work corrected or the rejected work removed and replaced. All costs associated with correction of defective work including compensation for additional professional services, shall be paid by the CONTRACTOR. The CONTRACTOR will not be held responsible for erosion of the beach fill after acceptance of completed fill segments by the ENGINEER. However, if unsuitable material including but not limited to rocks, debris, or construction materials placed as a result of the CONTRACTOR’s operations are found within one (1) year of the project completion, the CONTRACTOR will be held responsible to correct this at no further cost to the COUNTY.

20.10.2 Beach Erosion: The CONTRACTOR will not be responsible for erosion of the accepted beach fill sections after final acceptance of fill sections by the ENGINEER. The CONTRACTOR shall remain responsible for beach fill sections until they are accepted for payment by the ENGINEER. The CONTRACTOR shall be responsible for the placement of material that is not beach compatible or does not meet State of Florida standards for beach material.

TP-21 SCHEDULE OF SUBMITTALS

Submittals required by the Technical Provisions for Upland Sand Sources are provided in **Table 9**.

Table 9: Schedule of Submittals for Technical Provisions for Upland Sand Source

SPEC REFERENCE	DELIVERABLE	SUBMITTAL
TP - 2(a-h)	a) Bidder's proposed method of construction and overall schedule to demonstrate understanding of the Work and completion within the Contract time.	Submitted with Bid Documents under cover labeled "BIDDER QUALIFICATIONS"
	b) The additional equipment proposed to complete this project, to include bulldozers, loaders, excavators, etc.	
	c) Qualifications and prior experience of bidder's key personnel, to include proposed project manager, superintendent, site engineer, etc.	
	d) Experience with beach and dune nourishment via truck hauling operations.	
	e) Description of last project of this nature that the bidder completed.	
	f) References for at least three (3) similar beach nourishment works within the previous five (5) years.	
	g) Turbidity monitor experience and qualifications for compliance with project permits.	
	h) Scope of Work and resumes for the independent third party turbidity monitoring to demonstrate that the staff and equipment is available to conduct the monitoring correctly.	
TP - 4	Notification of Pre-/Post-Placement Surveys - Beach and Dune Fill	At least three (3) working days advance notice to the ENGINEER prior to conducting surveys
TP - 4.2	Pre-Placement Surveys - Beach and Dune Fill	Conduct at least seven (7) days prior to the commencement of beach and dune fill placement at any particular section
TP - 4.2	Post-Placement Surveys - Beach and Dune Fill	Conduct within seven (7) days upon the completion of fill placement and grading within an acceptance section; submit at least seven (7) days prior to submittal of an Application for Progress Payment and the Final Application for Payment
TP - 5	As-Built Surveys - Dune Vegetation	Submit at least seven (7) days prior to submittal of an Application for Progress Payment and the Final Application for Payment.
TP – 9.19	Daily Quality Control Reports	Submitted by 12:00 PM the following day from the Notice to Proceed to Final Acceptance
TP – 12.3	Plant Delivery	Submit notice three (3) days prior to delivery

END OF PART III - TECHNICAL PROVISIONS UPLAND SAND SOURCES

PART IV – ENVIRONMENTAL PROVISIONS

EP-1 SCOPE

The Environmental Provisions of the Contract Documents addresses CONTRACTOR responsibilities for the prevention of pollution and other environmental damage as the result of construction operations under the Contract Documents, including those measures set forth in the General Conditions and Technical Provisions. For the purpose of this specification, pollution and other environmental damages are defined as the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; degrade the utility of the environment for aesthetic, cultural, and/or historical purposes; or unnecessarily damage/destroy environmental resources. The control of pollution and damage requires consideration of air, water, land, and the marine environment and includes management of construction activities, visual aesthetics, noise, solid waste, radiant energy, and radioactive materials, as well as other pollutants.

The CONTRACTOR's cost for implementing and fulfilling the turbidity monitoring requirements shall be included in the lump sum price for Turbidity Monitoring. The CONTRACTOR's cost for fulfilling the remainder of these specifications shall be included in the lump sum price for Environmental Compliance.

EP-2 QUALITY CONTROL

The CONTRACTOR shall establish and maintain quality control for environmental protection for all items set forth herein. The CONTRACTOR shall record on Daily Contractor Quality Control Reports any problems in complying with laws, regulations, and ordinances, as well as project permits and corrective action taken.

At least seven (7) days prior to the pre-construction conference, the CONTRACTOR shall provide to the ENGINEER an Environmental Protection Plan. The plan shall outline the means and methods the CONTRACTOR will use to minimize impacts to the environment and comply with permit conditions and monitoring requirements. Submission of the plan does not constitute an endorsement on the part of the ENGINEER.

EP-3 PERMITS

The CONTRACTOR shall comply with all requirements under the terms and conditions set out in all permits applicable to the Work. The COUNTY has received the appropriate permits and approvals from the Florida Department of Environmental Protection (FDEP) and the U.S. Army Corps of Engineers (USACE). These permits are included in Appendices A and B and are part of the Contract Documents. Specifically, the CONTRACTOR will familiarize themselves with general and specific conditions contained in the FDEP and USACE permits and approvals. Any other licenses, easements, or approvals required, including, but not limited to, those which may be required by the COUNTY or local municipalities, shall be secured and paid for by the CONTRACTOR.

EP-4 SUBCONTRACTORS

Assurance of compliance with all sections of the Contract Documents by subcontractors shall be the responsibility of the CONTRACTOR, including compliance with all environmental and permit requirements.

EP-5 NOTIFICATION

The ENGINEER will notify the CONTRACTOR of any known non-compliance with the aforementioned Federal, State, or Local laws or regulations, permits, and other elements of the CONTRACTOR'S Environmental Protection Plan. Nevertheless, it remains the sole responsibility of the CONTRACTOR to comply with all applicable Federal, State, and Local laws and regulations, permits, and all elements of the Environmental Protection Plan. If there is known non-compliance, the ENGINEER will determine what action will be taken and such response will be transmitted to the CONTRACTOR by the ENGINEER, which may include stopping construction of the project until the CONTRACTOR complies with the Environmental Protection Plan. It shall also be the CONTRACTOR'S responsibility that all subcontractors comply with all applicable laws, regulations, permit requirements, and all elements of the Environmental Protection Plan.

EP-6 PROTECTION OF ENVIRONMENTAL RESOURCES

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. To meet this requirement, the CONTRACTOR shall confine all activities to areas defined by the Plans and Specifications. The CONTRACTOR shall, at all times, maintain adequate stakes or other markers required to delineate and layout work areas, access areas and corridors, protected land or environmental resources, no entrance areas, and sensitive areas to ensure the protection of resources. The disturbance of lands and waters that are outside the limits of construction as marked on the Plans is prohibited, except as found necessary and approved by the ENGINEER. The CONTRACTOR shall conduct his work in such manner as to prevent the entry of fuels, oils, bituminous materials, chemicals, sewage, or other harmful materials into streams, lakes, marshlands, bays, or the Atlantic Ocean. The CONTRACTOR shall also conduct his work in such manner as to prevent the placement of any fill material and the discharge of project-related discharges of turbid effluent and runoff into streams, lakes, marshlands, bays, or the Atlantic Ocean. All waterways shall be cleared as soon as practicable of false work, stakes, piling, debris, or other obstructions placed during construction operations and not a part of the finished work. Details regarding environmental protection shall be as stated in the following subparagraphs.

6.1 **Protection of Land Resources:** Prior to the beginning of any construction, and at the request of the CONTRACTOR, the ENGINEER shall identify land resources (if any) to be preserved within the CONTRACTOR'S work area. Unless indicated in the Plans or directed by the ENGINEER, the CONTRACTOR shall not remove, cut, deface, injure, or destroy land resources including sand dunes, dune vegetation, trees, shrubs, vines, grasses, topsoil, and landforms without direct written permission from the ENGINEER. No ropes, cables, or guys shall be fastened to or attached to any trees for

anchorage unless specifically authorized by the ENGINEER. Where such special emergency use is allowed, the CONTRACTOR shall provide effective protection for land and vegetation resources at all times as defined in the following paragraphs. The CONTRACTOR shall be responsible for the replacement of any damaged or destroyed vegetation outside the fill area and the restoration of any water bottoms and land forms to the satisfaction of the ENGINEER. Failure to replace damaged or destroyed vegetation or failure to restore damaged water bottoms and land forms outside the fill area by the CONTRACTOR may result in replacement by the COUNTY; the cost of replacement may be deducted from any money due, or to become due, to the CONTRACTOR or may be recovered under their bond

6.2 **Work Area Limits:** Isolated areas (if any) within the work area that are to be saved and protected shall also be identified by the ENGINEER and marked or fenced by the CONTRACTOR. All survey monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be made visible by lighting. The CONTRACTOR shall convey to all subcontractors and personnel the purpose of marking and/or protection for all necessary objects.

6.3 **Protection of Landscape:** Trees, shrubs, vines, grasses, land forms, and other landscape features within the work area shall be preserved unless directed by the ENGINEER, and shall be clearly delineated by the CONTRACTOR, by marking, fencing, or wrapping with boards, or any other technique approved by the ENGINEER. Unless otherwise approved by the ENGINEER, no trees, shrubs, vines, grasses, or other vegetation outside the Project area will be harmed or destroyed by the CONTRACTOR for any purpose.

6.4 **Fill Placement:** To avoid damage, no fill will be placed within twenty-five (25) feet of dunes, vegetation, seawalls, overwalks, or other structures by direct pumping unless previously approved by the ENGINEER. Unless authorized by the ENGINEER, fill placement in these areas shall be completed through the use of mechanical or manual means.

6.5 **Temporary Excavation:** Embankments or dikes for plant and/or other work areas shall be controlled to protect adjacent areas from despoilment. Temporary excavation shall not cause direct or indirect damage to adjacent areas, landscapes, structures, etc.

6.6 **Retardation and Control of Runoff:** Runoff from the construction site shall be controlled by the CONTRACTOR by the construction, maintenance, and operation of temporary retention dikes, use of turbidity control measures such as silt curtains, and active management of all effluent, discharge, and runoff.

6.7 **Disposal of Solid Wastes:** Solid wastes (including cleared debris) and rubbish resulting from the CONTRACTOR'S activities shall be picked up daily and placed in containers. These containers shall be removed from the beach area and emptied on a regular schedule. The CONTRACTOR shall empty containers when three-quarters full and

will avoid overflow conditions. The CONTRACTOR shall not burn any rubbish at the project site. Disposal of rubbish shall be at an approved off-site location and in a manner that complies with State and local laws and regulations. The CONTRACTOR shall be solely responsible for all costs associated with the collection, removal, and disposal of rubbish. All handling and disposal shall be conducted to prevent contamination. No steel, cables, wire, pipe, drums, or any other solid waste or debris shall be permitted to be disposed overboard into the waters of the Atlantic Ocean or any other water body. Disposal of solid wastes or debris in the Atlantic Ocean is a violation of State and Federal laws. If such debris is found, the debris shall be removed by the CONTRACTOR at his own cost. Failure to remove debris by the CONTRACTOR may result in removal by the COUNTY. The cost of removal may be deducted from any money due, or to become due, to the CONTRACTOR or may be recovered under their bond.

6.8 **Disposal of Chemical Waste:** 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. The CONTRACTOR shall perform all maintenance of equipment, including but not limited to refueling, filter changes, and replacement of hydraulic lines in a manner so as not to contaminate soils, ground or surface waters, or any other natural resources.

6.9 **Disposal of Discarded Materials:** Discarded materials other than those which can be included in the solid waste category will be handled by the CONTRACTOR as directed by the COUNTY.

6.10 **Use of Equipment:** The use of any wheeled or tracked vehicles outside the fill areas, as marked on the Plans, is prohibited. Any damage to wetland vegetation or change in the existing elevation (e.g., ruts, tracks, inappropriate excavation) greater than six inches in the beach, dune, construction staging areas, construction accesses, etc. occurring on the site or adjacent property, as a result of construction operations, shall be repaired by the CONTRACTOR at no additional expense to the COUNTY. If ruts persist on the beach for longer than three (3) days, a mandatory on-site meeting will occur the between the COUNTY, the ENGINEER, and the CONTRACTOR to discuss the condition of ruts on the beach. If the CONTRACTOR has not leveled the ruts 24 hours after the meeting, all construction operations must cease until remedied and leveled.

6.11 **Siltation / Turbidity Control:** The CONTRACTOR shall conduct Work in a manner that will not cause damaging siltation or pollution of any water bodies. All applicable Federal and State regulations of agencies and statutes relating to the prevention and abatement of pollution shall be complied with in the performance of the Contract.

6.11.1 The CONTRACTOR shall provide a Turbidity Control Plan detailing means and methods for any discharge of water outside the project footprint. The Plan must contain methods to limit turbidity and sedimentation in open water. The Turbidity Control Plan, which describes measures to be taken by the CONTRACTOR to

avoid the discharge of turbid, silt-laden water from the Project area, shall be sufficient to ensure that water bodies, wildlife, and fisheries resources, including commercial fisheries resources, will not be damaged. At least seven (7) days prior to the pre-construction conference, the CONTRACTOR shall provide to the ENGINEER and COUNTY a Turbidity Control Plan.

6.12 Protection of Water, Fish, and Wildlife Resources: The CONTRACTOR shall keep construction activities under continued surveillance, management, and control to minimize interference with, disturbance to, and damage of water, fish, wildlife, and hard-bottom resources and habitats. Species that require specific consideration, as well as measures for their protection, shall be addressed in the CONTRACTOR'S Environmental Protection Plan prior to the beginning of project construction. The CONTRACTOR shall comply with all conditions of the Endangered Species Act of 1973. The CONTRACTOR must comply with all Terms and Conditions of the FDEP permit, USACE permit, USFWS's Statewide Programmatic Biological Opinion (SPBO) dated March 13, 2015, USFWS's Programmatic Piping Plover Biological Opinion dated May 22, 2013, the National Marine Fisheries Service (NOAA Fisheries) South Atlantic Regional Biological Opinion (SARBO) dated March 27, 2020, the Standard Manatee Conditions for In-Water Work dated 2011, NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions dated March 23, 2006. The SARBO is provided at: https://www.fisheries.noaa.gov/content/endangered-species-act-section-7-biological-opinions-southeast.

6.12.1 Manatee Protection: To reduce the likelihood that manatees are adversely affected by construction activities, the CONTRACTOR shall adhere to the following measures:

6.12.1.1 The CONTRACTOR shall instruct all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees. All construction personnel are responsible for observing water-related activities for the presence of manatee(s) and shall implement appropriate precautions to ensure protection of the manatee(s).

6.12.1.2 All construction personnel shall be advised by the CONTRACTOR that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the marine mammal protection act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act. The CONTRACTOR may be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.

6.12.1.3 All vessels associated with the project shall operate at "idle speed/no wake" at all times while in the construction area and while in water where the draft of the vessel provides less than a four (4) foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

6.12.1.4 If manatee(s) are seen within 100 yards of the active daily construction/dredging operation, all appropriate precautions shall be implemented to ensure protection of the manatee(s). These precautions shall include the operation of all moving equipment no closer than 100 feet of a manatee. Operation of any equipment closer than 100 feet to the manatee shall necessitate immediate shutdown of that equipment. A "spotter" will visually follow the manatee to ensure that the manatee has left the construction area before equipment operation resumes.

6.12.1.5 Siltation barriers, if used, must be properly secured so that manatee(s) cannot become entangled, and are monitored at least hourly to avoid manatee entrapment. Barriers must not block manatee entry or exit from essential habitat.

6.12.1.6 The CONTRACTOR shall maintain a log detailing sightings, collisions, or injuries to manatee(s) should they occur during the contract period. The CONTRACTOR shall also report any sightings, collisions, or injuries to the engineer in the contractor's daily quality control report.

6.12.1.7 Any collision with and/or injury to a manatee shall be reported immediately to the Florida Fish & Wildlife Conservation Commission (FWCC) (1-888-404-FWCC ext. 3922), U.S. Fish and Wildlife Service's (USFWS) South Florida Ecological Services Office in Vero Beach, Florida (1-772-562-3909), Florida Marine Patrol (1-800-DIAL-FMP), COUNTY (772-226-1648), and ENGINEER.

6.12.2 Sea Turtle Protection: Endangered and threatened species of sea turtles are known to occur, particularly during and around the time of their nesting season (March 1 through October 31), in the Project vicinity. The CONTRACTOR shall comply with all conditions of the Endangered Species Act of 1973. There are civil and criminal penalties for harming, harassing or killing sea turtles. The CONTRACTOR must comply with all Terms and Conditions of the FDEP permit, USACE permit, USFWS's Statewide Programmatic Biological Opinion dated March 13, 2015, the National Marine Fisheries Service (NOAA Fisheries) South Atlantic Regional Biological Opinion (SARBO) dated March 27, 2020, the Standard Manatee Conditions for In-Water Work dated 2011, and NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions dated March 23, 2006. Construction on nesting beaches in south Florida is prohibited between May 1st and October 31st. The CONTRACTOR shall instruct all personnel and subcontractors relative to the sea turtle protection regulations. The CONTRACTOR shall be liable for any non-compliance with the conditions of the permits, easements and terms of this contract attributable to their personnel or subcontractors. During the placement of fill material, if Work is done during the sea turtle nesting season (March 1 to November 30); (a) the COUNTY shall make daily visual inspections to check for the existence of nests, mark these nests, and subsequently avoid or relocate the nests as required by the permits, and (b) a meeting will be arranged by the

ENGINEER between representatives of the CONTRACTOR, the COUNTY, the ENGINEER, the USFWS, FDEP, USACE, and the permitted person responsible for egg relocation at least 60 days prior to the start of the sea turtle nesting season (by March 1); the ENGINEER shall notify all participants of the meeting at least 10 days prior to this meeting.

6.12.2.1 Nesting Activity: Monitoring sea turtle nesting activity shall be performed by the COUNTY during the nesting season. Any signs of turtle nesting activity observed by the CONTRACTOR shall be reported immediately to the ENGINEER, COUNTY, and the COUNTY'S sea turtle monitoring agent. No construction activity shall occur in the vicinity of nesting turtles, turtle nests or hatching turtles until (a) the nests have been satisfactorily relocated or (b) the nesting or hatching turtles have been protected by the COUNTY'S agent. The CONTRACTOR shall instruct all personnel associated with the construction of the project, including subcontractors, about the presence of sea turtles and sea turtle nests in the area, stressing the need to avoid disturbance of nesting sea turtles, nests or hatchlings. If the project proceeds later than March 1, a daily marine turtle nesting survey will be required and performed by the county to identify and possibly relocate any nests in the project area. Construction activity may not commence until the completion of the marine turtle survey each day. Nests may be present on the beach outside of the work area at the time of construction. The CONTRACTOR shall not allow equipment on the beach outside of the designated work area.

6.12.2.2 Reporting: All sea turtle sightings during dredging or construction must also be reported immediately. During dredging operations, the sea turtle observer's reports shall be included in the CONTRACTOR'S daily quality control report. Any incidental takes or observations of dead, injured, or sick sea turtles shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division at (727-824-5312), the COUNTY (772-226-1648), the Sea Turtle Stranding and Salvage Network (STSSN) (seaturtlestranding@myfwc.com), and the USFWS's South Florida Ecological Services office in Vero Beach, Florida (772-562-3909), and the ENGINEER.

6.12.2.3 Compaction Testing: The COUNTY shall perform compaction testing in accordance with FDEP permit conditions and contract documents.

6.12.2.4 Escarpment Formations: The COUNTY shall monitor escarpment formations after final acceptance of the Work according to standard FDEP permit conditions. Prior to final acceptance of the Work, the CONTRACTOR shall be responsible for grading escarpments along the project shoreline in accordance with the FDEP permit conditions and the contract documents.

6.12.2.5 Artificial Lighting: No temporary lighting of the construction area is authorized at any time during the main portion of marine turtle nesting season (May 1 to October 31). During early and late marine turtle nesting season, direct

lighting of the beach and nearshore waters shall be limited to the immediate area of active construction only. Such lighting shall be the minimal lighting necessary to comply with safety requirements and shall be shielded low pressure sodium vapor lights to minimize illumination of the nesting beach and nearshore waters. Lighting on offshore and onshore equipment shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all Coast Guard and OSHA requirements. Shielded low pressure sodium vapor lights are recommended for all lights on offshore equipment that cannot be eliminated.

6.12.3 Hardbottom Protection: Nearshore hardbottom communities exist immediately seaward of beaches in Indian River County including within the Project area. The CONTRACTOR shall avoid contact with any and all hardbottom communities, which are to be protected during performance of the Work and in mobilization and demobilization to and from the Project site. It will be solely the responsibility of the CONTRACTOR to avoid all hardbottom formations and hardbottom biological communities as shown in the Plans for fill placement. Encroachment on, or contact with, hardbottom communities located outside of the fill template or access corridors is strictly prohibited. The CONTRACTOR shall take note that the State of Florida has levied significant fines to contractors who have damaged protected hardbottom communities. The CONTRACTOR will be responsible for any and all fines, or legal expenses, or hardbottom repairs or mitigation requirements incurred by the CONTRACTOR, the COUNTY and the ENGINEER in the event that the CONTRACTOR has damaged hardbottom communities in the Project area.

6.13 Protection of Commercial Fisheries: The CONTRACTOR shall note that bays, rivers, and water bodies in the vicinity of the project contain commercial fishery resources. The CONTRACTOR shall conduct all aspects of its operations to avoid any and all impacts to these resources.

6.14 Water Discharge: The CONTRACTOR shall provide a Turbidity Control Plan detailing means and methods for monitoring and controlling the discharge of any water outside the project footprint. A turbidity control plan is only required if hydraulic placement of fill is proposed with water discharge to the Atlantic Ocean. The Plan must contain methods to limit and monitor turbidity and sedimentation in open water as outlined in Section 7 of the Environmental Provisions, permits, and the Contract Documents. The Turbidity Control Plan must be submitted to the COUNTY and ENGINEER at least seven (7) days prior to the pre-construction meeting. The CONTRACTOR shall be responsible for implementing the Plan and ensuring compliance with the permits and Contract Documents.

6.15 Protection of Air Resources: 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 and all Federal emission and performance laws and standards.

6.16 **Dispensing of Fuel:** Secondary containment, which is capable of holding at minimum 110% of the tank contents, shall be provided by the CONTRACTOR for each fuel storage tank. Fuel dispensers shall have a 4-foot square, 16-gauge metal pan with borders banded up and welded at the corners right below the bib. The edges of the pans shall have an eight (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 contain the spill and contact the ENGINEER and the appropriate local authorities. The CONTRACTOR shall be solely responsible for any fines, penalties, or other legal activities related to fuel spills.

6.17 **Temporary Sanitary Facility:** The CONTRACTOR shall furnish and maintain chemical toilets for use by its employees, the COUNTY, and ENGINEER on the project site. Chemical toilets shall be cleaned on a regular basis to ensure that odor does not become a nuisance. The CONTRACTOR shall be responsible to coordinate, maintain, and monitor a cleaning schedule that is appropriate for the number of CONTRACTOR personnel on site.

6.18 **Storage of Lubricants:** All lubricants and other potential liquid pollutants shall be stored in sealed, non-corrosive containers. Individual containers shall be stored in metal pans with borders banded up and welded at the corners right below the bibb. Pans shall be deep enough to prevent contamination of the ground. Pans shall be kept clean of all spillage or leakage.

EP-7 TURBIDITY MONITORING

7.1 **General:** Turbidity monitoring shall be conducted by the CONTRACTOR if hydraulic placement of fill is used to construct the project. Turbidity monitoring is not required if all activities occur above the mean high water line. Monitoring shall be conducted as outlined below and required by the permits and Contract Documents. The CONTRACTOR shall have turbidity monitoring performed by an independent third party who is responsible for testing, reporting, and ensuring compliance with the permits and Contract Documents. The CONTRACTOR shall be bound and obligated to maintain the quality of the State's waters as stipulated in Chapter 62-302 of the Florida Administrative Code.

7.2 **Monitoring Requirements:** Turbidity monitoring shall be conducted and samples shall be taken in accordance with the Contract Documents. Specifically, the CONTRACTOR shall comply with the conditions and requirements set forth by the FDEP permit (#0285993-009-JC). The requirements pertaining to the upland sand sources and offshore borrow area are specified in these documents. In addition, the

requirements pertaining to operations conducted within and outside Outstanding Florida Waters (OFW) are specified in these documents. Water samples shall be obtained and analyzed for turbidity using a HACH 16800, 2100A, 2100N, 2100AN, or 2100P turbidity meter or equivalent as approved by the ENGINEER. Samples obtained for turbidity analysis shall be kept in the dark and analyzed within 2 hours of collection. Water samples obtained at mid-depth shall be taken with a sampler obtaining samples uncontaminated by water from any other depth. Monitoring required for turbidity shall be measured in Nephelometric Turbidity Units (NTU).

7.3 **Compliance:** The compliance locations shall be considered the limits of the temporary mixing zone for turbidity allowed during construction. If monitoring reveals turbidity levels at the beach or dredge compliance sites greater than the thresholds specified in the Contract Documents above the associated background turbidity levels, construction activities shall cease immediately and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. Such corrective measures may include, but are not limited to, stopping Work, changing construction methods, changing environmental protection methods, or other action. The CONTRACTOR shall immediately notify the ENGINEER or on the morning of the following workday if it occurs after normal work hours. Delays in Work due to compliance with turbidity monitoring shall not be compensated.

7.4 **Testing:** The CONTRACTOR shall provide the ENGINEER with a certification, documenting that the turbidity meter has been calibrated by the manufacturer within one year prior to the commencement of the Work and attesting to the accuracy of his testing equipment and procedure. The CONTRACTOR shall also provide the COUNTY with a duplicate of the standard used to calibrate his testing instrument. The CONTRACTOR will use this standard throughout the Project to maintain the calibration of the equipment. Whenever there is doubt as to the adequacy of the testing or validity of the results, the ENGINEER may direct that additional tests be performed at no additional cost to the COUNTY.

7.5 **Daily Turbidity Monitoring Reports:** The CONTRACTOR shall submit the turbidity monitoring report template, format, and forms to the ENGINEER for approval seven (7) days prior to the pre-construction conference. Sand placement and dredging of the offshore borrow area shall not commence until the report format, template, and forms are approved by the ENGINEER.

During construction, all monitoring data and analysis results shall be submitted by the CONTRACTOR to the ENGINEER on a weekly basis. The reports shall document the turbidity monitoring performed during each 24 hour period. The reports shall contain the following information:

(a) A document title referencing “Permit Number 0285993-009-JC, Indian River County Sector 3 Beach and Dune Nourishment”
(b) Specific monitoring requirements for the sampling location(s)
(c) Time and date samples were taken

(d) GPS location of sample
(e) Sampling results, the net difference between compliance and background results, and whether the turbidity level is in compliance
(f) Depth of water body and depth of samples
(g) Water temperature
(h) Antecedent weather conditions, including wind direction and velocity
(i) Tidal stage and direction of flow
(j) A statement describing the methods used in collection, handling, storage, and analysis of the samples
(k) A georeferenced map, overlaid on an aerial photograph, indicating the location of the current construction activities, the sampling locations (background and compliance), the visible plume pattern and extents, the limits of the mixing zone, and if applicable, the location of nearby Outstanding Florida Waters
(l) A statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, limits of detection, calibration of the meter, and accuracy of the data and precision of the GPS measurements
(m) In the event that weather conditions prevent sampling, written documentation from a reputable independent source of a small craft advisor, or other severe weather alert, which supports the lack of sampling due to weather.

Turbidity sampling, monitoring, and reporting are required for permit compliance. If the CONTRACTOR fails to provide the required documentation in a timely manner, the ENGINEER reserves the right to stop construction until such documentation is provided to the satisfaction of the ENGINEER. Delays in Work due to the CONTRACTOR's failure to comply with turbidity monitoring requirements shall not be compensated.

7.6 Submittal of Reports to FDEP: On a weekly basis, the CONTRACTOR's daily turbidity monitoring reports will be compiled and submitted electronically by the ENGINEER via email to the Florida Department of Environmental Protection, Bureau of Beaches and Coastal Systems, JCP Compliance Officer at JCPCompliance@dep.state.fl.us. If available, a standard template for the turbidity monitoring reports will be provided from FDEP for use by the CONTRACTOR. If not available, the submittal will be developed in coordination with FDEP during the permit required pre-construction meeting. All data shall be submitted under a cover letter with the following information:

(a) A statement which states: "This information is provided in partial fulfillment of the monitoring requirements in Permit No. 0285993-009-JC for the Indian River County Sector 3 Beach and Dune Restoration Project."
(b) Permit application number – cited in the letter reference heading.
(c) Dates included in the report period.
(d) A summary of the monitoring performed and compliance issues.
(e) A description of any factors influencing construction, sand placement, dredging operation, or implementation of the turbidity monitoring sampling program.

EP-8 ENDANGERED SPECIES AND SEA TURTLE PROTECTION REQUIRED FOR USE OF HOPPER DREDGES

In the event that a hopper dredge is utilized for sand excavation, the CONTRACTOR is required to provide all labor, materials, and equipment to meet the following requirements to ensure the protection of threatened and endangered species including sea turtles, sturgeon, elasmobranchs and ESA-listed marine mammals. At least seven (7) days prior to the pre-construction conference, the CONTRACTOR shall submit a detailed Plan which describes what personnel, equipment, and procedures will be used to meet the requirements of the following conditions and the Contract Documents. The CONTRACTOR shall comply with all conditions of the Endangered Species Act of 1973. The CONTRACTOR must comply with all Terms and Conditions of the FDEP permit, USACE permit, USFWS's Statewide Programmatic Biological Opinion dated March 13, 2015, the National Marine Fisheries Service (NOAA Fisheries) South Atlantic Regional Biological Opinion (SARBO) dated March 27, 2020, the Standard Manatee Conditions for In-Water Work dated 2011, and NMFS's Sea Turtle and Smalltooth Sawfish Construction Conditions dated March 23, 2006.

8.1 **NOAA Observers:** The CONTRACTOR shall provide trained NOAA Fisheries-approved sea turtle observers onboard the dredge vessel(s) at all times during the excavation of fill material. NOAA Fisheries-approved observers are required on all hopper dredges to visually monitor the dredge area repeatedly prior to and during all hopper dredge operations for sea turtle presence in the area. Observers shall also monitor the hopper spoil, overflow, screening and dragheads for sea turtles and their remains. The CONTRACTOR shall provide NOAA Fisheries-approved observers with demonstrated ability to identify sea turtle species, starting immediately upon project commencement, to monitor for the presence of listed species and/or parts being entrained or present in the vicinity of dredge operations. In addition, NOAA Fisheries-approved observers will be present onboard the relocation trawler(s) required in Section 8.3 of the Environmental Provisions, whenever relocation trawling is occurring. Flood lights will be installed on the dredge(s) and the relocation trawler(s) to allow observers to safely observe and monitor the baskets or screens. The NOAA Fisheries-approved observer shall be responsible for implementing the Endangered Species Observer Program (Appendix B) and the timely submittal of forms to the USACE (sajdredgenotice@usace.army.mil).

If an endangered species or sea turtle take occurs (either on the dredge or by the relocation trawler), the CONTRACTOR shall immediately notify (within 6 hours of the take event) the NOAA Fisheries' Protected Resources Division at (727-824-5312), the COUNTY (772-226-1648), the Sea Turtle Stranding and Salvage Network (STSSN) (SeaTurtleStranding@myfwc.com), the USFWS's South Florida Ecological Services Office in Vero Beach, Florida (772-562-3909), the USACE (sajdredgenotice@usace.army.mil), and ENGINEER. Notification shall also include submittal of photographic documentation and incidental take reports completed by the observer.

8.1.1 **Continuous Observation:** The CONTRACTOR shall provide NOAA Fisheries-approved observers with demonstrated ability to identify sea turtle species aboard

any and all hopper dredge(s) being used, starting immediately upon project commencement, to monitor for the presence of listed species and/or parts being entrained or present in the vicinity of dredge operations. Continuous, full time observation during any and all hopper dredging is required. NOAA Fisheries-approved observers with demonstrated ability to identify sea turtle species shall be placed aboard the dredge(s) being used starting immediately upon project commencement to monitor for the presence of listed species and/or parts being entrained or present in the vicinity of dredge operations.

8.1.2 Observer Inspection of Dredge Spoils: During the required inspection coverage, the trained NOAA Fisheries-approved observer shall inspect the galvanized screens and baskets at the completion of each loading cycle for evidence of sea turtles. The NOAA observer shall complete for each loading cycle the Load Data Form (Appendix B). Every incidental take (alive or dead) should be photographed. Dredging operations shall not resume until notified by the USACE District Engineer.

8.1.3 Information to be Collected: For each sighting of any endangered or threatened marine species, the information required for the Endangered Species Observer Program (Appendix B) shall be recorded and reported.

8.2 Dredge Equipment and Operations: The CONTRACTOR shall ensure that all hopper dredge operations are conducted in accordance with the following conditions. The CONTRACTOR shall ensure that all equipment and pertinent personnel (i.e., dredge captain) are familiar with and capable of conducting operations in accordance with the following requirements.

8.2.1 Inflow and Overflow Baskets and/or Screening: Baskets and/or screening must be installed over the hopper inflows with openings no greater than 4 inches by 4 inches to provide 100% coverage of all dredged material and shall remain in place during all dredging operations of any calendar year. Baskets/screening will allow for better monitoring by observers of the dredged material intake for sea turtles and their remains. The baskets or screening must be safely accessible to the observer and designed for efficient cleaning.

Complete (100%) inflow screening of dredged material is required. The hopper's inflow screens should have 4-inch by 4-inch screening. If the CONTRACTOR determines that the draghead is clogging and reducing production substantially, the CONTRACTOR may request ENGINEER approval to sequentially modify the required inflow screening by first increasing the screen mesh to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. The CONTRACTOR shall, in such request, include information and data to demonstrate that the required inflow screening is causing significant clogging of the draghead, reduced production rates, etc. The ENGINEER may elect to allow the CONTRACTOR to increase the required mesh size in sequential steps (i.e., to 6 inch, 9 inch); however, any such approved increase in inflow mesh size shall also require that the CONTRACTOR

implement effective, 100% overflow screening. As part of any request to the ENGINEER to reduce inflow screening requirements, the CONTRACTOR shall include a description of the methods to be used to meet the 100% overflow screening performance standard.

8.2.2 Turtle Deflector Device: When hopper dredges are used, the dredges must be equipped with a rigid deflector draghead. Deflectors must be checked and/or adjusted by a designated expert prior to dredge operation to insure proper installment and operation during dredging. The deflector must be checked after every load throughout the dredge operation to ensure that proper installation is maintained. Since operator skill is important to the effectiveness of the draghead, operators must be properly instructed in its use. The hopper dredge will be operated in a manner that will reduce the risk of interaction with any sea turtles that might be present in the dredge area, as detailed in the following guidelines.

8.2.3 Draghead Operations: The CONTRACTOR shall ensure that the draghead of all hopper dredges is operated in accordance with the following requirements.

The draghead shall remain on the bottom at all times during a pumping operation, except when: 1) the dredge is not in a pumping operation, and the suction pumps are turned completely off; 2) the dredge is being re-oriented to the next dredge line during borrow activities; or 3) the vessel's safety is at risk (i.e., the draghead is trailing too far under the ship's hull).

At initiation of dredging, the draghead shall be placed on the bottom during priming of the suction pump. If the draghead and/or drag-arm become clogged during dredging activity, the pump shall be shut down, the drag-arms raised, and the draghead and/or drag-arm can be flushed out by trailing the drag-arm alongside the ship. If plugging conditions persist, the draghead shall be placed on deck, whereby sufficient numbers of water ports can be opened on the draghead to prevent future plugging.

Upon completion of a dredge track line, the drag tender shall: 1) throttle back on the RPMs of the suction pump engine to an idling speed (e.g., generally less than 100 RPMs) prior to raising the draghead off the bottom, so that no flow of material is coming through the pipe into the dredge hopper. Before the draghead is raised, the vacuum gauge on the pipe should read zero, so that no suction exists both in the drag-arm and draghead, and no suction force exists that can impinge a turtle on the draghead grate; 2) hold the draghead firmly on the bottom with no flow conditions for approximately 10 to 15 seconds before raising the draghead; then, raise the draghead quickly off the bottom and up to a mid-water column level, to further reduce the potential for any adverse interaction with nearby turtles; 3) re-orient the dredge quickly to the next dredge line; and 4) re-position the draghead firmly on the bottom prior to bringing the dredge pump to normal pumping speed, and re-starting dredging activity.

8.2.4 Intervals Between Dredging: Sufficient time must be allotted between each dredging cycle for approved observers to inspect and thoroughly clean the baskets and screens for sea turtle and/or turtle parts and document findings. Between each dredging cycle, the approved observer should also examine and clean the dragheads and document findings.

8.3 Relocation Trawling: Relocation trawling shall be undertaken in addition to the use of turtle deflectors and visual observers to minimize the likelihood that a turtle take will occur. During the required trawling, the trained NOAA Fisheries-approved observer shall observe trawling activities and complete the daily Trawling Form provided by the USACE under the heading "Turtle Information" at http://el.erdc.usace.army.mil/seaturtles.

8.3.1 Mandatory Assessment Relocation Trawling. The CONTRACTOR is REQUIRED to conduct continuous and repeated assessment relocation trawling repeatedly in the dredging area for 72 hours prior to commencing hopper dredging to assess the presence of protected sea turtles in the dredge area and to relocate any individuals that may be in the path of the trawler. In the event that any protected turtles are taken or observed during assessment relocation trawling, relocation trawling shall continue concurrent with all hopper dredging operations. The relocation trawling shall occur continuously and concurrent with hopper dredging operations. In the event that no turtles are taken or observed over fourteen consecutive days of relocation trawling and hopper dredging operations, the CONTRACTOR may elect to discontinue relocation trawling, however, relocation trawling shall immediately resume in the event that either 1) two protected turtles are taken during a 24-hour period, or 2) a total of four (or more) protected turtles are taken during the execution of Work under this contract.

8.3.2 Relocation Trawling. In the event that protected turtles are observed or taken during assessment relocation trawling, or in the event that either: 1) two protected turtles are taken during a 24-hour period, or 2) a total of four (or more) protected turtles are taken during the execution of Work under this contract, the CONTRACTOR is REQUIRED to resume continuous and complete relocation trawling during all hopper dredging operations. Such relocation dredging will occur continuously unless no turtles are taken or observed over fourteen consecutive days of relocation trawling and hopper dredging operations, at which time the CONTRACTOR may elect to discontinue relocation trawling. However, relocation trawling shall immediately resume in the event that either 1) two protected turtles are taken during a 24-hour period, or 2) a total of four (or more) protected turtles are taken during the execution of Work under this contract.

8.3.3 Relocation Trawling Requirements. During any and all relocation trawling operations, continuous trawling should occur in front of the dredge vessel as it moves along the planned dredge track lines. In addition, NOAA Fisheries-approved observers will be present onboard the relocation trawler whenever relocation trawling is occurring. All trawling operations shall be conducted in conformance

with the below requirements.

(i) All sea turtles captured during relocation trawling will be handled solely by the NOAA Fisheries-approved observers and handled according to the Protected Resources Division's guidelines. The condition of captured turtles shall first be evaluated by the observers and resuscitation will be performed by the observers if necessary. Captured turtles will be scanned for existing tags. Untagged turtles will be fitted with the appropriate tag in accordance with Appendix H. The location of released turtles will be noted and recorded.

8.3.3.2 **TRAWL TOW TIME:** Trawl tow-time duration shall be no longer than 42 minutes (doors in - doors out) and trawl speeds shall not exceed 3.5 knots.

8.3.3.3 **HANDLING CAPTURED SEA TURTLES:** Sea turtles captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Handling and resuscitation requirements are attached (Appendix B).

a. Captured turtles shall be kept moist, and shaded whenever possible, until they are released.

b. All turtles shall be measured (standard carapace measurements including body depth) and tagged, and weighed when safely possible, prior to release. Any external tags shall be noted and data recorded into the observer's log. Only NOAA Fisheries-approved observers or observer candidates in training under the direct supervision of a NOAA Fisheries-approved observer shall conduct the tagging/measuring/weighing operations.

c. Turtles shall be kept no longer than 12 hours prior to release.

8.3.3.4 **RELOCATION OF CAPTURED SEA TURTLES:** Captured sea turtles shall be released not less than three nautical miles from the dredge site. If two or more released turtles are later recaptured, subsequent turtle captures shall be released not less than five nautical miles away. If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

8.4 **Artificial Lighting.** No temporary lighting of the construction area is authorized at any time during the main portion of marine turtle nesting season (May 1 through October 31). During early and late nesting season, when night work is performed, all on-beach

lighting associated with the project will be limited to the immediate area of active construction. Such lighting must consist of shielded, low pressure, sodium vapor lights to minimize illumination of the nesting beach and near shore waters. Red filters will be placed over vehicle headlights (i.e. bulldozers, front-end loaders). Lighting on offshore equipment will be similarly minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements. Shielded, low pressure, sodium vapor lights are highly recommended for use on offshore equipment when lighting cannot be eliminated.

8.5 Reporting Requirements:

8.5.1 Daily and Weekly Reports: In addition to the notification requirements, the CONTRACTOR shall prepare daily and weekly reports, including all completed load sheets, photographs, completed Endangered Species Observation Forms and relevant Incident Reports. The daily and weekly reports shall also describe the extent and nature of activities required under this section, including personnel, equipment, any visual sightings, and the results of all relocation trawling. Reports shall be submitted to the USACE (sajdredgenotice@usace.army.mil), the COUNTY, and the ENGINEER.

8.5.2 Final Report: The CONTRACTOR shall submit a final report which summarizes all actions taken under this section and shall include a complete set of all daily and weekly reports, completed forms and notifications. The report is intended to serve as an independent comprehensive review and summary of all elements of the CONTRACTOR'S work in accordance with the provisions of this section. The final report shall be submitted within 15 days of the completion of activities required under this section to the USACE (sajdredgenotice@usace.army.mil), the COUNTY, and the ENGINEER.

8.5.3 Disposition of Parts: If any whole turtles (alive or dead) or turtle parts are taken incidental to the project, all whole dead sea turtles or turtle parts should be photographed and described in detail on the Sea Turtle Incidental Take Data Form (Appendix B) and submitted within 6 hours to the NOAA Fisheries Protected Resources Division at (727-824-5312), the COUNTY (772-226-1648), the Sea Turtle Stranding and Salvage Network (STSSN) (SeaTurtleStranding@myfwc.com), the USFWS's South Florida Ecological Services Office in Vero Beach, Florida (772-562-3909), the USACE (sajdredgenotice@usace.army.mil), and ENGINEER. Any dead Kemp's Ridley sea turtles shall be photographed, placed in plastic bags, labeled with location, load number, date, and time taken, and placed in cold storage. Dead turtles or turtle parts will be further labeled as recent or old kills based on evidence such as fresh blood, odor, and length of time in water since death. Disposition of other dead sea turtle species (loggerhead, leatherback, or green turtles) whole or in parts will be determined by the National Marine Fisheries Service. If the species is unidentifiable or if there are entrails that may have come from a turtle, the subject should be photographed, placed in plastic bags, labeled with location, load number,

date and time taken, and placed in cold storage. Dead Kemp's Ridley or unidentifiable species or parts will be collected by National Marine Fisheries Service-approved personnel.

8.5.4 **Silent Inspector:** As required by the USACE permit conditions and attachments, hopper dredges shall be equipped with the Dredge Quality Management (DQM) system for hopper dredge monitoring. The CONTRACTOR shall be responsible for operating and maintaining the DQM system throughout completion of the Work. The CONTRACTOR shall be responsible for ensuring that the DQM has been certified by the USACE DQM Support Team within one calendar year prior to the initiation of the dredging. The CONTRACTOR shall be responsible for gathering, recording, archiving, reporting, and disseminating information and data to the appropriate permitting and regulatory agencies as required to ensure compliance with the Contract Documents.

EP-9 PROTECTION OF MIGRATORY AND OTHER PROTECTED BIRDS

The CONTRACTOR must comply with all Terms and Conditions of the USFWS Programmatic Piping Plover Biological Opinion (P^3BO) for piping plovers and red knots, dated May 22, 2013.

9.1 Certain bird species are protected by the U.S. Fish and Wildlife Service and the Florida Department of Environmental Protection. Protected bird species most likely to be encountered include, but are not limited to, piping plover, snowy plover, least terns, brown pelicans, and red knot. The CONTRACTOR is invited to employ personnel familiar with protected birds to allow for easy identification of birds encountered during the execution of Work under this Contract.

9.2 The CONTRACTOR shall patrol daily beaches and dunes to identify any nesting birds between April 1st and September 1st. The CONTRACTOR shall especially patrol unvegetated or sparsely vegetated dunes and construction accesses, which are prime nesting habitat. The CONTRACTOR should note that created dune are premium nesting habitats; consequently, increased patrols of created dune habitat may be required to preclude the initiation of nesting on these areas during grading and shaping, as-built surveys, data processing, review and acceptance and sand fence installation. Such patrols shall be conducted continuously from April 1st through September 1st throughout the period of construction, or until all Work (including grading and shaping, installation of dune vegetation, and access activities) is completed for acceptance segments. In the event that the CONTRACTOR discovers any evidence of nests or eggs of any protected bird species, the CONTRACTOR shall immediately cease Work in the immediate vicinity of the nest and shall immediately notify the ENGINEER.

9.3 The CONTRACTOR shall include a description of daily patrols (personnel, locations, time), patrol results (any bird observations, species observed, location, behavior, nests found), and any actions taken as a result of such patrols or observations in the CONTRACTOR's daily quality control report (Appendix C).

EP-10 POST CONSTRUCTION CLEAN-UP

The CONTRACTOR shall clean-up any area used for construction as stated in the Contract Documents.

EP-11 RESTORATION OF LANDSCAPE DAMAGE

The CONTRACTOR shall restore all landscape features, land resources, water resources, and fish and wildlife resources damaged or destroyed during construction operations. Such restoration shall be in accordance with a Plan submitted for approval by the ENGINEER. This Work shall be accomplished at the CONTRACTOR's expense. Final payment to the CONTRACTOR shall not occur until the ENGINEER is satisfied with the CONTRACTOR's effort to restore landscape or any other damage caused by the CONTRACTOR or his subcontractors.

EP-12 MAINTENANCE OF POLLUTION CONTROL FACILITIES

The CONTRACTOR shall maintain constructed facilities and portable pollution control devices for the duration of the Contract or for that length of time that construction activities create the particular pollutant.

EP-13 TRAINING OF CONTRACTOR PERSONNEL IN POLLUTION CONTROL AND ENVIRONMENTAL PROTECTION

The CONTRACTOR shall train all subcontractors and personnel in all phases of environmental protection. Personnel and subcontractors shall be familiar with permit requirements and with the necessity of protection of all habitats. 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 the CONTRACTOR. Quality Control personnel shall be identified in the Quality Control Plan submitted in accordance with the Specific Provisions.

EP-14 FUEL OIL TRANSFER OPERATIONS

In accordance with U.S. Coast Guard regulations (33 CFR 156.120, or as revised or updated), couplings used in fuel oil transfer operations on any vessel with a capacity of 250 or more barrels of oil (or fuel) shall be either a bolted or full-threaded connection, a quick-connect coupling approved by the Commandant, or an automatic back-pressure shutoff nozzle used to fuel the vessel. An executed fuel oil transfer (Declaration) form signed by the tanker man shall be completed for each refueling operation. The U.S. Coast Guard shall also be notified prior to any refueling.

EP-15 ENVIRONMENTAL PROTECTION PLAN

At least seven (7) days prior to the pre-construction meeting, the CONTRACTOR shall submit in writing an Environmental Protection Plan to the COUNTY and ENGINEER. Approval of the CONTRACTOR'S plan will not relieve the CONTRACTOR of his responsibility for adequate and continuing control of pollutants and other environmental protection measures. The Environmental Protection Plan shall include but may not be limited to the following:

15.1 Methods for protection of features and habitats to be preserved within authorized Work areas. The CONTRACTOR shall prepare a listing of methods to protect resources needing protection (i.e. all vegetation, trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil, historical, archeological and cultural resources, and environmental resources).

15.2 Procedures to be implemented by the CONTRACTOR to assure compliance with the environmental protection requirements of Section **6.1** of the Environmental Provisions, Protection of Land Resources, and to comply with the applicable permits, laws, and regulations. The CONTRACTOR shall address each element of Environmental Protection described in Section 6.1 of the Environmental Provisions. The CONTRACTOR shall also 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 procedures set out in accordance with the Environmental Protection Plan.

15.3 Procedures to be implemented by the CONTRACTOR to assure compliance with the protection of water, fish, and wildlife resources, per the requirements of Section **6.12** of the Environmental Provisions, and to comply with the applicable permits, laws, and regulations. The CONTRACTOR shall address each element of the protection of water, fish, and wildlife resources as described in Section **6.12** of the Environmental Provisions. The CONTRACTOR shall also 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 procedures set out in accordance with the Environmental Protection Plan.

15.4 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.

15.5 Drawings showing locations of any proposed temporary excavations or embankments for haul roads, material storage areas, structures, sanitary facilities, and stockpiles of excess or spoil materials.

15.6 Environmental monitoring plans for the jobsite, including land, water, air, and noise monitoring.

15.7 Oil spill prevention.

15.8 Oil spill contingency plan.

15.9 Marine hardbottom protection plan.

15.10 Sea turtle protection plan.

15.11 Manatee protection plan.

15.12 A protection plan for threatened and/or endangered species within the project area.

15.13 Work area plan showing the proposed activity in each portion of the area and identifying the areas of limited use or nonuse. The Plan shall include measures for marking the limits of use areas.

15.14 The location of the solid disposal area.

15.15 A statement as to the person who will be responsible for implementation of the Environmental Protection Plan. The CONTRACTOR 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.

15.16 A statement acknowledging that the CONTRACTOR is responsible for environmental protection, including all of the CONTRACTOR'S personnel and subcontractors.

15.17 The Environmental Protection Plan shall be dated and endorsed by the individual of top management in charge of the construction.

EP-16 NOISE CONTROL

The CONTRACTOR shall comply with all Federal, state, and local sound control and noise level ordinances, regulations, and laws that apply to the project site. All hauling and excavating equipment, including dredges, used on this Work shall be equipped with satisfactory mufflers or other noise abatement devices. Booster pumps used on this Work shall be equipped with either or both satisfactory mufflers and other sound abatement devices to reduce engine noise. The COUNTY may request the CONTRACTOR to construct a sound barrier landward of booster pumps in order to reflect noise waterward.

END OF PART IV – ENVIRONMENTAL PROVISIONS

APPENDIX A

FDEP PERMIT

FLORIDA DEPARTMENT OF Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Ron DeSantis
Governor

Jeanette Nuñez
Lt. Governor

Noah Valenstein
Secretary

CONSOLIDATED JOINT COASTAL PERMIT AND SOVEREIGN SUBMERGED LANDS AUTHORIZATION

PERMITTEE:
Indian River County
Attn: Richard Szpyrka
1801 27th Street, Building A
Vero Beach, Florida 32960
rszpyrka@ircgov.com

AGENT:
APTIM
Attn: Doris Otero
2481 N.W. Boca Raton Blvd.
Boca Raton, Florida 33431
Doris.Otero@aptim.com

PERMIT INFORMATION:
Permit Number: 0285993-009-JC

Project Name: Indian River County Sector 3 Beach and Dune Nourishment Project

County: Indian River

Issuance Date: July 17, 2020

Expiration Date: July 17, 2035

REGULATORY AUTHORIZATION:

This permit is issued under the authority of Chapter 161 which includes consideration of the provisions contained in Part IV of Chapter 373, Florida Statutes (F.S.), and Title 62, Florida Administrative Code (F.A.C.). Pursuant to Operating Agreements executed between the Department of Environmental Protection (Department) and the water management districts, as referenced in Chapter 62-113, F.A.C., the Department is responsible for reviewing and taking final agency action on this activity.

PROJECT DESCRIPTION:

The project is to nourish the beach and dunes along approximately 6.6 miles of the Indian River County shoreline. Sand for the project will either be pumped to the project site from the offshore South Borrow Area or truck hauled from an approved upland sand source. The approved upland sand sources are the Vulcan Materials' Diamond, Witherspoon, and Sandland mines; the Stewart Mining Industries' Capron Trail mine; and the Jahna Industries' Independent North, Independent South, and Greenbay mines.

The authorized design template consists of dune and berm placement. The dune features a variable crest height between +11 and +15 feet NAVD, a backdune slope of 5:1 (Horizontal:Vertical) and a foredune slope of 3:1. Native dune vegetation will be planted on the

constructed dune crest, as necessary. The berm features a variable width between 0 and 12 feet, a crest elevation varying between +7 and +8 feet NAVD, and a 10:1 foreslope from the seaward edge of the berm crest to existing grade.

Five upland staging and truck haul access areas have been authorized along the beach restoration site: Treasure Shores Beach Park (R-24.5 to R-25.6), Golden Sands Beach Park (R-31.8 to R-32.5), Wabasso Beach Park and the adjacent beach access (R-39.8), Sea Grape Trail (R-47.4) and Turtle Trail (R-51.5).

PROJECT LOCATION:

The beach and dune restoration site is located along approximately 6.6 miles of beach east of US Highway A1A between R-20 and R-55, in Indian River County; Section 1, Township 32 South, Range 39 East; Section 6, Township 32 South, Range 40 East; and Sections 3, 10, 14, 15, 23, 25, 26, and 36, Township 31 South, Range 39 East; Atlantic Ocean, Class III Waters. Portions of the project are located within the Archie Carr National Wildlife Refuge, which is designated as Outstanding Florida Waters. The South Borrow Area is located approximately 10,000 feet offshore, positioned between R-105 and R-119, just north of the Indian River County/St. Lucie County border.

PROPRIETARY AUTHORIZATION:

This activity also requires a proprietary authorization, as the activity is located on sovereign submerged lands held in trust by the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees), pursuant to Article X, Section 11 of the Florida Constitution, and Sections 253.002 and 253.77, F.S. The activity is not exempt from the need to obtain a proprietary authorization. The Board of Trustees delegated, to the Department, the responsibility to review and take final action on this request for proprietary authorization in accordance with Section 18-21.0051, F.A.C., and the Operating Agreements executed between the Department and the water management districts, as referenced in Chapter 62-113, F.A.C. This proprietary authorization has been reviewed in accordance with Chapter 253, Chapter 18-21 and Section 62-330.075, F.A.C., and the policies of the Board of Trustees.

The Department has also determined that the beach and dune renourishment activity qualifies for a Letter of Consent to use sovereign, submerged lands, as long as the work performed is located within the boundaries as described herein and is consistent with the terms and conditions herein. Therefore, consent is hereby granted, pursuant to Chapter 253.77, F.S., to perform the activity on the specified sovereign submerged lands.

As staff to the Board of Trustees, the Department has reviewed the project described above, and has also determined that dredging of the borrow area requires a public easement for the use of those lands, pursuant to Chapter 253.77, F.S. The Department intends to modify the existing public easement, subject to the conditions outlined in the previously issued *Consolidated Intent to Issue* and in the Recommended Proprietary Action (entitled *Delegation of Authority*).

The final documents required to execute the modification of Public Easement No. 40034 have been sent to the Department's Division of State Lands. The Department intends to issue the easement upon satisfactory execution of those documents. **You may not begin construction of this activity on state-owned, sovereign submerged lands until the easement has been executed to the satisfaction of the Department.**

COASTAL ZONE MANAGEMENT:

This permit constitutes a finding of consistency with Florida's Coastal Zone Management Program, as required by Section 307 of the Coastal Zone Management Act.

WATER QUALITY CERTIFICATION:

This permit constitutes certification of compliance with state water quality standards pursuant to Section 401 of the Clean Water Act, 33 U.S.C. 1341.

OTHER PERMITS:

Authorization from the Department does not relieve you from the responsibility of obtaining other permits (Federal, State, or local) that may be required for the project. Failure to obtain Corps authorization prior to construction could subject you to federal enforcement action by that agency.

AGENCY ACTION:

The above-named Permittee is hereby authorized to construct the work that is outlined in the Project Description and Project Location of this permit and as shown on the approved permit drawings, plans and other documents attached hereto. This agency action is based on the information submitted to the Department as part of the permit application, and adherence with the final details of that proposal shall be a requirement of the permit. **This permit and authorization to use sovereign submerged lands are subject to the General Conditions, General Consent Conditions, Specific Conditions, and attached Plans which are a binding part of this permit and authorization.** Both the Permittee and their Contractor are responsible for reading and understanding this permit (including the permit conditions and the approved permit drawings) prior to commencing the authorized activities, and for ensuring that the work is conducted in conformance with all the terms, conditions and drawings.

GENERAL CONDITIONS:

1. All activities authorized by this permit shall be implemented as set forth in the project description, permit drawings, plans and specifications approved as a part of this permit, and all conditions and requirements of this permit. The Permittee shall notify the Department in writing of any anticipated deviation from the permit prior to implementation so that the Department can determine whether a modification of the permit is required pursuant to Rule 62B-49.008, F.A.C.

2. If, for any reason, the Permittee does not comply with any condition or limitation specified in this permit, the Permittee shall immediately provide the Department and the appropriate District office of the Department with a written report containing the following information: a description of and cause of noncompliance; and the period of noncompliance, including dates and times; and, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

3. This permit does not eliminate the necessity to obtain any other applicable licenses or permits that may be required by federal, state, local or special district laws and regulations. This permit is not a waiver or approval of any other Department permit or authorization that may be required for other aspects of the total project that are not addressed in this permit.

4. Pursuant to Sections 253.77 and 373.422, F.S., prior to conducting any works or other activities on state-owned submerged lands, or other lands of the state, title to which is vested in the Board of Trustees, the Permittee must receive all necessary approvals and authorizations under Chapters 253 and 258, F.S. Written authorization that requires formal execution by the Board of Trustees shall not be considered received until it has been fully executed.

5. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered specifically approved unless a specific condition of this permit or a formal determination under Section 373.421(2), F.S., provides otherwise.

6. This permit does not convey to the Permittee or create in the Permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the Permittee. The issuance of this permit does not convey any vested rights or any exclusive privileges.

7. This permit or a copy thereof, complete with all conditions, attachments, plans and specifications, modifications, and time extensions shall be kept at the work site of the

permitted activity. The Permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.

8. The Permittee, by accepting this permit, specifically agrees to allow authorized Department personnel with proper identification and at reasonable times, access to the premises where the permitted activity is located or conducted for the purpose of ascertaining compliance with the terms of the permit and with the rules of the Department and to have access to and copy any records that must be kept under conditions of the permit; to inspect the facility, equipment, practices, or operations regulated or required under this permit; and to sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules.

9. At least 48 hours prior to commencement of activity authorized by this permit, the Permittee shall electronically submit to the Department, by email at JCPCompliance@dep.state.fl.us, and the appropriate District office of the Department a written notice of commencement of construction indicating the actual start date and the expected completion date and an affirmative statement that the Permittee and the contractor, if one is to be used, have read the general and specific conditions of the permit and understand them.

10. If any prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, shipwreck remains or anchors, dugout canoes or other physical remains that could be associated with Native American cultures, or early Colonial or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The Permittee, or other designee, shall contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section at (850)245-6333 or (800)847-7278, as well as the appropriate permitting agency office. Project activities shall not resume without verbal and/or written authorization from the Division of Historical Resources. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, F.S.

11. Within 30 days after completion of construction or completion of a subsequent maintenance event authorized by this permit, the Permittee shall electronically submit to the Department, by email at JCPCompliance@dep.state.fl.us, and the appropriate District office of the Department a written statement of completion and certification by a registered professional engineer. This certification shall state that all locations and elevations specified by the permit have been verified; the activities authorized by the permit have been performed in compliance with the plans and specifications approved as a part of the permit, and all conditions of the permit; or shall describe any deviations from the plans and specifications, and all conditions of the permit. When the completed activity differs substantially from the permitted plans, any substantial deviations shall be

noted and explained on as-built drawings electronically submitted to the Department, by email at JCPCompliance@dep.state.fl.us.

GENERAL CONSENT CONDITIONS:

1. Authorizations are valid only for the specified activity or use. Any unauthorized deviation from the specified activity or use and the conditions for undertaking that activity or use shall constitute a violation. Violation of the authorization shall result in suspension or revocation of the grantee's use of the sovereignty submerged land unless cured to the satisfaction of the Board.

2. Authorizations convey no title to sovereignty submerged land or water column, nor do they constitute recognition or acknowledgment of any other person's title to such land or water.

3. Authorizations may be modified, suspended or revoked in accordance with their terms or the remedies provided in Sections 253.04 and 258.46, F.S., or Chapter 18-14, F.A.C.

4. Structures or activities shall be constructed and used to avoid or minimize adverse impacts to sovereignty submerged lands and resources.

5. Construction, use or operation of the structure or activity shall not adversely affect any species that is endangered, threatened or of special concern, as listed in Rules 68A-27.003, 68A-27.004 and 68A-27.005, F.A.C.

6. Structures or activities shall not unreasonably interfere with riparian rights. When a court of competent jurisdiction determines that riparian rights have been unlawfully affected, the structure or activity shall be modified in accordance with the court's decision.

7. Structures or activities shall not create a navigational hazard.

8. Structures shall be maintained in a functional condition and shall be repaired or removed if they become dilapidated to such an extent that they are no longer functional. This shall not be construed to prohibit the repair or replacement subject to the provisions of Rule 18-21.005, F.A.C., within one year, of a structure damaged in a discrete event such as a storm, flood, accident or fire.

9. Structures or activities shall be constructed, operated and maintained solely for water dependent purposes, or for non-water dependent activities authorized under paragraph 18-21.004(1)(f), F.A.C., or any other applicable law.

SPECIFIC CONDITIONS:

1. Unless otherwise specified in the specific conditions of this permit all submittals required herein (e.g., progress reports, water-quality reports etc.) shall be electronically submitted (via e-mail, file transfer site or hard drive). Email submittals shall be sent to the Department's JCP Compliance Officer (e-mail address: JCPCompliance@dep.state.fl.us). If a file transfer site is used, a link shall be e-mailed to the JCP Compliance Officer. If data are too large to be submitted via e-mail or file transfer site, the Permittee may submit the data via an external hard drive, provided by the Permittee. The external hard drive shall be mailed to:

   Department of Environmental Protection
   Office of Resilience and Coastal Protection
   Attn: JCP Compliance Officer
   2600 Blair Stone Road, Mail Station 3566
   Tallahassee, FL 32399-2400

2. The Permittee shall not store or stockpile tools, equipment, or materials within littoral zones or elsewhere within surface waters of the state without prior written approval from the Department. Storing, stockpiling, or accessing equipment on, in, over, or through areas with benthic biological resources (including beds of submerged aquatic vegetation, wetlands, oyster reefs, or hardbottom) is prohibited unless it occurs within a work area or ingress / egress corridor that is specifically approved by this permit and is shown on the approved permit drawings. Anchoring or spudding of vessels and barges within areas with benthic biological resources (including beds of aquatic vegetation, oyster reefs, or hardbottom) is also prohibited.

3. The Permittee shall not conduct project operations or store project-related equipment in, on or over dunes, or otherwise impact dune vegetation, outside the approved staging, beach access and dune restoration areas designated in the permit drawings.

4. The terms, conditions and provisions of the required easement (No. 40034) shall be met. Construction of this activity shall not commence on sovereign submerged lands, title to which is held by the Board of Trustees, until all easement documents have been executed to the satisfaction of the Department.

5. For each construction event under this permit, no work shall commence until the Permittee has satisfactorily submitted all information noted in this condition. At least **45** days prior to commencement of construction, the Permittee shall submit the following items for review by the Department. Unless otherwise notified by the Department within 15 days of receipt of all information specified below, the Permittee shall assume the submittals are satisfactory:

a. An electronic copy of detailed ***final construction plans and specifications*** for all authorized activities. The plans and specifications must be consistent with the project description, conditions and approved drawings of this permit. These documents shall be certified by a professional engineer (P.E.), who is registered in the State of Florida. The Permittee shall point out any deviations from the Project Description of this permit (as stated above) or the approved permit drawings (attached to this permit), and any significant changes that would require a permit modification. The plans and specifications shall include a description of the dredging and construction methods to be utilized and drawings and surveys that show all biological resources and work spaces (e.g., anchoring areas, pipeline corridors, staging areas, boat access corridors, etc.) to be used for this project.

b. ***Turbidity Monitoring:*** In order to assure that turbidity levels do not exceed the compliance standards established in this permit, construction at the project site shall be monitored closely by an independent third party with formal training in water quality monitoring and professional experience in turbidity monitoring for coastal construction projects. Also, an individual familiar with beach construction techniques and turbidity monitoring shall be present at all times when turbidity generating activities are occurring. This individual shall have authority to alter construction techniques or shut down the dredging or beach construction operations if turbidity levels exceed the compliance standards established in this permit.

    i. ***Qualifications***: The names, credentials (demonstrating experience and qualifications) and 24-hour contact information of those individuals performing these functions;

    ii. A ***Scope of Work*** for the turbidity monitoring to ensure that the right equipment is available to conduct the monitoring correctly at any location, and under any conditions;

    iii. ***Draft turbidity sampling map.*** An example of the geo-referenced map that will be provided with turbidity reports, including aerial photography and the boundaries of biological resources and/or OFW (pursuant to Specific Condition 29)

c. **Fish & Wildlife Monitoring Qualifications:** To ensure that individuals conducting monitoring of fish and wildlife resources have appropriate qualifications, the Permittee shall provide documentation demonstrating expertise/experience in surveying the types of resources that are present in the project. The Department and the Florida Fish and Wildlife Conservation Commission (FWC) will review this information for confirmation that the monitors are capable of meeting the requirements in this authorization. This documentation shall include the following:

i. ***Marine Turtle Protection****:* Monitoring plan, including a list of the names and permit numbers for the Marine Turtle Permit Holders.

ii. ***Shorebird Protection****:* Monitoring plan, including a list of Bird Monitors with their contact information, summary of qualifications including bird identification skills and avian survey experience, proposed locations of shorebird survey routes, and the locations of travel routes.

d. **Biological Monitoring*:***

i. ***Qualifications.*** At least 30 days prior to conducting any surveys or monitoring, the Permittee shall submit the names and qualifications of the individuals performing biological surveys and monitoring via email to the JCP Compliance Officer for review by the Department (see Section 4.0 of the Biological Monitoring Plan). Individuals that will be performing biological surveys and monitoring shall be certified SCUBA divers, shall have a BS degree or higher in the study of marine biology or a comparable field, shall have scientific knowledge of local benthic marine hardbottom habitats and their flora and fauna, and shall have professional experience in conducting hardbottom monitoring surveys. If additional monitoring team(s) are subcontracted, or new staff are added to the monitoring team, proposed changes as well as names and qualifications of individuals shall be submitted by the Permittee to the JCP Compliance Officer for Department review at least 30 days prior to conducting any surveys or monitoring. The Permittee shall instruct, and is responsible for ensuring, that their selected biological monitoring firm provides training for new staff members and subcontractors on required survey and monitoring procedures and conducts QA/QC verification of their work;

ii. Prior to the initial (first) fill placement event ONLY, the Permittee shall submit ***Baseline Nearshore Hardbottom Monitoring Results***. The results of the full pre-construction (baseline) survey of nearshore hardbottom (see Sections 2.0 and 5.2.1 of the Biological Monitoring Plan).

iii. Prior to each construction event in which the borrow area will be the sand source and pipelines will be used to transport fill material to the placement area, the Permittee shall submit:

(1) ***Pipeline Corridor Hardbottom Survey Results***. All pre-construction pipeline corridor hardbottom survey data collected for the upcoming construction (nourishment) event (see Sections 3.1 and 5.2.2 of the Biological Monitoring Plan).

(2) ***Pipeline Corridor Hardbottom Survey Report***. A detailed pre-construction pipeline corridor survey report for the upcoming construction event (see Sections 3.2 and 5.2.2 of the Biological Monitoring Plan and Specific Condition 30 of this permit).

(3) ***Post-Placement Pre-Pumping Pipeline Survey Results***. When required (see Section 3.3 of the approved Biological Monitoring Plan and see Specific Condition 30 of this Permit). Post-placement pre-pumping pipeline Survey Data shall be submitted to the JCP Compliance officer 72 hours prior to the intended or actual start of pumping. See Section 5.2.3 of the Biological Monitoring Plan for reporting requirements.

e. Documentation from the U.S. Fish and Wildlife Service (FWS) that this work will be covered under a Statewide Programmatic **Biological Opinion** or a Biological Opinions (BO) issued for construction on this project site. If the BO contains conditions that are not already contained herein, a permit modification may be required prior to construction to include those additional conditions.

f. Documentation confirming that the approved upland source is currently producing the quantity and quality of the authorized sand product required for the upcoming event, as required by Specific Condition 26.

g. Documentation that the modification of ***Public Easement*** No. 40034 has been executed to the satisfaction of the Department.

h. ***Pre-Construction Conference.*** **After all items required by a through g above have been submitted to the Department,** the Permittee shall conduct a pre-construction conference to review the specific conditions and monitoring requirements of this permit with the Permittee's contractors, the engineer of record, those responsible for turbidity monitoring, those responsible for protected species monitoring, staff representatives of the Fish and Wildlife Conservation Commission (FWC) and the JCP Compliance Officer (or designated alternate) prior to each construction event. In order to ensure that appropriate representatives are available, at least twenty-one (21) days prior to the intended commencement date for the permitted construction, the Permittee is advised to contact the Department, and the other agency representatives listed below:

DEP, JCP Compliance Officer
e-mail: JCPCompliance@dep.state.fl.us

FWC, Imperiled Species Management Section
e-mail: marineturtle@myfwc.com

FWC, Regional Biologist
Contact list: http://myfwc.com/conservation/you-conserve/wildlife/shorebirds/

The Permittee is also advised to schedule the pre-construction conference at least a week prior to the intended commencement date. At least seven (7) days in advance of the pre-construction conference, the Permittee shall provide written notification, advising the participants of the agreed-upon date, time and location of the meeting, and also provide a meeting agenda and a teleconference number.

If the actual construction start date is different from the expected start date proposed during the preconstruction conference, at least 48 hours prior to the commencement of each construction event, the Permittee shall ensure that notification is sent to the FWC, at marineturtle@myfwc.com, indicating the actual start date and the expected completion date. The Permittee shall also ensure that all contracted workers and observers are provided a copy of all permit conditions.

6. When discharging slurried sand onto the beach from a pipeline, the Permittee shall employ best management practices (BMPs) to reduce turbidity. At a minimum, these BMPs shall include the following:

   a. Use of shore-parallel sand dike to promote settlement of suspended sediment on the beach before return water from the dredged discharge reenters the Atlantic Ocean; and

   b. The pipeline discharge location shall be a minimum of 50 feet landward from open water. If 50 feet is not attainable due to a narrow beach berm, the pipeline discharge location shall be placed as far landward on the beach berm as possible without disturbing the dune.

7. Sediment quality shall be assessed as outlined in the offshore and upland Sediment QA/QC Plans (as appropriate for the source), dated May 26, 2020. Placement of material that is not in compliance with the Plan shall be handled according to the protocols set forth in the Sediment QA/QC Plan. The sediment testing result shall be submitted to The Department within 90 days following the completion of beach construction. The following requirements are included in the Sediment QA/QC Plan:

   a. If, during construction, the Permittee determines that the beach fill material does not comply with the sediment compliance specifications, the Permittee shall take measures to avoid further placement of noncompliant fill, and the sediment inspection results shall be reported to the Department.

   b. The Permittee shall submit post-construction sediment testing results and an analysis report as outlined in the Sediment QA/QC plan to the Department within 90 days following beach construction. The sediment testing results will be certified by a P.E.

or P.G. from the testing laboratory. A summary table of the sediment samples and test results for the sediment compliance parameters as outlined in Table 1 of the Sediment QA/QC plan shall accompany the complete set of laboratory testing results. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the geotechnical investigation shall be included in the sediment testing results report.

c. A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced shall be submitted to the Department within 7 days following completion of remediation activities.

8. The following upland sand source products were reviewed and authorized for use in this project: (1) Beach Sand product from the Vulcan Materials' Diamond, Witherspoon, and Sandland mines; (2) BCH450 and BCH320 products from the Stewart Mining Industries' Fort Pierce mine; and (3) Beach Sand product from Jahna Industries' Independent – North, Independent – South, and Greenbay mines. Any additional upland sand sources will require review and authorization through the permit modification process.

9. Prior to each construction event, the Permittee (or Permittee's Representative) shall submit documentation confirming that the authorized upland sand source(s) is currently producing both the quantity and quality of the authorized sand product(s) to meet the needs of the upcoming event. The documentation shall be signed and sealed by a Registered Professional in the State of Florida (i.e., a P.E. or P.G.) and shall indicate the name(s) of the product(s), the upland sand source(s) and the approximate volume (per product per source) needed for the upcoming event. The Permittee shall submit the documentation to the Department as a preconstruction submittal item no later than 45 days prior to construction. *Note: If the upland source(s) is no longer producing a product consistent with the approved Sediment QA/QC plan, a permit modification will be required to authorize an alternate source.*

10. **In-water Activity.** The Permittee shall adhere to the following requirements for all in-water activity:

a. The Permittee shall instruct all personnel associated with the project about the presence of marine turtles and manatees, and the need to avoid collisions with (and injury to) these protected marine species. The Permittee shall be responsible for harm to these resources and shall require their contractors to advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees or marine turtles, which are protected under the Endangered Species Act, the Marine Mammal Protection Act, the Marine Turtle Protection Act and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate project area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels shall follow routes of deep water whenever possible.

c. Siltation or turbidity barriers (if used) shall be made of material in which manatees and marine turtles cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers shall not impede manatee or marine turtle movement or travel.

d. The Permittee is responsible for all on-site project personnel and shall require them to observe water-related activities for the presence of marine turtles and manatee(s). All in-water operations shall be immediately shall be shut down if a marine turtle or manatee comes within 50 feet of the operation. For unanchored vessels, operators shall disengage the propeller and drift out of the potential impact zone. If drifting would jeopardize the safety of the vessel then idle speed may be used to leave the potential impact zone. Activities shall not resume until the animal(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the animal(s) has not reappeared within 50 feet of the operation. Animals shall not be herded away or harassed into leaving.

e. Any collision with (or injury to) a marine turtle or manatee shall be reported immediately to the FWC Hotline at 1-888-404-3922, and to FWC at ImperiledSpecies@myFWC.com. Any collision with (and/or injury to) a marine turtle shall also be reported immediately to the Sea Turtle Stranding and Salvage Network (STSSN) at SeaTurtleStranding@myfwc.com.

f. Temporary signs concerning manatees shall be prominently posted prior to and during all in-water project activities, at sufficient locations to be regularly and easily viewed by all personnel engaged in water-related activities. Two temporary signs, which have already been approved for this use by the FWC, shall be posted at each location. One sign shall read "Caution Boaters – Watch for Manatees". A second sign measuring at least 8 ½" by 11", shall explain the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations. All signs shall be removed by the Permittee upon completion of the project. These signs can be viewed at MyFWC.com/manatee. Questions concerning these signs can be sent to ImperiledSpecies@myFWC.com.

11. **Construction Area Project Lighting. No temporary lighting of the construction area is authorized at any time during the main portion of marine turtle nesting season (May 1 through October 31).** During early and late nesting season, direct lighting of the beach and nearshore waters shall be limited to the immediate area of active construction while meeting safety requirements as required by law. Lighting on offshore and onshore

equipment shall be minimized by reducing the number of fixtures, shielding, lowering the height and appropriately placing fixtures to avoid excessive illumination of the water's surface and nesting beach. The intensity of lighting shall be reduced to the minimum standard required for general construction area safety. Shields shall be affixed to the light housing on dredge and land-based lights and be large enough to block lamp light from being transmitted outside the construction area or to the adjacent marine turtle nesting beach. (Figure 1 below).

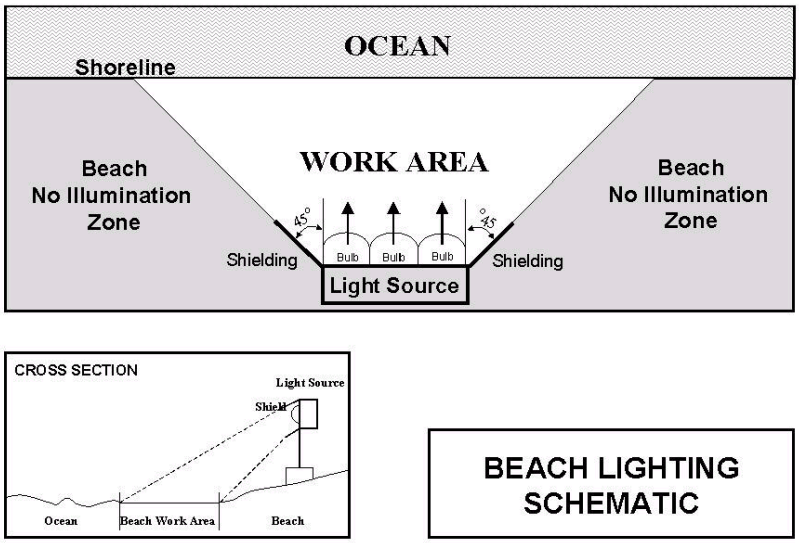


Figure 1

12. **All Beach Related Activities.** The Permittee shall adhere to the following requirements for all beach-related activities during marine turtle and shorebird nesting/breeding seasons (March 1 through October 31) in Indian River County.

    a. The Permittee shall require their contractor and protected species monitors to inspect all work areas that have excavations and temporary alteration of beach topography to determine which areas have deviations (such as depressions, ruts, holes and vehicle tracks) capable of trapping flightless shorebird chicks or marine turtle hatchlings each day. If so, the deviations shall be filled or leveled from the natural beach profile prior to 9:00 p.m. each day. The beach surface shall also be inspected after completion of the project, and all tracks, mounds, ridges or impressions, etc. left by construction equipment on the beach shall be smoothed and leveled.

    b. If any debris, including derelict construction or coastal armoring material, concrete and metal occurs on the beach placement site, it shall be removed from the beach to the maximum extent practicable prior to any placement of fill material. If debris

removal activities will take place during protected species nesting seasons, the work shall be conducted during daylight hours only, and shall not commence until completion of daily monitoring surveys.

c. Equipment Storage and Placement. Staging areas and temporary storage for construction equipment and pipes shall be located off the beach to the maximum extent practicable during March 1 through October 31. Nighttime storage of construction equipment that is not in use shall be located off the beach. All construction pipes that are in use on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system, and if placed parallel to the dune shall be 5 to 10 feet away from the toe of the dune.

d. If it is necessary to extend construction pipes past a known shorebird nesting site, then those pipes shall be placed landward of the site before birds are active in that area. No pipe or sand shall be placed seaward of a shorebird nesting site during the shorebird nesting season. If such placement is not feasible for the project, FWC's Regional Biologist shall be contacted for alternative measures. See contacts available at http://myfwc.com/conservation/you-conserve/wildlife/shorebirds/contacts.

e. Beach Driving. All vehicles shall be operated at speeds less than 6 mph and run at or below the high-tide line. All personnel associated with the project shall be instructed about the potential presence of onsite protected species, and the need to avoid injury and disturbance to these species. In addition, all vehicles operated on the beach shall operate in accordance with the FWC's Best Management Practices for Operating Vehicles on the Beach (http://myfwc.com/conservation/you-conserve/wildlife/beach-driving/). *Note: when flightless chicks are present within or adjacent to travel corridors, construction-related vehicles shall not be driven through the corridor unless a Bird Monitor is present.*

13. **Dune Planting Conditions.** Planting of dune vegetation is encouraged outside of marine turtle nesting season. However, planting activities may occur during the marine turtle nesting season March 1 through October 31 under the following conditions:

a. It is the responsibility of the Permittee to ensure that the project area and access sites are surveyed for marine turtle nesting activity. All nest surveys and activities involving marine turtles shall be conducted only by persons with a valid FWC permit issued pursuant to Florida Administrative Code 68E-1. For information regarding marine turtle permit holders, contact the FWC at MTP@myfwc.com. a. Marine turtle nest surveys shall be initiated at the beginning of the nesting season or 65 days prior to installation of plants (whichever is later). Surveys shall continue until completion of the project or through September 15 (whichever is earliest). Surveys shall be conducted throughout the project area and all beach access sites.

b. Any nests deposited in the area shall be left in place. The marine turtle permit holder shall install an on-beach marker at any nest site and a secondary marker located at a point as far landward as possible to ensure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and survey ribbon or string shall be installed to establish an area of 3 feet radius surrounding the nest. No planting or other activity shall occur within this area nor shall any activity occur which might cause indirect impacts within this area. Nest sites shall be inspected daily to ensure nest markers have not been removed.

c. The use of heavy equipment (including vehicles such as trucks) is not authorized in marine turtle nesting habitat. A lightweight (ATV style) vehicle, with tire pressures of 10 p.s.i. or less can operate on the beach if required.

d. Any vegetation planting shall be installed by hand labor/tools only.

e. All activity shall be confined to daylight hours and shall not occur prior to the completion of all necessary marine turtle surveys and conservation activities within the project area. Nighttime storage of equipment or materials shall be off the beach.

f. In the event a nest is disturbed or uncovered during planting activity, the Permittee shall cease all work and immediately contact the marine turtle permit holder responsible for marine turtle conservation measures within the project area. If a nest(s) cannot be safely avoided during construction, all activity within the affected project area shall be delayed until complete hatching and emergence of the nest.

g. All planting related activities must avoid marked marine turtle nests including those that may be on the beach before and after the marine turtle nesting season dates (March 1 through October 31). Any impacts to nests or marine turtles that inadvertently occur shall be immediately reported the Florida Fish and Wildlife Conservation Commission (FWC) at MarineTurtle@myfwc.com, and all work shall stop until authorized to continue by the Department and FWC.

h. All irrigation lines for the dune restoration planting, if proposed, will be temporarily installed along the landward side of the dune only and will be removed once the plants have become established. Any watering necessary along the seaward side of the dune will be done by hand on an “as needed” basis.

14. **Marine Turtle Protection Conditions.** Beach nourishment shall occur outside of the main part of marine turtle nesting season, starting after October 31 and completed before May 1. During the May 1 through October 31 period, no construction equipment shall be placed or stored on the beach. Temporary approvals of work to extend into marine turtle nesting season may be authorized on a case by case basis. Such authorizations shall be in writing from the Department with FWC approval and accompanied by proof the

extension is covered under a valid Biological Opinion. If such an authorization is granted all conditions below shall be followed.

15. Construction-related activities are authorized to occur on the nesting beach (seaward of existing coastal armoring structures or dune crest and all sandy beach areas such as those used for beach access during the early nesting season (March 1 through May 1) and late nesting season (November 1 through November 30) under the following conditions:

    a. Daily early morning marine turtle nest surveys shall start at the beginning of marine turtle nesting season (March 1). Daily nesting surveys shall continue through November 30, or until two weeks after the last crawl in the project area, whichever is earlier.

    b. Daily nesting surveys shall be conducted beginning ½ hour prior to sunrise, and no construction activity may commence until completion of the marine turtle survey each day.

    c. The Permittee shall ensure that marine turtle nesting surveys are conducted as required in this authorization, and only conducted by personnel with a valid FWC Marine Turtle Permit, that covers all project activities as required by Chapter 68E-1, F.A.C. If needed, contact FWC at MTP@myfwc.com for information on the authorized Marine Turtle Permit Holders in the project area.

    d. Only those nests laid in the area where sand placement will occur shall be relocated, and nest relocation shall cease after the sand placement is completed. Nests requiring relocation shall be moved no later than 9 a.m., the morning following deposition (no longer than 12 hours from the time the eggs are laid), to a nearby self-release beach site in a secure setting, where artificial lighting will not interfere with hatchling orientation. The relocation site shall be determined in conjunction with and approved by FWC prior to nest relocations. Relocated nests shall not be placed in organized groupings. Relocated nests shall be randomly staggered along the length and width of beach settings that are not expected to experience any of the following: inundation by high tides; severe erosion; previous egg loss; or illumination by artificial lighting.

    e. Nests deposited within areas where construction activities will not occur for 65 days, or nests laid in the nourished berm prior to tilling, shall be marked and left in place. The Marine Turtle Permit Holder shall install on-beach markers at the nest site and shall also install a secondary marker at a point as far landward as possible to assure that the nest can be located should the on-beach marker be lost. No activity shall occur within the marked area, nor shall any activities occur that could result in impacts to the nest. Nest sites shall be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the project activity.

f. Beginning March 1, daytime surveys shall be conducted for leatherback marine turtle nests. Nighttime surveys for leatherback marine turtles shall begin when the first leatherback crawl is recorded within the project or adjacent beach area through April 30, or until completion of the project, whichever is earliest. Nightly nesting surveys shall be conducted from 9 p.m. until 6 a.m. The project area shall be surveyed at 1-hour intervals and eggs shall be relocated per the preceding requirements. Since leatherbacks require at least 1.5 hours to complete nesting, the1-hour interval will ensure that all nesting leatherbacks are encountered.

16. **Fill Restrictions.** During the marine turtle nesting season, the contractor shall not advance the beach fill more than 500 feet along the shoreline between dusk and the following day, until the daily nesting survey is completed, and the beach has been cleared for fill advancement. If the 500-foot advancement limitation is not feasible for the project, an alternative distance shall be established during the preconstruction meeting, if a distance can be agreed upon in consultation with FWC. If the work area is extended, nighttime nesting surveys are required, and a Marine Turtle Permit Holder is required to be present on-site to ensure that no nesting and hatching marine turtles are present. If any nesting turtles are sighted on the beach within the immediate construction area, activities shall cease immediately until the turtle has returned to the water and the Marine Turtle Permit Holder responsible for nest monitoring has relocated the nest.

17. **Marine Turtle or Nest Encounters.** Upon locating a dead or injured marine turtle, a hatchling, or egg that may have been harmed or destroyed as a result of the project, the Permittee shall be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922). Care shall be taken in handling injured marine turtles or exposed eggs to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials for later analysis. If a marine turtle nest is excavated during construction activities, but not as part of the authorized nest relocation process outlined in these specific conditions, the permitted person responsible for egg relocation for the project shall be notified immediately so the eggs can be moved to a suitable relocation site.

18. **Tilling, Compaction and Escarpment Remediation Requirements.** For the years after the first-year sand placement (out-year), compaction monitoring, tilling and escarpment monitoring are not required if placed material no longer remains on the dry beach.

a. **Compaction Sampling.** Sand compaction shall be monitored in the area of sand placement immediately after completion of the nourishment event, and two weeks prior to marine turtle nesting season, for three (3) subsequent years. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area shall be tilled prior to the beginning of marine turtle nesting season. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required. Compaction monitoring shall be in accordance with the following protocol:

i. Compaction sampling stations shall be located at 500-foot intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station shall be midway between the dune line and the high-water line (normal wrack line).

ii. At each station, the cone penetrometer shall be pushed to depths of 6, 12 and 18 inches three times (i.e., three replicates at each depth). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lie over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth shall be averaged to produce final values for each depth at each station. Reports shall include all 18 values for each transect line, and the final 6 averaged compaction values.

iii. If values exceeding 500 psi are distributed throughout the project area, but do not exist at two adjacent stations at the same depth, then the Permittee shall consult with the FWC to determine if tilling is required. A tilling waiver based on these compaction values shall be submitted to the FWC at marineturtle@myfwc.com.

b. **Tilling Requirements.** If tilling is performed regardless of post-construction compaction levels or tilling is required based on compaction measurements, the area shall be tilled to a depth of 36 inches.

i. All tilling activity shall be completed prior to the marine turtle nesting season. If the project is completed during the marine turtle nesting season, tilling shall not be performed in areas where nests have been left in place or relocated.

ii. Each pass of the tilling equipment shall be overlapped to allow thorough and even tilling. A relatively even surface, with no deep ruts or furrows, shall be created during tilling. To do this, chain-linked fencing or other material shall be dragged over those areas as necessary after tilling.

iii. Tilling shall occur landward of the wrack line and shall avoid all naturally vegetated areas that are at least 3 square feet in size, as well as any planted areas that have been authorized by the Department. A 3-foot-wide No-Tilling buffer shall be maintained around vegetated areas. The slope between the mean high-water line and the mean low water line shall be maintained to approximate natural slopes.

c. **Escarpment Surveys.** Visual surveys for escarpments along the project area shall be made immediately after completion of sand placement, two weeks prior to marine

turtle nesting season, and weekly for three (3) subsequent years, each year placed sand remains on the beach. Escarpment remediation shall be as follows:

i. Prior to marine turtle nesting season, escarpments that interfere with marine turtle nesting or that exceed 18 inches in height for a distance of at least 100 feet shall be leveled to the natural beach contour or the beach profile shall be reconfigured to minimize scarp formation. Any escarpment removal shall be reported relative to R- monument location to FWC at marineturtle@myfwc.com, with a copy sent to the JCP Compliance Officer.

ii. If weekly surveys during the marine turtle nesting season document escarpments that exceed 18 inches in height for a distance of at least 100 feet and have persisted for more than two weeks, the FWC shall be contacted immediately to determine the appropriate action to be taken. Submitted information shall include locations and measurements of the escarpments and marine turtle nests located within 20 feet of the escarpments, with photographs when possible. Upon written notification, the Permittee shall level escarpments in accordance with methods that minimize impacts to any existing nest in coordination with the FWC and the marine turtle permit holder. An annual summary of escarpment surveys and actions taken shall be submitted electronically to FWC (marineturtle@myfwc.com).

d. If compaction sampling, tilling or escarpment removal occurs during shorebird breeding season, the Shorebird Conditions (including surveys) included in this authorization shall be followed. No heavy equipment shall operate, and no compaction sampling or tilling shall occur within 300 feet of any shorebird nest. If flightless shorebird chicks are present within the work zone or equipment travel corridor, a Bird Monitor shall be present during the operation to ensure that no heavy equipment operates within 300 feet of the flightless young. It is the responsibility of the Permittee to ensure that their contractors avoid tilling, scarp removal or dune vegetation planting in areas where nesting birds are present.

19. **Post-Construction Monitoring and Reporting Marine Turtle Protection Conditions**

a. For each sand placement event, reports for all required marine turtle nesting surveys shall be provided for the post construction (partial or remaining) nesting season and for two full nesting seasons post construction in accordance with the Table 1 (below). If nesting and reproductive success is less than the criteria in the table below, an additional year of monitoring and reporting may be required. If criteria are not met, additional conditions prior to the next sand placement on this beach may be required by the Department and FWC.

b. Data shall be reported and summarized for the nourished areas in accordance with Table 1 (below). Reports shall summarize all crawl activity, hatching success of a representative sampling of nests left in place (if any) by species, project name and applicable project permit numbers and dates of construction. Data shall be submitted in electronic format (Excel spreadsheets) which are available upon request from marineturtle@myfwc.com. Reports shall be sent to the FWC Imperiled Species Management section at marineturtle@myfwc.com and **copied to** JCPCompliance@dep.state.fl.us. All summaries should be submitted by January 15th of the following year.

Table 1. Marine Turtle Monitoring for Beach Placement of Material

Date	Duration	Variable	Criterion
Nesting Success	Year of in-season construction and two entire nesting seasons post construction, with possible additional year[1 & 2]	Number of nests and non-nesting emergences by day by species	40 percent or greater
Hatching success	Year of in-season construction and one entire nesting season post construction, with possible additional year[1 & 2]	Number of hatchlings by species to hatch from egg	60 percent or greater (a statistically valid number of loggerhead and green nests, and all leatherback nests)
Emergence Success	Year of in-season construction and one entire nesting season post construction, with possible additional year[1 & 2]	Number of hatchlings by species to emerge from nest onto beach	Average must not be significantly different than the average hatching success
Disorientations	Year of in-season construction and two entire nesting seasons post construction[1]	Number of nests and individuals that misorient or disorient	
Nests affected by erosion or inundation	Year of construction and two years post construction if placed sand remains on the beach	Number of nests lost and/or affected, by species	
Lighting Surveys	Two in-season surveys the year following construction; First survey between May 1 and May 15 and second survey between July 15 and August 1[1]	Number, location and photographs of lights visible from nourished berm, corrective actions and notifications made	Lighting survey and meeting resulting with plan for reduction in lights visible from nourished berm

Date	Duration	Variable	Criterion
Compaction	Three nesting seasons beginning with the year of construction. Not required if the beach is tilled prior to nesting seasons[1]	Shear resistance	Less than 500 psi
Escarpment Surveys	Weekly during nesting season for three years beginning with year of construction[1]	Number of scarps 18 inches or greater extending for more than 100 feet that persist for more than 2 weeks	Successful remediation of all persistent scarps as needed
1 If placed sand remains on the beach 2 Additional years may be required if variable does not meet criterion based on previous year			

20. **Post-Construction Lighting Surveys.** The Permittee shall ensure that lighting surveys be conducted from the nourished berm and the following actions taken to address potential adverse impacts expected with artificial lights visible from any dry portion of the newly elevated beach. The surveys shall be conducted from the top of the foreshore slope (i.e., the seaward edge of the filled berm before it slopes into the water), facing landward. The survey shall follow standard techniques for such a survey, such as including the number and type of visible lights, location of lights, and photo documentation (see additional techniques as per the 2015 USFWS Statewide Programmatic Biological Opinion).

    a. The first survey shall be conducted between May 1 and May 15 for the first nesting season following construction. For each visible light source, the Permittee shall document that the property owners have been notified and has been provided with recommendations for correcting the light as soon as possible. Recommendations shall be in accordance with local lighting ordinances. A report summarizing all visible lights and the recommendations for correcting the light shall be forwarded to local code enforcement. If no lighting ordinances exist, the recommendations to the property owners shall be consistent with FWC lighting guidelines, which include no lights or light sources shall be visible from the newly elevated beach. The second survey shall be conducted between July 15 and August 1 to assess any remaining visible lights requiring corrective action.

    b. A summary report of the surveys and what corrective actions or local enforcement actions have been taken shall be submitted to FWC at marineturtle@myfwc.com and copied to JCPCompliance@dep.state.fl.us by December 31 of the year in which surveys are conducted. Upon request by the FWC, the Permittee shall set up and hold a meeting with the those responsible for code enforcement (when applicable), FWC and the USFWS to discuss the report and potential additional corrective action needed, as well as any documented marine turtle disorientations in or adjacent to the project area.

21. **Shorebird Protection.** The term "shorebird" refers to all solitary nesting shorebirds and colonial nesting seabirds. If any project activities as described below are conducted, the following shorebird protection conditions are required during the shorebird breeding cycle, which includes nesting. The following conditions are intended to avoid direct impacts associated with the construction of the project and may not address all potential take incidental to the operation and use related to this authorization.

    a. Shorebird breeding season dates for this project area are March 1 through September 1. Note that while most species have completed the breeding cycle by September 1, flightless young may be present through September and must be protected if present.

    b. Any parts of the project where "project activities" on the beach take place entirely outside the breeding season, do not require shorebird surveys. The term "project activities" includes operation of vehicles on the beach, movement or storage of equipment on the beach, sand placement or sand removal, and other similar activities that may harm or disturb shorebirds. Bird survey routes must be established and monitored throughout the entire breeding season in any parts of the project area where: 1) potential shorebird breeding habitat occurs, and 2) project activities are expected to occur at any time within the breeding season.

    c. Bird surveys shall be conducted in all potential beach-nesting bird habitats within the project boundaries that may be impacted by construction or pre-construction activities. One or more shorebird survey routes shall be established by the Permittee to cover project areas which require shorebird surveys. These routes must be approved by the FWC Regional Biologist as part of the Environmental Protection Plan approval process. Routes shall not be modified without prior FWC approval.

    d. During the pre-construction and construction phases of the project, the Permittee shall ensure that surveys for detecting breeding activity and the presence of flightless chicks shall be completed on a daily basis by a qualified bird monitor prior to movement of equipment, operation of vehicles, or other activities that could potentially disrupt breeding behavior or cause harm to the birds or their eggs or young. If all project activities are completed and all personnel and equipment have been removed from the beach prior to the end of the breeding season, route surveys shall continue to be conducted at least weekly through the end of the breeding season. If breeding or nesting behavior is confirmed by the presence of a scrape, eggs or young, the Permittee (or their designee) shall establish a 300-foot buffer around the site and notify the FWC Regional Biologist within 24 hours.

    e. The Bird Monitor shall conduct a shorebird education and identification program (and/or provide educational materials) with the on-site staff to ensure protection of precocial (mobile) chicks. All personnel are responsible for watching for shorebirds, nests, eggs and chicks. If the Bird Monitor finds that shorebirds are breeding within

the project area, a bulletin board shall be placed and maintained in the construction staging area with the location map of the construction site showing the bird breeding areas and a warning, clearly visible, stating that "NESTING BIRDS ARE PROTECTED BY LAW INCLUDING THE FLORIDA ENDANGERED AND THREATENED SPECIES ACT AND THE STATE and FEDERAL MIGRATORY BIRD ACTS".

f. **Bird Monitor Requirements.** The Permittee shall ensure that shorebird surveys are conducted by trained, dedicated individuals (Bird Monitor) with proven shorebird identification skills and avian survey experience. Bird Monitors shall review and become familiar with the general information, employ the data collection protocol, and implement data entry procedures outlined on the FWC's FSD website (http://www.flshorebirddatabase.org or Florida Shorebird Database). The Permittee shall submit a list of Bird Monitors, with their contact information and a summary of qualifications, including bird identification skills and avian survey experience to the FWC Regional Biologist for approval. The Permittee shall submit the names and contact information of the Bird Monitors who have been approved by FWC to JCPCompliance@dep.state.fl.us, prior to any construction or shorebird surveys. In order to be approved, the Bird Monitors must meet the following minimum qualifications:

i. Has previously participated in beach-nesting bird surveys in Florida (provide references or resume). Experience with previous projects must document the ability to 1) identify all species of beach-nesting birds by sight and sound, 2) identify breeding/territorial behaviors, and find nests of shorebirds that occur in the project area, and 3) identify habitats preferred by shorebirds nesting in the project area.

ii. Have a clear working knowledge of, and adhere to, the Breeding Bird Protocol for Florida's Seabirds and Shorebirds.

iii. Have completed full-length webinars: Route-Surveyor Training and Rooftop Monitoring Training, including the annual refresher training. Training resources can be found on the Florida Shorebird Database (FSD) website.

iv. Familiar with FWC beach driving guidelines.

v. Experience posting beach-nesting bird sites, consistent with Florida Shorebird Alliance (FSA) Guidelines.

vi. Has registered as a contributor to the FSD.

22. **Shorebird Survey Protocols.** Shorebird survey protocols, including downloadable field data sheets, are available on the FSD website. All breeding activity shall be reported to the FSD website within one week of data collection. If the use of this website is not feasible for data collection, the FWC Regional Biologist must be contacted for alternative methods of reporting. The Permittee shall ensure that the Bird Monitors use the following survey protocols:

    a. Surveys shall be conducted by walking the length of all survey routes and visually surveying for the presence of shorebirds exhibiting breeding behavior, shorebird chicks or shorebird juveniles, as outlined in the FSD Breeding Bird Protocol for Shorebirds and Seabirds. Use of binoculars (minimum 8x40) is required and use of spotting scope may be necessary to accurately survey the area. If an ATV or other vehicle is needed to cover large survey routes, the Bird Monitor shall stop at intervals of no greater than 600 feet to visually inspect for breeding activity.

    b. Once breeding is confirmed by the presence of a scrape, eggs or young, the Permittee (or their designee) shall notify the FWC Regional Biologist within 24 hours.

23. **Shorebird Buffer Zones and Travel Corridors.** The Permittee shall require the Bird Monitor(s) and Contractor(s) to meet the following:

    a. The Bird Monitor(s) shall establish a disturbance-free buffer zone around any location within the project area where the Bird Monitor has observed shorebirds engaged in breeding behavior, including territory defense. A 300-foot buffer shall be established around each nest or around the perimeter of each colonial nesting area. A 300-foot buffer shall also be placed around the perimeter of areas where shorebirds are seen digging nest scrapes or defending nest territories. All construction activities, movement of vehicles, stockpiling of equipment, and pedestrian traffic are prohibited in the buffer zone. **Smaller, site-specific buffers may be established if approved in writing by the FWC Regional Biologist.** Travel corridors shall be designated and marked outside the buffer areas for pedestrian, equipment or vehicular traffic.

    b. The Bird Monitor(s) shall keep breeding sites under sufficient surveillance to determine if birds appear agitated or disturbed by construction or other activities in adjacent areas. If birds do appear to be agitated or disturbed by these activities, then the Bird Monitor(s) shall immediately widen the buffer zone to a sufficient size to protect breeding birds.

    c. The Bird Monitor(s) shall ensure that where breeding birds will tolerate pedestrian traffic, traditional pedestrian access will not be blocked. This is generally the case with lateral movement of beach-goers walking parallel to the beach at or below the highest tide line. Pedestrian traffic may also be allowed when breeding was initiated within 300 feet of an established beach access pathway.

d. The Bird Monitor(s) shall ensure that the perimeters of designated buffer zones shall be marked according to FSA Posting Guidelines: (http://flshorebirdalliance.org/resources/instructions-manuals.aspx) with posts, twine and FWC-approved signs stating "Do Not Enter, Important Nesting Area" or similar language around the perimeter (see example of signage for marking designated buffer zones at http://myfwc.com/conservation/you-conserve/wildlife/shorebirds/). Posts shall not exceed 3 feet in height once installed. Symbolic fencing (twine, string or rope) should be placed between all posts at least 2.5 feet above the ground and rendered clearly visible to pedestrians. If pedestrian pathway and/or equipment travel corridor modifications are approved by the FWC Regional Biologist, these shall be clearly marked. **Posting shall be maintained in good repair until no active nests, eggs, or flightless young are present.** Although solitary nesters may leave the buffer zone temporarily with their chicks, the posted area continues to provide a potential refuge for the family until breeding is complete. Breeding is not considered to be completed until all chicks have fledged.

e. The Permittee shall ensure that the Bird Monitor(s) designate and mark travel corridors outside the buffer areas so as not to cause disturbance to breeding birds. Heavy equipment, other vehicles, or pedestrians may transit past breeding areas in these corridors. Stopping or turning heavy equipment and vehicles shall be prohibited within the designated travel corridors adjacent to the breeding site. When flightless chicks are present within or adjacent to travel corridors, movement of vehicles shall be adequately monitored by the Bird Monitor(s), who shall advise the contractor whose responsibility it is to ensure no chicks are in the path of the moving vehicle. In addition, tracks, ruts, or holes capable of trapping flightless chicks shall be smoothed or leveled after the Bird Monitor(s) inspect them for the presence of flightless young.

f. Any injury or death of a shorebird (including crushing eggs or young) resulting from project activities shall be reported immediately to the FWC Regional Biologist.

24. Subarea 2 of the South Borrow Area shall be used for the initial construction event. Subarea 2 shall be completely used prior to dredging Subarea 3. The borrow areas shall be dredged in such a manner that the material remaining shall be practicable and feasible to dredge in the subsequent event should an entire subarea not be used for a single dredge event.

25. Subarea 1 of the South Borrow Area shall be reserved for use as a sand source for emergency beach repair in the event that a storm or other event causes damage to the beach within the authorized project area.

26. Sediment quality shall be assessed as outlined in the Sediment QA/QC Plan, dated May 26th, 2020. Placement of material that is not in compliance with the Plan shall be handled according to the protocols set forth in the Sediment QA/QC Plan. The sediment testing

results shall be submitted to The Department within 90 days following the completion of beach construction. The following requirements are included in the Sediment QA/QC Plan:

a. If, during construction, the Permittee determines that the beach fill material does not comply with the sediment compliance specifications, the Permittee shall take measures to avoid further placement of noncompliant fill, and the sediment inspection results shall be reported to the Department.

b. The Permittee shall submit post-construction sediment testing results and an analysis report as outlined in the Sediment QA/QC Plan to the Department within 90 days following beach construction. The sediment testing results shall be certified by a P.E. or P.G. from the testing laboratory. A summary table of the sediment samples and test results for the sediment compliance parameters, as outlined in Table 1 of the Sediment QA/QC Plan, shall accompany the complete set of laboratory testing results. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the geotechnical investigation shall be included in the sediment testing results report.

c. A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced shall be submitted to the Department within 7 days following completion of remediation activities.

MONITORING REQUIRED:

27. Water Quality - Turbidity shall be monitored as follows:

Units: Nephelometric Turbidity Units (NTUs).

Frequency: Monitoring shall be conducted 3 times daily, approximately 4 hours apart, and at any other time that there is a likelihood of an exceedance of the turbidity standard, during all dredging and sand placement operations. At the dredge site, sampling shall be conducted after overflow from the hopper begins and the associated turbidity plume has reached the edge of the mixing zone. At the fill placement site, sampling shall be conducted after discharge from the hopper begins and the associated turbidity plume has reached the edge of the mixing zone.

Sampling shall be conducted **while the highest project-related turbidity levels are crossing the edge of the mixing zone**. Since turbidity levels can be related to pumping rates, the dredge pumping rates shall be recorded, and provided to the Department upon request. The compliance samples and the corresponding background samples shall be collected at approximately the

same time, i.e., background sample shall immediately follow the compliance sample.

Location: Background: Sampling shall occur at surface (approximately one foot below the surface), mid-depth (for sites with depths greater than 6 feet), and bottom (approximately 6 feet-above the bottom for sites with depths greater than 25 feet). All background sampling shall occur clearly outside the influence of any artificially generated turbidity plume or the influence of an outgoing inlet plume.

Borrow Site: Samples shall be collected at least 300 meters up-current from the source of turbidity at the dredge site.

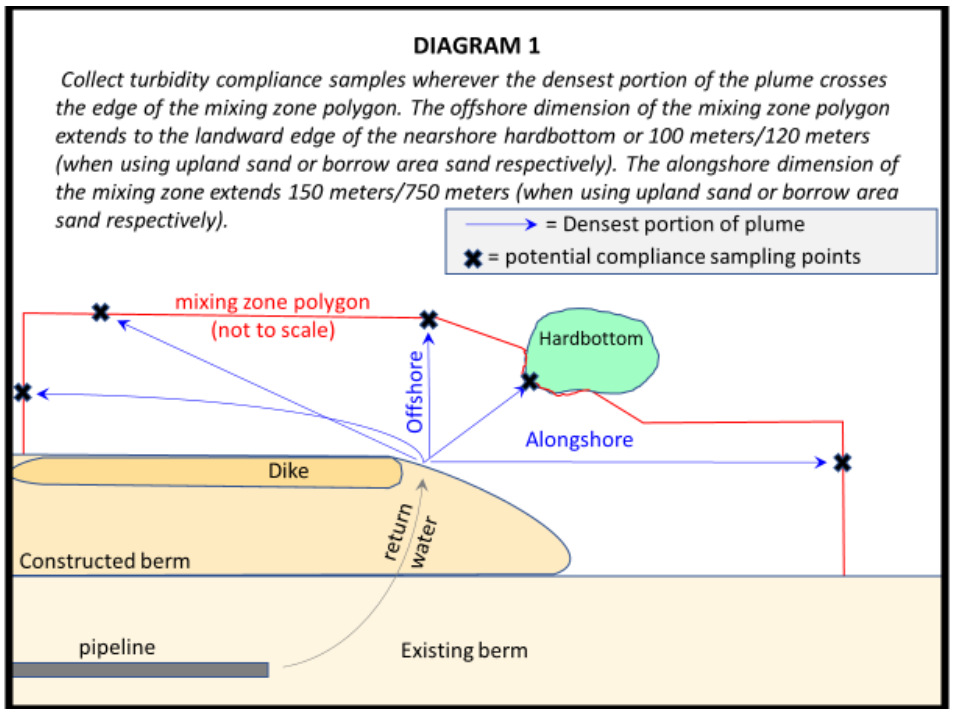
Beach Site: Samples shall be collected at least 300 meters up-current from any portion of the beach that has been, or is being, filled during the current construction event, at the same distances offshore as the associated compliance samples.

Compliance: Sampling shall occur at surface (approximately one foot below the surface), mid-depth (for sites with depths greater than 6 feet), and bottom (approximately 6 feet above the bottom for sites with depths greater than 25 feet).

Borrow Site: Samples shall be collected 150 meters down-current from the cutterhead or the hopper dredge overflow point, or at the edge of the nearest seagrass bed/hardbottom in the downcurrent direction, whichever is closest to the cutterhead or overflow point **and** from any other source of turbidity generated by the dredge, in the densest portion of any visible turbidity plume. If no plume is visible, follow the likely direction of flow.

Beach Site (when placing sand from upland source): Samples shall be collected where the densest portion of the turbidity plume crosses the edge of the mixing zone polygon, which measures up to 100 meters offshore or to the landward edge of the nearshore hardbottom, whichever is closer, and up to 150 meters alongshore from the point where the return water from the dredged discharge reenters the Atlantic Ocean. *Note: If the plume flows parallel to the shoreline, the densest portion of the plume may be close to shore, in shallow water. In that case, it may be necessary to access the sampling location from the shore, in water that is too shallow for a boat. See Figure 2 (below).*

Beach Site (when placing sand from offshore source): Samples shall be collected where the densest portion of the turbidity plume crosses the edge of the mixing zone polygon, which measures up to 120 meters offshore or to the landward edge of the nearshore hardbottom, whichever is closer, and up to 750 meters alongshore from the point where the return water from the dredged discharge reenters the Atlantic Ocean. *Note: If the plume flows parallel to the shoreline, the densest portion of the plume may be close to shore, in shallow water. In that case, it may be necessary to access the sampling location from the shore, in water that is too shallow for a boat. See Figure 2 (below).*



Calibration: The instruments used to measure turbidity shall be fully calibrated with primary standards within one month of the commencement of the project, and at least once a month throughout the project. Calibration with secondary standards shall be verified each morning prior to use, after each time the instrument is turned on, and after field sampling using two secondary turbidity "standards" that bracket the anticipated turbidity samples. If the post-sampling calibration value deviates more than 8% from the previous calibration value, results shall be reported as estimated and a description of the problem shall be included in the field notes.

Analysis of turbidity samples shall be performed in compliance with DEP-SOP-001/01 FT 1600 Field Measurement of Turbidity:
http://publicfiles.dep.state.fl.us/dear/sas/sopdoc/2008sops/ft1600.pdf

If the turbidity monitoring protocol specified above prevents the collection of accurate data, the person in charge of the turbidity monitoring shall contact the JCP Compliance Officer to establish a more appropriate protocol. Once approved in writing by the Department, the new protocol shall be implemented through an administrative permit modification.

28. The **compliance** locations given above shall be considered the limits of the temporary mixing zone for turbidity allowed during construction. If monitoring reveals turbidity levels at the **compliance** sites that are greater than 11 NTUs above the corresponding background turbidity levels when the plume extends into OFW, or 29 NTUs above the corresponding background turbidity levels outside of OFW, construction activities shall **cease immediately** and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. Any such occurrence shall also be immediately reported to the JCP Compliance Officer via email at JCPCompliance@dep.state.fl.us and include in the subject line, "TURBIDITY EXCEEDANCE", and the Project Name and Permit Number. Also notify the Department's Southeast District office.

Any project-associated turbidity source other than dredging or fill placement for beach nourishment (e.g., scow or pipeline leakage) shall be monitored as close to the source as possible. If the turbidity level exceeds 11NTUs above background within OFW or 29 NTUs above background outside of OFW, the construction activities related to the exceedance shall **cease immediately** and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. This turbidity monitoring shall continue every hour until background turbidity levels are restored or until otherwise directed by the Department. The Permittee shall notify the Department, by separate email to the JCP Compliance Officer, of such an event within 24 hours of the time the Permittee first becomes aware of the discharge. The subject line of the email shall state "OTHER PROJECT-ASSOCIATED DISCHARGE, TURBIDITY EXCEEDANCE".

a. When reporting a turbidity exceedance, the following information shall also be included:

   i. the Project Name;

   ii. the Permit Number;

   iii. location and level (NTUs above background) of the turbidity exceedance;

   iv. the time and date that the exceedance occurred; and

   v. the time and date that construction ceased.

b. Prior to re-commencing the construction, a report shall be emailed to the Department with the same information that was included in the "Exceedance Report", plus the following information:

   i. turbidity monitoring data collected during the shutdown documenting the decline in turbidity levels and achievement of acceptable levels;

   ii. corrective measures that were taken; and

   iii. cause of the exceedance.

29. **Turbidity Reports:** All turbidity monitoring data shall be submitted within one week of analysis. The data shall be presented in tabular format, indicating the measured turbidity levels at the compliance sites for each depth, the corresponding background levels at each depth and the number of NTUs over background at each depth. Any exceedances of the turbidity standard (11 NTUs above background within OFW, 29 NTUs above background outside of OFW) shall be highlighted in the table. In addition to the raw and processed data, the reports shall also contain the following information:

   a. time of day samples were taken;

   b. dates of sampling and analysis;

   c. GPS location of sample and source. *When possible, coordinates should be provided in decimal degrees with a 5 decimal level of precision (i.e., 0.00001). Please also indicate the datum*;

   d. depth of water body;

   e. depth of each sample

   f. antecedent weather conditions, including wind direction and velocity;

   g. tidal stage and direction of flow;

   h. water temperature;

   i. a geo-referenced map, overlaid on an aerial photograph, indicating the sampling locations (background and compliance), location of active construction, the visible plume pattern and direction of flow. The map shall also include the boundaries of any benthic resources or OFW. A sample map shall be submitted to and reviewed by the Department prior to construction (Specific Condition 5);

j. a statement describing the methods used in collection, handling, storage and analysis of the samples;

k. a statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, limits of detection, calibration of the meter, accuracy of the data and precision of the GPS measurements;

l. When samples cannot be collected, include an explanation in the report. If unable to collect samples due to severe weather conditions, include a copy of a current report from a reliable, independent source, such as an online weather service.

Monitoring reports shall be submitted by email to the Department's JCP Compliance Officer. In the subject line of the reports, include the Project Name, Permit Number and the dates of the monitoring interval. Failure to submit reports in a timely manner constitutes grounds for revocation of the permit. When submitting this information to the Department's JCP Compliance Officer, on the cover page to the submittal and at the top of each page, please state: **"This information is provided in partial fulfillment of the monitoring requirements in Permit No. 0285993-009-JC, for the Indian River County Sector 3 Beach and Dune Nourishment Project"**

30. **Biological Monitoring**

a. The Permittee shall adhere to the current, Department-approved **Biological Monitoring Plan (BMP)** (dated April 29, 2020), which is a binding part of this permit. The Permittee is responsible for ensuring that their selected contractor(s) / subcontractor(s) are knowledgeable of all permit conditions pertaining to monitoring requirements (including the BMP); not just the scope of work in the contract prepared by the Permittee / contractor. The Permittee shall acquire written approval from the Department prior to implementing any revisions to the BMP. Table 2 (below), titled "Hardbottom Monitoring Summary", summarizes surveys, monitoring events, and tasks required by the Biological Monitoring Plan; these are described in detail in the Biological Monitoring Plan itself.

No impacts to hardbottom resources are authorized by this permit. Biological monitoring shall be conducted to provide the Department with reasonable assurance that any unpermitted, project-related, persistent or temporary, negative impacts (direct or indirect) to hardbottom resources will be documented, if they occur. Unpermitted project-related impacts shall be mitigated for. Impacts and their mitigation may be handled through compliance and enforcement action, and the amount of mitigation may be determined according to the Department's UMAM assessment.

b. **Nearshore Hardbottom Monitoring**. Nearshore hardbottom adjacent to the fill template, beyond the ETOF, shall be monitored (see Section 2.0 of the BMP). A

single pre-construction monitoring event shall be conducted prior to the initial fill placement event conducted under this Permit (see Specific Condition 5.d.ii of the permit). This pre-construction monitoring event shall serve as the baseline for all post-construction monitoring conducted under this Permit. An immediate post-construction monitoring event (within six months of project completion) and three annual post-construction monitoring events (Years 1, 2, and 3 post-construction) shall be conducted following each fill placement event (i.e., each fill placement event shall trigger a complete round of post-construction monitoring). Unless otherwise approved in writing by DEP staff, all monitoring events shall be conducted during summer months (May through September), as close as practicable to the date the baseline survey was conducted. Standard operating procedures shall be used during each monitoring event to provide consistent and repeatable collection of data. Monitoring data and reports are required to be submitted following each monitoring event, according to the Plan.

c. **Pipeline Corridor Monitoring**. Prior to each fill placement event in which the borrow area will be the sand source and pipelines will be used to transport fill material to the placement area, Pre-Construction Pipeline Corridor Surveys shall be conducted to determine the current presence or absence of hardbottom resources and, if present, to determine the current distribution and condition of hardbottom resources within each authorized pipeline corridor and the area 25 meters to the right and left of each pipeline corridor (see Section 3.1 of the BMP).

For survey areas documented as currently containing hardbottom resources, the Permittee shall use the results of the Pre-Construction Pipeline Corridor Surveys to determine where hardbottom resources can be avoided when placing and using pipelines. For hardbottom resources that cannot be avoided within pipeline corridors, the Permittee shall, to the greatest extent practicable, use the results of the Pre-Construction Pipeline Corridor Surveys to determine the least impactful placement for each pipeline within each corridor and the locations along each pipeline where Minimization Measures (e.g., collars or risers or floating pipeline) can be used to limit impacts to resources. Following survey completion and data analysis, the Permittee shall submit all raw Data and a written Pre-Construction Pipeline Corridor Survey Report to the DEP (see Section 3.2 of the BMP and Specific Conditions 5.d.iii.(1) and (2) of the permit).

Results of the current Pre-Construction Pipeline Corridor Surveys as well as the avoidance and minimization measures that will be employed by the Permittee shall determine whether additional surveys, monitoring of hardbottom resources, or activities to provide assurance are required within project areas. If monitoring is required, the type of monitoring that shall be conducted will be based on current survey results, as specified below:

i. If results of the current Pre-Construction Pipeline Corridor Surveys demonstrate that hardbottom resources are currently absent within a pipeline corridor and the 25-meter buffer to either side of the corridor, then no additional surveys or monitoring will be required for the corridor for the current construction event.

ii. If results of the Pre-Construction Pipeline Corridor Surveys demonstrate that hardbottom resources are currently present within a pipeline corridor or the 25-meter buffer to either side of the corridor, and if the Permittee will avoid hardbottom resources documented within the pipeline corridor and corridor buffer during construction (e.g., during pipeline placement and use), then the Department will require reasonable assurance that resources within the corridor have successfully been avoided. The Permittee shall conduct a Post-Placement Pre-Pumping Pipeline Survey and provide the results (data) of the survey to the Department (see Section 3.3 of the BMP and see Specific Condition 5.d.iii.(3) of the permit). To meet the Department's reasonable assurance requirement for Avoidance, results of the Post-Placement Pre-Pumping Pipeline Survey must demonstrate that hardbottom resources are absent within 25-meter to either side of the placed pipeline. Hardbottom resources that have not been avoided shall be Monitored (see Section 3.4 of the BMP for monitoring methods).

iii. If hardbottom resources within a pipeline corridor and corridor buffer area cannot be avoided during construction (e.g., during pipeline placement and use), then resources within close proximity to placed pipelines (i.e., present within 25-meter to either side of a pipeline) shall be monitored. The Permittee shall conduct a Post-Placement, Pre-Pumping Pipeline Survey and provide the results of the survey to the Department (see Section 3.3 of the BMP and Specific Condition 5.d.iii.(3) of the permit). The type of monitoring required for each hardbottom patch/feature in close proximity to the pipeline shall depend on whether the pipeline, once placed, runs adjacent to or across/through hardbottom resources (see Section 3.4 of the BMP for required monitoring methods). Reports are required to be submitted following each survey, according to the Plan.

d. **Reporting Requirements for Biological Monitoring.** See Section 5.0 of the BMP for reporting requirements.

e. **Hardbottom Monitoring Summary.** All pre-construction survey tasks shall be completed prior to the start of any and all related construction activities, respectively. Post-placement pipeline surveys and initial corridor monitoring events shall be completed prior to the initiation of pumping activities. Other pre- and post-construction monitoring shall be conducted as specified in each individual section of the approved Biological Monitoring Plan. Surveys, monitoring, and tasks required for nearshore hardbottom and pipeline corridors are summarized in Table 2, below. See the Biological Monitoring Plan for details.

Table 2. Hardbottom Monitoring Summary

Project Area	Survey	Survey Type	Survey Period & Number of Events	Deliverables
Nearshore Hardbottom	38 Permanent Transects outside of ETOF (N=24 Biological and N=14 Sediment Only; Max 50 m long each; and Permanent Quadrats (0.5 m^2)	Line-Intercept (all transects)	**Pre-Construction** (N=1): Once prior to initial fill placement (Baseline). **Post-Construction** (N=4 per fill placement event): Immediately (within 6 months) and annually for 3 years (years 1, 2, and 3).	Excel spreadsheet, PDF of field sheets
		Interval Sediment Depth (all transects)		Excel spreadsheet, PDF of field sheets
		Video (all transects)		Video
		Quadrat Sampling (only biological transects)		Excel spreadsheet, PDF of field sheets
	Hardbottom Edge	In-situ Delineation of Edge (from R-19.5 to R-57)		Shapefiles
Pipeline Corridors	Pre-Construction Corridor Area Surveys	Sonar Survey	**Pre-Construction** (N=1 full survey of all 6 corridors prior to each fill placement event)	Sonar survey data
		Diver Verification Survey		PDF of field sheets, Photos/Video
		Hardbottom Mapping		Shapefiles
	Post-Placement Pipeline Survey	Mapping	**Pre-Pumping** (N=1 per corridor per fill placement event): Prior to pumping	Shapefiles
	Corridor Monitoring – All Monitoring Types (1 & 2)	Transect Video Survey	**Pre-Pumping** (N=1 per corridor per fill placement event): Prior to pumping **Post-Construction** (N=1 per corridor per fill placement event)	Video
	Type 1 Corridor Monitoring Only	Transect Video Survey	**During-Construction** (Weekly – multiple events per fill placement)	Video

31. **Physical Monitoring:** The physical monitoring and associated reporting shall be conducted in accordance with the approved physical monitoring plan (approved April 2020) and the conditions of this permit.

    One electronic copy of the monitoring report and one electronic copy of the survey data shall be submitted to the JCP Compliance Officer. When submitting any monitoring information to the Department, please include a transmittal cover letter clearly labeled with the following at the top of each page: **"This monitoring information is submitted in accordance with Item No. 3.4 of the approved Physical Monitoring Plan for Permit No. 0285993-009-JC for the monitoring period [XX].**"

32. If the Permittee is unable to complete two maintenance events within the 15-year life of the permit, the Permittee may request (prior to the expiration date of the permit), and the Department shall grant, an extension of the permit expiration date in order to allow

completion of the second maintenance event. The extension would be documented through an administrative modification.

33. **Post-Construction Meeting.** Within 60 days following each construction activity authorized by this permit, the Permittee shall hold a post-construction conference. Attendees shall include at minimum, the Permittee, Agent, Department representative, and FWC representative.

FLAWAC Review
The applicant, or any party within the meaning of Section 373.114(1)(a) or 373.4275, F.S., may also seek appellate review of this order before the Land and Water Adjudicatory Commission under Section 373.114(1) or 373.4275, F.S. Requests for review before the Land and Water Adjudicatory Commission must be filed with the Secretary of the Commission and served on the Department within 20 days from the date when this order is filed with the Clerk of the Department.

Judicial Review
Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Rules 9.110 and 9.190, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 3900 Commonwealth Boulevard, M.S. 35, Tallahassee, Florida 32399-3000; and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date this action is filed with the Clerk of the Department.

EXECUTION AND CLERKING:

Executed in Tallahassee, Florida.
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

_____
Gregory W. Garis.
Program Administrator
Beaches, Inlets and Ports Program
Office of Resilience and Coastal Protection

Attachments: Approved Permit Drawings (29 pages)
Upland Sediment QA/QC Plan (approved on May 26, 2020)
Offshore Sediment QA/QC Plan (approved on May 26, 2020)
Biological Monitoring Plan (approved April 29, 2020)
Physical Monitoring Plan (Approved April 2020)

CERTIFICATE OF SERVICE
The undersigned duly designated deputy clerk hereby certifies that this permit and all attachments were sent on the filing date below.

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to Section 120.52, F. S., with the designated Department Clerk, receipt of which is hereby acknowledged.

_____ July 17, 2020
Clerk **Date**

APPENDIX B

USACE PERMIT

DEPARTMENT OF THE ARMY PERMIT

Permittee: Indian River County, Public Works
Attn: Mr. Richard Szpyrka
1801 27th Street, Building A
Vero Beach, Florida 32960

Permit No: SAJ-2007-01645 (SP-BJC)

Issuing Office: U.S. Army Engineer District, Jacksonville

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the U.S. Army Corps of Engineers (Corps) having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: The applicant seeks authorization for a 15-year permit to restore and maintain the Sector 3 beach. Approximately 461,700 cubic yards (cy) of in-place material is required to fill the design template based on the July 2018 beach condition. The proposed beach nourishment project includes sand nourishment in the form of a restored dune and a narrow berm feature that intersects the existing beach near the waterline. The proposed beach renourishment project extends along the same shoreline originally permitted, between FDEP reference monuments R-20 and R-55, which includes portions of North Beach, Orchid, Wabasso Beach, Indian River Shores, and unincorporated portions of Indian River County

The work described above is to be completed in accordance with the 32 pages of drawings [and 16 attachments] affixed at the end of this permit instrument.

Project Location: The project would affect waters of the United States associated with the Atlantic Ocean. The project site is located along the shoreline of the Atlantic Ocean beginning at Florida Department of Environmental Protection (FDEP) Range Monument (R) R-20, approximately at Seaview Boulevard, and extending south to R-55 at approximately 640 Ocean Road. The project limits are referred to as Sector 3. The project is located in Sections 1, 3, 6, 10, 14, 15, 23, 25, 26, and 36, Townships 31 and 32 South, Ranges 39 and 40 East, Indian River County, Florida.

Directions to site: From I-95 Southbound, take State Road 60 (20th Street) east approximately 13 miles, to Indian River Boulevard (A1A). Turn left and travel north on Indian River Boulevard for approximately 5.2 miles to southern terminus of Sector 3 (R-

55) located beachside at approximately 640 Ocean Road. For the northern terminus continue north on A1A approximately 6.6 miles until Seaview Boulevard on the east side of A1A.

Approximate Coordinates:
Start: Latitude 27.8115836°
Longitude -80.42233373°

End: Latitude 27.72468001°
Longitude -80.37893356°

Permit Conditions

General Conditions:

1. The time limit for completing the work authorized ends on **October 9, 2035**. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature and the mailing address of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this

permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. **Reporting Address:** The Permittee shall submit all reports, notifications, documentation and correspondence required by the general and special conditions of this permit to either (not both) of the following addresses:

   a. For electronic mail (preferred): SAJ-RD-Enforcement@usace.army.mil (not to exceed 15 MB).

   b. For standard mail: U.S. Army Corps of Engineers, Regulatory Division, Enforcement Section, P.O. Box 4970, Jacksonville, FL 32232-0019.

   The Permittee shall reference this permit number, SAJ-2007-01645 (SP-BJC), on all submittals.

2. The attached Specific Conditions of Water Quality Certification/Permit number 0285993-009-JC dated July 17, 2020, issued by the FDEP (Attachments 2-6), are hereby incorporated in this Department of the Army (DA) permit. The Permittee agrees that should the above referenced State permit be modified in any way the Permittee will apply to the Corps for a modification to this permit instrument.

3. **Commencement Notification:** Within 10 days from the date of initiating the authorized work, the Permittee shall provide to the Corps a written notification of the date of commencement of work authorized by this permit.

4. **Fill Material**: Based on the beach profile survey conducted in July 2018, the Permittee shall place +/-461,700 cubic yards of beach quality sand within the permitted template along 6.6 linear miles of Atlantic Ocean shoreline between FDEP Reference Monuments R-20 and R-55. The volume may vary based on updated profile survey of the beach in accordance with Special Condition No. 31 of the FDEP permit (0285993-009-JC). The varying volume of material shall maintain the project design intent to not impact nearshore hardbottom. The Permittee shall use only clean, beach-compatible fill material for this project. The

fill material shall be free from items such as trash, debris, construction materials, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act. All beach fill material utilized shall comply with the FDEP-approved Sediment Quality Control/Quality Assurance Plans (Attachments 3 and 4). Sampling reports required by the plan shall be provided to the Corps Enforcement Section. If the beach fill material placed at the project site does not meet the specifications of the Sediment Quality Control/Quality Assurance Plan and/or the specifications of the terms and conditions of the FWS Biological Opinion, the Corps and FWS shall be notified immediately and any necessary remediation efforts shall be coordinated with Corps Enforcement Section staff. To the extent the Sediment Quality Control/Quality Assurance Plan conflicts with the terms and conditions of the attached FWS Biological Opinion, the FWS Biological Opinion shall prevail.

5. **South Atlantic Regional Biological Opinion:** The authorized work is approved under the current National Marine Fisheries Service (NMFS) South Atlantic Regional Biological Opinion (SARBO) and its references, which can be viewed on the following website in the folder titled Information: https://www.fisheries.noaa.gov/content/endangered-species-act-section-7-biological-opinions-southeast

   Note – Please use an alternate browser in the event you have trouble opening the above website.

   The Permittee is responsible for obtaining and complying with the SARBO. If the Permittee is unable to view the SARBO at this website, the Permittee shall contact the Corps to receive a copy of the SARBO. The Permittee shall implement all reasonable and prudent measures identified in the SARBO. NMFS has issued the SARBO to the Corps for projects that limit the take of listed turtles, whales, sturgeon, sawfish, and any other species listed in the SARBO. Authorization under this permit is conditional upon compliance with all of the mandatory terms and conditions associated with the SARBO, which terms and conditions are incorporated by reference in this permit. The mandatory terms and conditions include adherence to the Project Design Criteria (PDC) applicable to the authorized project. The applicable PDCs are identified with a check mark in Attachment 7. Failure to comply with the terms and conditions associated with the SARBO, where a take of the listed species occurs, would constitute noncompliance with this permit. Failure to comply with this permit will be the basis for suspension and revocation of this permit and may be the basis for other enforcement action. NMFS has directed that this SARBO issued to the Corps serve as the formal consultation for all projects in the area covered by the

SARBO; however, where the terms and conditions of the SARBO differ from the special conditions of this permit, the special conditions of this permit will take precedence as the more stringent condition.

6. **Incidental Take Statement:** This permit does not authorize the Permittee to take an endangered species, in particular sea turtles, sturgeon, whales, or any other endangered species listed in the SARBO. The SARBO includes an Incidental Take Statement (ITS) issued to the Corps. The Permittee understands and agrees that, even where it is in full compliance with the terms and conditions of the SARBO ITS and this permit, incidental take by the Permittee or other hopper dredging operations within the area covered by the SARBO may result in suspension or modification of this permit by the Corps. The amount of incidental take that will trigger suspension, and the need for any such suspension, shall be determined at the discretion of the Corps. The Permittee understands and agrees on behalf of itself, its agents, contractors, and other representatives, no claim, legal action in equity or for damages, adjustment, or other entitlement against the Corps shall arise as a result of such suspension or related action.

7. **Project timing**: The USACE and/or BOEM will determine project timing and necessary minimization measures to reduce the risk of take of ESA-listed species through the Risk Based Adaptive Management process outlined in Section 2.9.2.2 of the 2020 SARBO and Appendix J. Additional timing requirements apply within the range of certain species, as outlined in the North Atlantic Right Whale Conservation Plan (Appendix F) and sturgeon PDCs (Appendix E).

8. **Dredging Quality Management (DQM):** Dredging and dredged material disposal and monitoring of dredging projects using the Dredging Quality Management (DQM) system shall be implemented for this permit. The Permittee shall ensure that each hopper dredge assigned to the work authorized by this permit is equipped with DQM, previously known as 'Silent Inspector', for hopper dredge monitoring. The Permittee's DQM system must have been certified by the DQM Support Team within one calendar year prior to the initiation of the dredging/disposal. Questions regarding certification should be addressed to the DQM Support Center at 877-840-8024. Additional information about the DQM System can be found at https://dqm.usace.army.mil/. The Permittee is responsible for insuring that the DQM system is operational throughout the dredging and disposal project and that project data are submitted to the DQM National Support Center in accordance with the specifications provided at the aforementioned website. The data collected by the DQM system shall, upon

request, be made available to the Regulatory Division of the U.S. Army Corps of Engineers - Jacksonville District.

9. **Biological Monitoring Plan**: The Permittee shall comply with the attached biological monitoring plan (Attachment 5). The biological monitoring reports shall be submitted to the Corps Enforcement Section within 90 days of survey completion. To the extent the biological monitoring plan conflicts with the terms and conditions of the FWS Biological Opinion AND/OR the NMFS 2020 SARBO, the FWS and NMFS Biological Opinions shall prevail.

10. **Deflector Device Submittal:** The Permittee shall ensure drawings of the proposed sea turtle deflector device and the completed "Hopper Dredge Deflector Device Checklist" form (Attachment 10) and all required documentation are submitted to the Corps at least 30 days prior to initiating the authorized work to the addresses listed in the **Reporting Special Condition.** No dredging shall be performed by a hopper dredge without the inclusion of an approved, rigid, sea turtle deflector device. The Permittee shall not commence hopper dredging until approval of the sea turtle deflector device has been granted by the Corps. A copy of the approved drawings, calculations, and signed "Hopper Dredge Deflector Device Checklist" form shall be available on the vessel during dredging operations.

11. **Hopper Dredging Pre-Dredging Inspection Submittal**: The Permittee shall submit the completed "Hopper Dredge Pre-Dredge Inspection Checklist" form (Attachment 11) to the Corps, at least 5 days prior to initiating the authorized work. This checklist can be accessed at:

    https://dqm.usace.army.mil/odess/

    Note – Please use a different browser if experiencing trouble opening the above link.

12. **Statewide Programmatic Biological Opinion (SPBO):** The Permittee provided information to the U. S. Fish and Wildlife Service (FWS) during consultation for loggerhead sea turtle, leatherback sea turtle, green sea turtle, hawksbill sea turtle, Kemp's Ridley sea turtle, West Indian manatee, southeastern beach mouse. The Permittee has reviewed the Reasonable and Prudent Measures, Terms and Conditions of the SPBO dated March 13, 2015, and agreed to follow the measures included to minimize impacts to the above-mentioned species. The FWS provided concurrence the maintenance dredging activities and sand

placement activities are consistent with the SPBO provide the Permittee follows the term and conditions contained herein (Attachment 12).

13. **Programmatic Piping Plover Biological Opinion (P^3BO)**: The Permittee provided information to the U. S. Fish and Wildlife Service (FWS) during consultation for piping plover and red knot. The Permittee has reviewed the Conservation Measures of the P^3BO dated May 22, 2013, and agreed to follow the measures included to minimize impacts to the above-mentioned species. The FWS provided concurrence the maintenance dredging activities and sand placement activities are consistent with the P^3BO provide the Permittee follows the term and conditions contained herein (Attachment 13).

14. **Manatee Protection:** The permittee shall comply with the "Standard Manatee Conditions for In-Water Work – 2011" (attachment 14).

15. **Sea Turtle and Smalltooth Sawfish Conditions:** The Permittee shall comply with National Marine Fisheries Service's "Sea Turtle and Smalltooth Sawfish Construction Conditions" dated March 23, 2006, (Attachment 15).

16. **As-Built Certification:** Within 60 days of completion of the work authorized by this permit, the Permittee shall submit as-built drawings of the authorized work and a completed "As-Built Certification By Professional Engineer" form (Attachment 16) to the Corps. The as-built drawings shall be signed and sealed by a registered professional engineer and include the following:

    a. A plan view drawing of the location of the authorized work footprint, as shown on the permit drawings, with transparent overlay of the work as constructed in the same scale as the permit drawings on 8½-inch by 11-inch sheets. The plan view drawing should show all "earth disturbance," including wetland impacts and water management structures.

    b. A list of any deviations between the work authorized by this permit and the work as constructed. In the event that the completed work deviates, in any manner, from the authorized work, describe on the attached "As-Built Certification By Professional Engineer" form the deviations between the work authorized by this permit and the work as constructed. Clearly indicate on the as-built drawings any deviations that have been listed. Please note that the depiction and/or description of any deviations on the drawings and/or "As-Built Certification By Professional Engineer" form does not constitute approval of any deviations by the Corps.

c. Include the Department of the Army permit number on all sheets submitted.

d. Include pre- and post-construction aerial photographs of the project site if available

17. Cultural Resources/Historic Properties:

a. No structure or work shall adversely affect impact or disturb properties listed in the *National Register of Historic Places* (NRHP) or those eligible for inclusion in the NRHP.

b. If during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, flora, fauna, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with Native American cultures or early colonial or American settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps within the same business day (8 hours). The Corps shall then notify the Florida State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officer(s) (THPO(s)) to assess the significance of the discovery and devise appropriate actions.

c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition; and if deemed necessary by the SHPO, THPO(s), or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the SHPO for finds under his or her jurisdiction, and from the Corps.

d. In the unlikely event that unmarked human remains are identified on non-federal lands, they will be treated in accordance with Section 872.05 Florida Statutes. All work and ground disturbing activities within a 100-meter diameter of the unmarked human remains shall immediately cease and the Permittee shall immediately notify the medical examiner, Corps, and State Archeologist within the same business day (8-hours). The Corps shall then

notify the appropriate SHPO and THPO(s). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the State Archeologist and from the Corps.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)

( ) Section 404 of the Clean Water Act (33 U.S.C. 1344)

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413)

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, State, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision: This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions: General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

Richard B. Szpyrka P.E Digitally signed by Richard B. Szpyrka P.E
Date: 2020.12.04 15:26:50 -05'00'

December 4, 2020

(PERMITTEE) (DATE)

Richard B. Szpyrka - Public Works Director

(PERMITTEE NAME-PRINTED)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

PALMER.JOHN.C.1364675034 Digitally signed by PALMER.JOHN.C.1364675034
Date: 2020.12.15 11:31:01 -05'00'

(DISTRICT ENGINEER) (DATE)
Andrew D. Kelly Jr.
Colonel, U.S. Army
District Commander

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

_____ _____
(TRANSFEREE-SIGNATURE) (DATE)

_____
(NAME-PRINTED)

_____
(ADDRESS)

_____
(CITY, STATE, AND ZIP CODE)

Attachments to Department of the Army Permit Number SAJ-2007-01645

1. PERMIT DRAWINGS: 32 pages, dated February, March, April 2019, and February 2020.

2. WATER QUALITY CERTIFICATION: Specific Conditions of the permit/certification in accordance with General Condition number 5 on page 2 of this DA permit.

3. Upland Sediment QA/QC Plan

4. Offshore Sediment QA/QC Plan

5. Biological Monitoring Plan

6. Physical Monitoring Plan

7. SARBO PDC Checklist

8. SARBO Pre/Post Construction Reporting Form

9. SARBO ESA Take Reporting Form

10. Hopper Dredge Deflector Device Checklist

11. Hopper Dredge Pre-Dredge Inspection Checklist

12. USFWS Biological Opinion – SPBO. 193 pages

13. USFWS Biological Opinion – P3BO. 64 pages

14. Standard Manatee Conditions for In-Water Work - 2011: 2 pages

15. Sea Turtle and Smalltooth Sawfish Construction Conditions – 2006: 1 page

16. As-Built Certification Form: 2 pages

APPENDIX C

CONTRACTOR DAILY REPORT FORMAT

INDIAN RIVER COUNTY

SECTOR 3 - BEACH AND DUNE RESTORATION PROJECT

DAILY CONTRACTOR QUALITY CONTROL REPORT

Date:_____ - _____ Contract Day:_____

(Report is due by 12:00 p.m. of the following day)

Beach Access Utilized (If Truck Haul): _____

WEATHER: (Clear) (P. Cloudy) (Cloudy) (Rain) TEMP. Min. Max.

Wind speed:_____mph

Wave Height:_____feet

Wind Direction: _____

Wave Direction: _____

GRADING/DRESSING OPERATIONS:

COMPLETE FROM:_____feet (north/south) of profile line no._____

COMPLETE TO: _____feet (north/south) of profile line no._____

FILL PLACEMENT OPERATIONS:

COMPLETE FROM:_____feet (north/south) of profile line no._____

COMPLETE TO: _____feet (north/south) of profile line no._____

DUNE VEGETATION INSTALLATION:

COMPLETE FROM:_____feet (north/south) of profile line no._____

COMPLETE TO: _____feet (north/south) of profile line no._____

1. Work Performed Today: (Indicate location and description of work performed. Provide beach fill advance over last 24 hours. If offshore borrow area utilized, attach dredge position printouts and plot to this report).

2. Results of Surveillance: (Include satisfactory work completed or deficiencies with action to be taken.)

3. Sand Quality Monitoring: Did all sand placed today meet the requirements of the contract? Yes/No? _____

4. Water Quality Monitoring: Was water quality monitoring conducted today in compliance with project permit requirements of the Florida Department of Environmental Protection Permit and water quality protection laws, and the results provided to the COUNTY and ENGINER? Yes/No? _____

5. Verbal Instructions Received: (List any instructions given by the ENGINEER or COUNTY, construction deficiencies, retesting required, etc., with action to be taken.)

6. Equipment Data: (Indicate items of construction equipment other than hand tools at job site and whether or not used and if operable.)

7. Progress Summary:

Description	This Day	To Date
Worked Hours		
Downtime Hours (Explain Below)		
Length of Fill Placement Advance on Beach *(ft)*		
Number of Truck Deliveries (if applicable)		
Sand Volume Placed (estimated c,y.)		
Volume Pay (cy in accepted sections only)		
Linear % Completed		

Explanation of Downtime:

CONTRACTOR's Verification: The above report is complete and correct, equipment used, and works performed during this reporting period are in compliance with the contract drawings and Specifications except as noted above.

_____
Contractor's Approved Authorized Representative

APPENDIX D

OFFSHORE QA/QC PLAN

SEDIMENT QUALITY CONTROL/QUALITY ASSURANCE PLAN
FOR BEACH RESTORATION OR NOURISHMENT USING AN OFFSHORE BORROW AREA
0285993-009-JC

Indian River County

Sector 3 Beach and Dune Restoration Project

May 26th, 2020

A. INTRODUCTION

As indicated in the title above, this template plan is for use for beach restoration and beach nourishment when an offshore borrow area is used. A different plan document will be used for inlet excavation involving beach or nearshore placement of dredged material.

Pursuant to Fla. Admin. Code r. 62B-41.008 (1) (k) 4.b., permit applications for inlet excavation, beach restoration, or nourishment shall include a quality control/assurance plan that will ensure that the sediment from the borrow areas to be used in the project will meet the standard in Fla. Admin. Code r. 62B-41.007(2)(j). To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system.

The Permittee has conducted geotechnical investigations that provide adequate data concerning the character of the sediment and the quantities available within the spatial limits of the permitted borrow area(s). The Permittee has provided an analysis of the existing or native sediment and the sediment within the permitted borrow area(s) that demonstrates its compatibility with the naturally occurring beach sediment in accordance with Fla. Admin. Code r. 62B-41.007(2)(j). The sediment analysis and beach volume calculations were performed using established industry standards, and are certified by a Professional Engineer or a Professional Geologist registered in the State of Florida.

Based upon this information and the design of the borrow area(s), the Department of Environmental Protection (Department) has determined that use of the sediment from the borrow area(s) will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. Furthermore, this information and the borrow area design provides sufficient quality control/quality assurance (QC/QA) that the sediment from the borrow area(s) will comply with the requirements of Fla. Admin. Code r. 62B-41.007(2)(j); hence, additional QC/QA procedures beyond those described in this permit are not required for these sediment parameters during construction.

This plan outlines the responsibilities of each stakeholder in the project as they relate to the placement of beach compatible material on the beach. These responsibilities are in response to the possibility that non-beach compatible sediments may exist within the borrow area(s) and could be unintentionally placed on the beach. The QC Plan specifies the minimum construction management, inspection, and reporting requirements placed on the Marine Dredging Contractor and enforced by the Permittee, to ensure that the sediment from the borrow area(s) to be used in the project meet the compliance specifications. The QA Plan specifies the minimum construction oversight, inspection, and reporting requirements to be undertaken by the Permittee or the Permittee's On-Site Representative to observe, sample, and test the placed sediments to verify the sediments are in compliance.

B. SEDIMENT QUALITY SPECIFICATIONS

The sediment from the borrow area(s) is similar in Munsell color and grain size distribution to the material in the existing coastal system at the beach placement site. The Department and the Permittee acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted borrow area(s) that do not comply with the limiting parameters of Fla. Admin. Code r. 62B-41.007(2)(j) 1. – 5., or vary in Munsell color from the composite value. Furthermore, the Department may consider more restrictive values for the sediment parameters to ensure that the sediment from the borrow area(s) is similar in color and grain size distribution to the

sediment in the existing coastal system at the beach placement site. Therefore, fill material compliance specifications for the sediment from the borrow area(s) proposed for this project are provided in Table 1.

The compliance specifications take into account the variability of sediment on the native or existing beach, and are values which may reasonably be attained given what is known about the borrow area sediment. Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation.

Table 1- Sediment Compliance Specifications

Sediment Parameter	Parameter Definition	Compliance Value
Mean Grain Size	calculated by moment method	0.33 mm – 0.55 mm
Max. Silt Content	passing #230 sieve	2%
Max. Shell Content*	retained on #4 sieve	2%
Munsell Color Value	moist Hue	10YR, 2.5Y, or 5Y
	moist Value	≥ 6
	moist Chroma	≤ 2
The beach fill material shall not contain construction debris, toxic material, other foreign matter, or coarse gravel or rocks.		

*Determined using the sieve numbers listed in Section D.7.b

C. QUALITY CONTROL PLAN

The contract documents shall incorporate the following technical requirements, or equivalent language that addresses the location of dredging, sediment quality monitoring on the beach, and, if necessary, remedial actions. The Permittee will seek to enforce these contract requirements during the execution of work.

1. **Electronic Positioning and Dredge Depth Monitoring Equipment**. The Contractor will continuously operate electronic positioning equipment, approved by the Project Engineer, to monitor the precise positioning of the excavation device location(s) and depth(s). A Differential Global Positioning System (DGPS) or equivalent system providing equal or better accuracy will be used to determine the horizontal position and will be interfaced with an appropriate depth measuring device to determine the vertical position of the bottom of the excavation device. The horizontal positioning equipment will maintain an accuracy of +/- 3.0 feet. The vertical positioning equipment will maintain a vertical accuracy of +/-0.5 feet with continuous applicable tidal corrections measured at the project site.

2. **Dredge Location Control**. The Contractor is required to have, in continuous operation on the dredge, electronic positioning equipment that will accurately compute and plot the position of the dredge. Such fixes, and the accompanying plots, will be furnished to the Permittee's on-site representative daily as part of the QC Reports. The electronic positioning equipment will be installed on the dredge so as to monitor, as closely as possible, the actual location of the excavation device(s). The location of the master antenna on the dredge and the distance and direction from the master antenna to the bottom of the excavation device will be reported on the Daily Reports. A printout of the excavation device positions in State Plane Coordinates, the excavation device depths corrected for tide elevation and referenced to the North American Vertical Datum of 1988 (NAVD 88), and the time, will be maintained using an interval of two (2) minutes for each printed fix. A printed and computer file (in ASCII format) copy of the position data will be provided to the Project Engineer as part of the daily report. The Contractor will prepare a plot of the data that includes the State Plane Coordinate grid system and the borrow area limits. The format of the plot may be subject to approval by the Permittee's Engineer. No dredging will take place outside of the borrow area limits (horizontal and vertical limits) as shown on the drawings.

3. **Dredging Observation.** The Contractor will be responsible for establishing such control as may be necessary to ensure that the allowable excavation depths and spatial limits are not exceeded. If the Contractor encounters noncompliant sediment during dredging, the Contractor will immediately cease dredging, relocate the dredge into compliant sediment, and will verbally notify the Permittee's On-site Representative, providing the time, location, and description of the noncompliant sediment. The Contractor will also report any encounters with noncompliant sediment

in the Contractor's Daily Report, providing depth and location in State Plane Coordinates of said materials within the borrow area. The Contractor, in cooperation with the Permittee's Engineer, will use the dredge positioning records, plans, and vibracore descriptions to determine where the Contractor may dredge to avoid additional placement of noncompliant sediment. The Contractor will adjust his or her construction operation to avoid the noncompliant sediment to the greatest extent practicable.

4. **Beach Observation**. The Contractor will continuously visually monitor the sediment being placed on the beach to assess grain size, silt content, gravel content, and Munsell color. If noncompliant sediment is placed on the beach, the Contractor will immediately cease dredging, relocate the dredge into compliant sediment, and verbally notify the Permittee's On-site Representative, providing the time, location, and description of the noncompliant sediment. The Contractor will also report any encounters with noncompliant sediment in the Contractor's Daily Report, providing depth and location in State Plane Coordinates of said materials within the borrow area. The Contractor will take the appropriate remediation actions as directed by the Permittee or Permittee's Project Engineer.

5. **Excavation Requirements**. The Contractor will excavate within the approved boundaries and maximum depths of the borrow area(s) in a uniform and continuous manner. If directed by the Permittee's Project Engineer, the Contractor will change the location and/or depth of excavation within the borrow area limits.

6. **Vibracore Logs and Grain Size Data.** The Contractor will be provided with all descriptions of sediment vibracore borings collected within the borrow area(s), and will acknowledge that he is aware of the quality of the sediment as described in the sediment vibracore logs. These logs and grain size data will be presented in the construction specifications.

D. QUALITY ASSURANCE PLAN

The Permittee will seek to enforce the construction contract and Department permits related to sediment quality. In order to do so, the following steps shall be followed:

1. **Construction Observation and Sampling for Visual Assessment.** Construction observation by the Permittee's On-Site Representative will be performed 7 days a week, at least 8 hours a day during periods of active construction. Most observations will be conducted during daylight hours; however, random nighttime observations shall be conducted.

2. **On-Site Representative.** The Permittee will provide on-site observation by individuals with training or experience in beach nourishment and construction inspection and testing, and who are knowledgeable of the project design and permit conditions. The Project Engineer, a qualified coastal engineer, will actively coordinate with the Permittee's On-Site Representative, who may be an employee or sub-contractor of the Permittee or the Project Engineer. Communications will take place between the Project Engineer and the Permittee's On-Site Representative on a daily basis during periods of active construction.

3. **Pre-Construction Meeting.** The project QC/QA Plan will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the above described QC/QA Plan, in writing, prior to commencement of construction.

4. **Contractor's Daily Reports.** The Project Engineer or Permittee's On-Site Representative will review the Contractor's Daily Reports which characterize the nature of the sediments encountered at the borrow area and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, shell, silt, or debris that exceeds acceptable limits. The Project Engineer will review the dredge positions in the Contractor's Daily Report.

5. **On Call.** The Project Engineer will be continuously on call during the period of construction for the purpose of making decisions regarding issues that involve QC/QA Plan compliance.

6. **Addendums.** Any addendum or change order to the Contract between the Permittee and the Contractor will be evaluated to determine whether or not the change in scope will potentially affect the QC/QA Plan.

7. **During Construction Sampling for Visual Inspection.** To assure that the fill material placed on the beach is in compliance with the permit, the Project Engineer or Permittee's On-Site Representative will conduct assessments of the beach fill material as follows:

a. During excavation and fill placement activities, the Permittee's On-Site Representative will collect a sediment sample at not less than 200-foot intervals of newly constructed berm to visually assess grain size, Munsell color, shell content, and silt content. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). This assessment will consist of handling the fill material to ensure that it is predominantly sand to note the physical characteristics and assure the material meets the sediment compliance parameter specified in this Plan. If deemed necessary, quantitative assessments of the sand will be conducted for grain size, silt content, shell content and Munsell color using the methods outlined in section D.8.b. Each sample will be archived with the date, time, and location of the sample. The results of these daily inspections, regardless of the quality of the sediment, will be appended to or notated on the Contractor's Daily Report. All samples will be stored by the Permittee for at least 60 days after project completion.

b. If the Permittee or Project Engineer determines that the beach fill material does not comply with the sediment compliance specifications in this QC/QA Plan, the Permittee or Project Engineer will immediately instruct the Contractor to cease material excavation operations and take whatever actions necessary to avoid further discharge of noncompliant sediment The Contractor, in cooperation with the Project Engineer, will use the dredge positioning records, plans, and vibracore descriptions to determine where the Contractor may dredge to avoid additional placement of noncompliant sediment. The Contractor will adjust his or her construction operation to avoid the noncompliant sediment to the greatest extent practicable. The sediment inspection results will be reported to the Department.

8. **Post-Construction Sampling for Laboratory Testing.** To assure that the fill material placed on the beach was adequately assessed by the borrow area investigation and design, the Project Engineer will conduct assessments of the sediment as follows:

a. Post-construction sampling of each acceptance section and testing of the fill material will be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics provided during from the geotechnical investigation and borrow area design process. Upon completion of an acceptance section of constructed beach, the Project Engineer will collect two (2) duplicate sand samples at each Department reference monument profile line to quantitatively assess the grain size distribution, moist Munsell color, shell content, and silt content for compliance. The Project Engineer will collect the sediment samples of a minimum of 1 U.S. pint (at least 200 grams) each from the bottom of a test hole a minimum of 18 inches deep within the limits of the constructed berm. The Project Engineer will visually assess grain size, Munsell color, shell content, and silt content of the material by handling the fill material to ensure that it is predominantly sand, and further to note the physical characteristics. The Project Engineer will note the existence of any layering or rocks within the test hole. One sample will be sent for laboratory analysis while the other sample will be archived by the Permittee. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument Profile Line designation, State Plane (X,Y) Coordinate location, date sample was obtained, and "Construction Berm Sample."

b. All samples will be evaluated for visual attributes (Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils), ASTM D1140 (Standard Test Method for Amount of Material in Soils Finer than No. 200 Sieve), and ASTM D2487 (Classification of Soils for Engineering Purposes), and analyzed for carbonate content. The samples will be sieved using the following U.S. Standard Sieve Numbers: 3/4", 5/8", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

c. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings will include: Sample Number; Mean Grain Size (mm); Sorting Value: Silt Content (%); Shell Content (%); Munsell Color Value; and a column stating whether each sample MET or FAILED the compliance values found in Table 1 The sediment testing results will be certified by a P.E or P.G. registered in the State of Florida. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the sand search investigation and

borrow area design shall be included in the sediment testing results report. The Permittee will submit sediment testing results and analysis report to the Department within 90 days following beach construction.

d. In the event that a section of beach contains fill material that is not in compliance with the sediment compliance specifications, then the Department will be notified. Notification will indicate the volume, aerial extent and location of any unacceptable beach areas, and remediation planned.

E. REMEDIATION

1. **Compliance Area.** If a sample does not meet the compliance value for construction debris, toxic material, other foreign material, coarse gravel, or rock, the Permittee shall determine the aerial extent and remediate regardless of the extent of the noncompliant material. If a sample is noncompliant for the silt content, shell content, or Munsell color and the aerial extent exceeds 10,000 square feet, the Permittee shall remediate.

2. **Notification.** If an area of newly constructed beach does not meet the Sediment Compliance Specifications, then the Department (JCPCompliance@dep.state.fl.us) will be notified. Notification will indicate the aerial extent and location of any areas of noncompliant beach fill material and remediation planned. As outlined in section E.4 below, the Permittee will immediately undertake remediation actions without additional approvals from the Department. The results of any remediation will be reported to the Department following completion of the remediation activities and shall indicate the volume of noncompliant fill material removed and replaced.

3. **Sampling to determine extent.** In order to determine if an area greater than 10,000 square feet of beach fill is noncompliant, the following procedure will be performed by the Project Engineer:

a. Upon determination that the first sediment sample is noncompliant, at minimum, five (5) additional sediment samples will be collected at a 25-foot spacing in all directions and assessed. If the additional samples are also noncompliant, then additional samples will be collected at a 25-foot spacing in all directions until the aerial extent is identified.
b. The samples will be visually compared to the acceptable sand criteria. If deemed necessary by the Project Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, shell content, and Munsell color using the methods outlined in section D.8.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of noncompliant fill.
d. The total square footage will be determined.
e. The site map and analysis will be included in the Contractor's Daily Report.

4. **Actions.** The Permittee or Project Engineer shall have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the Contractor will be directed by the Permittee or Project Engineer on the necessary corrective actions. Should a situation arise during construction that cannot be corrected by the remediation methods described within this QC/QA Plan, the Department will be notified. The remediation actions for each sediment parameter are as follows:

a. Silt: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.
b. Shell: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
c. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
d. Coarse gravel: screening and removing the noncompliant fill material and replacing it with compliant fill material.
e. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material and replacing it with compliant fill material.

All noncompliant fill material removed from the beach will be transported to an appropriate upland disposal facility located landward of the Coastal Construction Control Line.

5. **Post-Remediation Testing.** Re-sampling shall be conducted following any remediation actions in accordance with the following protocols:

a. Within the boundaries of the remediation actions, samples will be taken at maximum of 25-foot spacing.
b. b. The samples will be visually compared to the acceptable sand criteria. If deemed necessary by the Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.8.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of remediation actions.

6. **Reporting.** A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced will be submitted to the Department within 7 days following completion of remediation activities.

All reports or notices relating to this permit shall be emailed and sent to the Department at:

FDEP Office of Resiliency and Coastal protection
JCP Compliance Officer
Mail Station 3544
2600 Blair Stone Road
Tallahassee, Florida 32399
phone: (850) 414-7716
e-mail: JCPCompliance@dep.state.fl.us

End of Plan

APPENDIX E

UPLAND QA/QC PLAN

DRAFT SEDIMENT QUALITY CONTROL/QUALITY ASSURANCE PLAN
FOR BEACH OR DUNE RESTORATION USING AN UPLAND SAND SOURCE

0285993-009-JC

Indian River County

Sector 3 Beach and Dune Restoration Project

May 26th, 2020

A. INTRODUCTION

Pursuant to Fla. Admin. Code r. 62B-41.008 (1) (k) 4.b., permit applications for inlet excavation, beach restoration, or nourishment shall include a quality control/assurance plan that will ensure that the sediment from the borrow areas to be used in the project will meet the standard in Fla. Admin. Code r. 62B-41.007(2)(j). To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system.

The Department has received the results of geotechnical investigations that provide adequate data concerning the character of the sediment and the quantities available within the spatial limits of the upland sand source(s). The Department has received an analysis of the existing or native sediment and the sediment within the permitted upland sand source(s), including the methods of mining and post-mining processing, that demonstrates its compatibility with the naturally occurring beach sediment in accordance with Fla. Admin. Code r. 62B-41.007(2)(j). The sediment analysis and volume calculations were performed using established industry standards, and are certified by a Professional Engineer or a Professional Geologist registered in the State of Florida.

Based upon this information, the Department of Environmental Protection (Department) has determined that use of the sediment from the upland sand source(s) will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. Furthermore, this information provides sufficient quality control/quality assurance (QC/QA) that the mean grain size and carbonate content of the sediment from the upland sand source(s) will meet the requirements of Fla. Admin. Code r. 62B-41.007(2)(j); hence, additional QC/QA procedures beyond those described in this permit are not required for these sediment parameters during construction.

This plan outlines the responsibilities of each stakeholder in the project as they relate to the placement of beach compatible material on the beach. These responsibilities are in response to the possibility that non-beach compatible sediments may exist within the upland sand source(s) and could be unintentionally placed on the beach. The QC Plan specifies the minimum construction management, inspection, and reporting requirements placed on the Contractor and enforced by the Permittee, to ensure that the sediment from the upland sand source(s) to be used in the project meet the compliance specifications. The QA Plan specifies the minimum construction oversight, inspection, and reporting requirements to be undertaken by the Permittee or the Permittee's On-Site Representative to observe, sample, and test the placed sediments to verify the sediments are in compliance.

B. SEDIMENT QUALITY SPECIFICATIONS

The sediment from the upland sand source(s) is similar in Munsell color and grain size distribution to the material in the existing coastal system at the beach placement site. The Department and the Permittee acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted upland sand source(s) that do not comply with the limiting parameters of Fla. Admin. Code r. 62B-41.007(2)(j) 1. – 5 or vary in Munsell color from the composite value. Furthermore, the Department may consider more restrictive values for the sediment parameters to ensure that the sediment from the upland sand source(s) is similar in color and grain size distribution to the sediment in the existing coastal system at the beach placement site. Therefore, fill material compliance specifications for the sediment from the upland sand source(s) proposed for this project are provided in Table 1.

The compliance specifications take into account the variability of sediment on the native or existing beach, and are values which may reasonably be attained given what is known about the upland sand source(s). Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation, as described in Section E.

Table 1- Sediment Compliance Specifications

Sediment Parameter	Parameter Definition	Compliance Value
Median Grain Size	50% larger/smaller by weight*	0.30 to 0.55
Mean Grain Size	calculated by moment method*	0.33 to 0.55
Max. Silt Content	passing #230 sieve	2%
Max. Gravel Content*	retained on #4 sieve	2%
Munsell Color	moist Hue	10YR, 2.5Y, or 5Y
	moist Value	≥ 7
	moist Chroma	≤ 2
The beach fill material shall not contain construction debris, toxic material, other foreign matter, or coarse gravel or rocks.		

*Determined using sieves listed in Section D.7.b.

C. QUALITY CONTROL PLAN

The contract documents shall incorporate the following technical requirements, or equivalent language that addresses the sediment quality monitoring on the beach, and, if necessary, remedial actions. The Permittee will seek to enforce these contract requirements during the execution of work. For each construction event, the Contractor shall submit a Quality Control Plan for review and acceptance by the Permittee. This Plan shall comply with the quality control measures set forth in this permit, and also address sediment quality assurance by including: (1) the specific sampling frequency and testing methodology to be provided by the Contractor, (2) the name, address and point of contact for the Licensed Testing Laboratory to be used for the required collection of samples and laboratory testing, and (3) how the Contractor intends to assess compliance with the Sediment Compliance Specifications as shown in Table 1.

The characteristics of the in-situ materials in the upland sand source(s) are indicated by geotechnical data. , including the boring logs and grain size distribution curves. The characteristics of the processed material are also included with the geotechnical data. However, the Contractor should be aware that it is possible for material of differing characteristics to be present and that the mining process may correspondingly require revisions during construction to produce beach compatible sand consistent with the Sediment Compliance Specifications in Table 1.

1. **Assessment at Upland Sand Source.** The material shall be observed by the Contractor while the material is being loaded into the trucks for transport to the Construction Access/Staging Area. Both the Contractor and the Permittee will have benchmark samples labeled with the permit number, "Benchmark Sample", date collected, site name, and information on where the sample was attained. The benchmark sample shall be material that has been deemed beach compatible in accordance with the Sediment Compliance Specifications in Table 1 and shall serve as the minimum requirement for the material being placed on the beach. If any material appears to be non-compliant, it shall be set aside for testing and/or further processing and not transported to the beach.

a. **For conventional hydraulic excavation and stockpiling.** The Contractor will collect a sediment sample at not less than 4 sample for each 3,000 cubic yards of stockpiled material no less than 6 inches below the surface to visually assess grain size, Munsell color, gravel content, and silt content against the benchmark sample. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). Each sample will be archived with the date, time, and location of the sample. This assessment will consist of handling the fill material to ensure that it is predominantly sand and to evaluate if the physical characteristics of the material meets the Sediment Compliance Specifications in Table 1. If deemed that the material may not be in compliance, the sample shall be tested at a Licensed Testing Laboratory using the criteria outlined in Section D.7.b. Sediment testing results shall be provided to the Permittee and Project Engineer prior to any portion of the 3,000 cubic yards of material

represented by that sample being transported to the Construction Access/Staging Area. Sediment testing results shall reference a specific stockpile name and GPS location within the mine. The results of daily inspections, regardless of the quality of the sediment, will be appended to or notated on the Contractor's Daily Report. All samples will be stored by the Permittee for at least 120 days after project completion.

b. **For material requiring special handling and material processing.** If special handling and material processing are necessary to produce beach compatible material consistent with the Sediment Compliance Specifications in Table 1, then sampling and laboratory testing of the processed sand shall be conducted at the upland mine(s) from the stockpiled material before the material is transported to the Construction Access/Staging Areas. The Contractor will collect not less than 4 representative samples from approximately every 3,000 cubic yards of material in the stockpile no less than 6 inches below the surface from the middle of the stockpile. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). Each sample will be archived with the stockpile name, date, time, and GPS location of the sample. The samples shall be tested at a Licensed Testing Laboratory using the criteria outlined in Section D.7.b. Sediment testing results shall be provided to the Permittee and Project Engineer prior to any portion of the 3,000 cubic yards of material represented by that sample being transported to the Construction Access/Staging Area. The laboratory testing results will be appended to or notated on the Contractor's Daily Report. All samples will be stored for at least 120 days after project completion and shall be made available to the Permittee upon request.

If a sample does not meet the Sediment Compliance Specifications in Table 1, then the 3,000 cubic yards of material represented by that sample shall not be transported to the Construction Access/Staging Area. The material may undergo further processing to meet the Sediment Compliance Specifications with additional laboratory testing to verify the additional processing produces material that meets the Sediment Compliance Specifications, or the material shall be set aside and not used.

2. **Beach Observation**. The Contractor will continuously visually monitor the sediment being placed on the beach to assess grain size, silt content, gravel content, and Munsell color. An assessment will be made during placement at a minimum of once every hour. This assessment will consist of handling the fill material to ensure that it is predominantly sand and to note the physical characteristics, and assure the material meets the Sediment Compliance Specifications in Table 1. If deemed necessary, quantitative assessment of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.7.b. If noncompliant sediment is placed on the beach, the Contractor will immediately cease placement until any stockpiled material at the beach construction staging area can be verified as beach compatible. The Contractor will notify the Permittee, providing the time, location, and description of the noncompliant sediment. The Contractor will take the appropriate actions to remediate the noncompliant material to achieve and document compliance with the Sediment Compliance Specifications. The Contractor, in cooperation with the Permittee or Project Engineer, will utilize the sampling records at the upland source(s) to determine where the material originated from to avoid additional placement of noncompliant sediment.

D. QUALITY ASSURANCE PLAN

The Permittee will seek to enforce the construction contract and Department permits related to sediment quality. In order to do so, the following steps shall be followed:

1. **Construction Observation and Sampling for Visual Assessment.** Construction observation by the Permittee's On-Site Representative will be performed on a daily basis during periods of active construction. The Permittee's On-Site Representative will collect a sediment sample to visually assess grain size, Munsell color, gravel content, and silt content. The observation will include handling the fill material to ensure that it is predominantly sand and to evaluate if the physical characteristics of the material meet the Sediment Compliance Specifications in Table 1. If the Permittee or Project Engineer determines that the beach fill material does not comply with the Sediment Compliance Specifications, the Permittee or Project Engineer will immediately instruct the Contractor to cease placement and take the necessary actions to avoid further placement of noncompliant sediment. If deemed necessary, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in section D.7.b. If noncompliant sediment is placed on the beach, the Permittee or Project Engineer will document the time, location, and description of the noncompliant sediment. The noncompliant sediment will be subject to remediation, as described in Section E. The Permittee or Project Engineer, in cooperation with the

Contractor, will utilize the sampling records at the upland source(s) to determine where the material originated from to avoid additional placement of noncompliant sediment.

2. **On-Site Representative.** The Permittee will provide on-site observation by individuals with training or experience in beach nourishment and construction inspection and testing, and who are knowledgeable of the project design and permit conditions. The Project Engineer will actively coordinate with the Permittee's On-Site Representative, who may be an employee or sub-contractor of the Permittee or the Project Engineer. Communications will take place between the Project Engineer and the Permittee's On-Site Representative on a daily basis during periods of active construction.

3. **Pre-Construction Meeting.** The project QC/QA Plan will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the above described QC/QA Plan, in writing, prior to commencement of construction.

4. **Contractor's Daily Reports.** The Permittee's On-Site Representative or Project Engineer will review the Contractor's Daily Reports which will characterize the nature of the sediments encountered at the upland sand source and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, gravel, silt, or debris.

5. **On Call.** The Project Engineer will be continuously on call during the period of construction for the purpose of making decisions regarding issues that involve QC/QA Plan compliance.

6. **Addendums.** Any addendum or change order to the Contract between the Permittee and the Contractor will be evaluated to determine whether or not the change in scope will potentially affect the QC/QA Plan.

7. **Post-Construction Sampling for Laboratory Testing.** To assure that the fill material placed on the beach was adequately assessed by the borrow area investigation and design, the Project Engineer or Permittee's On-Site Representative will conduct assessments of the sediment as follows:

a. Post-construction sampling and testing of the fill material will be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics provided during the geotechnical investigation and borrow area design process. Upon completion of sections of constructed beach, the project Engineer will collect two (2) duplicate sand samples will be collected at each FDEP Reference Monument to quantitatively assess the grain size distribution, moist Munsell color, gravel content, and silt content for compliance. The collected sediment samples shall be a minimum of 1 U.S. pint (at least 200 grams) each and obtained from the bottom of a test hole a minimum of 12 inches deep within the limits of the constructed berm. If the constructed section was filled only at the dune, then the sediment sample will be obtained from the dune. The Engineer will visually assess grain size, Munsell color, gravel content, and silt content of the material. The observation will include handling the fill material to ensure that it is predominantly sand, and to further note the physical characteristics. The Engineer will note the existence of any layering or rocks within the test hole. One sample will be sent for testing at a Licensed Testing Laboratory while the other sample will be archived by the Permittee for 120 days after project completion. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument, date sample was obtained, and "Construction Fill Sample."

b. Samples collected for laboratory testing will be evaluated for visual attributes (Moist Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils), ASTM D1140 (Standard Test Method for Amount of Material in Soils Finer than No. 200 Sieve), and ASTM D2487 (Classification of Soils for Engineering Purposes), and analyzed for carbonate content. The samples will be sieved using the following U.S. Standard Sieve Numbers: 3/4", 5/8", 7/16", 5/16", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, 200, and 230.

c. Laboratory testing results will include a cumulative grain size distribution table and curve for each sample tested. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings will include: Sample Number; Mean Grain Size (mm, calculated by moment method); Median Grain Size (mm); Sorting Value (phi); Silt Content (% passing #230 sieve); Gravel Content (% retained above #4 sieve); Carbonate Content (%); Munsell

Color Value; and a column stating whether each sample MET or FAILED the compliance values found in Table 1. The sediment testing results will be certified by a P.E or P.G. registered in the State of Florida. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the sand search investigation shall be included in the sediment testing results report. The Permittee will submit post-construction sediment testing results and analysis report to the Department within 90 days following beach construction.

d. In the event that a section of beach contains fill material that is not in compliance with the Sediment Compliance Specifications, then the Department will be notified. Notification will indicate the volume, aerial extent and location of any unacceptable beach areas, and remediation planned.

E. REMEDIATION

1. **Compliance Area.** If a sample does not meet the compliance requirement to not contain coarse gravel or rocks, construction debris, toxic material, or other foreign matter, the Permittee shall determine the aerial extent of the noncompliant beach fill material and remediate regardless of the extent of the noncompliant material. If a sample is noncompliant for the grain size, silt content, gravel content, or Munsell color, and the aerial extent exceeds 10,000 square feet of beach berm or 100 linear feet of dune for dune-only projects, the Permittee shall remediate.

2. **Notification.** If an area of newly constructed beach or dune does not meet the Sediment Compliance Specifications, then the Department (JCPCompliance@dep.state.fl.us) will be notified. Notification will indicate the aerial extent and location of any areas of noncompliant beach fill material and remediation planned. As outlined in Section E.4 below, the Permittee will immediately undertake remediation actions without additional approvals from the Department. The results of any remediation will be reported to the Department following completion of the remediation activities and shall indicate the volume of noncompliant fill material removed and replaced.

3. **Sampling to determine extent.** In order to determine if an area greater than 10,000 square feet of beach berm or 100 linear feet of dune for dune-only projects is noncompliant, the following procedure will be performed by the Permittee's On-site Representative or Project Engineer:

a. Upon determination that the first sediment sample is noncompliant, at minimum, five (5) additional sediment samples will be collected at a maximum 25-foot spacing in all directions and assessed. If the additional samples are also noncompliant, then additional samples will be collected at a 25-foot spacing in all directions until the aerial extent is identified.
b. The samples will be visually assessed to evaluate compliance with the Sediment Compliance Specifications. If deemed necessary by the Project Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.7.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of noncompliant fill.
d. The total square footage will be determined.
e. The site map and analysis will be included in the Contractor's Daily Report.

4. **Actions.** The Permittee or Project Engineer shall have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the Contractor will be directed by the Permittee or Project Engineer on the necessary corrective actions. Should a situation arise during construction that cannot be corrected by the remediation methods described within this QC/QA Plan, the Department will be notified. The remediation actions for each sediment parameter are as follows:

a. Mean grain size: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.
b. Silt content: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.

c. Gravel content: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
d. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm or dune sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
e. Coarse gravel or rocks: screening and removing the noncompliant fill material and replacing it with compliant fill material.
f. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material and replacing it with compliant fill material.

All noncompliant fill material removed from the beach will be transported to an appropriate upland disposal facility located landward of the Coastal Construction Control Line or returned to the upland mine.

5. **Post-Remediation Testing.** Re-sampling shall be conducted following any remediation actions in accordance with the following protocols:

a. Within the boundaries of the remediation actions, samples will be taken at maximum of 25-foot spacing.
b. The samples will be visually assessed to evaluate compliance with the Sediment Compliance Specifications. If deemed necessary by the Project Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, gravel content, and Munsell color using the methods outlined in Section D.7.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of remediation actions.

6. **Reporting.** A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced will be submitted to the Department within 7 days following completion of remediation activities.

All reports or notices relating to this permit shall be emailed or sent to the Department at:

FDEP Office of Resilience and Coastal Protection
JCP Compliance Officer
Mail Station 3544
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000
phone: (850) 245-7539
e-mail: JCPCompliance@dep.state.fl.us

End of Plan

APPENDIX F

GEOTECHNICAL REPORTS

Section 3a

Offshore Sand Sources

Sub-Area 2

Sample Summary Table

Sample Summary Table (Sub Area 2)[1]

Core #	Interval [ft]	Gravel [% wt ret]	Sand [% wt ret]	< #200 [% wt ret]	Mean [mm]	Phi [ϕ]	USCS
IR-S-09	0.5	2.27	97.64	0.09	0.53	0.97	SW
	4.0	1.67	97.34	0.99	0.49	1.00	SW
	8.0	2.20	97.17	0.63	0.40	1.00	SW
	13.0	0.00	96.59	3.41	0.23	0.72	SP
IR-S-12	0.5	0.45	99.25	0.30	0.42	0.64	SP
	4.0	0.00	99.33	0.67	0.43	0.58	SP
	8.0	1.15	96.97	1.88	0.54	1.08	SW
	12.0	0.24	99.18	0.58	0.37	0.84	SP
IR-S-14	0.5	0.77	98.12	1.11	0.40	0.94	SW
	4.0	1.85	95.79	2.36	0.44	0.95	SW
	8.0	3.11	93.96	2.93	0.40	1.26	SW
IR-S-15	0.5	2.30	96.14	1.56	0.45	0.92	SW
	4.0	4.22	94.61	1.17	0.68	1.10	SW
	8.0	1.74	95.42	2.84	0.55	1.05	SW
	14.0	5.40	90.67	3.93	0.47	1.52	SW
IR-S-16	0.5	1.42	97.63	0.95	0.36	0.97	SW
	4.0	0.00	97.39	2.61	0.31	0.68	SP
	8.0	2.63	93.48	3.89	0.36	1.29	SW
IR-S-17	0.5	2.27	97.28	0.45	0.43	0.99	SW
	4.0	0.00	96.54	3.46	0.45	0.78	SP
	8.0	3.09	95.39	1.52	0.63	1.13	SW
IR-S-18	0.5	0.00	99.35	0.65	0.36	0.86	SW
	4.0	0.20	99.04	0.76	0.44	0.76	SP
	8.0	0.93	96.80	2.27	0.38	1.10	SW
IR-S-19	0.5	2.40	97.11	0.49	0.46	1.11	SW
	4.0	0.00	99.59	0.41	0.47	0.61	SP
	8.0	11.36	86.22	2.42	0.80	1.65	SW
	13.0	23.66	69.86	6.48	1.52	1.73	SW-SM
IR-S-20	0.5	0.00	99.49	0.51	0.39	0.67	SP
	4.0	0.84	97.46	1.70	0.37	0.69	SP
	8.0	5.55	93.71	0.74	0.52	1.25	SW
IR-S-21	0.5	0.05	99.00	0.95	0.34	0.82	SP
	4.0	0.10	99.01	0.89	0.43	0.66	SP
	8.0	6.71	91.11	2.18	0.56	1.50	SW

[1] Data summarized from Granulametric Curves & Reports (Appendix A - Section 3c)

Section 3b

Offshore Sand Sources

Sub-Area 2

Boring Logs

Boring Designation IR-S-09

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County		9. SIZE AND TYPE OF BIT: 4.0 In.	
		10. COORDINATE SYSTEM/DATUM: Florida State Plane East	HORIZONTAL: NAD 1983 / VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-09	LOCATION COORDINATES: X = 727,558.3 Y = 1,180,264.6	11. MANUFACTURER'S DESIGNATION OF DRILL	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc		13. TOTAL NUMBER CORE BOXES: 2	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. ELEVATION GROUND WATER	
		15. DATE BORING	STARTED: 06-26-99 / COMPLETED: 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.		16. ELEVATION TOP OF BORING: -20.0 Ft.	
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.		17. TOTAL RECOVERY FOR BORING: 17.7 Ft.	
8. TOTAL DEPTH OF BORING: 18.7 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG	

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Depths and elevations based on measured values)	% REC.	BOX OR SAMPLE	REMARKS
-20.0	0.0					
			Tan medium to fine sand, shell fragments, whole shells to 1 inch, very pale brown (10YR-7/3), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0'
-32.3	12.3					
			Gray fine sand, gray (10YR-6/1), (SP).		4	Sample #4, Depth = 13.0'
-34.7	14.7					
			Brown fine sand and silt, (10YR-5.5/1), (SM).			
-37.2	17.2					
			Gray coarse shell, rock fragments, gray (10YR-6/1), (GW).		Comp	Sample #Comp, Depth = 18.0' Comp (0-13.0')
-38.7	18.7					
			End of Boring			

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FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

Boring Designation IR-S-12

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-12; LOCATION COORDINATES: X = 727,395.8 Y = 1,179,296.9	11. MANUFACTURER'S DESIGNATION OF DRILL: ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING: STARTED 06-26-99; COMPLETED 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -19.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 18.5 Ft.
8. TOTAL DEPTH OF BORING: 18.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-19.0	0.0					
			Tan medium sand, small shell fragments, whole shells to 1/2 inch, pale brown (10YR-6/3), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
-24.9	5.9					
			Tan to light gray medium to fine sand, shell fragments and whole shells to 1 inch, (10YR-6.5/2), (SP).		3	Sample #3, Depth = 8.0'
-31.0	12.0				4	Sample #4, Depth = 12.0' Sample wash weight adjusted
			Light gray medium to fine sand, shell fragments and whole shells to 1 inch, (10YR-6.5/1), (SP).			
-34.1	15.1				Comp	Sample #Comp, Depth = 15.0' Comp (0-15.0')
			Light gray fine sand, small shell fragments, light gray (10YR-7/1), (SP).			
-37.5	18.5					
			End of Boring			

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Boring Designation IR-S-14

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-14; LOCATION COORDINATES: X = 727,666.3 Y = 1,178,001.5	11. MANUFACTURER'S DESIGNATION OF DRILL: ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING: STARTED 06-27-99; COMPLETED 06-27-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -24.4 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 18.3 Ft.
8. TOTAL DEPTH OF BORING: 18.3 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Depths and elevations based on measured values)	% REC.	BOX OR SAMPLE	REMARKS
-24.4	0.0					
-30.0	5.6		Tan medium to fine sand, small shell fragments, whole shells to 10 mm, (10YR-6.5/2), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
-33.2	8.8		Gray to light brown medium to fine sand, (10YR-6.5/1), (SP).		3	Sample #3, Depth = 8.0'
-35.2	10.8		Gray to light brown fine sand, (10YR-6.5/1), (SP).			
-36.2	11.8		Light gray fine sand and silt, light gray (10YR-7/1), (SM).			
-37.7	13.3		Light gray fine sand, light gray (10YR-7/1), (SP).			
-41.3	16.9		Gray to light gray fine sand, (10YR-7.5/1), (SP).		Comp	Sample #Comp, Depth = 16.0' Comp (0-8.0')
-42.7	18.3		Gray to light gray medium to fine sand, shell fragments, light gray (10YR-7/1), (SP).			
			End of Boring			

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FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

Boring Designation IR-S-15

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-15; LOCATION COORDINATES: X = 727,129.4 Y = 1,178,509.4	11. MANUFACTURER'S DESIGNATION OF DRILL: ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING: STARTED 06-26-99; COMPLETED 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -18.4 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 18.7 Ft.
8. TOTAL DEPTH OF BORING: 18.7 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-18.4	0.0					
			Tan medium to fine sand, small shell fragments, whole shells to 2 cm, pale brown (10YR-6/3), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0'
-28.4	10.0					
			Tan to light brown medium to fine sand, small shell fragments, whole shells to 1 cm, (10YR-6.5/2), (SP).		4	Sample #4, Depth = 14.0'
-33.8	15.4					
-34.7	16.3		Light gray fine sand, small shell fragments, gray (10YR-6/1), (SP).			
-36.3	17.9		Light gray fine silty sand, (10YR-6.5/1), (SP).			
-37.1	18.7		Coarse to medium shell fragments, light gray (10YR-7/1), (SW).		Comp	Sample #Comp, Depth = 18.0' Comp (0-16.0')
			End of Boring			

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FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

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Boring Designation IR-S-16

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-16; LOCATION COORDINATES: X = 727,680.7 Y = 1,178,759.8	11. MANUFACTURER'S DESIGNATION OF DRILL; ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING; STARTED: 07-02-99; COMPLETED: 07-02-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -22.7 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 17.1 Ft.
8. TOTAL DEPTH OF BORING: 17.1 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-22.7	0.0					
-27.8	5.1		Tan medium to fine sand, small shell fragments, light gray (10YR-7/2), (SP).		1	Sample #1, Depth = 0.1' Sample wash weight adjusted
					2	Sample #2, Depth = 4.0'
-32.2	9.5		Light brown to gray medium to fine sand, small shell fragments, whole shells to 1 cm, (10YR-6.5/2), (SP).		3	Sample #3, Depth = 8.0'
-37.5	14.8		Light gray fine sand and silt, shell layer at 10.7-10.9 ft, (10YR-6.5/1), (SM).		Comp	Sample #Comp, Depth = 10.0' Comp (0-10.0')
-39.8	17.1		Gray to brown coarse shell, (10YR-5.5/1), (GW).			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

Boring Designation IR-S-17

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County		9. SIZE AND TYPE OF BIT: 4.0 In.	
		10. COORDINATE SYSTEM/DATUM: Florida State Plane East	HORIZONTAL: NAD 1983 / VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-17	LOCATION COORDINATES: X = 726,754.6 Y = 1,177,596.6	11. MANUFACTURER'S DESIGNATION OF DRILL	☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY	CONTRACTOR FILE NO.	12. TOTAL SAMPLES	DISTURBED / UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine		13. TOTAL NUMBER CORE BOXES: 2	
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED	DEG. FROM VERTICAL / BEARING	14. ELEVATION GROUND WATER	
		15. DATE BORING	STARTED: 06-26-99 / COMPLETED: 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.		16. ELEVATION TOP OF BORING: -19.5 Ft.	
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.		17. TOTAL RECOVERY FOR BORING: 19.3 Ft.	
8. TOTAL DEPTH OF BORING: 19.3 Ft.		18. SIGNATURE AND TITLE OF INSPECTOR: Garry Zarillo, PG	

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Depths and elevations based on measured values)	% REC.	BOX OR SAMPLE	REMARKS
-19.5	0.0					
			Tan medium-fine sand, shell frags, whole shells to 1 cm, (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0'
-29.8	10.3					
			Tan tolight grey medium-fine sand, small shell frags, whole shells to 1/2 inch, (SP).		Comp	Sample #Comp, Depth = 14.0' - 14.0' Composite sample
-34.9	15.4					
			Grey fine sand and silt, (SM).			
-37.9	18.4					
-38.8	19.3		Grey coarse shell, (GW).			
			End of Boring			

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FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

SAJ FORM 1836 **MODIFIED FOR THE FLORIDA DEP**
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Boring Designation IR-S-18

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-18; LOCATION COORDINATES: X = 727,435.2 Y = 1,176,997.6	11. MANUFACTURER'S DESIGNATION OF DRILL; ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING; STARTED: 07-02-99; COMPLETED: 07-02-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -23.0 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 16.5 Ft.
8. TOTAL DEPTH OF BORING: 16.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Garry Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-23.0	0.0					
			Tan medium to fine sand, small shell fragments, whole shells to 1 inch, (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0'
-32.8	9.8					
			Grey-light grey medium to fine sand, large shells to 1 inch, abundant large shell frags, (SP).			
-34.8	11.8					
			Grey fine sand and silt, (SP).			
-35.2	12.2					
			Grey coarse shell and sand matrix, (GW).		Comp	Sample #Comp, Depth = 13.0' - 13.0' Composite sample
-37.8	14.8					
			Grey fine sand and silt, thin layers of shell frags, (SP).			
-39.5	16.5					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

SAJ FORM 1836 MODIFIED FOR THE FLORIDA DEP
JUN 02 JUN 04

Boring Designation IR-S-19

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-19; LOCATION COORDINATES: X = 726,675.7 Y = 1,176,404.3	11. MANUFACTURER'S DESIGNATION OF DRILL: ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING: STARTED 06-26-99; COMPLETED 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -19.4 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 18.5 Ft.
8. TOTAL DEPTH OF BORING: 18.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Depths and elevations based on measured values)	% REC.	BOX OR SAMPLE	REMARKS
-19.4	0.0					
			Tan medium to fine sand, small shell fragments, scattered whole shells to 1 inch, (10YR-6.5/3), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0'
-33.0	13.6				4	Sample #4, Depth = 13.0'
			Light gray fine sand and silt, shell layer at 14.7-14.9 ft, light gray (10YR-7/1), (SM).			
-36.6	17.2					
-37.9	18.5		Gray coarse shell, fine sand matrix, (10YR-6.5/1), (GW).		Comp	Sample #Comp, Depth = 18.0' Comp (0-14.0')
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

SAJ FORM 1836 **MODIFIED FOR THE FLORIDA DEP**
JUN 02 JUN 04

Boring Designation IR-S-20

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-20; LOCATION COORDINATES: X = 726,501.4 Y = 1,178,192.9	11. MANUFACTURER'S DESIGNATION OF DRILL: ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING: STARTED 07-02-99; COMPLETED 07-02-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -22.8 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 17.5 Ft.
8. TOTAL DEPTH OF BORING: 17.5 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-22.8	0.0					
			Tan medium sand, shell fragments, scattered whole shells to 1 inch, (10YR-6.5/2), (SP).		1	Sample #1, Depth = 0.5' Sample wash weight adjusted
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0' Sample wash weight adjusted
-33.4	10.6					
-34.5	11.7		Light gray fine sand, shell fragments and silt, (10YR-6.5/1), (SM).			
-36.5	13.7		Light gray fine sand and silt, light gray (10YR-7/1), (SM).		Comp	Sample #Comp, Depth = 12.0' Comp (11.3')
-39.3	16.5		Brown coarse shell and fine sand to silt matrix, (10YR-6.5/1), (GW).			
-40.3	17.5		Light gray silty sand, (10YR-7.5/1), (SM).			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

Boring Designation IR-S-21

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-21; LOCATION COORDINATES: X = 727,167.8 Y = 1,175,775.8	11. MANUFACTURER'S DESIGNATION OF DRILL: ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING: STARTED 07-02-99; COMPLETED 07-02-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -22.2 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 16.8 Ft.
8. TOTAL DEPTH OF BORING: 16.8 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Garry Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS Depths and elevations based on measured values	% REC.	BOX OR SAMPLE	REMARKS
-22.2	0.0					
-29.6	7.4		Tan medium to fine sand, shell frags, whole shells to 1 inch, (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
-30.6	8.4		Tan-light grey coarse shell and medium to fine sand, (SP).		3	Sample #3, Depth = 8.0'
-31.7	9.5		Brown to tan medium sand, shell fragments, (SP).			
-35.3	13.1		Light grey medium to fine sand, whole shells to 1 inch, (SP).			
-37.4	15.2		Grey to brown coarse shell and fine sand matrix, (GW).			
-39.0	16.8		Light grey silty sand, (SM).			
			End of Boring			

0, 5, 10, 15, 20, 25

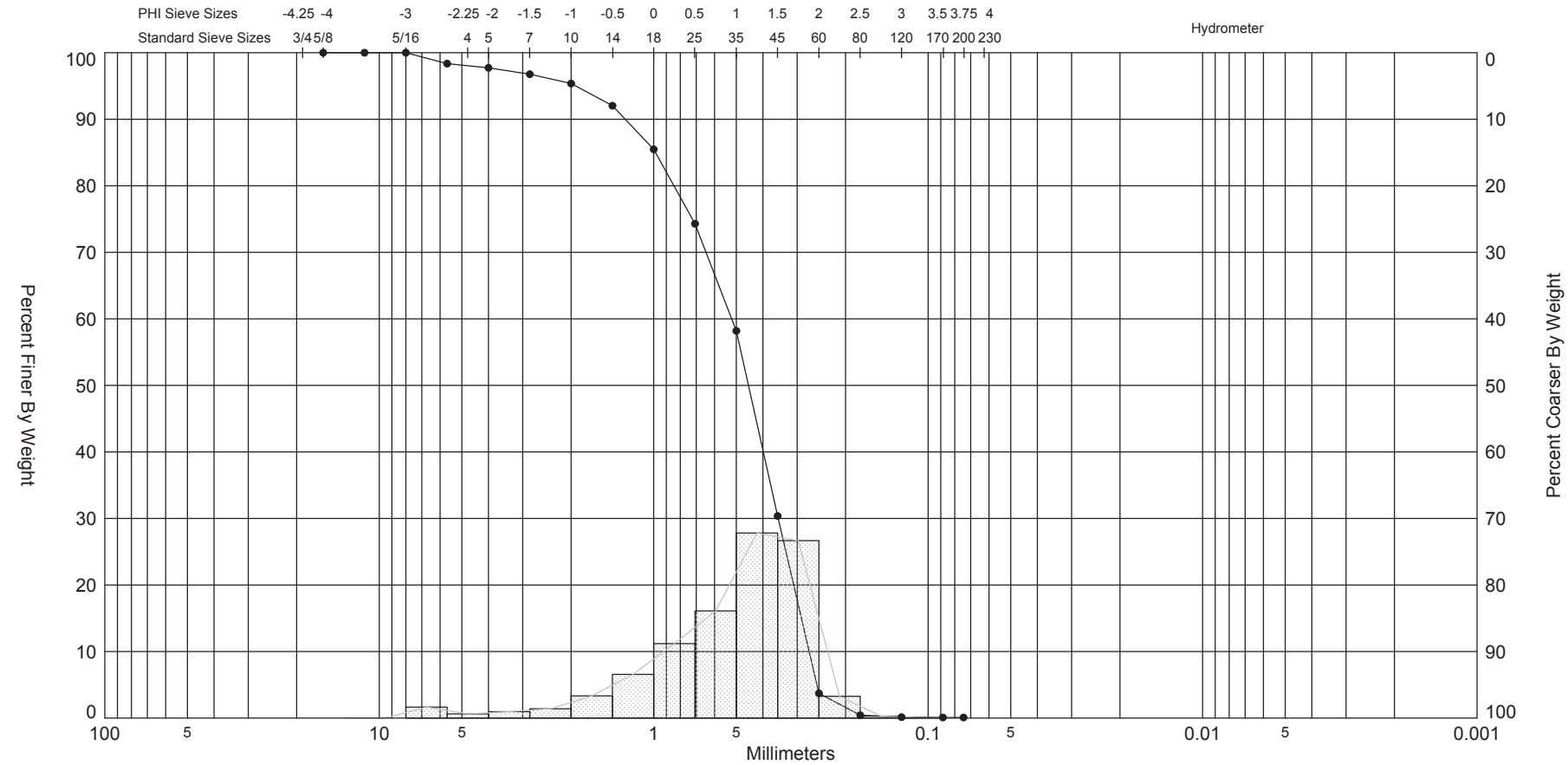
FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

Section 3c

Offshore Sand Sources

Sub-Area 2

Granulometric Curves & Reports



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-09 #1	—●—	-19.2	SW	#200 - 0.09			1.15	0.91	-1.48	5.71	0.97

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,558.3
Northing (Y, ft):	1,180,264.6
Horizontal System:	
Vertical System:	

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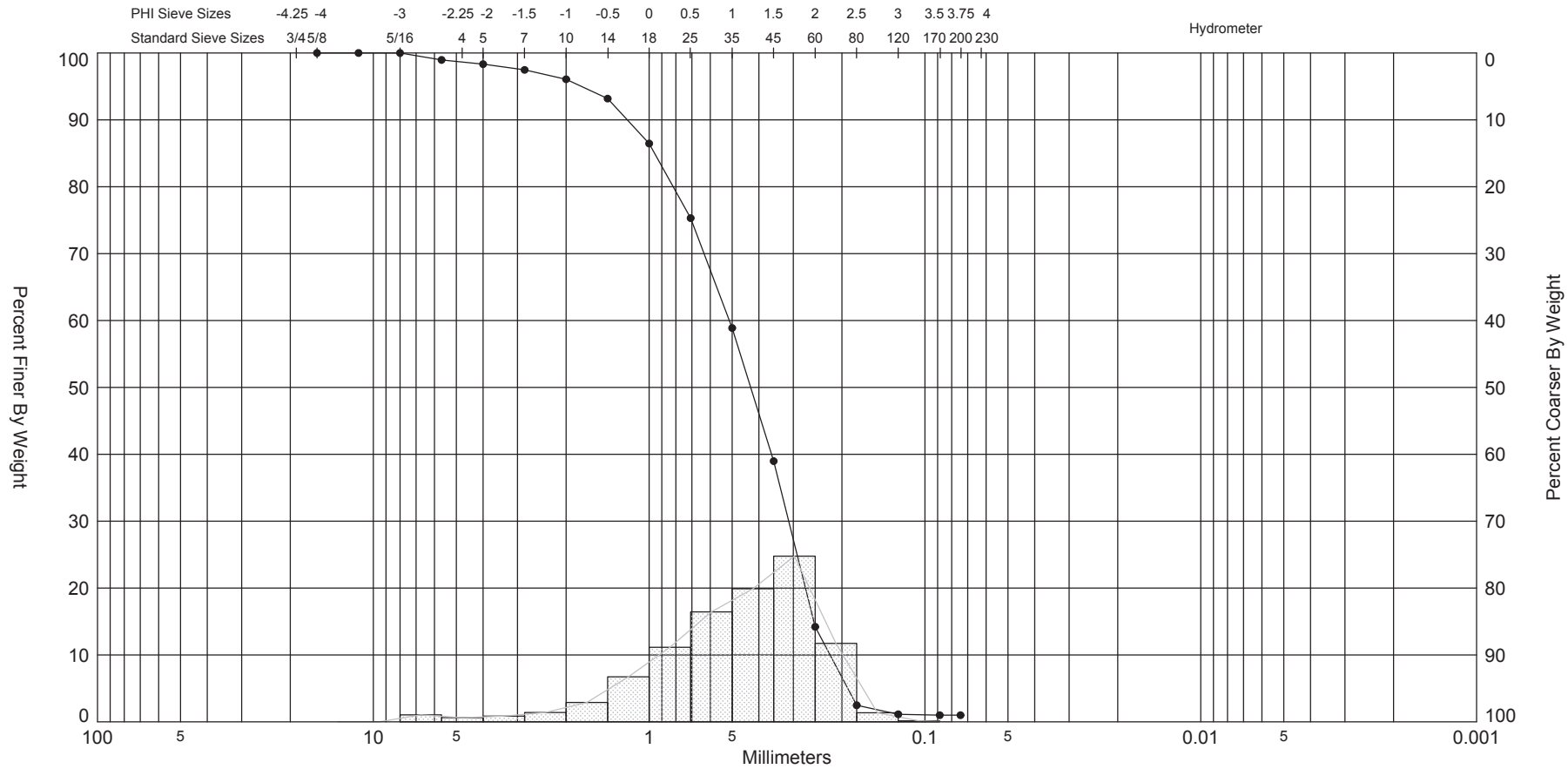

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-09 #2	—●—	-22.7	SW	#200 - 0.99			1.22	1.04	-1.12	4.74	1

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,558.3
Northing (Y, ft):	1,180,264.6
Horizontal System:	
Vertical System:	

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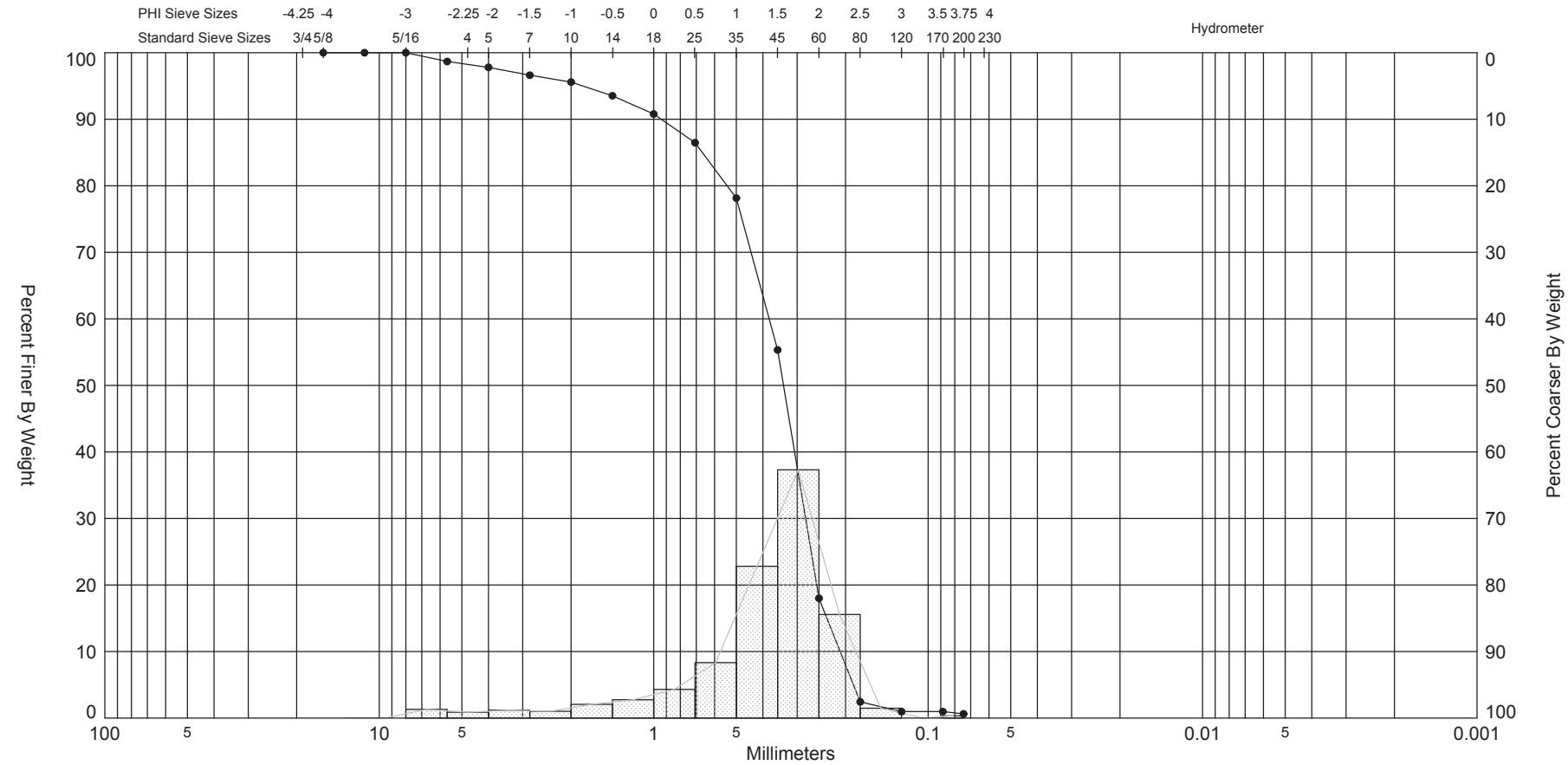

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-09 #3	—●—	-26.7	SW	#200 - 0.63			1.57	1.31	-1.91	7.41	1

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,558.3
Northing (Y, ft):	1,180,264.6
Horizontal System:	
Vertical System:	

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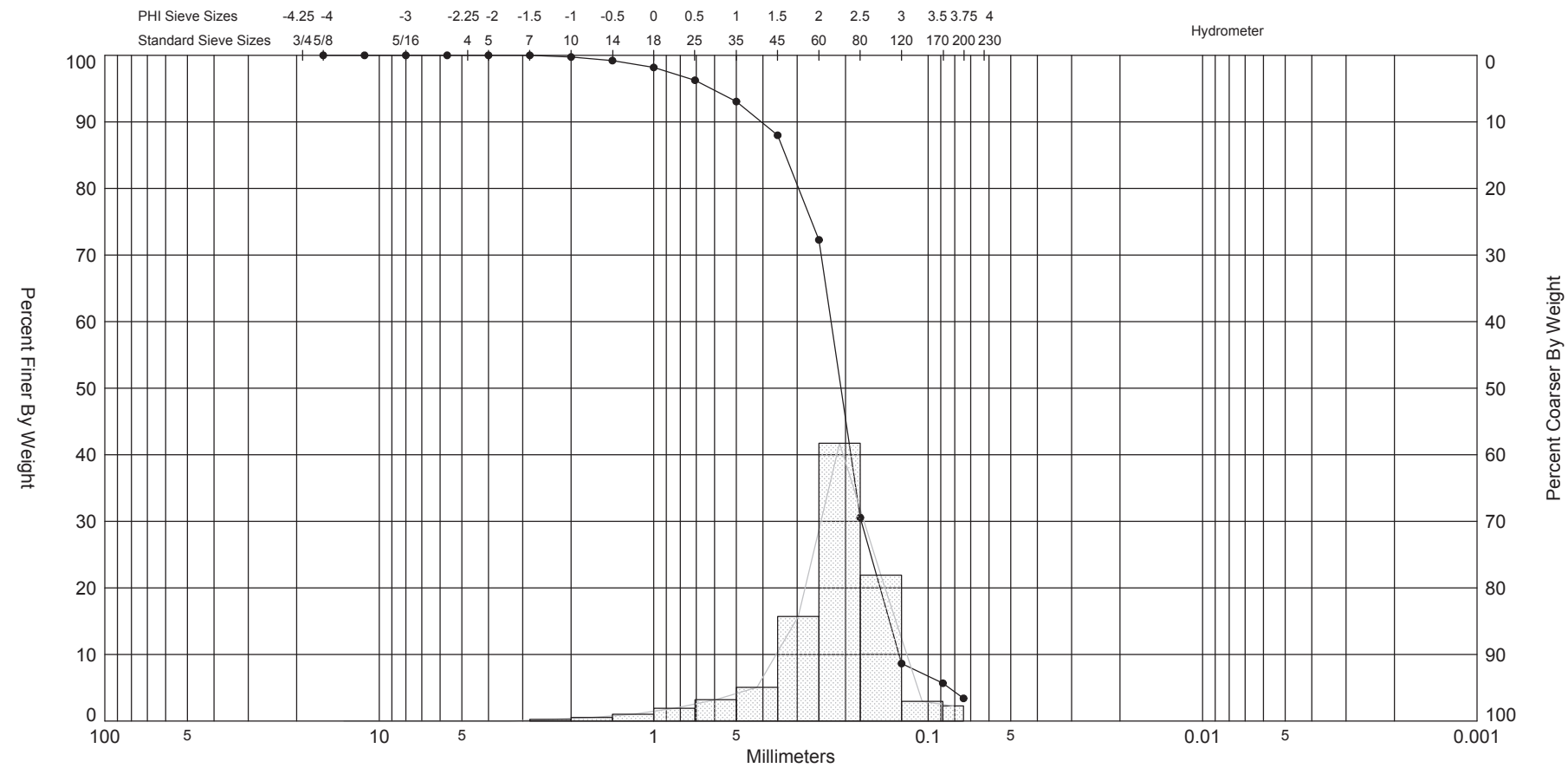

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-09 #4	—●—	-31.7	SP	#200 - 3.41			2.27	2.15	-1.33	6.36	0.72

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,558.3
Northing (Y, ft):	1,180,264.6
Horizontal System:	
Vertical System:	

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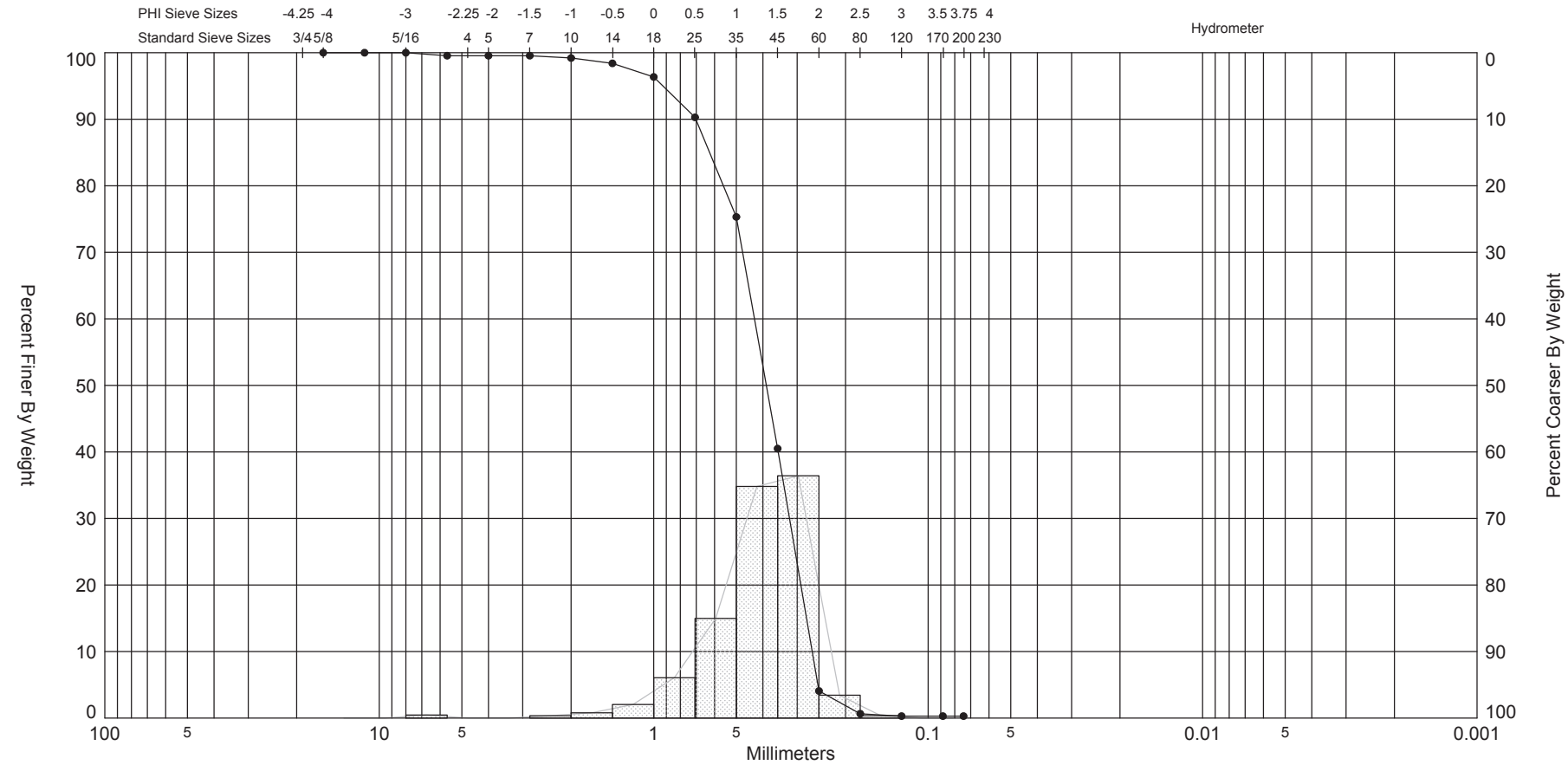

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-12 #1	—●—	-18.2	SP	#200 - 0.30			1.36	1.26	-1.87	10.36	0.64

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,395.8
Northing (Y, ft):	1,179,296.9
Horizontal System:	
Vertical System:	

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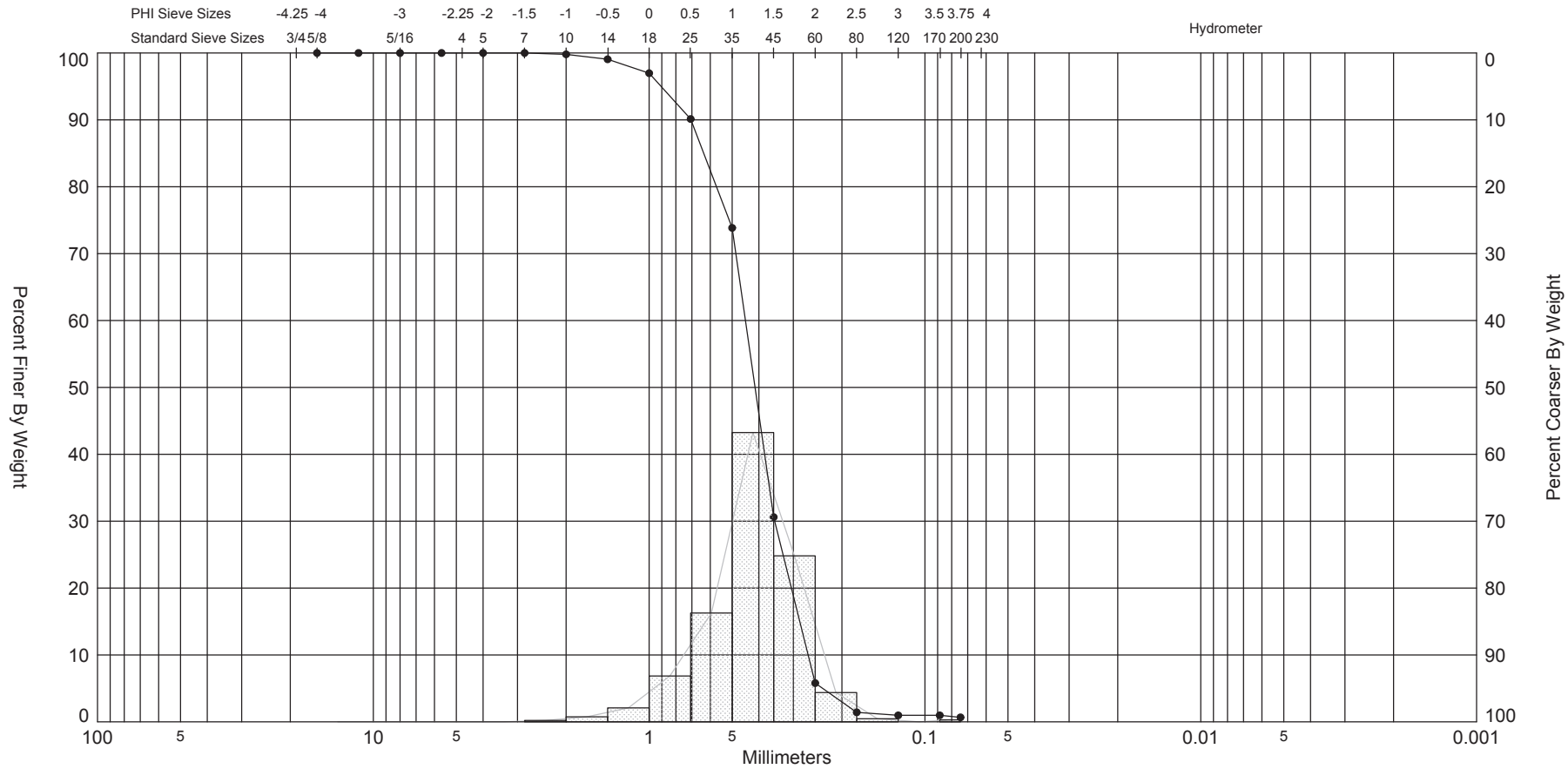

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-12 #2	—●—	-21.7	SP	#200 - 0.67			1.28	1.23	-0.53	4.99	0.58

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,395.8
Northing (Y, ft):	1,179,296.9
Horizontal System:	
Vertical System:	

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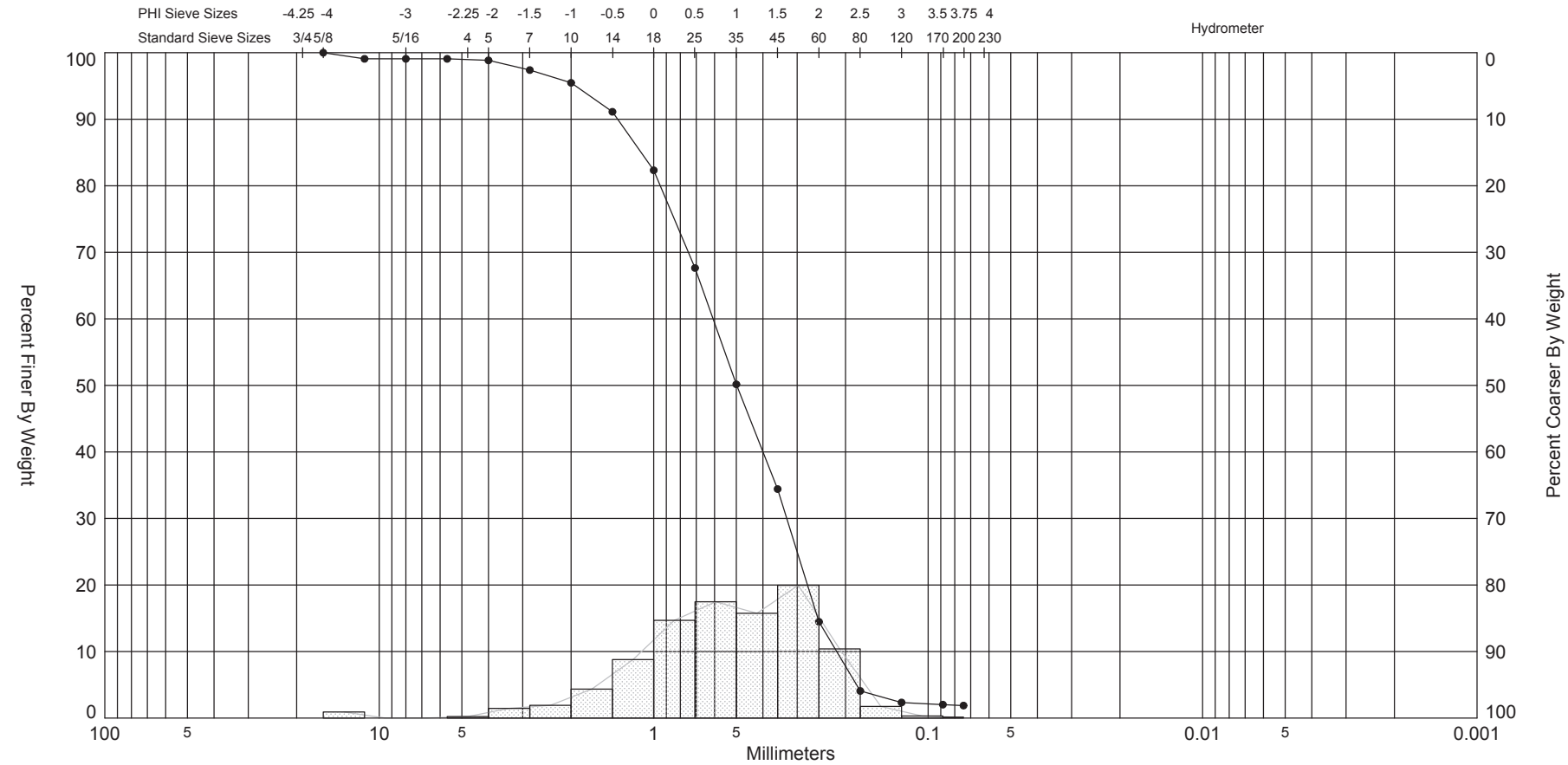

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-12 #3	—●—	-25.7	SW	#200 - 1.88			1.01	0.88	-0.96	5.09	1.08

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,395.8
Northing (Y, ft):	1,179,296.9
Horizontal System:	
Vertical System:	

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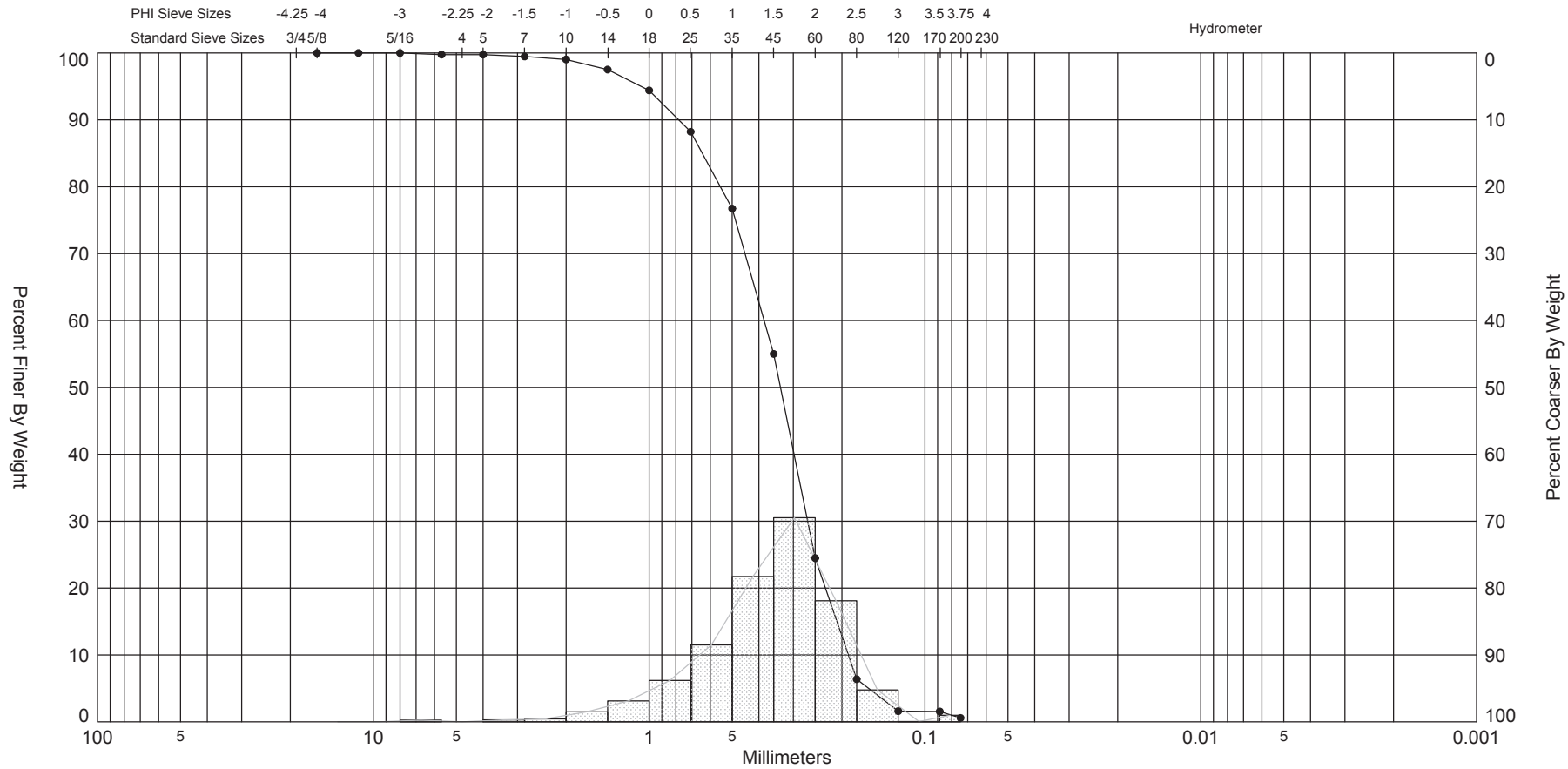

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-12 #4	—●—	-29.7	SP	#200 - 0.58			1.58	1.45	-0.91	5.19	0.84

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,395.8
Northing (Y, ft):	1,179,296.9
Horizontal System:	
Vertical System:	

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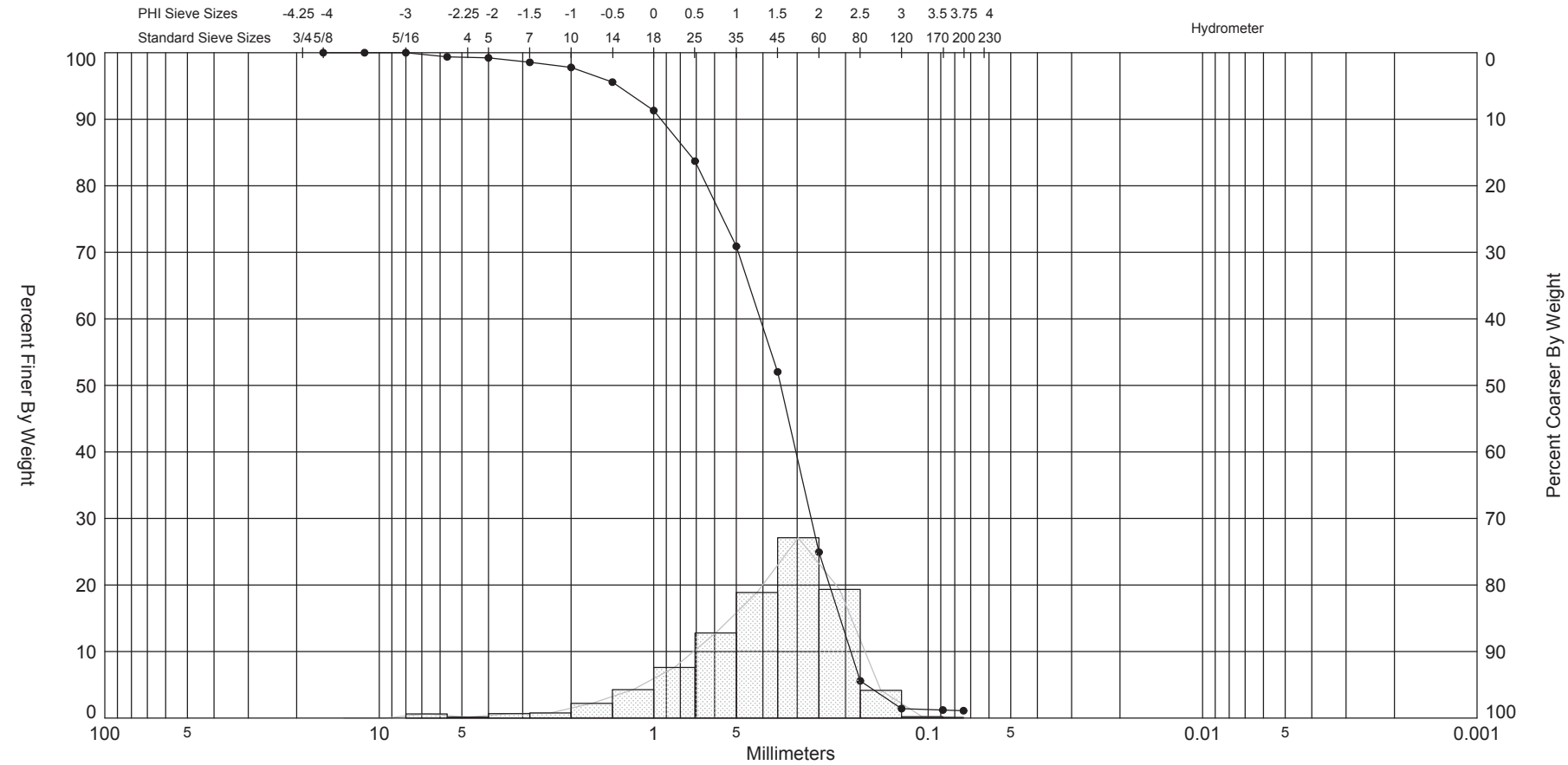

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-14 #1	—●—	-23.6	SW	#200 - 1.11			1.54	1.33	-1.19	5.2	0.94

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,666.3
Northing (Y, ft):	1,178,001.5
Horizontal System:	
Vertical System:	

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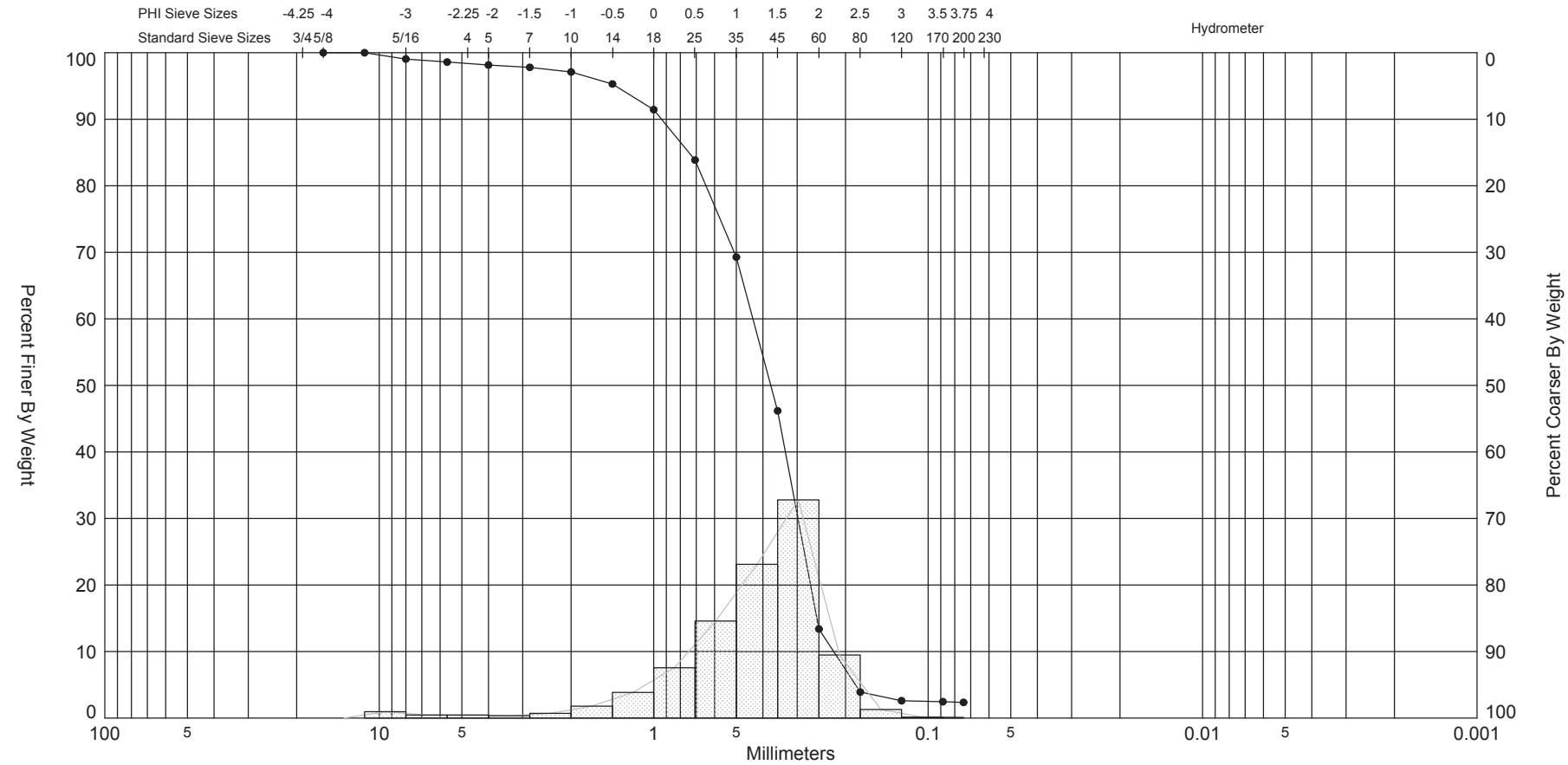

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-14 #2	—●—	-27.1	SW	#200 - 2.36			1.42	1.18	-1.85	8.41	0.95

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,666.3
Northing (Y, ft):	1,178,001.5
Horizontal System:	
Vertical System:	

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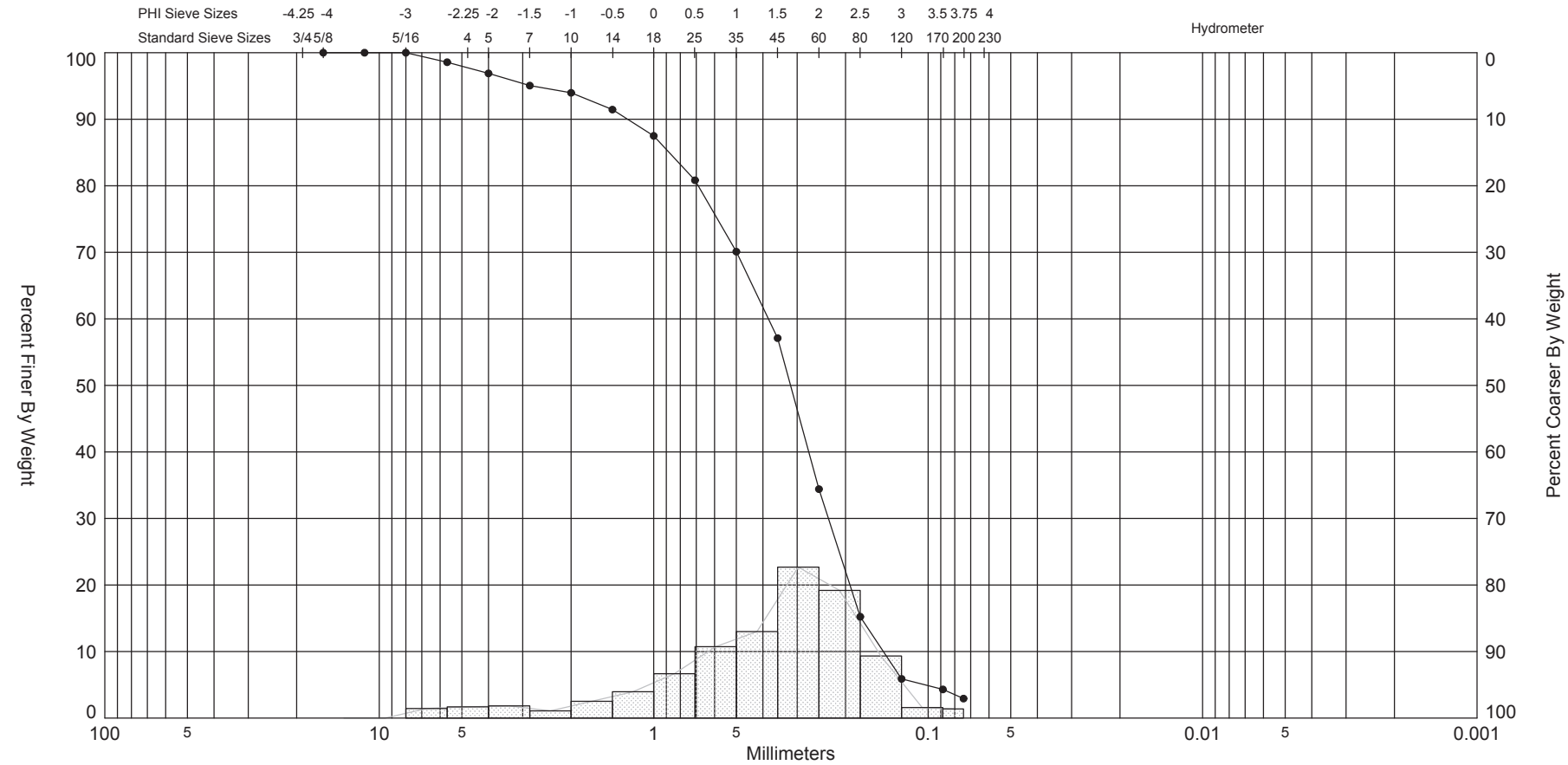

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-14 #3	—●—	-31.1	SW	#200 - 2.93			1.66	1.33	-1.16	4.41	1.26

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,666.3
Northing (Y, ft):	1,178,001.5
Horizontal System:	
Vertical System:	

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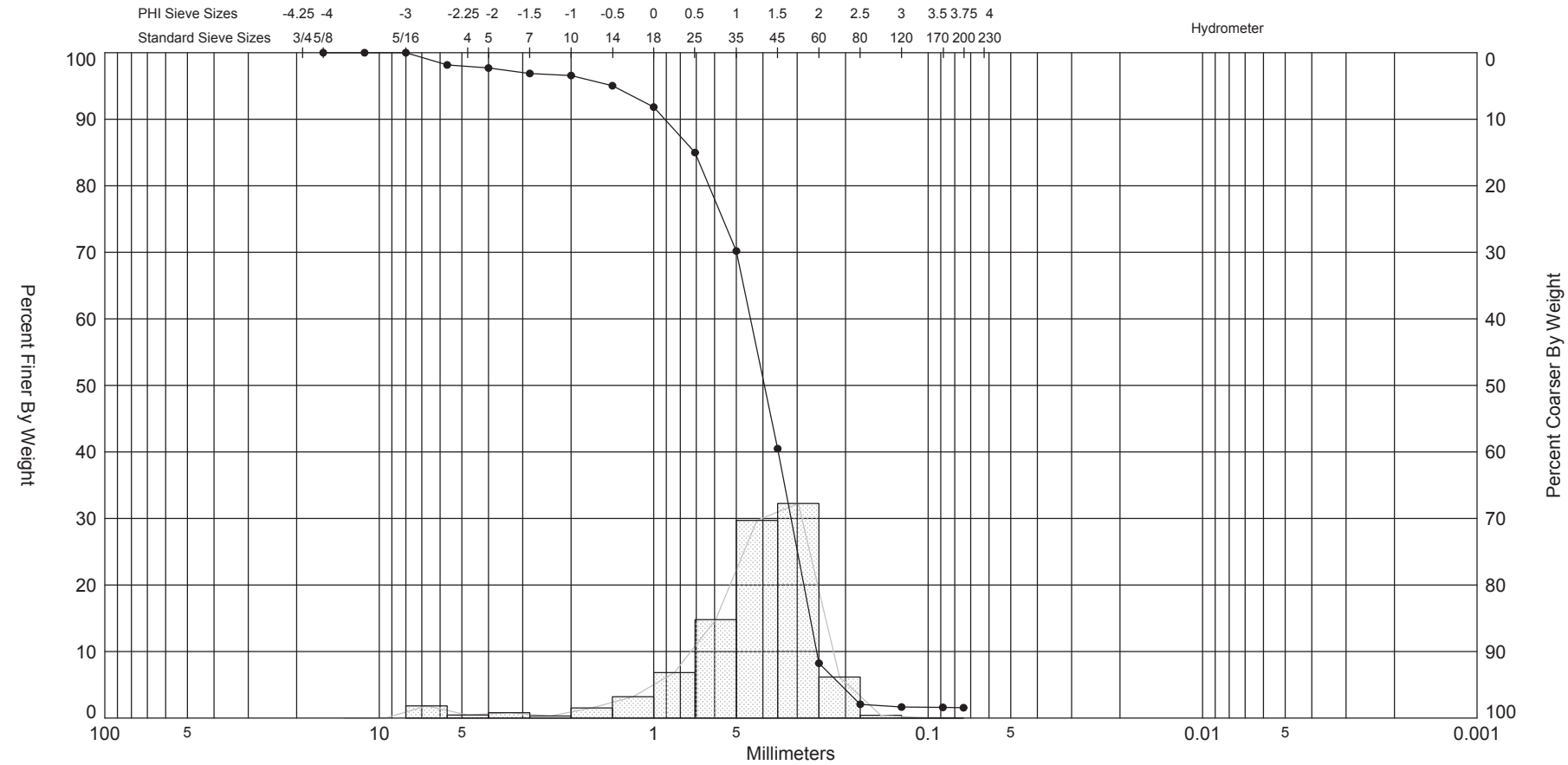

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-15 #1	—●—	-17.6	SW	#200 - 1.56			1.34	1.14	-2.05	8.69	0.92

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,129.4
Northing (Y, ft):	1,178,509.4
Horizontal System:	
Vertical System:	

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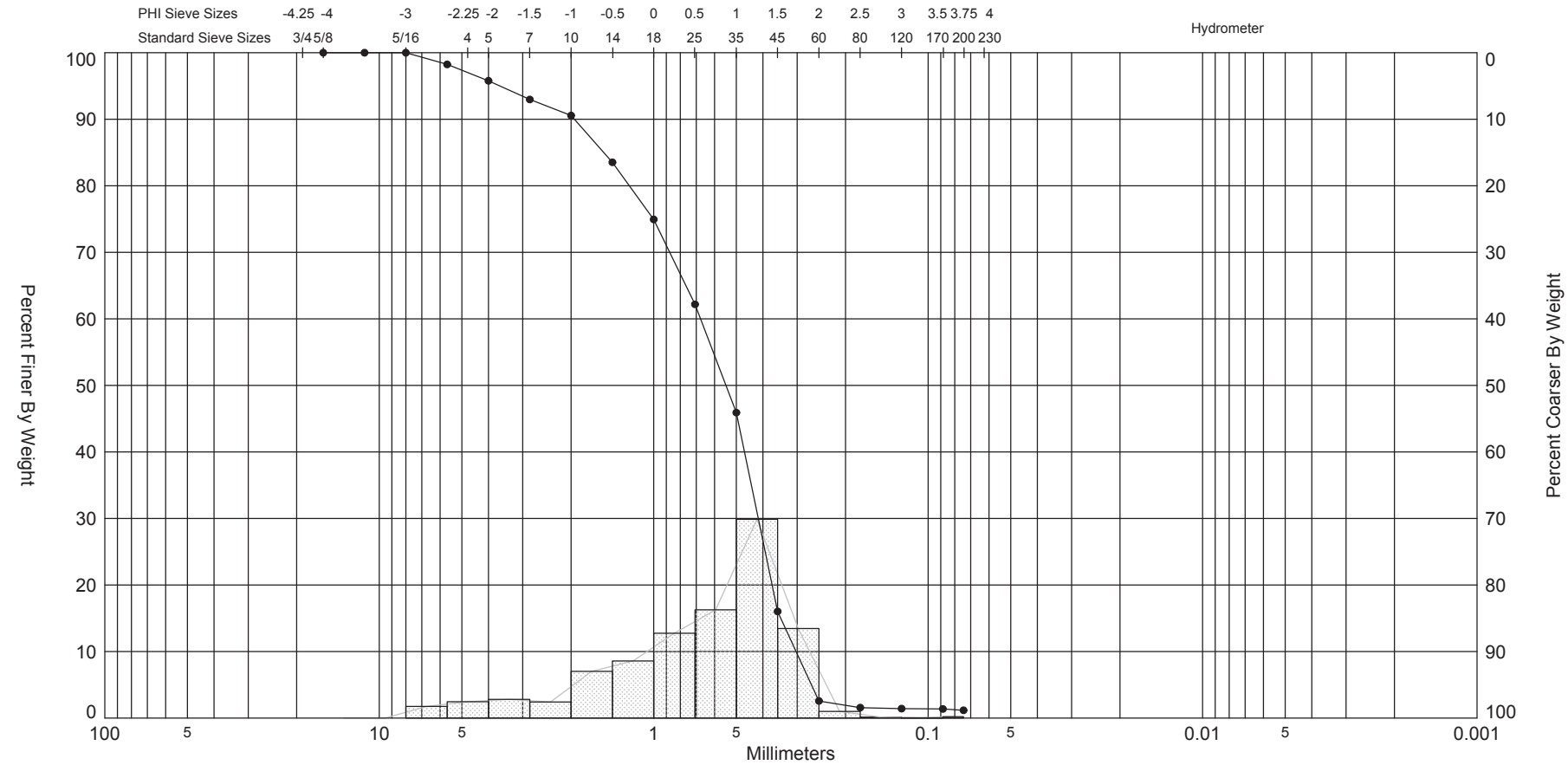

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-15 #2	—●—	-21.1	SW	#200 - 1.17			0.87	0.55	-1.04	3.79	1.1

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,129.4
Northing (Y, ft):	1,178,509.4
Horizontal System:	
Vertical System:	

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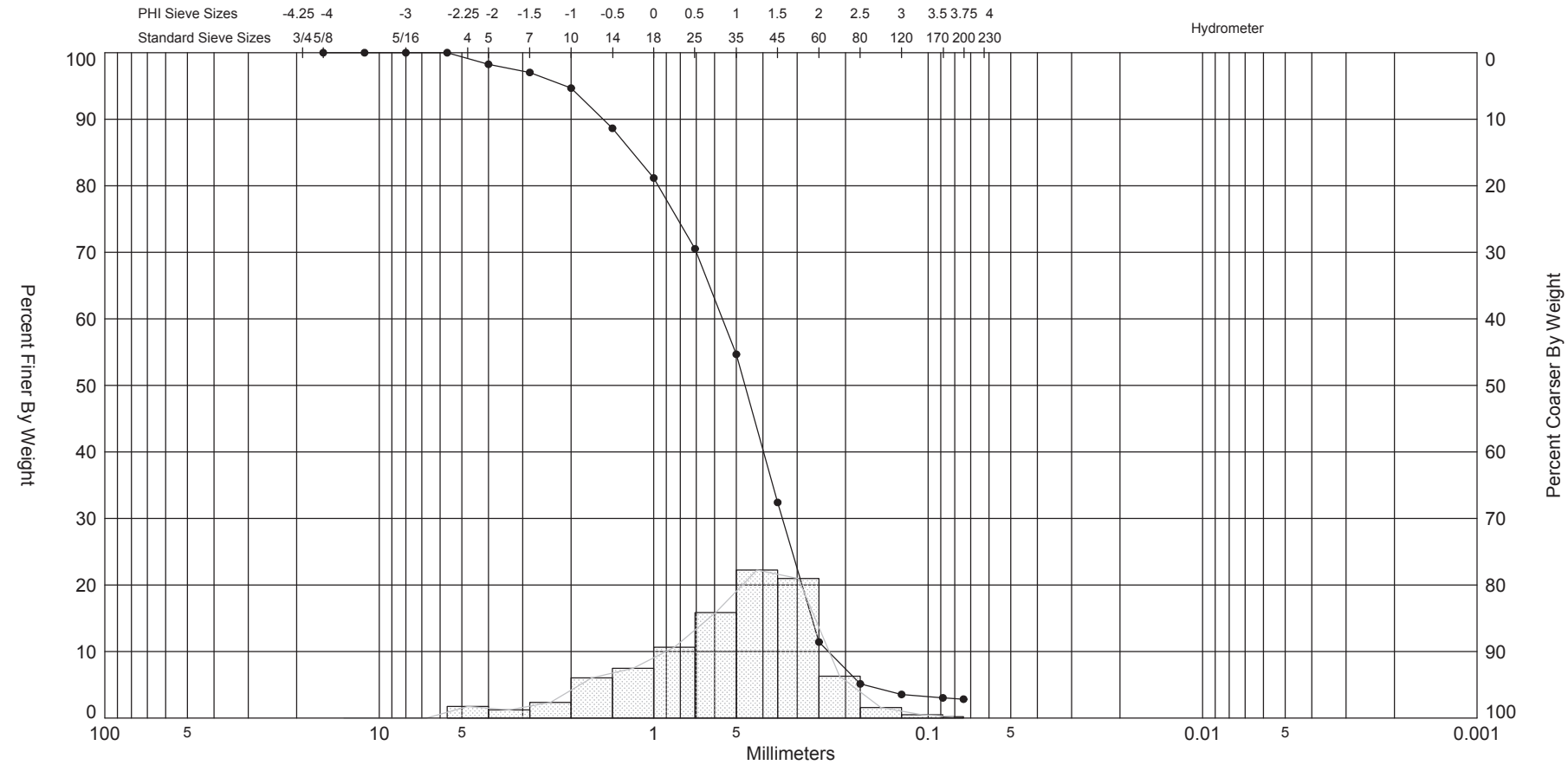

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-15 #3	—●—	-25.1	SW	#200 - 2.84			1.1	0.87	-0.74	3.48	1.05

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,129.4
Northing (Y, ft):	1,178,509.4
Horizontal System:	
Vertical System:	

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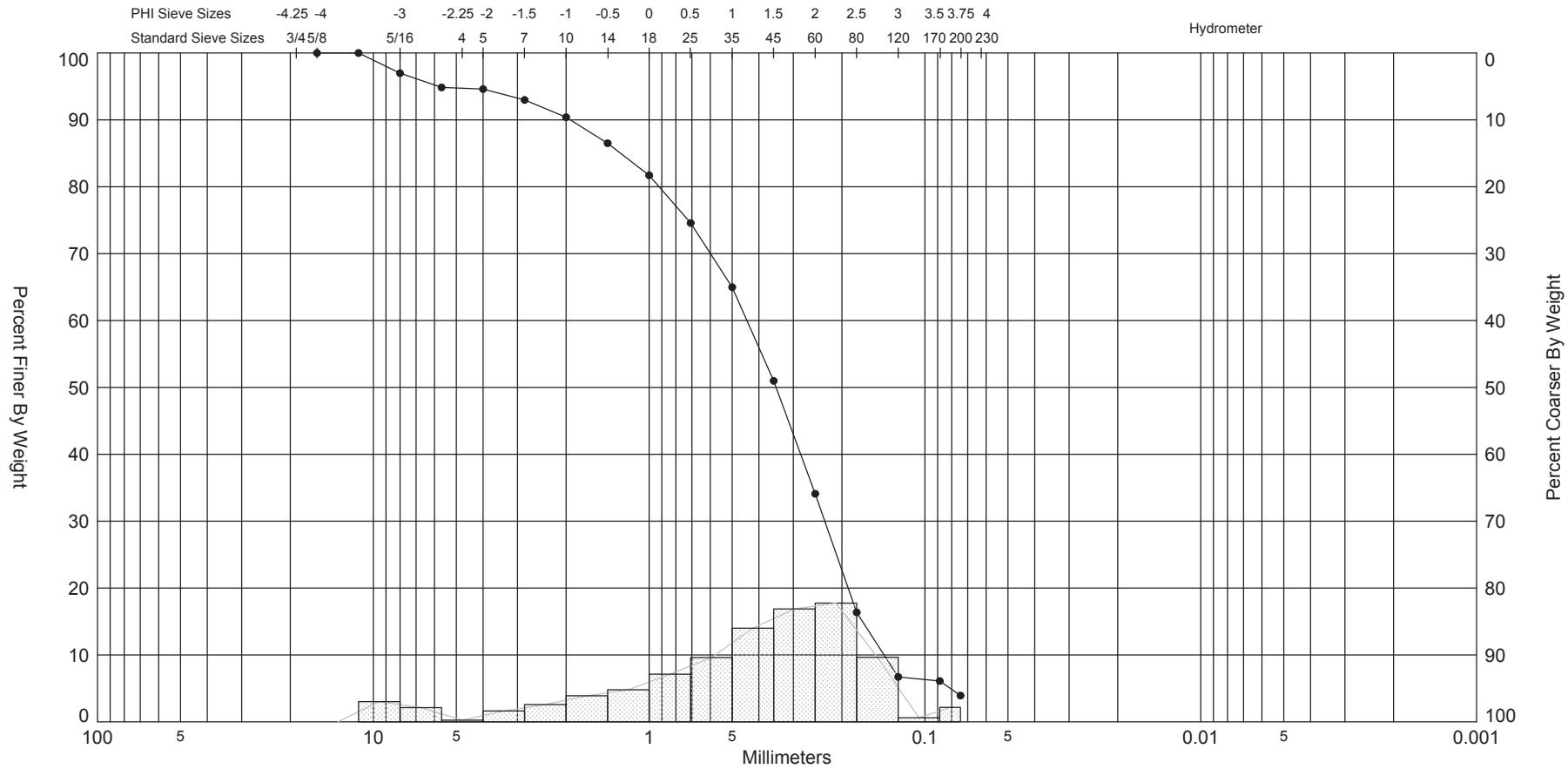

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-15 #4	—●—	-31.1	SW	#200 - 3.93			1.53	1.1	-1.12	4.01	1.52

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,129.4
Northing (Y, ft):	1,178,509.4
Horizontal System:	
Vertical System:	

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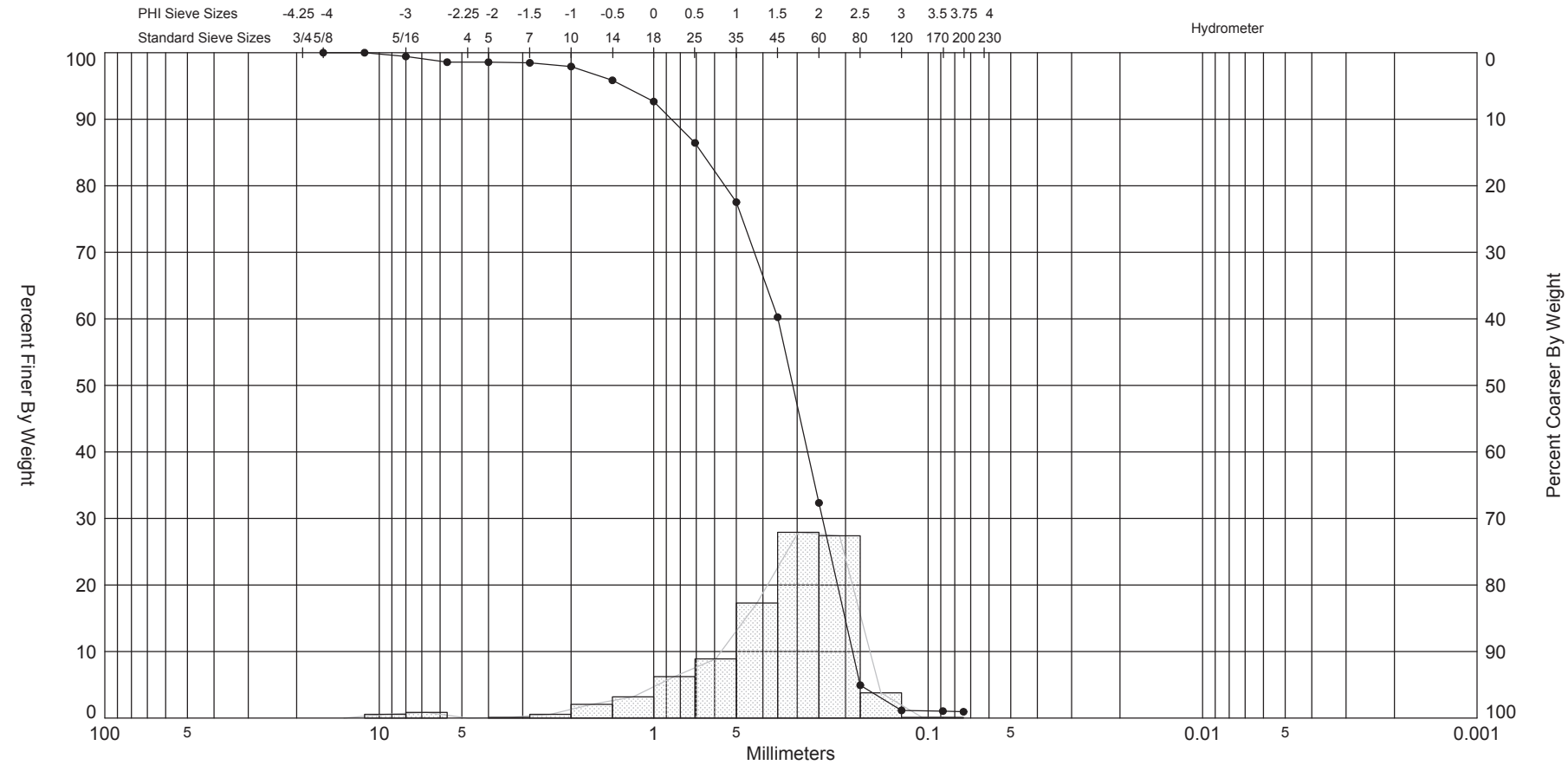

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-16 #1	—●—	-21.5	SW	#200 - 0.95			1.68	1.45	-1.82	7.98	0.97

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,680.7
Northing (Y, ft):	1,178,759.8
Horizontal System:	
Vertical System:	

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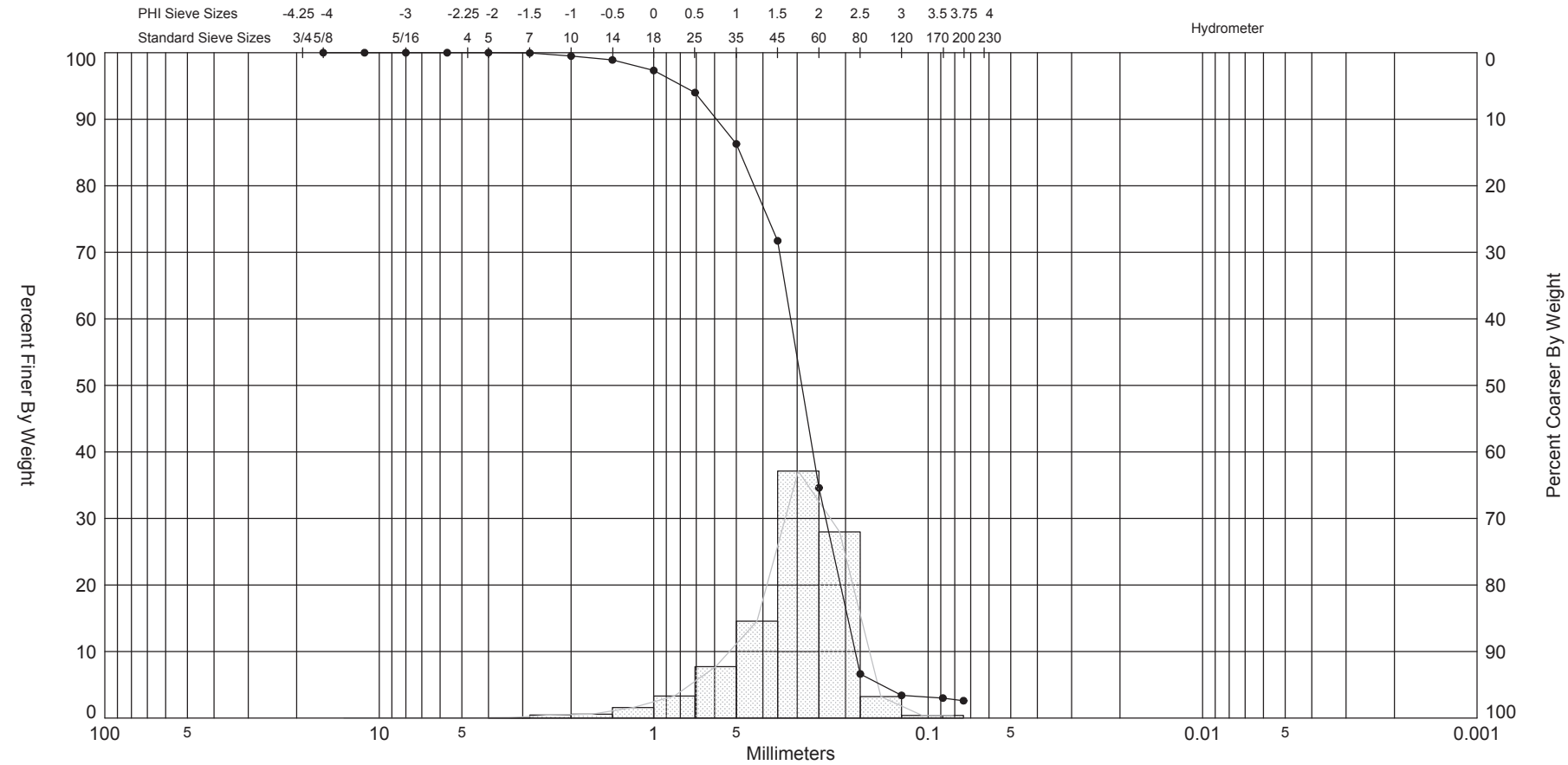

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-16 #2	—●—	-25.4	SP	#200 - 2.61			1.79	1.67	-1.15	5.51	0.68

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,680.7
Northing (Y, ft):	1,178,759.8
Horizontal System:	
Vertical System:	

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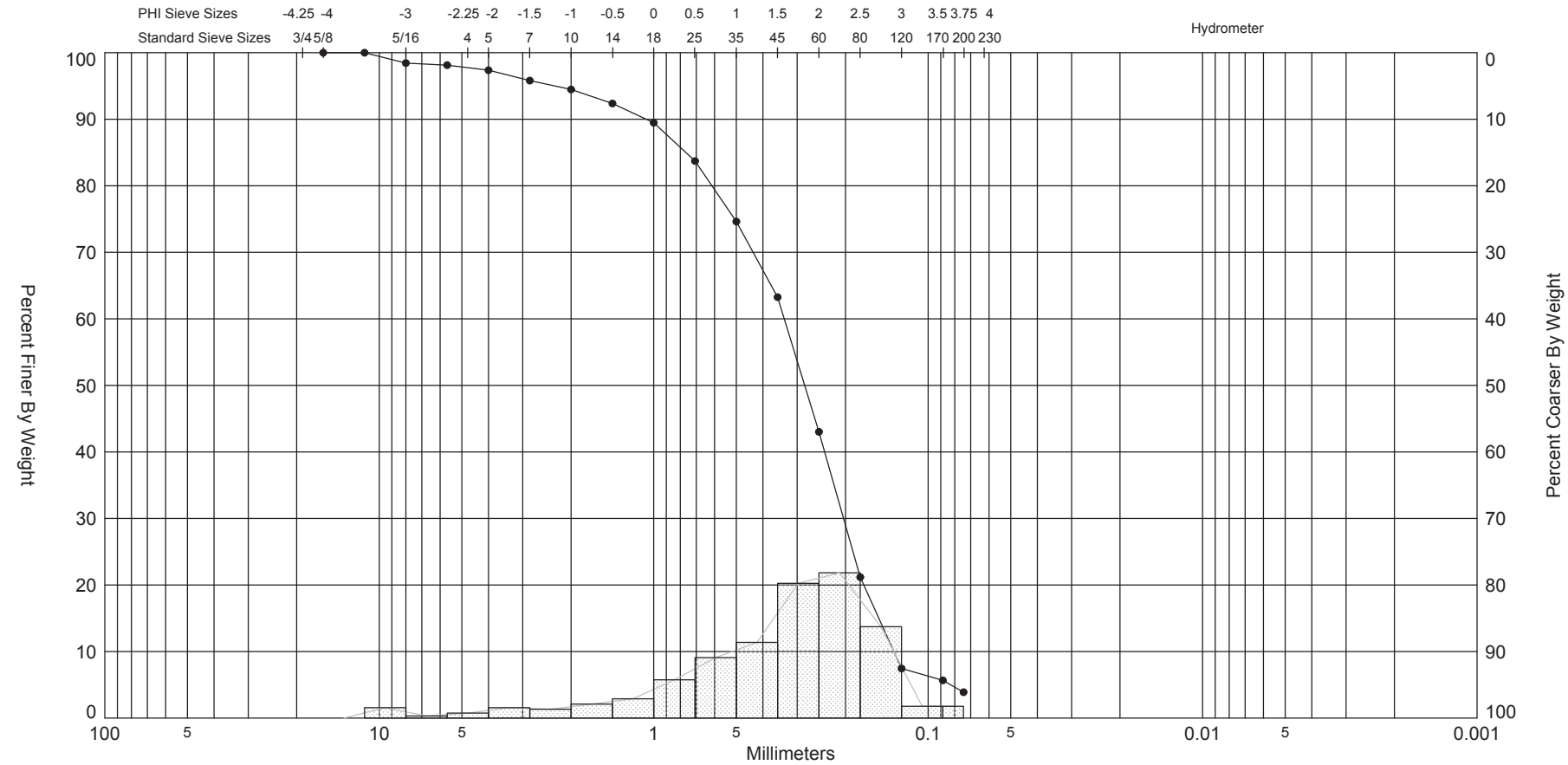

Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-16 #3	—●—	-29.4	SW	#200 - 3.89			1.83	1.48	-1.43	5.46	1.29

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	727,680.7
Northing (Y, ft):	1,178,759.8
Horizontal System:	
Vertical System:	

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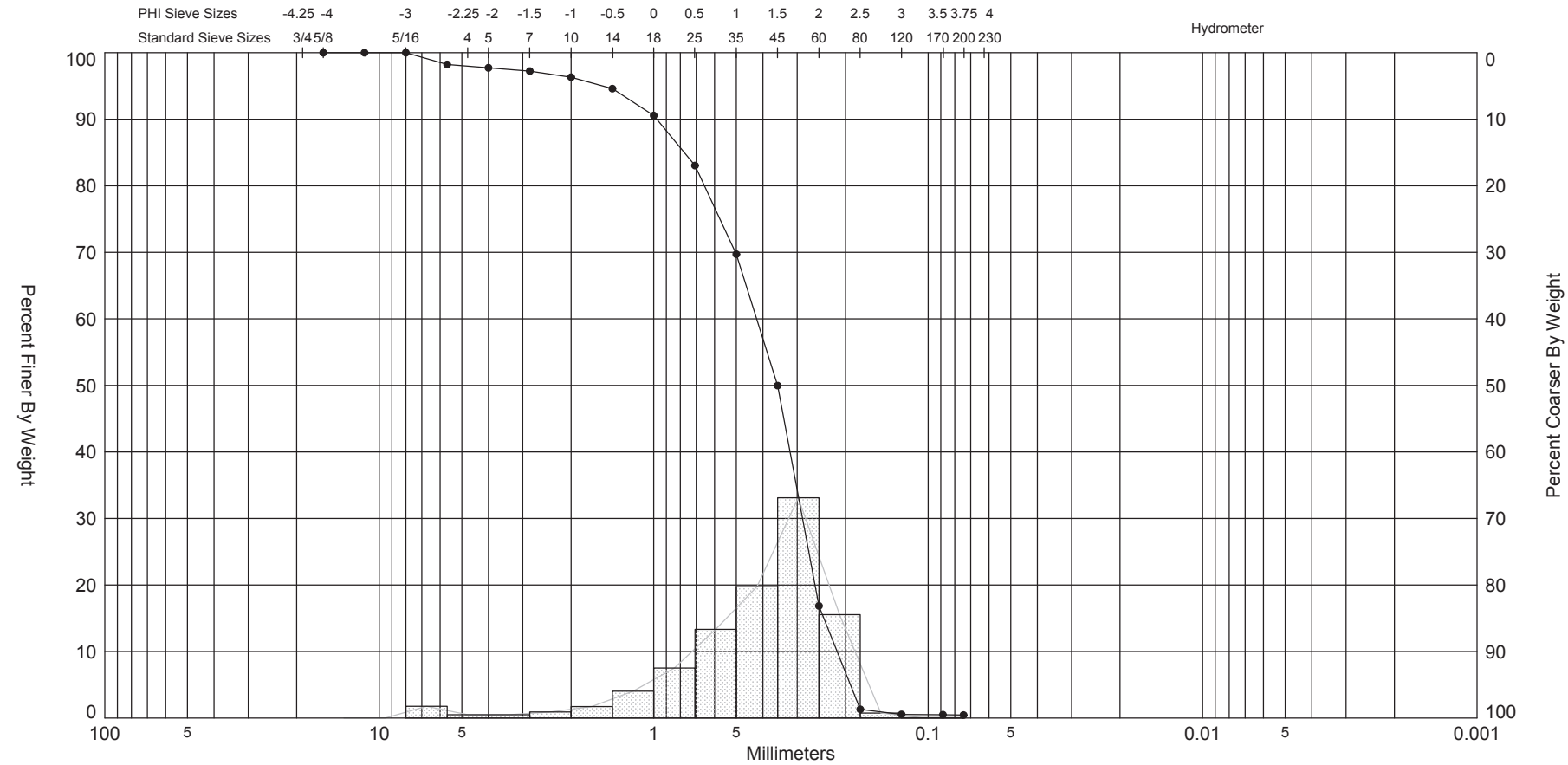

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-17 #1	—●—	-18.7	SW	#200 - 0.45			1.5	1.22	-1.74	6.98	0.99

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	726,754.6
Northing (Y, ft):	1,177,596.6
Horizontal System:	
Vertical System:	

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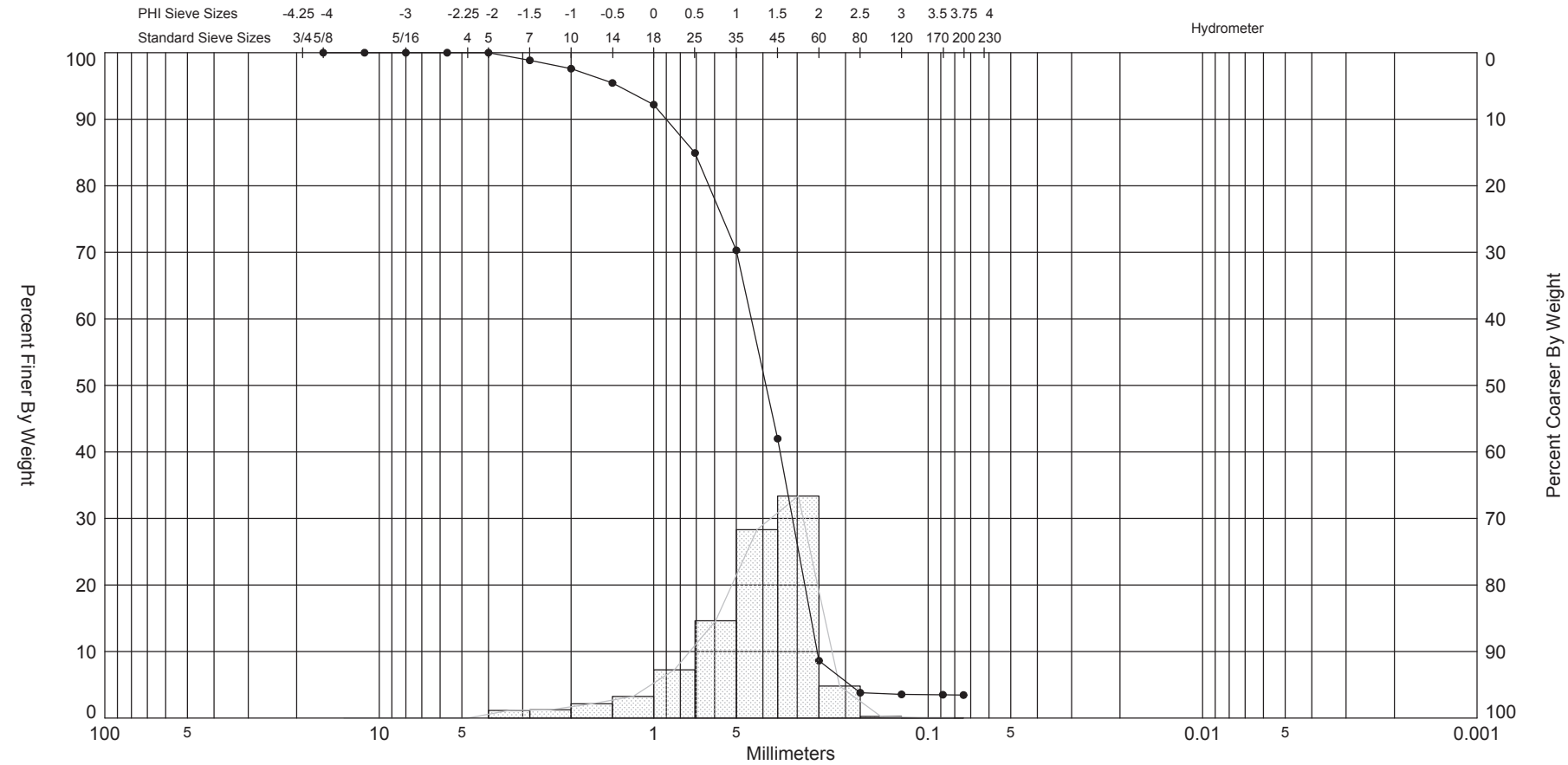

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-17 #2	—●—	-22.2	SP	#200 - 3.46			1.36	1.16	-1.36	5.3	0.78

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	726,754.6
Northing (Y, ft):	1,177,596.6
Horizontal System:	
Vertical System:	

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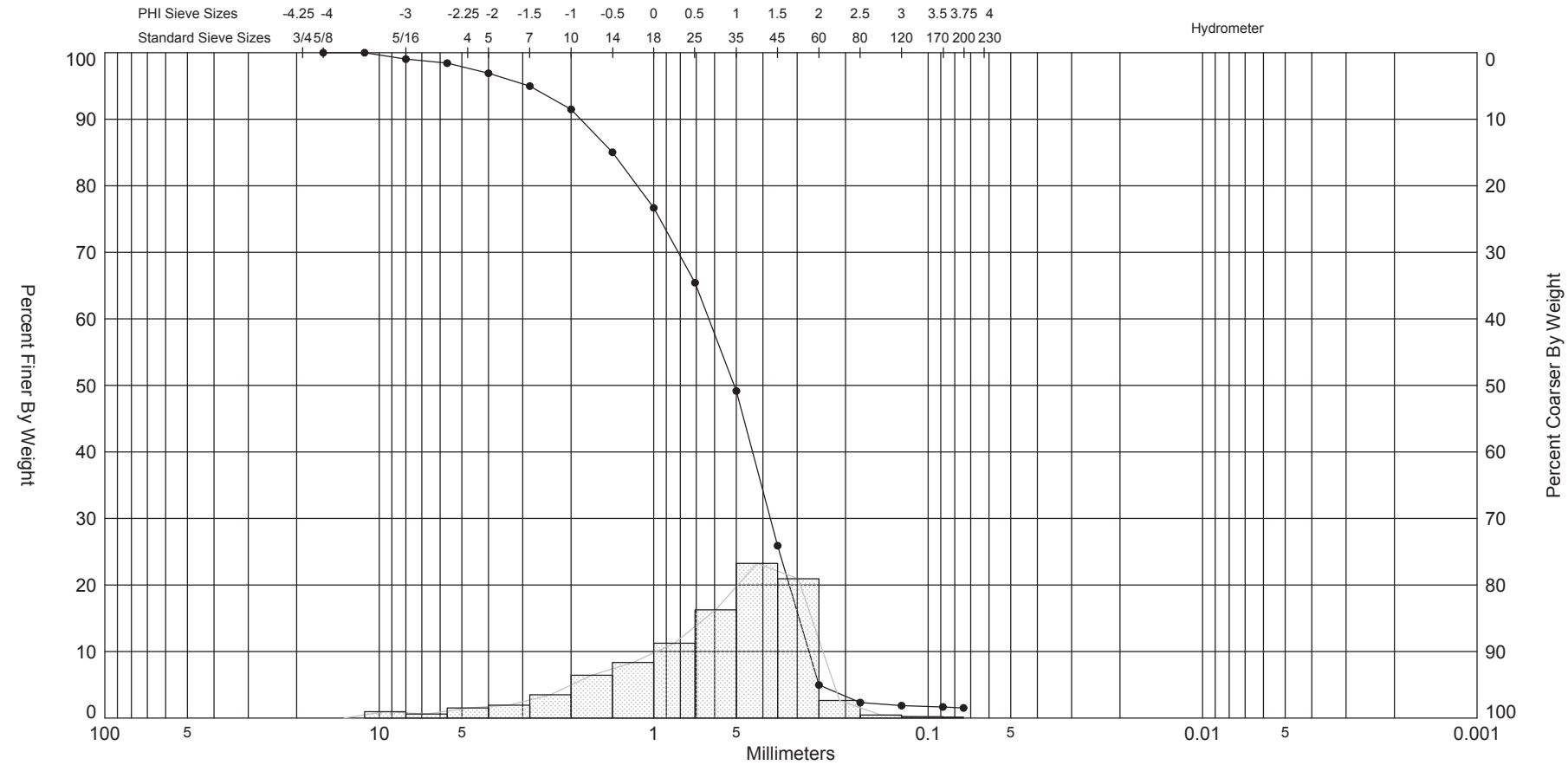

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-17 #3	—●—	-26.2	SW	#200 - 1.52			0.97	0.67	-1.04	4.09	1.13

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	726,754.6
Northing (Y, ft):	1,177,596.6
Horizontal System:	
Vertical System:	

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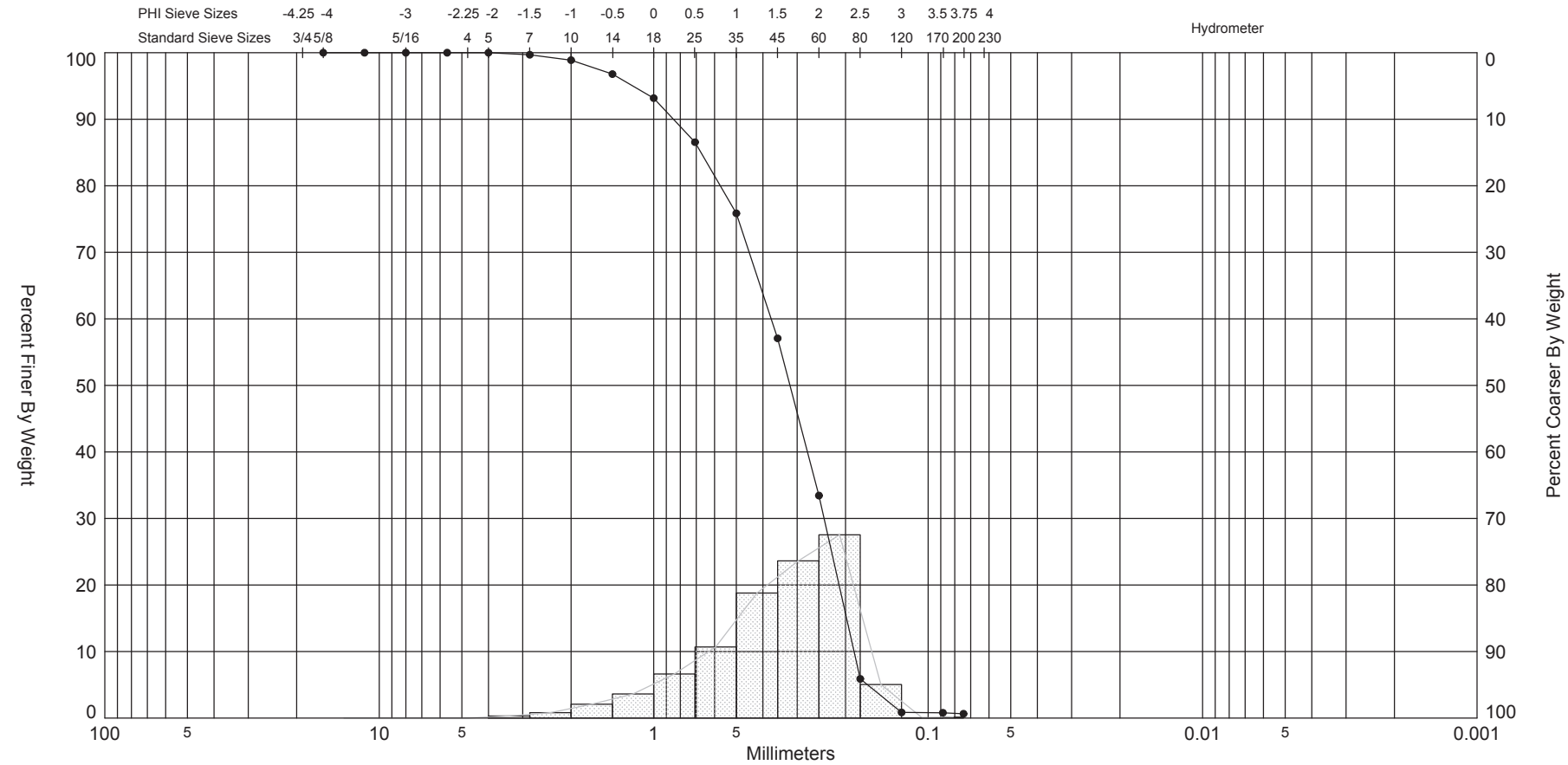

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-18 #1	—●—	-22.2	SW	#200 - 0.65			1.65	1.48	-0.94	3.74	0.86

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	727,435.2
Northing (Y, ft):	1,176,997.6
Horizontal System:	
Vertical System:	

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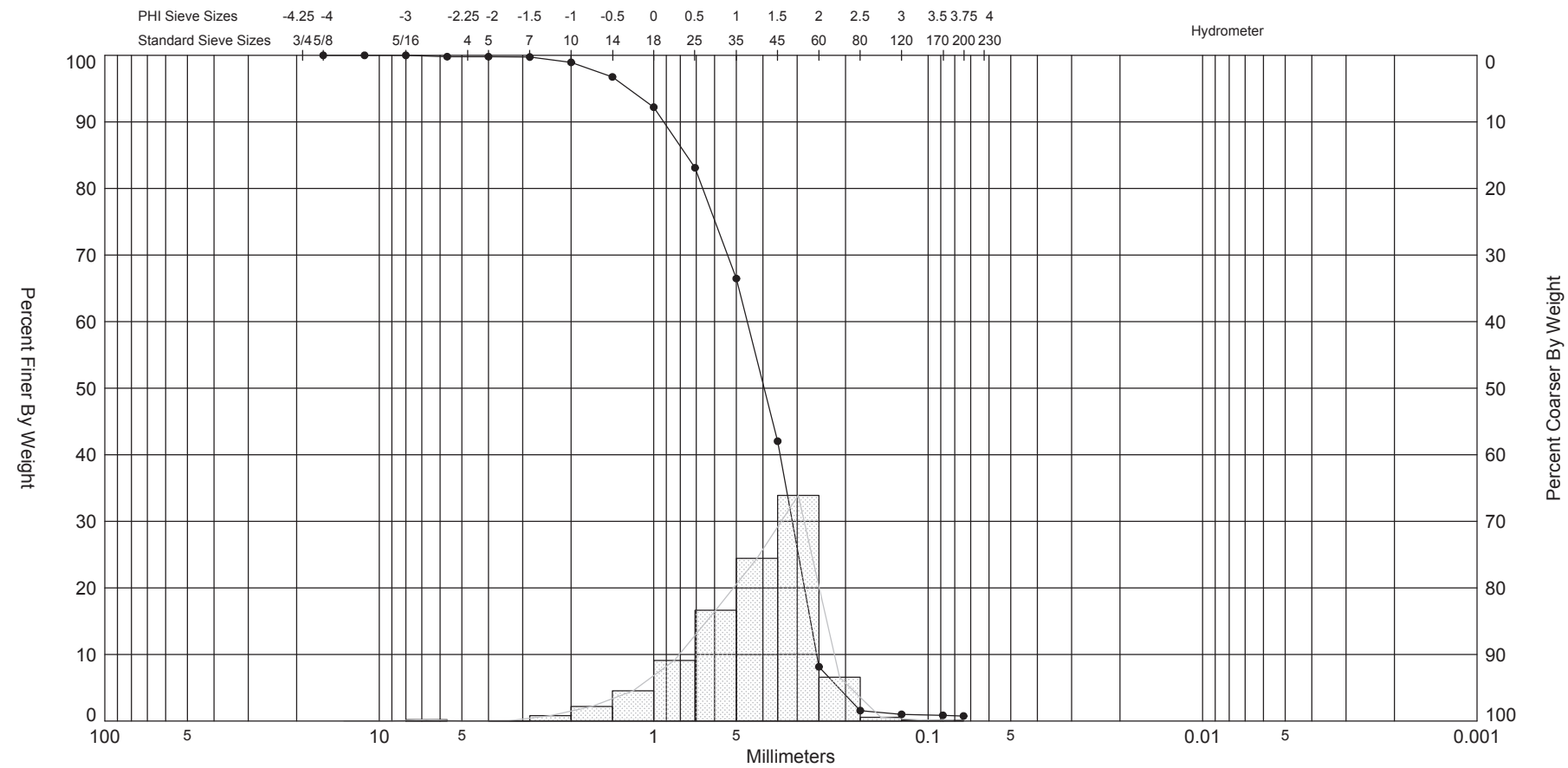

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-18 #2	—●—	-25.7	SP	#200 - 0.76			1.34	1.18	-0.99	4.7	0.76

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	727,435.2
Northing (Y, ft):	1,176,997.6
Horizontal System:	
Vertical System:	

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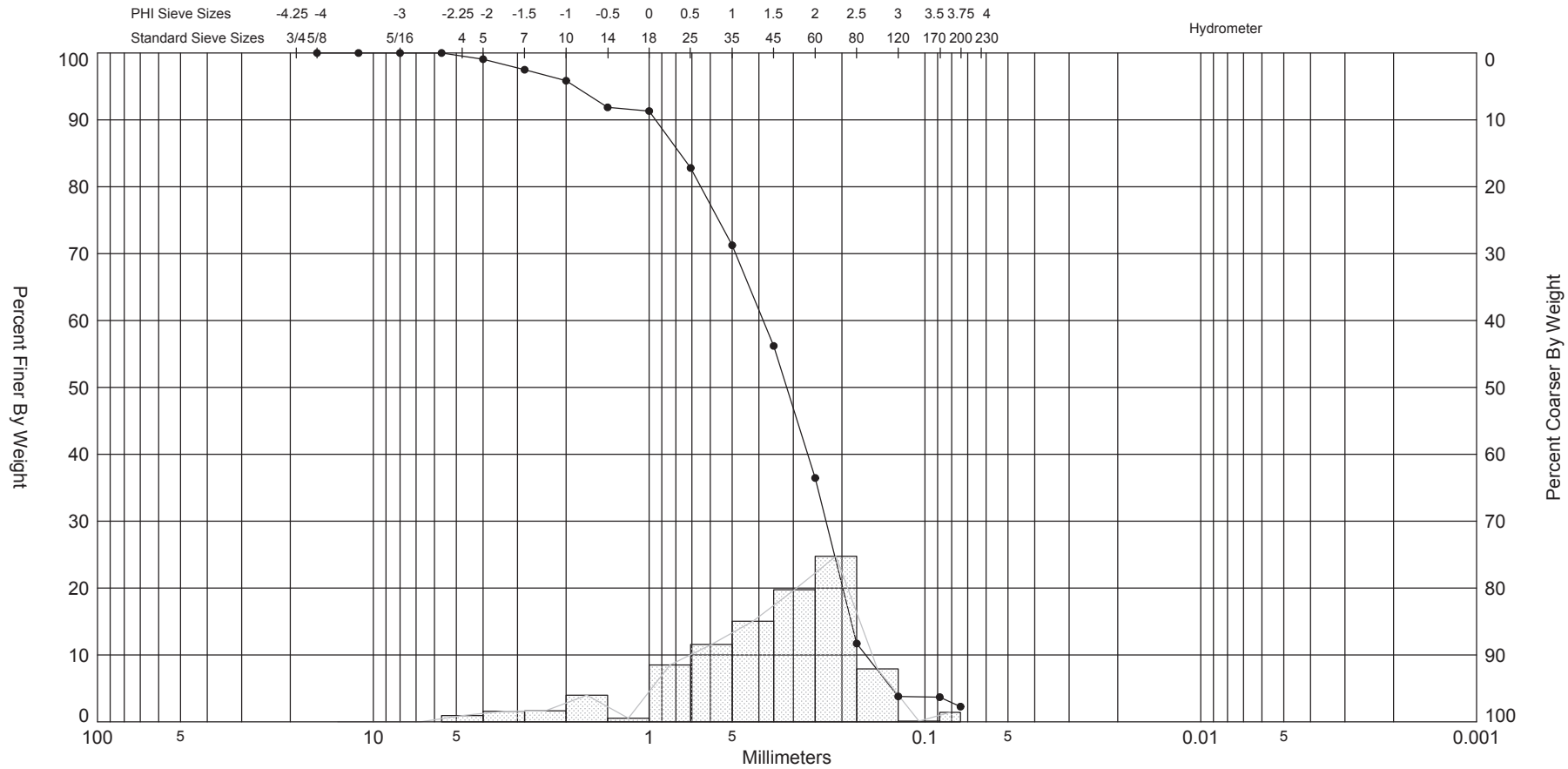

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-18 #3	—●—	-29.7	SW	#200 - 2.27			1.66	1.4	-1.02	4.1	1.1

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	727,435.2
Northing (Y, ft):	1,176,997.6
Horizontal System:	
Vertical System:	

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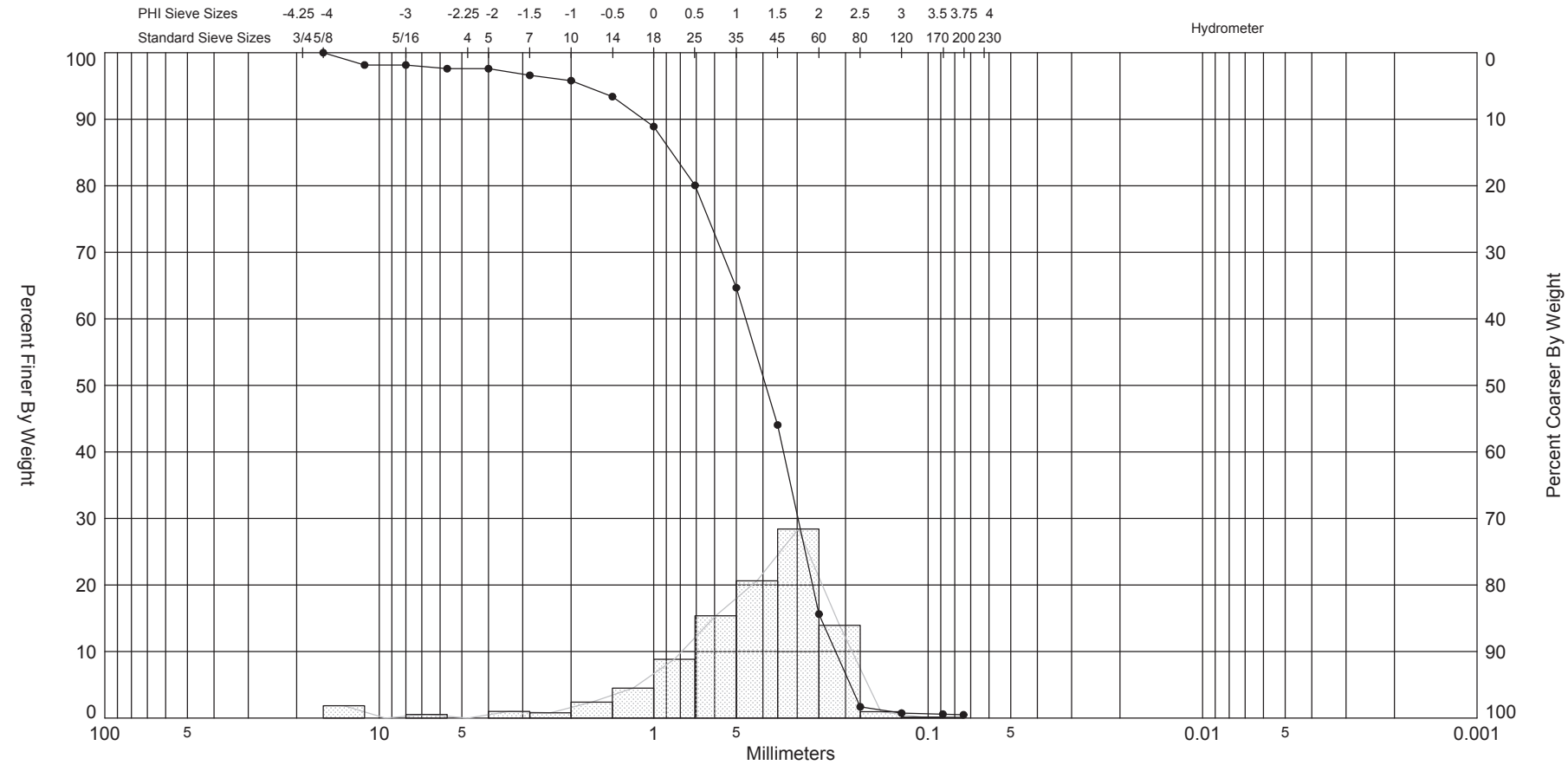

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-19 #1	—●—	-18.6	SW	#200 - 0.49			1.36	1.11	-1.99	8.66	1.11

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,675.7
Northing (Y, ft):	1,176,404.3
Horizontal System:	
Vertical System:	

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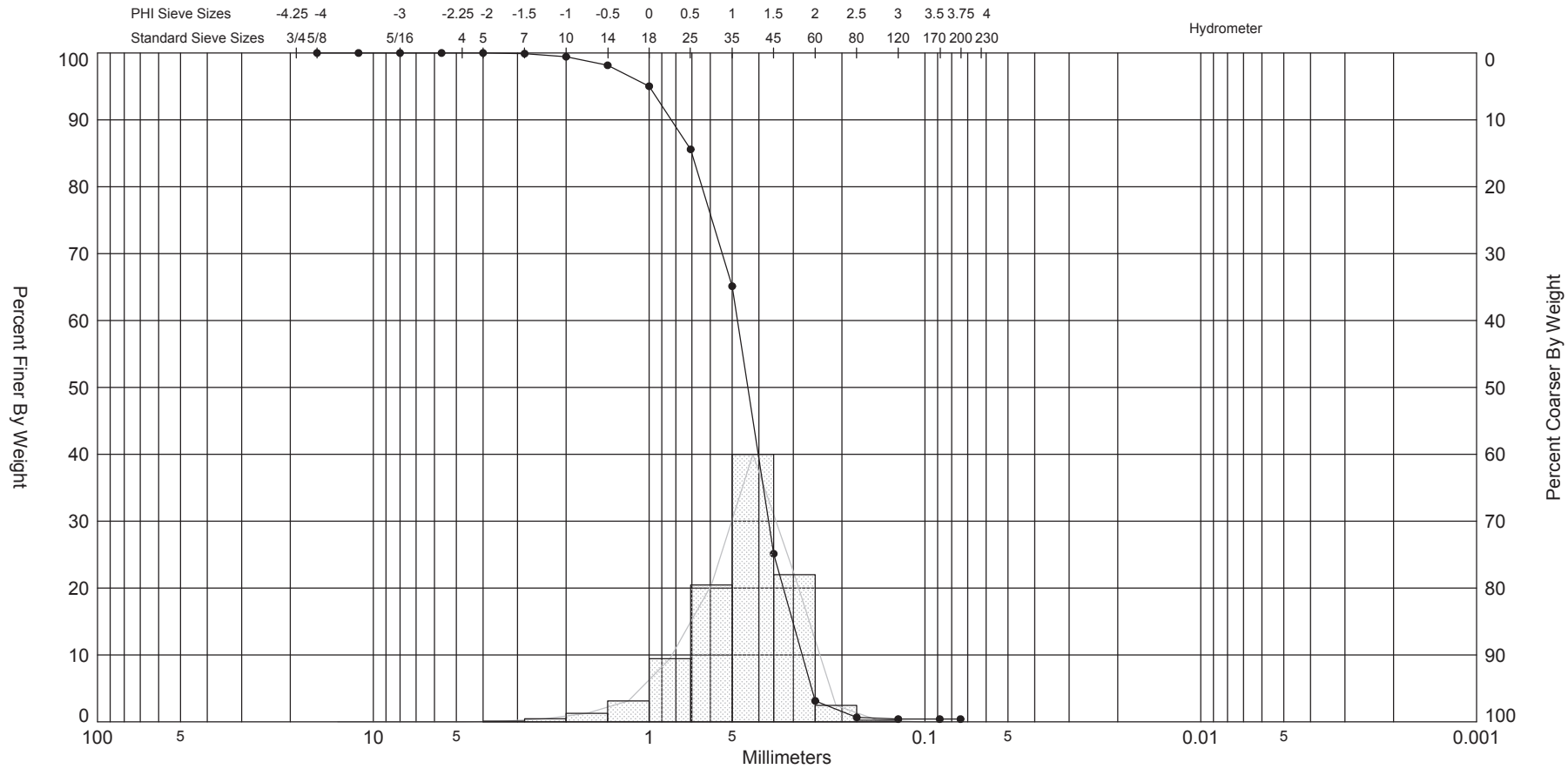

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-19 #2	—●—	-22.1	SP	#200 - 0.41			1.19	1.1	-0.9	4.52	0.61

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,675.7
Northing (Y, ft):	1,176,404.3
Horizontal System:	
Vertical System:	

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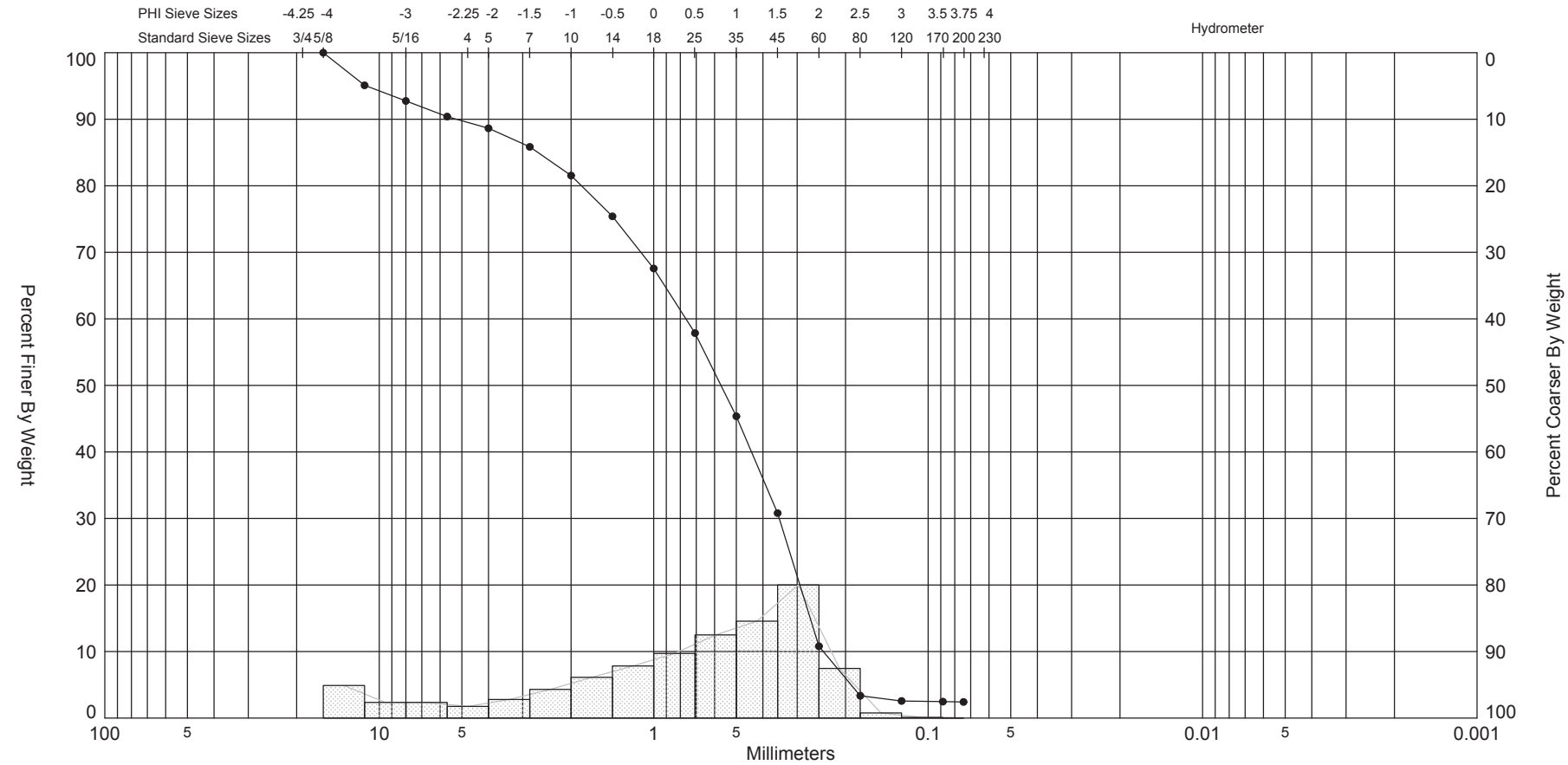

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-19 #3	—●—	-26.1	SW	#200 - 2.42			0.81	0.32	-1.01	3.2	1.65

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,675.7
Northing (Y, ft):	1,176,404.3
Horizontal System:	
Vertical System:	

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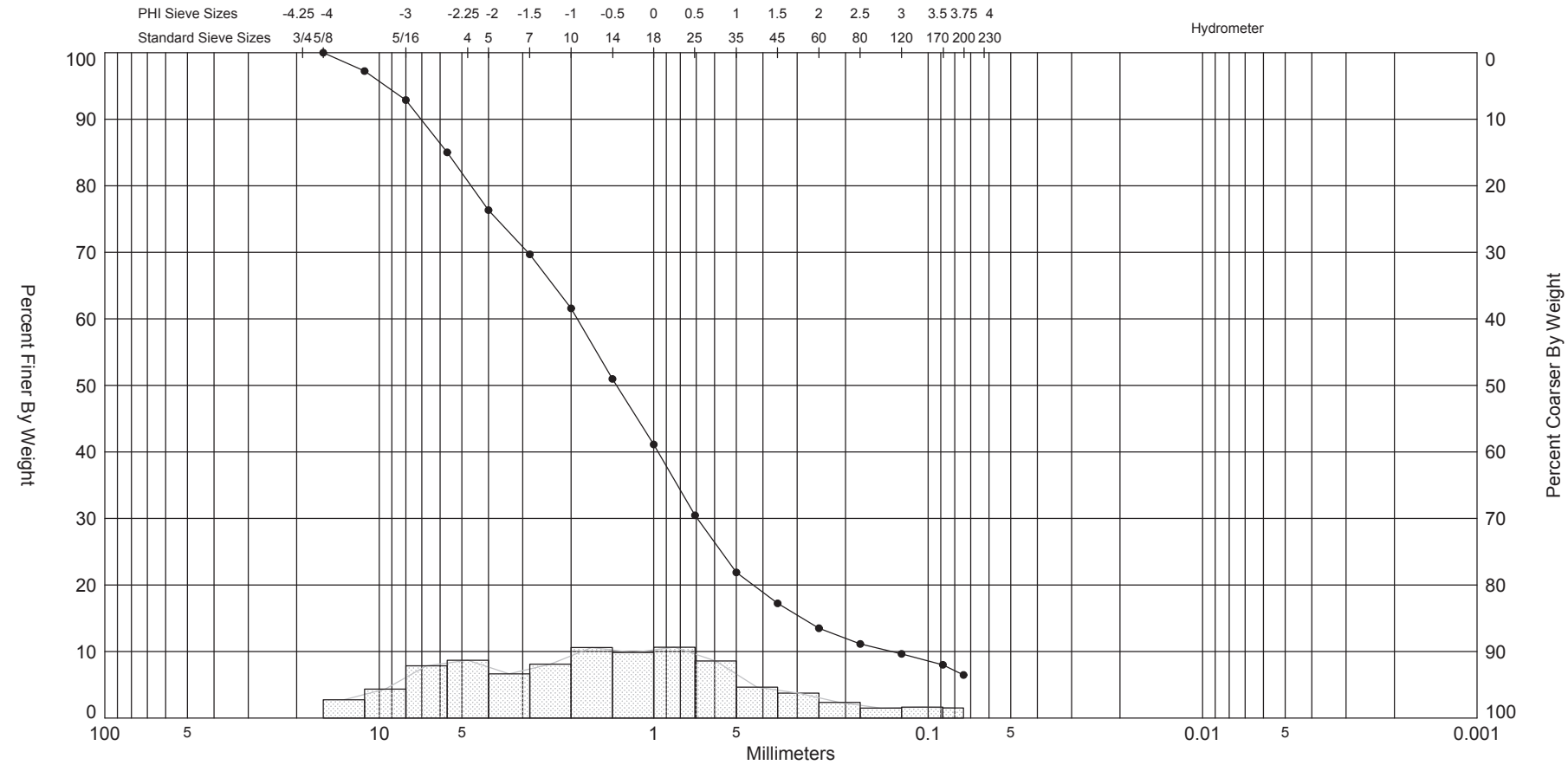

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-19 #4	—●—	-31.1	SW-SM	#200 - 6.48				-0.6	0.27	2.55	1.73

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,675.7
Northing (Y, ft):	1,176,404.3
Horizontal System:	
Vertical System:	

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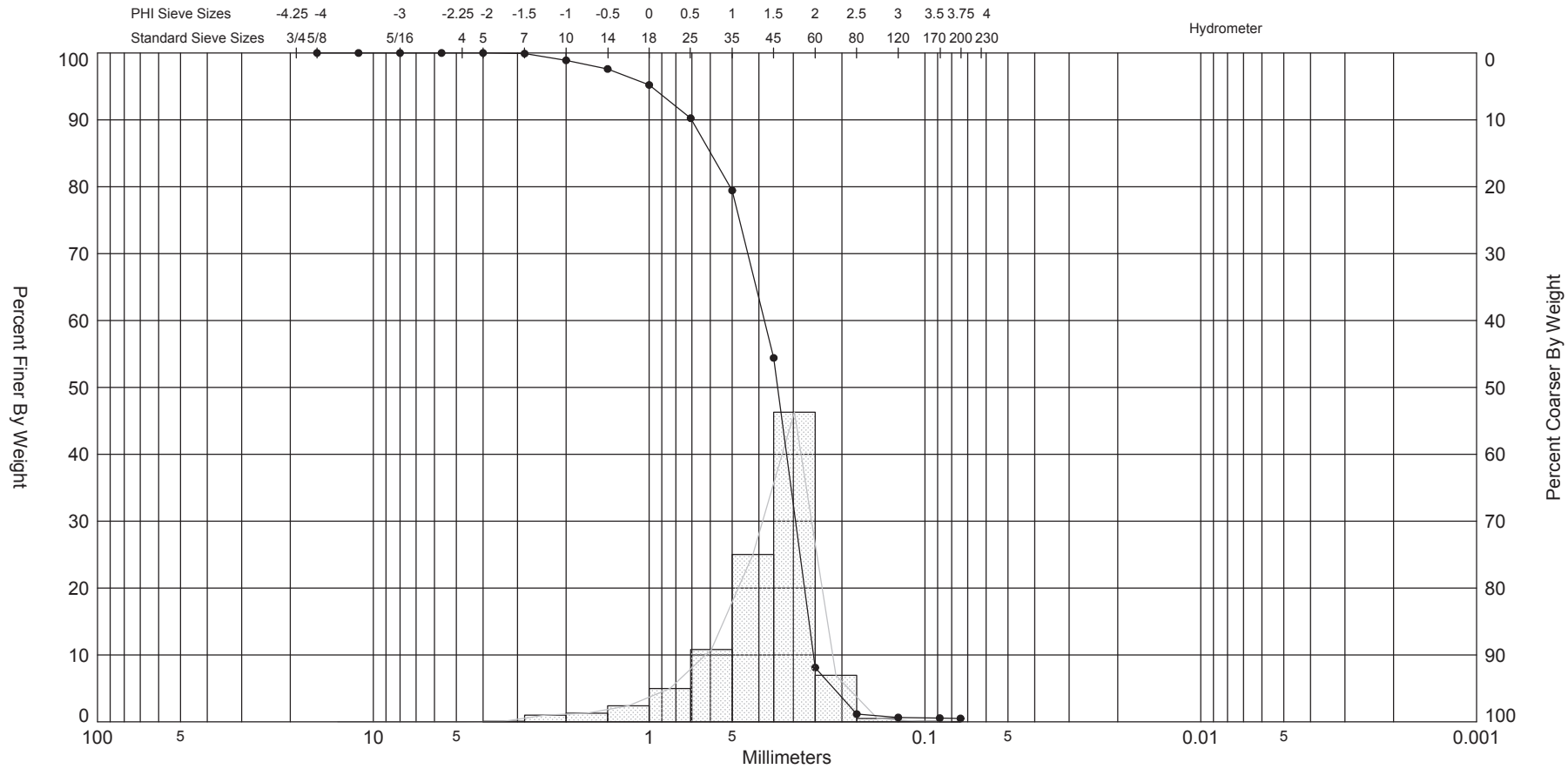

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-20 #1	—●—	-22.0	SP	#200 - 0.51			1.55	1.37	-1.46	5.96	0.67

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,501.4
Northing (Y, ft):	1,178,192.9
Horizontal System:	
Vertical System:	

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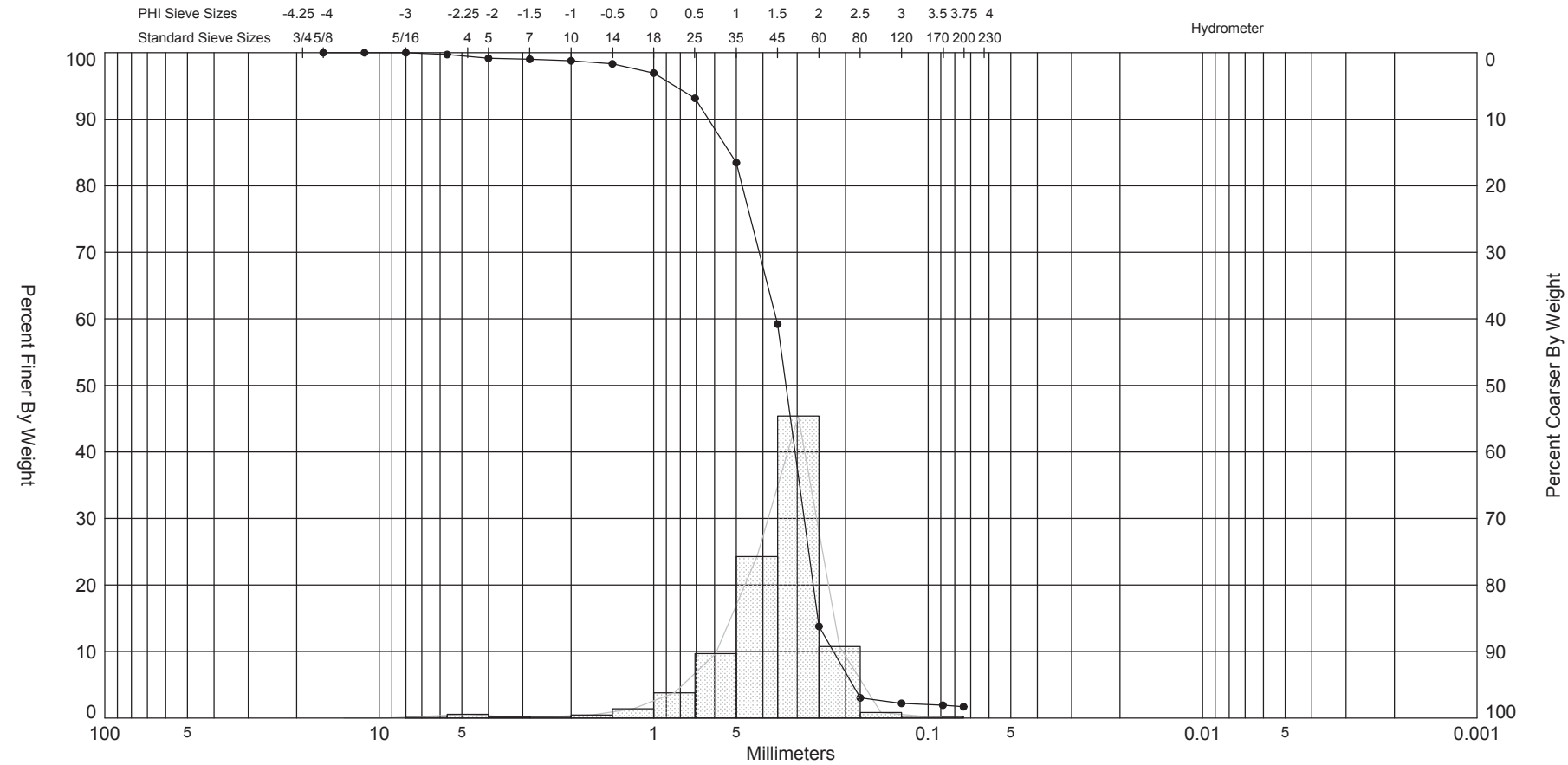

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-20 #2	—●—	-25.5	SP	#200 - 1.70			1.6	1.45	-2.06	11.65	0.69

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,501.4
Northing (Y, ft):	1,178,192.9
Horizontal System:	
Vertical System:	

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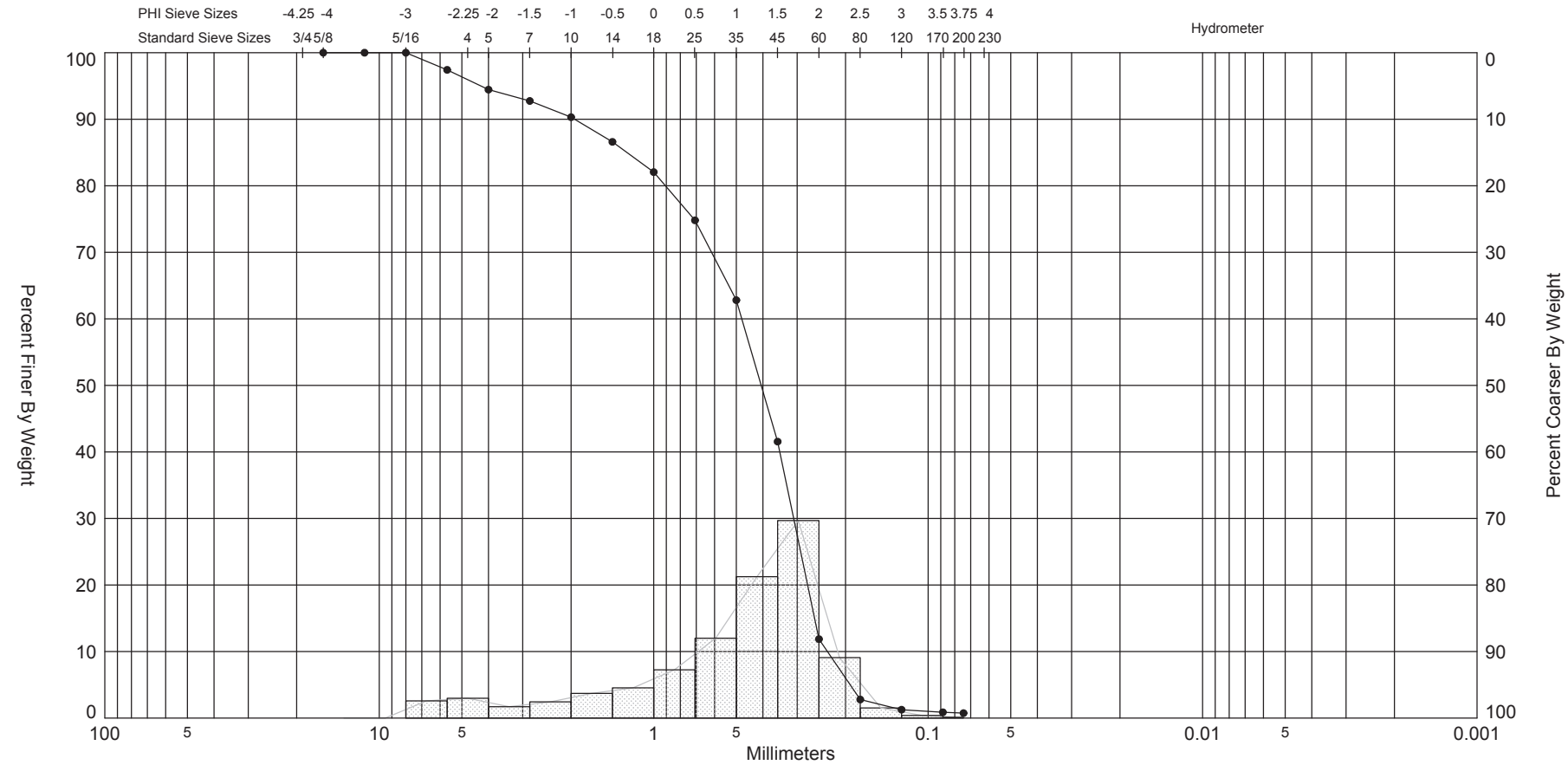

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-20 #3	—●—	-29.5	SW	#200 - 0.74			1.3	0.93	-1.3	4.24	1.25

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,501.4
Northing (Y, ft):	1,178,192.9
Horizontal System:	
Vertical System:	

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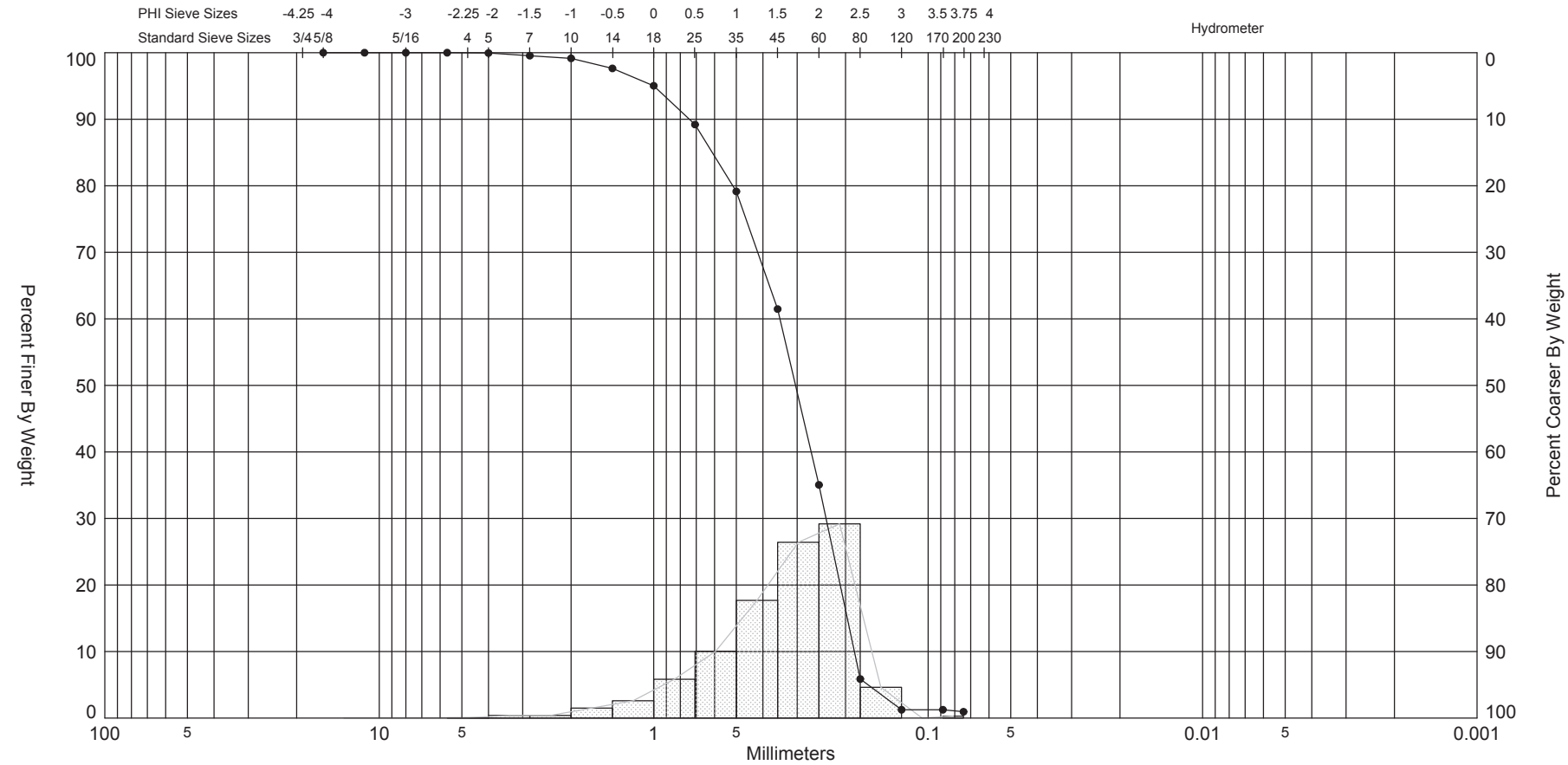

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-21 #1	—●—	-21.4	SP	#200 - 0.95			1.72	1.55	-1.07	4.47	0.82

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	727,167.8
Northing (Y, ft):	1,175,775.8
Horizontal System:	
Vertical System:	

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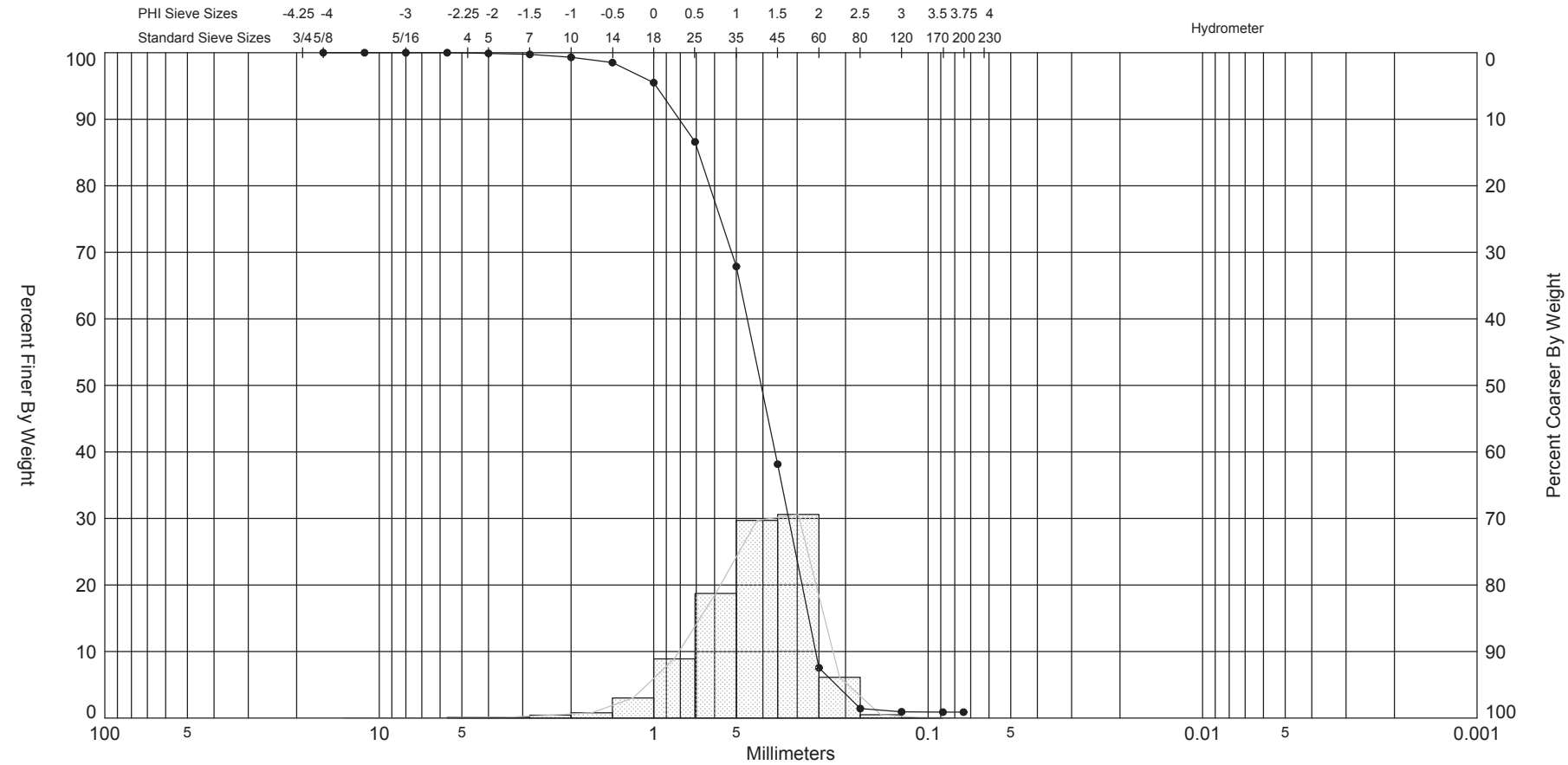

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-21 #2	—●—	-24.9	SP	#200 - 0.89			1.3	1.21	-0.88	4.6	0.66

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	727,167.8
Northing (Y, ft):	1,175,775.8
Horizontal System:	
Vertical System:	

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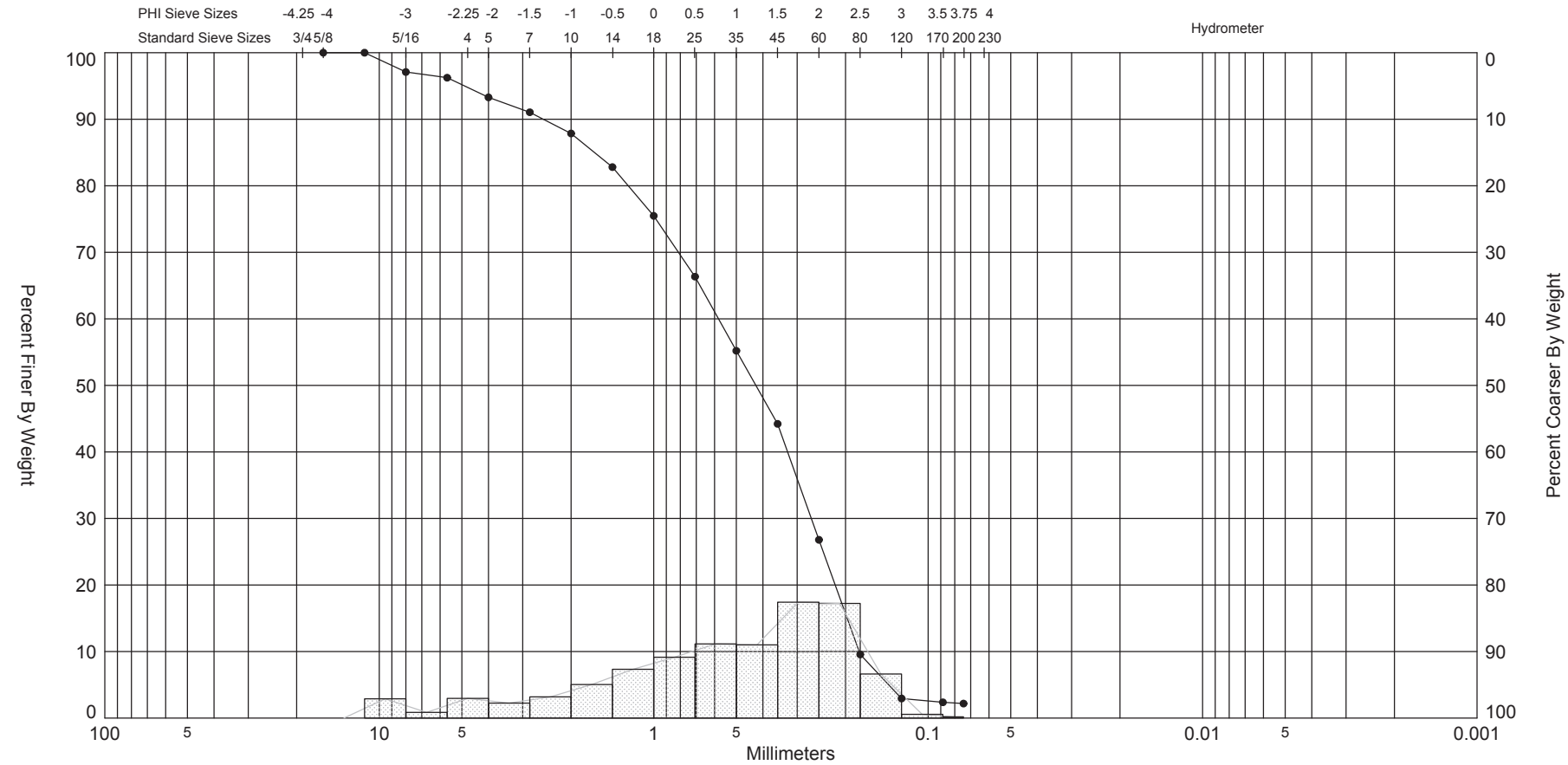

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-21 #3	—●—	-28.9	SW	#200 - 2.18			1.24	0.84	-0.92	3.27	1.5

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA, Inc.
Easting (X, ft):	727,167.8
Northing (Y, ft):	1,175,775.8
Horizontal System:	
Vertical System:	

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Granularmetric Report

Depths and elevations based on measured values

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Project Name: Indian River County
Sample Name: IR-S-09 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,558.3	1,180,264.6		-19.2

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.74	20.73	0.01	0.00	#200 - 0.09			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.34	1.64	0.34	1.64
5	-2.00	4.00	0.13	0.63	0.47	2.27
7	-1.50	2.83	0.20	0.96	0.67	3.23
10	-1.00	2.00	0.29	1.40	0.96	4.63
14	-0.50	1.41	0.69	3.33	1.65	7.96
18	0.00	1.00	1.36	6.56	3.01	14.52
25	0.50	0.71	2.32	11.19	5.33	25.71
35	1.00	0.50	3.34	16.10	8.67	41.81
45	1.50	0.35	5.77	27.82	14.44	69.63
60	2.00	0.25	5.53	26.66	19.97	96.29
80	2.50	0.18	0.68	3.28	20.65	99.57
120	3.00	0.13	0.06	0.29	20.71	99.86
170	3.50	0.09	0.01	0.05	20.72	99.91
200	3.75	0.07	0.00	0.00	20.72	99.91

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
1.98	1.77	1.60	1.15	0.47	0.07	-0.94

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.91	0.53	0.97	-1.48	5.71

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-09 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,558.3	1,180,264.6		-22.7

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
22.16	22.06	0.12	0.00	#200 - 0.99			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.23	1.04	0.23	1.04
5	-2.00	4.00	0.14	0.63	0.37	1.67
7	-1.50	2.83	0.19	0.86	0.56	2.53
10	-1.00	2.00	0.31	1.40	0.87	3.93
14	-0.50	1.41	0.64	2.89	1.51	6.82
18	0.00	1.00	1.49	6.72	3.00	13.54
25	0.50	0.71	2.47	11.15	5.47	24.69
35	1.00	0.50	3.64	16.43	9.11	41.12
45	1.50	0.35	4.41	19.90	13.52	61.02
60	2.00	0.25	5.49	24.77	19.01	85.79
80	2.50	0.18	2.60	11.73	21.61	97.52
120	3.00	0.13	0.30	1.35	21.91	98.87
170	3.50	0.09	0.03	0.14	21.94	99.01
200	3.75	0.07	0.00	0.00	21.94	99.01

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.39	1.96	1.78	1.22	0.51	0.11	-0.81

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.04	0.49	1	-1.12	4.74

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-09 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,558.3	1,180,264.6		-26.7

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.42	20.34	0.05	0.00	#200 - 0.63			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.27	1.32	0.27	1.32
5	-2.00	4.00	0.18	0.88	0.45	2.20
7	-1.50	2.83	0.24	1.18	0.69	3.38
10	-1.00	2.00	0.21	1.03	0.90	4.41
14	-0.50	1.41	0.42	2.06	1.32	6.47
18	0.00	1.00	0.56	2.74	1.88	9.21
25	0.50	0.71	0.88	4.31	2.76	13.52
35	1.00	0.50	1.70	8.33	4.46	21.85
45	1.50	0.35	4.66	22.82	9.12	44.67
60	2.00	0.25	7.62	37.32	16.74	81.99
80	2.50	0.18	3.18	15.57	19.92	97.56
120	3.00	0.13	0.30	1.47	20.22	99.03
170	3.50	0.09	0.00	0.00	20.22	99.03
200	3.75	0.07	0.07	0.34	20.29	99.37

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.42	2.06	1.91	1.57	1.07	0.65	-0.86

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.31	0.40	1	-1.91	7.41

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-09 #4
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,558.3	1,180,264.6		-31.7

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.30	19.62	0.01	0.00	#200 - 3.41			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.05	0.25	0.05	0.25
14	-0.50	1.41	0.11	0.54	0.16	0.79
18	0.00	1.00	0.21	1.03	0.37	1.82
25	0.50	0.71	0.39	1.92	0.76	3.74
35	1.00	0.50	0.65	3.20	1.41	6.94
45	1.50	0.35	1.03	5.07	2.44	12.01
60	2.00	0.25	3.19	15.71	5.63	27.72
80	2.50	0.18	8.47	41.72	14.10	69.44
120	3.00	0.13	4.45	21.92	18.55	91.36
170	3.50	0.09	0.60	2.96	19.15	94.32
200	3.75	0.07	0.46	2.27	19.61	96.59

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.57	2.83	2.63	2.27	1.91	1.63	0.70

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	2.15	0.23	0.72	-1.33	6.36

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-12 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,395.8	1,179,296.9		-18.2

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.10	20.06	0.00	0.10	#200 - 0.30			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.09	0.45	0.09	0.45
5	-2.00	4.00	0.00	0.00	0.09	0.45
7	-1.50	2.83	0.00	0.00	0.09	0.45
10	-1.00	2.00	0.07	0.35	0.16	0.80
14	-0.50	1.41	0.16	0.80	0.32	1.60
18	0.00	1.00	0.41	2.04	0.73	3.64
25	0.50	0.71	1.22	6.07	1.95	9.71
35	1.00	0.50	3.01	14.97	4.96	24.68
45	1.50	0.35	7.00	34.82	11.96	59.50
60	2.00	0.25	7.32	36.42	19.28	95.92
80	2.50	0.18	0.69	3.43	19.97	99.35
120	3.00	0.13	0.07	0.35	20.04	99.70
170	3.50	0.09	0.00	0.00	20.04	99.70
200	3.75	0.07	0.00	0.00	20.04	99.70

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
1.99	1.84	1.71	1.36	1.00	0.71	0.11

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.26	0.42	0.64	-1.87	10.36

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-12 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,395.8	1,179,296.9		-21.7

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.14	20.02	0.00	0.03	#200 - 0.67			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.00	0.00	0.00	0.00
10	-1.00	2.00	0.04	0.20	0.04	0.20
14	-0.50	1.41	0.15	0.74	0.19	0.94
18	0.00	1.00	0.42	2.08	0.61	3.02
25	0.50	0.71	1.38	6.85	1.99	9.87
35	1.00	0.50	3.28	16.28	5.27	26.15
45	1.50	0.35	8.71	43.24	13.98	69.39
60	2.00	0.25	5.00	24.82	18.98	94.21
80	2.50	0.18	0.88	4.37	19.86	98.58
120	3.00	0.13	0.09	0.45	19.95	99.03
170	3.50	0.09	0.00	0.00	19.95	99.03
200	3.75	0.07	0.06	0.30	20.01	99.33

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.09	1.79	1.61	1.28	0.96	0.69	0.14

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.23	0.43	0.58	-0.53	4.99

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-12 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,395.8	1,179,296.9		-25.7

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
21.85	21.70	0.26	0.00	#200 - 1.88			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.20	0.92	0.20	0.92
5/16"	-3.00	8.00	0.00	0.00	0.20	0.92
3.5	-2.50	5.66	0.00	0.00	0.20	0.92
5	-2.00	4.00	0.05	0.23	0.25	1.15
7	-1.50	2.83	0.32	1.46	0.57	2.61
10	-1.00	2.00	0.42	1.92	0.99	4.53
14	-0.50	1.41	0.95	4.35	1.94	8.88
18	0.00	1.00	1.92	8.79	3.86	17.67
25	0.50	0.71	3.21	14.69	7.07	32.36
35	1.00	0.50	3.82	17.48	10.89	49.84
45	1.50	0.35	3.44	15.74	14.33	65.58
60	2.00	0.25	4.36	19.95	18.69	85.53
80	2.50	0.18	2.27	10.39	20.96	95.92
120	3.00	0.13	0.38	1.74	21.34	97.66
170	3.50	0.09	0.07	0.32	21.41	97.98
200	3.75	0.07	0.03	0.14	21.44	98.12

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.46	1.96	1.74	1.01	0.25	-0.09	-0.95

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.88	0.54	1.08	-0.96	5.09

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-12 #4
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,395.8	1,179,296.9		-29.7

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.54	20.42	0.00	0.00	#200 - 0.58			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.05	0.24	0.05	0.24
5	-2.00	4.00	0.00	0.00	0.05	0.24
7	-1.50	2.83	0.06	0.29	0.11	0.53
10	-1.00	2.00	0.09	0.44	0.20	0.97
14	-0.50	1.41	0.31	1.51	0.51	2.48
18	0.00	1.00	0.64	3.12	1.15	5.60
25	0.50	0.71	1.27	6.18	2.42	11.78
35	1.00	0.50	2.36	11.49	4.78	23.27
45	1.50	0.35	4.46	21.72	9.24	44.99
60	2.00	0.25	6.27	30.53	15.51	75.52
80	2.50	0.18	3.72	18.11	19.23	93.63
120	3.00	0.13	0.98	4.77	20.21	98.40
170	3.50	0.09	0.01	0.05	20.22	98.45
200	3.75	0.07	0.20	0.97	20.42	99.42

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.64	2.23	1.99	1.58	1.04	0.68	-0.10

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.45	0.37	0.84	-0.91	5.19

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-14 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,666.3	1,178,001.5		-23.6

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.45	19.34	0.11	0.00	#200 - 1.11			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.12	0.62	0.12	0.62
5	-2.00	4.00	0.03	0.15	0.15	0.77
7	-1.50	2.83	0.13	0.67	0.28	1.44
10	-1.00	2.00	0.15	0.77	0.43	2.21
14	-0.50	1.41	0.43	2.21	0.86	4.42
18	0.00	1.00	0.83	4.27	1.69	8.69
25	0.50	0.71	1.48	7.61	3.17	16.30
35	1.00	0.50	2.49	12.80	5.66	29.10
45	1.50	0.35	3.67	18.87	9.33	47.97
60	2.00	0.25	5.27	27.10	14.60	75.07
80	2.50	0.18	3.76	19.34	18.36	94.41
120	3.00	0.13	0.81	4.17	19.17	98.58
170	3.50	0.09	0.04	0.21	19.21	98.79
200	3.75	0.07	0.02	0.10	19.23	98.89

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.57	2.23	2.00	1.54	0.84	0.48	-0.43

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.33	0.40	0.94	-1.19	5.2

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-14 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,666.3	1,178,001.5		-27.1

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.95	19.82	0.34	0.00	#200 - 2.36			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.19	0.95	0.19	0.95
3.5	-2.50	5.66	0.09	0.45	0.28	1.40
5	-2.00	4.00	0.09	0.45	0.37	1.85
7	-1.50	2.83	0.07	0.35	0.44	2.20
10	-1.00	2.00	0.14	0.70	0.58	2.90
14	-0.50	1.41	0.36	1.80	0.94	4.70
18	0.00	1.00	0.77	3.86	1.71	8.56
25	0.50	0.71	1.51	7.57	3.22	16.13
35	1.00	0.50	2.91	14.59	6.13	30.72
45	1.50	0.35	4.61	23.11	10.74	53.83
60	2.00	0.25	6.54	32.79	17.28	86.62
80	2.50	0.18	1.89	9.47	19.17	96.09
120	3.00	0.13	0.26	1.30	19.43	97.39
170	3.50	0.09	0.03	0.15	19.46	97.54
200	3.75	0.07	0.02	0.10	19.48	97.64

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.44	1.96	1.82	1.42	0.80	0.49	-0.46

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.18	0.44	0.95	-1.85	8.41

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-14 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,666.3	1,178,001.5		-31.1

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.23	19.74	0.10	0.00	#200 - 2.93			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.29	1.43	0.29	1.43
5	-2.00	4.00	0.34	1.68	0.63	3.11
7	-1.50	2.83	0.37	1.83	1.00	4.94
10	-1.00	2.00	0.22	1.09	1.22	6.03
14	-0.50	1.41	0.51	2.52	1.73	8.55
18	0.00	1.00	0.80	3.95	2.53	12.50
25	0.50	0.71	1.35	6.67	3.88	19.17
35	1.00	0.50	2.17	10.73	6.05	29.90
45	1.50	0.35	2.63	13.00	8.68	42.90
60	2.00	0.25	4.59	22.69	13.27	65.59
80	2.50	0.18	3.88	19.18	17.15	84.77
120	3.00	0.13	1.89	9.34	19.04	94.11
170	3.50	0.09	0.32	1.58	19.36	95.69
200	3.75	0.07	0.28	1.38	19.64	97.07

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.28	2.48	2.25	1.66	0.77	0.26	-1.47

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.33	0.40	1.26	-1.16	4.41

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-15 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,129.4	1,178,509.4		-17.6

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.60	19.45	0.16	0.00	#200 - 1.56			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.36	1.84	0.36	1.84
5	-2.00	4.00	0.09	0.46	0.45	2.30
7	-1.50	2.83	0.16	0.82	0.61	3.12
10	-1.00	2.00	0.06	0.31	0.67	3.43
14	-0.50	1.41	0.30	1.53	0.97	4.96
18	0.00	1.00	0.63	3.21	1.60	8.17
25	0.50	0.71	1.34	6.84	2.94	15.01
35	1.00	0.50	2.90	14.80	5.84	29.81
45	1.50	0.35	5.82	29.70	11.66	59.51
60	2.00	0.25	6.32	32.25	17.98	91.76
80	2.50	0.18	1.21	6.17	19.19	97.93
120	3.00	0.13	0.08	0.41	19.27	98.34
170	3.50	0.09	0.01	0.05	19.28	98.39
200	3.75	0.07	0.01	0.05	19.29	98.44

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.26	1.88	1.74	1.34	0.84	0.53	-0.49

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.14	0.45	0.92	-2.05	8.69

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-15 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,129.4	1,178,509.4		-21.1

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.91	19.83	0.15	0.00	#200 - 1.17			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.35	1.76	0.35	1.76
5	-2.00	4.00	0.49	2.46	0.84	4.22
7	-1.50	2.83	0.56	2.81	1.40	7.03
10	-1.00	2.00	0.48	2.41	1.88	9.44
14	-0.50	1.41	1.40	7.03	3.28	16.47
18	0.00	1.00	1.71	8.59	4.99	25.06
25	0.50	0.71	2.54	12.76	7.53	37.82
35	1.00	0.50	3.24	16.27	10.77	54.09
45	1.50	0.35	5.95	29.88	16.72	83.97
60	2.00	0.25	2.68	13.46	19.40	97.43
80	2.50	0.18	0.20	1.00	19.60	98.43
120	3.00	0.13	0.03	0.15	19.63	98.58
170	3.50	0.09	0.01	0.05	19.64	98.63
200	3.75	0.07	0.04	0.20	19.68	98.83

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
1.91	1.50	1.35	0.87	0.00	-0.53	-1.86

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.55	0.68	1.1	-1.04	3.79

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-15 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,129.4	1,178,509.4		-25.1

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.55	19.22	0.23	0.00	#200 - 2.84			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.34	1.74	0.34	1.74
7	-1.50	2.83	0.24	1.23	0.58	2.97
10	-1.00	2.00	0.46	2.35	1.04	5.32
14	-0.50	1.41	1.18	6.04	2.22	11.36
18	0.00	1.00	1.46	7.47	3.68	18.83
25	0.50	0.71	2.08	10.64	5.76	29.47
35	1.00	0.50	3.10	15.86	8.86	45.33
45	1.50	0.35	4.35	22.26	13.21	67.59
60	2.00	0.25	4.10	20.98	17.31	88.57
80	2.50	0.18	1.23	6.29	18.54	94.86
120	3.00	0.13	0.31	1.59	18.85	96.45
170	3.50	0.09	0.10	0.51	18.95	96.96
200	3.75	0.07	0.04	0.20	18.99	97.16

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.54	1.89	1.68	1.10	0.29	-0.19	-1.07

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.87	0.55	1.05	-0.74	3.48

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-15 #4
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,129.4	1,178,509.4		-31.1

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.79	19.25	0.24	0.00	#200 - 3.93			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.60	3.03	0.60	3.03
3.5	-2.50	5.66	0.42	2.12	1.02	5.15
5	-2.00	4.00	0.05	0.25	1.07	5.40
7	-1.50	2.83	0.32	1.62	1.39	7.02
10	-1.00	2.00	0.51	2.58	1.90	9.60
14	-0.50	1.41	0.77	3.89	2.67	13.49
18	0.00	1.00	0.95	4.80	3.62	18.29
25	0.50	0.71	1.41	7.13	5.03	25.42
35	1.00	0.50	1.90	9.60	6.93	35.02
45	1.50	0.35	2.77	14.00	9.70	49.02
60	2.00	0.25	3.34	16.88	13.04	65.90
80	2.50	0.18	3.51	17.74	16.55	83.64
120	3.00	0.13	1.91	9.65	18.46	93.29
170	3.50	0.09	0.12	0.61	18.58	93.90
200	3.75	0.07	0.43	2.17	19.01	96.07

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.63	2.52	2.26	1.53	0.47	-0.24	-2.54

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.1	0.47	1.52	-1.12	4.01

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-16 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,680.7	1,178,759.8		-21.5

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.78	19.59	0.00	0.00	#200 - 0.95			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.11	0.56	0.11	0.56
3.5	-2.50	5.66	0.17	0.86	0.28	1.42
5	-2.00	4.00	0.00	0.00	0.28	1.42
7	-1.50	2.83	0.02	0.10	0.30	1.52
10	-1.00	2.00	0.11	0.56	0.41	2.08
14	-0.50	1.41	0.41	2.07	0.82	4.15
18	0.00	1.00	0.63	3.19	1.45	7.34
25	0.50	0.71	1.23	6.22	2.68	13.56
35	1.00	0.50	1.76	8.90	4.44	22.46
45	1.50	0.35	3.42	17.29	7.86	39.75
60	2.00	0.25	5.52	27.91	13.38	67.66
80	2.50	0.18	5.42	27.40	18.80	95.06
120	3.00	0.13	0.75	3.79	19.55	98.85
170	3.50	0.09	0.02	0.10	19.57	98.95
200	3.75	0.07	0.02	0.10	19.59	99.05

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.50	2.30	2.13	1.68	1.07	0.64	-0.37

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.45	0.37	0.97	-1.82	7.98

GRANULARMETRIC REPORT IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 1/16/08

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-16 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,680.7	1,178,759.8		-25.4

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.20	19.87	0.20	0.00	#200 - 2.61			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.01	0.05	0.01	0.05
10	-1.00	2.00	0.09	0.45	0.10	0.50
14	-0.50	1.41	0.12	0.59	0.22	1.09
18	0.00	1.00	0.32	1.58	0.54	2.67
25	0.50	0.71	0.67	3.32	1.21	5.99
35	1.00	0.50	1.56	7.72	2.77	13.71
45	1.50	0.35	2.94	14.56	5.71	28.27
60	2.00	0.25	7.50	37.13	13.21	65.40
80	2.50	0.18	5.65	27.97	18.86	93.37
120	3.00	0.13	0.65	3.22	19.51	96.59
170	3.50	0.09	0.08	0.40	19.59	96.99
200	3.75	0.07	0.08	0.40	19.67	97.39

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.75	2.33	2.17	1.79	1.39	1.08	0.35

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.67	0.31	0.68	-1.15	5.51

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-16 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,680.7	1,178,759.8		-29.4

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
22.43	21.57	0.01	0.00	#200 - 3.89			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.35	1.56	0.35	1.56
3.5	-2.50	5.66	0.07	0.31	0.42	1.87
5	-2.00	4.00	0.17	0.76	0.59	2.63
7	-1.50	2.83	0.35	1.56	0.94	4.19
10	-1.00	2.00	0.30	1.34	1.24	5.53
14	-0.50	1.41	0.47	2.10	1.71	7.63
18	0.00	1.00	0.65	2.90	2.36	10.53
25	0.50	0.71	1.29	5.75	3.65	16.28
35	1.00	0.50	2.04	9.09	5.69	25.37
45	1.50	0.35	2.55	11.37	8.24	36.74
60	2.00	0.25	4.54	20.24	12.78	56.98
80	2.50	0.18	4.90	21.84	17.68	78.82
120	3.00	0.13	3.08	13.73	20.76	92.55
170	3.50	0.09	0.40	1.78	21.16	94.33
200	3.75	0.07	0.40	1.78	21.56	96.11

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.59	2.69	2.41	1.83	0.98	0.48	-1.20

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.48	0.36	1.29	-1.43	5.46

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-17 #1
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,754.6	1,177,596.6		-18.7

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.81	19.73	0.01	0.00	#200 - 0.45			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.35	1.77	0.35	1.77
5	-2.00	4.00	0.10	0.50	0.45	2.27
7	-1.50	2.83	0.10	0.50	0.55	2.77
10	-1.00	2.00	0.18	0.91	0.73	3.68
14	-0.50	1.41	0.34	1.72	1.07	5.40
18	0.00	1.00	0.80	4.04	1.87	9.44
25	0.50	0.71	1.49	7.52	3.36	16.96
35	1.00	0.50	2.64	13.33	6.00	30.29
45	1.50	0.35	3.91	19.74	9.91	50.03
60	2.00	0.25	6.56	33.11	16.47	83.14
80	2.50	0.18	3.08	15.55	19.55	98.69
120	3.00	0.13	0.15	0.76	19.70	99.45
170	3.50	0.09	0.01	0.05	19.71	99.50
200	3.75	0.07	0.01	0.05	19.72	99.55

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.38	2.03	1.88	1.50	0.80	0.44	-0.62

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.22	0.43	0.99	-1.74	6.98

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-17 #2
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,754.6	1,177,596.6		-22.2

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.96	19.27	0.00	0.00	#200 - 3.46			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.23	1.15	0.23	1.15
10	-1.00	2.00	0.25	1.25	0.48	2.40
14	-0.50	1.41	0.43	2.15	0.91	4.55
18	0.00	1.00	0.65	3.26	1.56	7.81
25	0.50	0.71	1.45	7.26	3.01	15.07
35	1.00	0.50	2.92	14.63	5.93	29.70
45	1.50	0.35	5.65	28.31	11.58	58.01
60	2.00	0.25	6.66	33.37	18.24	91.38
80	2.50	0.18	0.96	4.81	19.20	96.19
120	3.00	0.13	0.05	0.25	19.25	96.44
170	3.50	0.09	0.01	0.05	19.26	96.49
200	3.75	0.07	0.01	0.05	19.27	96.54

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.38	1.89	1.75	1.36	0.84	0.53	-0.43

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.16	0.45	0.78	-1.36	5.3

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-17 #3
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,754.6	1,177,596.6		-26.2

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.73	19.44	0.01	0.00	#200 - 1.52			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.19	0.96	0.19	0.96
3.5	-2.50	5.66	0.12	0.61	0.31	1.57
5	-2.00	4.00	0.30	1.52	0.61	3.09
7	-1.50	2.83	0.38	1.93	0.99	5.02
10	-1.00	2.00	0.69	3.50	1.68	8.52
14	-0.50	1.41	1.27	6.44	2.95	14.96
18	0.00	1.00	1.65	8.36	4.60	23.32
25	0.50	0.71	2.22	11.25	6.82	34.57
35	1.00	0.50	3.21	16.27	10.03	50.84
45	1.50	0.35	4.59	23.26	14.62	74.10
60	2.00	0.25	4.13	20.93	18.75	95.03
80	2.50	0.18	0.52	2.64	19.27	97.67
120	3.00	0.13	0.09	0.46	19.36	98.13
170	3.50	0.09	0.04	0.20	19.40	98.33
200	3.75	0.07	0.03	0.15	19.43	98.48

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.00	1.74	1.52	0.97	0.07	-0.44	-1.51

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.67	0.63	1.13	-1.04	4.09

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-18 #1
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,435.2	1,176,997.6		-22.2

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.64	19.51	0.00	0.00	#200 - 0.65			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.06	0.31	0.06	0.31
10	-1.00	2.00	0.16	0.81	0.22	1.12
14	-0.50	1.41	0.41	2.09	0.63	3.21
18	0.00	1.00	0.71	3.62	1.34	6.83
25	0.50	0.71	1.30	6.62	2.64	13.45
35	1.00	0.50	2.10	10.69	4.74	24.14
45	1.50	0.35	3.69	18.79	8.43	42.93
60	2.00	0.25	4.64	23.63	13.07	66.56
80	2.50	0.18	5.41	27.55	18.48	94.11
120	3.00	0.13	0.99	5.04	19.47	99.15
170	3.50	0.09	0.01	0.05	19.48	99.20
200	3.75	0.07	0.03	0.15	19.51	99.35

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.59	2.32	2.15	1.65	1.02	0.62	-0.25

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.48	0.36	0.86	-0.94	3.74

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-18 #2
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,435.2	1,176,997.6		-25.7

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.77	19.62	0.00	0.00	#200 - 0.76			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.04	0.20	0.04	0.20
5	-2.00	4.00	0.00	0.00	0.04	0.20
7	-1.50	2.83	0.01	0.05	0.05	0.25
10	-1.00	2.00	0.16	0.81	0.21	1.06
14	-0.50	1.41	0.43	2.18	0.64	3.24
18	0.00	1.00	0.90	4.55	1.54	7.79
25	0.50	0.71	1.80	9.10	3.34	16.89
35	1.00	0.50	3.29	16.64	6.63	33.53
45	1.50	0.35	4.83	24.43	11.46	57.96
60	2.00	0.25	6.70	33.89	18.16	91.85
80	2.50	0.18	1.30	6.58	19.46	98.43
120	3.00	0.13	0.11	0.56	19.57	98.99
170	3.50	0.09	0.03	0.15	19.60	99.14
200	3.75	0.07	0.02	0.10	19.62	99.24

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.24	1.88	1.75	1.34	0.74	0.45	-0.31

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	1.18	0.44	0.76	-0.99	4.7

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-18 #3
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,435.2	1,176,997.6		-29.7

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
18.34	17.92	0.00	0.00	#200 - 2.27			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.17	0.93	0.17	0.93
7	-1.50	2.83	0.29	1.58	0.46	2.51
10	-1.00	2.00	0.30	1.64	0.76	4.15
14	-0.50	1.41	0.73	3.98	1.49	8.13
18	0.00	1.00	0.10	0.55	1.59	8.68
25	0.50	0.71	1.56	8.51	3.15	17.19
35	1.00	0.50	2.12	11.56	5.27	28.75
45	1.50	0.35	2.76	15.05	8.03	43.80
60	2.00	0.25	3.62	19.74	11.65	63.54
80	2.50	0.18	4.54	24.75	16.19	88.29
120	3.00	0.13	1.45	7.91	17.64	96.20
170	3.50	0.09	0.02	0.11	17.66	96.31
200	3.75	0.07	0.26	1.42	17.92	97.73

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.92	2.41	2.23	1.66	0.84	0.43	-0.89

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.4	0.38	1.1	-1.02	4.1

GRANULARMETRIC REPORT IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 1/16/08

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-19 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,675.7	1,176,404.3		-18.6

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.02	19.93	0.00	0.06	#200 - 0.49			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.37	1.85	0.37	1.85
5/16"	-3.00	8.00	0.00	0.00	0.37	1.85
3.5	-2.50	5.66	0.11	0.55	0.48	2.40
5	-2.00	4.00	0.00	0.00	0.48	2.40
7	-1.50	2.83	0.20	1.00	0.68	3.40
10	-1.00	2.00	0.16	0.80	0.84	4.20
14	-0.50	1.41	0.48	2.40	1.32	6.60
18	0.00	1.00	0.90	4.50	2.22	11.10
25	0.50	0.71	1.77	8.84	3.99	19.94
35	1.00	0.50	3.08	15.38	7.07	35.32
45	1.50	0.35	4.13	20.63	11.20	55.95
60	2.00	0.25	5.69	28.42	16.89	84.37
80	2.50	0.18	2.79	13.94	19.68	98.31
120	3.00	0.13	0.19	0.95	19.87	99.26
170	3.50	0.09	0.03	0.15	19.90	99.41
200	3.75	0.07	0.02	0.10	19.92	99.51

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.38	1.99	1.84	1.36	0.66	0.28	-0.83

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.11	0.46	1.11	-1.99	8.66

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-19 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,675.7	1,176,404.3		-22.1

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.50	19.44	0.02	0.00	#200 - 0.41			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.10	0.02	0.10
10	-1.00	2.00	0.09	0.46	0.11	0.56
14	-0.50	1.41	0.25	1.28	0.36	1.84
18	0.00	1.00	0.61	3.13	0.97	4.97
25	0.50	0.71	1.84	9.44	2.81	14.41
35	1.00	0.50	3.99	20.46	6.80	34.87
45	1.50	0.35	7.80	40.00	14.60	74.87
60	2.00	0.25	4.29	22.00	18.89	96.87
80	2.50	0.18	0.48	2.46	19.37	99.33
120	3.00	0.13	0.05	0.26	19.42	99.59
170	3.50	0.09	0.00	0.00	19.42	99.59
200	3.75	0.07	0.00	0.00	19.42	99.59

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
1.96	1.71	1.50	1.19	0.76	0.54	0.00

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.1	0.47	0.61	-0.9	4.52

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-19 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,675.7	1,176,404.3		-26.1

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.40	20.17	0.26	0.00	#200 - 2.42			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	1.00	4.90	1.00	4.90
5/16"	-3.00	8.00	0.48	2.35	1.48	7.25
3.5	-2.50	5.66	0.48	2.35	1.96	9.60
5	-2.00	4.00	0.36	1.76	2.32	11.36
7	-1.50	2.83	0.57	2.79	2.89	14.15
10	-1.00	2.00	0.88	4.31	3.77	18.46
14	-0.50	1.41	1.25	6.13	5.02	24.59
18	0.00	1.00	1.60	7.84	6.62	32.43
25	0.50	0.71	1.98	9.71	8.60	42.14
35	1.00	0.50	2.55	12.50	11.15	54.64
45	1.50	0.35	2.97	14.56	14.12	69.20
60	2.00	0.25	4.08	20.00	18.20	89.20
80	2.50	0.18	1.52	7.45	19.72	96.65
120	3.00	0.13	0.16	0.78	19.88	97.43
170	3.50	0.09	0.02	0.10	19.90	97.53
200	3.75	0.07	0.01	0.05	19.91	97.58

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.39	1.87	1.64	0.81	-0.47	-1.29	-3.48

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.32	0.80	1.65	-1.01	3.2

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-19 #4
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,675.7	1,176,404.3		-31.1

USCS:	Munsell:	Comments:
SW-SM		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
27.51	25.84	0.11	0.00	#200 - 6.48			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.76	2.76	0.76	2.76
5/16"	-3.00	8.00	1.20	4.36	1.96	7.12
3.5	-2.50	5.66	2.16	7.85	4.12	14.97
5	-2.00	4.00	2.39	8.69	6.51	23.66
7	-1.50	2.83	1.83	6.65	8.34	30.31
10	-1.00	2.00	2.23	8.11	10.57	38.42
14	-0.50	1.41	2.92	10.61	13.49	49.03
18	0.00	1.00	2.71	9.85	16.20	58.88
25	0.50	0.71	2.93	10.65	19.13	69.53
35	1.00	0.50	2.36	8.58	21.49	78.11
45	1.50	0.35	1.28	4.65	22.77	82.76
60	2.00	0.25	1.03	3.74	23.80	86.50
80	2.50	0.18	0.65	2.36	24.45	88.86
120	3.00	0.13	0.41	1.49	24.86	90.35
170	3.50	0.09	0.45	1.64	25.31	91.99
200	3.75	0.07	0.42	1.53	25.73	93.52

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
	1.67	0.82	-0.45	-1.90	-2.44	-3.24

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	-0.6	1.52	1.73	0.27	2.55

GRANULARMETRIC REPORT IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 1/16/08

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-20 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,501.4	1,178,192.9		-22.0

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
21.73	21.62	0.00	0.00	#200 - 0.51			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.00	0.00	0.00	0.00
7	-1.50	2.83	0.02	0.09	0.02	0.09
10	-1.00	2.00	0.22	1.01	0.24	1.10
14	-0.50	1.41	0.28	1.29	0.52	2.39
18	0.00	1.00	0.52	2.39	1.04	4.78
25	0.50	0.71	1.08	4.97	2.12	9.75
35	1.00	0.50	2.35	10.81	4.47	20.56
45	1.50	0.35	5.44	25.03	9.91	45.59
60	2.00	0.25	10.06	46.30	19.97	91.89
80	2.50	0.18	1.51	6.95	21.48	98.84
120	3.00	0.13	0.11	0.51	21.59	99.35
170	3.50	0.09	0.02	0.09	21.61	99.44
200	3.75	0.07	0.01	0.05	21.62	99.49

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.22	1.91	1.82	1.55	1.09	0.79	0.02

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.37	0.39	0.67	-1.46	5.96

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-20 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,501.4	1,178,192.9		-25.5

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
21.59	21.34	0.12	0.00	#200 - 1.70			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.06	0.28	0.06	0.28
5	-2.00	4.00	0.12	0.56	0.18	0.84
7	-1.50	2.83	0.03	0.14	0.21	0.98
10	-1.00	2.00	0.05	0.23	0.26	1.21
14	-0.50	1.41	0.10	0.46	0.36	1.67
18	0.00	1.00	0.30	1.39	0.66	3.06
25	0.50	0.71	0.82	3.80	1.48	6.86
35	1.00	0.50	2.09	9.68	3.57	16.54
45	1.50	0.35	5.24	24.27	8.81	40.81
60	2.00	0.25	9.80	45.40	18.61	86.21
80	2.50	0.18	2.32	10.75	20.93	96.96
120	3.00	0.13	0.18	0.83	21.11	97.79
170	3.50	0.09	0.06	0.28	21.17	98.07
200	3.75	0.07	0.05	0.23	21.22	98.30

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.41	1.98	1.88	1.60	1.17	0.97	0.26

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.45	0.37	0.69	-2.06	11.65

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-20 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,501.4	1,178,192.9		-29.5

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
22.91	22.74	0.00	0.00	#200 - 0.74			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.59	2.58	0.59	2.58
5	-2.00	4.00	0.68	2.97	1.27	5.55
7	-1.50	2.83	0.39	1.70	1.66	7.25
10	-1.00	2.00	0.56	2.44	2.22	9.69
14	-0.50	1.41	0.85	3.71	3.07	13.40
18	0.00	1.00	1.04	4.54	4.11	17.94
25	0.50	0.71	1.66	7.25	5.77	25.19
35	1.00	0.50	2.75	12.00	8.52	37.19
45	1.50	0.35	4.87	21.26	13.39	58.45
60	2.00	0.25	6.80	29.68	20.19	88.13
80	2.50	0.18	2.08	9.08	22.27	97.21
120	3.00	0.13	0.35	1.53	22.62	98.74
170	3.50	0.09	0.09	0.39	22.71	99.13
200	3.75	0.07	0.03	0.13	22.74	99.26

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.38	1.93	1.78	1.30	0.49	-0.21	-2.09

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.93	0.52	1.25	-1.3	4.24

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-21 #1
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,167.8	1,175,775.8		-21.4

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.91	19.72	0.00	0.00	#200 - 0.95			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.01	0.05	0.01	0.05
7	-1.50	2.83	0.08	0.40	0.09	0.45
10	-1.00	2.00	0.08	0.40	0.17	0.85
14	-0.50	1.41	0.30	1.51	0.47	2.36
18	0.00	1.00	0.52	2.61	0.99	4.97
25	0.50	0.71	1.16	5.83	2.15	10.80
35	1.00	0.50	2.00	10.05	4.15	20.85
45	1.50	0.35	3.52	17.68	7.67	38.53
60	2.00	0.25	5.26	26.42	12.93	64.95
80	2.50	0.18	5.81	29.18	18.74	94.13
120	3.00	0.13	0.92	4.62	19.66	98.75
170	3.50	0.09	0.00	0.00	19.66	98.75
200	3.75	0.07	0.06	0.30	19.72	99.05

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.69	2.33	2.17	1.72	1.12	0.76	0.00

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.55	0.34	0.82	-1.07	4.47

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-21 #2
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,167.8	1,175,775.8		-24.9

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.23	20.07	0.02	0.00	#200 - 0.89			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.10	0.02	0.10
7	-1.50	2.83	0.03	0.15	0.05	0.25
10	-1.00	2.00	0.09	0.44	0.14	0.69
14	-0.50	1.41	0.16	0.79	0.30	1.48
18	0.00	1.00	0.61	3.02	0.91	4.50
25	0.50	0.71	1.80	8.90	2.71	13.40
35	1.00	0.50	3.79	18.73	6.50	32.13
45	1.50	0.35	6.01	29.71	12.51	61.84
60	2.00	0.25	6.19	30.60	18.70	92.44
80	2.50	0.18	1.24	6.13	19.94	98.57
120	3.00	0.13	0.10	0.49	20.04	99.06
170	3.50	0.09	0.01	0.05	20.05	99.11
200	3.75	0.07	0.00	0.00	20.05	99.11

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.21	1.86	1.72	1.30	0.81	0.57	0.03

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.21	0.43	0.66	-0.88	4.6

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-21 #3
Analysis Date:
Analyzed By: SEA, Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
727,167.8	1,175,775.8		-28.9

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
21.01	20.55	0.00	0.00	#200 - 2.18			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.61	2.90	0.61	2.90
3.5	-2.50	5.66	0.18	0.86	0.79	3.76
5	-2.00	4.00	0.62	2.95	1.41	6.71
7	-1.50	2.83	0.47	2.24	1.88	8.95
10	-1.00	2.00	0.67	3.19	2.55	12.14
14	-0.50	1.41	1.06	5.05	3.61	17.19
18	0.00	1.00	1.54	7.33	5.15	24.52
25	0.50	0.71	1.92	9.14	7.07	33.66
35	1.00	0.50	2.34	11.14	9.41	44.80
45	1.50	0.35	2.31	10.99	11.72	55.79
60	2.00	0.25	3.66	17.42	15.38	73.21
80	2.50	0.18	3.62	17.23	19.00	90.44
120	3.00	0.13	1.39	6.62	20.39	97.06
170	3.50	0.09	0.12	0.57	20.51	97.63
200	3.75	0.07	0.04	0.19	20.55	97.82

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.84	2.31	2.05	1.24	0.03	-0.62	-2.29

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.84	0.56	1.5	-0.92	3.27

Section 3d

Offshore Sand Sources

Sub-Area 2

Compositional & Color Analysis

Compositional & Color Analysis (Sub Area 2)[1]

Sample #	Organics [%]	CaCO3 [%]	Siliciclastic [%]	Wet Munsell Color	Description	Dry Munsell Color	Description
IRS 9: 1.0	1.6	59.7	38.7	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 9: 3.0	1.6	63.8	34.6	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 9: 7.0	1.5	64.8	33.7	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 9: 9.0	1.8	65.8	32.4	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 9: 11.0	1.9	69.6	28.5	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 12: 3.0	1.7	55.7	42.5	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 12: 9.0	1.7	67.3	31.0	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 12: 11.0	1.8	71.5	26.7	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 14: 3.0	1.7	64.5	33.8	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 14: 7.0	2.0	70.2	27.7	10YR 6/1	Gray	10YR 7/1	Lt. Gray
IRS 16: 3.0	1.7	63.1	35.2	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 16: 7.0	1.9	74.0	24.1	10YR 6/1	Gray	10YR 7/1	Lt. Gray
IRS 16: 9.0	2.0	68.9	29.2	10YR 6/1	Gray	10YR 7/1	Lt. Gray
IRS 17: 1.0	1.7	64.1	34.1	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 17: 9.0	1.7	60.1	38.2	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 17: 13.0	1.8	69.1	29.1	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 18: 1.0	1.5	58.4	40.1	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 18: 5.0	1.9	74.6	23.5	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 18: 9.0	2.0	76.0	21.9	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 19: 3.0	1.6	57.8	40.6	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 19: 9.0	1.8	76.7	21.4	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 19: 13.0	1.8	72.0	26.1	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 20: 3.0	1.7	63.8	34.5	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 20: 7.0	1.7	67.0	31.3	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 20: 9.0	1.9	73.4	24.7	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 21: 3.0	1.8	72.4	25.8	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 21: 7.0	2.0	80.2	17.8	10YR 6/1	Gray	10YR 7/1	Lt. Gray

[1] Data from Indian River County, Sector 3 Beach & Dune Restoration Project – Design Document. Prepared by Coastal Tech, January 2008

Section 3e

Offshore Sand Sources

Sub-Area 3

Sample Summary Table

Sample Summary Table (Sub Area 3)[1]

Core #	Interval [ft]	Gravel [% wt ret]	Sand [% wt ret]	< #200 [% wt ret]	Mean [mm]	Phi [ϕ]	USCS
IR-S-22	0.5	0.18	99.25	0.57	0.37	0.79	SP
	4.0	2.51	95.82	1.67	0.53	1.14	SW
	8.0	1.96	95.25	2.79	0.43	1.11	SW
	11.0	3.65	91.61	4.74	0.52	1.29	SW
IR-S-24	0.5	0.10	98.82	1.08	0.37	0.85	SP
	4.0	2.50	97.11	0.39	0.41	0.91	SW
	8.0	3.27	94.81	1.92	0.54	1.22	SW
	12.0	1.46	96.67	1.87	0.34	0.89	SW
IR-S-25	0.5	0.67	99.29	0.04	0.36	0.84	SP
	4.0	4.54	94.56	0.90	0.67	1.25	SW
	8.0	0.25	98.42	1.33	0.54	1.11	SW
	11.0	1.02	94.86	4.12	0.31	1.16	SW

[1] Data summarized from Granulametric Curves & Reports (Appendix A - Section 3g)

Section 3f

Offshore Sand Sources

Sub-Area 3

Boring Logs

Boring Designation IR-S-22

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-22; LOCATION COORDINATES: X = 726,460.4 Y = 1,175,416.7	11. MANUFACTURER'S DESIGNATION OF DRILL: ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING: STARTED 06-26-99; COMPLETED 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -19.7 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 18.4 Ft.
8. TOTAL DEPTH OF BORING: 18.4 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Depths and elevations based on measured values)	% REC.	BOX OR SAMPLE	REMARKS
-19.7	0.0					
			Tan medium to fine sand, shell fragments, whole shells to 1 inch, (10YR-6.5/2), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0'
-31.0	11.3				4	Sample #4, Depth = 11.0'
-32.1	12.4		Brown to gray medium to fine sand, shell fragments, (10YR-6.5/1), (SP).			
-34.6	14.9		Brown fine sand and silt, (10YR-6.5/2), (SM).			
-38.1	18.4		Gray to brown coarse shell and sand matrix, gray (10YR-6/1), (GW).		Comp	Sample #Comp, Depth = 18.0' Comp (0-12.0')
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

SAJ FORM 1836 **MODIFIED FOR THE FLORIDA DEP**
JUN 02 JUN 04

Boring Designation IR-S-24

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-24; LOCATION COORDINATES: X = 726,256.7 Y = 1,174,162.7	11. MANUFACTURER'S DESIGNATION OF DRILL; ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING; STARTED: 06-26-99; COMPLETED: 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -19.2 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 17.8 Ft.
8. TOTAL DEPTH OF BORING: 17.8 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Depths and elevations based on measured values)	% REC.	BOX OR SAMPLE	REMARKS
-19.2	0.0					
			Tan medium to fine sand, shell fragments, whole shells to 1 inch, (10YR-6.5/3), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0' Sample wash weight adjusted
					3	Sample #3, Depth = 8.0'
					4	Sample #4, Depth = 12.0'
-31.8	12.6					
-32.5	13.3		Gray shelly medium to fine sand, whole shells up to 1 inch, (10YR-6.5/2), (SP).			
			Brown fine sand and silt, no shell material, light gray (10YR-7/2), (SM).		Comp	Sample #Comp, Depth = 16.0' Comp (0-13.0')
-35.6	16.4					
-37.0	17.8		Gray to brown coarse shell sand-silt matrix, (10YR-6.5/1), (GW).			
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

SAJ FORM 1836 **MODIFIED FOR THE FLORIDA DEP**
JUN 02 JUN 04

Boring Designation IR-S-25

DRILLING LOG	DIVISION	INSTALLATION	SHEET 1 OF 1 SHEETS

1. PROJECT: Indian River County	9. SIZE AND TYPE OF BIT: 4.0 In.
	10. COORDINATE SYSTEM/DATUM: Florida State Plane East; HORIZONTAL: NAD 1983; VERTICAL: NAVD 88
2. BORING DESIGNATION: IR-S-25; LOCATION COORDINATES: X = 726,065.1 Y = 1,173,074.6	11. MANUFACTURER'S DESIGNATION OF DRILL; ☐ AUTO HAMMER ☐ MANUAL HAMMER
3. DRILLING AGENCY; CONTRACTOR FILE NO.	12. TOTAL SAMPLES; DISTURBED; UNDISTURBED (UD)
4. NAME OF DRILLER: Alpine Ocean Seismic Survey Inc	13. TOTAL NUMBER CORE BOXES: 2
5. DIRECTION OF BORING: ☒ VERTICAL ☐ INCLINED; DEG. FROM VERTICAL; BEARING	14. ELEVATION GROUND WATER
	15. DATE BORING; STARTED: 06-26-99; COMPLETED: 06-26-99
6. THICKNESS OF OVERBURDEN: 0.0 Ft.	16. ELEVATION TOP OF BORING: -18.6 Ft.
7. DEPTH DRILLED INTO ROCK: 0.0 Ft.	17. TOTAL RECOVERY FOR BORING: 18.9 Ft.
8. TOTAL DEPTH OF BORING: 18.9 Ft.	18. SIGNATURE AND TITLE OF INSPECTOR: Gary Zarillo, PG

ELEV. (ft)	DEPTH (ft)	LEGEND	CLASSIFICATION OF MATERIALS (Depths and elevations based on measured values)	% REC.	BOX OR SAMPLE	REMARKS
-18.6	0.0					
			Tan medium to fine sand, whole shells to 1 inch, layer of coarse shells at 1.1-1.2 ft, (10YR-6.5/2), (SP).		1	Sample #1, Depth = 0.5'
					2	Sample #2, Depth = 4.0'
					3	Sample #3, Depth = 8.0'
-29.0	10.4					
			Light brown to light gray fine sand, (10YR-6.5/1), (SP).		4	Sample #4, Depth = 11.0'
-30.7	12.1					
			Brown silty sand, light gray (10YR-7/2), (SM).			
-34.3	15.7					
			Brown silty sand and thin shell layers, (10YR-6.5/3), (SM).			
-36.1	17.5					
			Gray to light brown coarse shell, sand matrix, (10YR-6.5/2), (GW).		Comp	Sample #Comp, Depth = 18.0' Comp (0-12.0')
-37.5	18.9					
			End of Boring			

0 5 10 15 20 25

FLORIDA DEP ROSS IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 3/14/08

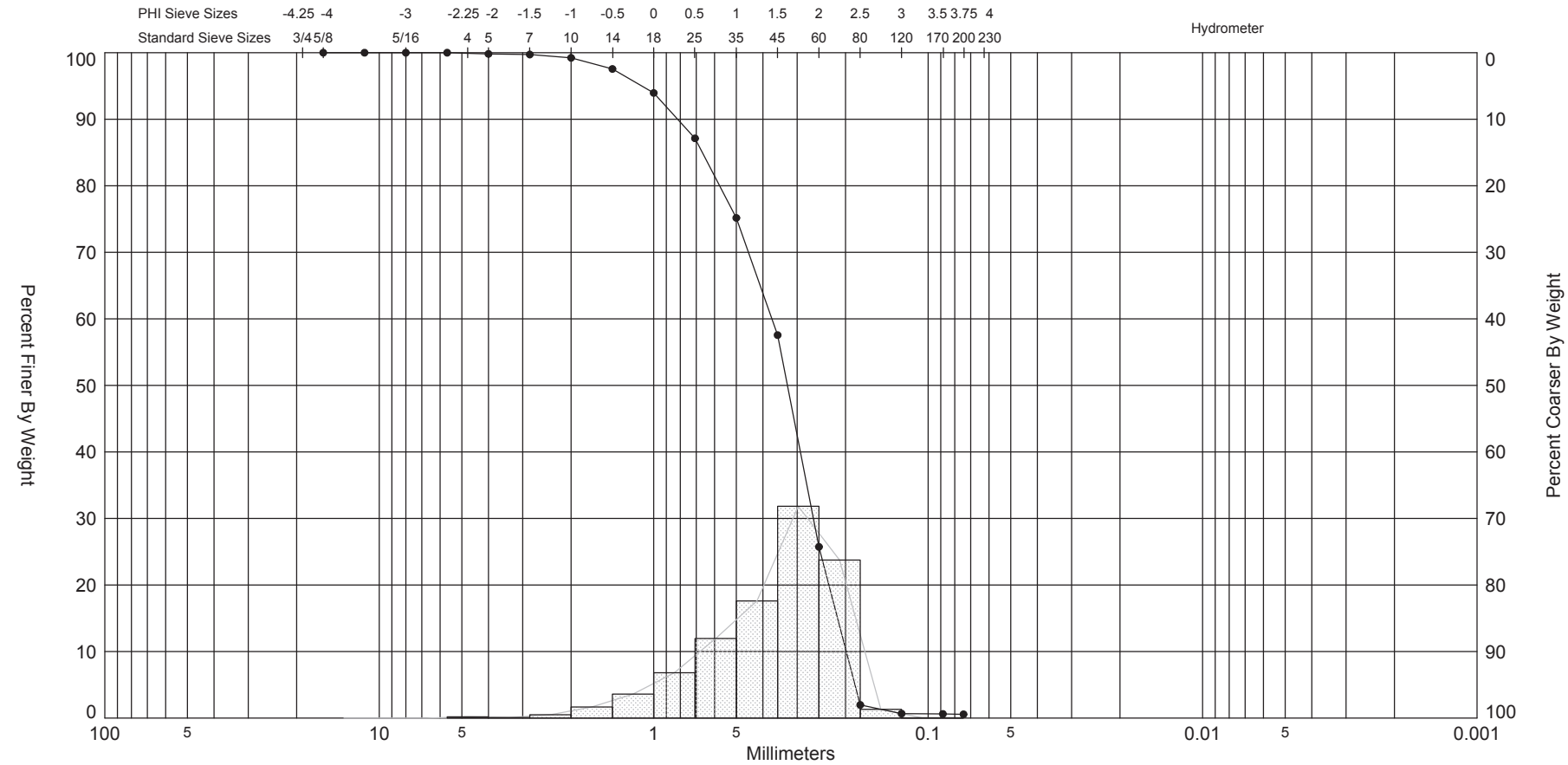
SAJ FORM 1836 **MODIFIED FOR THE FLORIDA DEP**
JUN 02 JUN 04

Section 3g

Offshore Sand Sources

Sub-Area 3

Granulometric Curves & Reports



Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-22 #1	—●—	-18.9	SP	#200 - 0.57			1.62	1.43	-1.08	4.25	0.79

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,460.4
Northing (Y, ft):	1,175,416.7
Horizontal System:	
Vertical System:	

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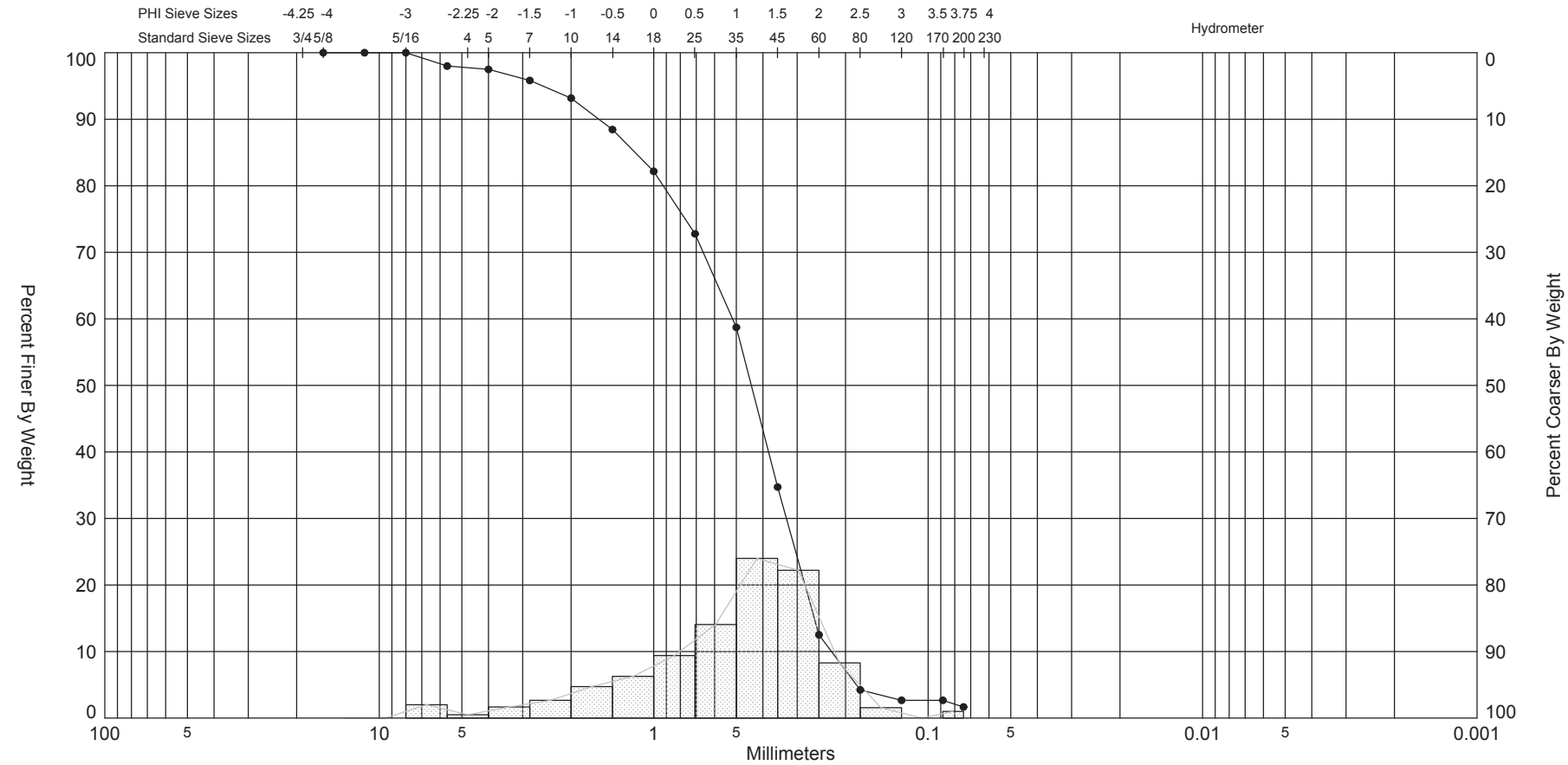

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-22 #2	—●—	-22.4	SW	#200 - 1.67			1.18	0.92	-1	4.3	1.14

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,460.4
Northing (Y, ft):	1,175,416.7
Horizontal System:	
Vertical System:	

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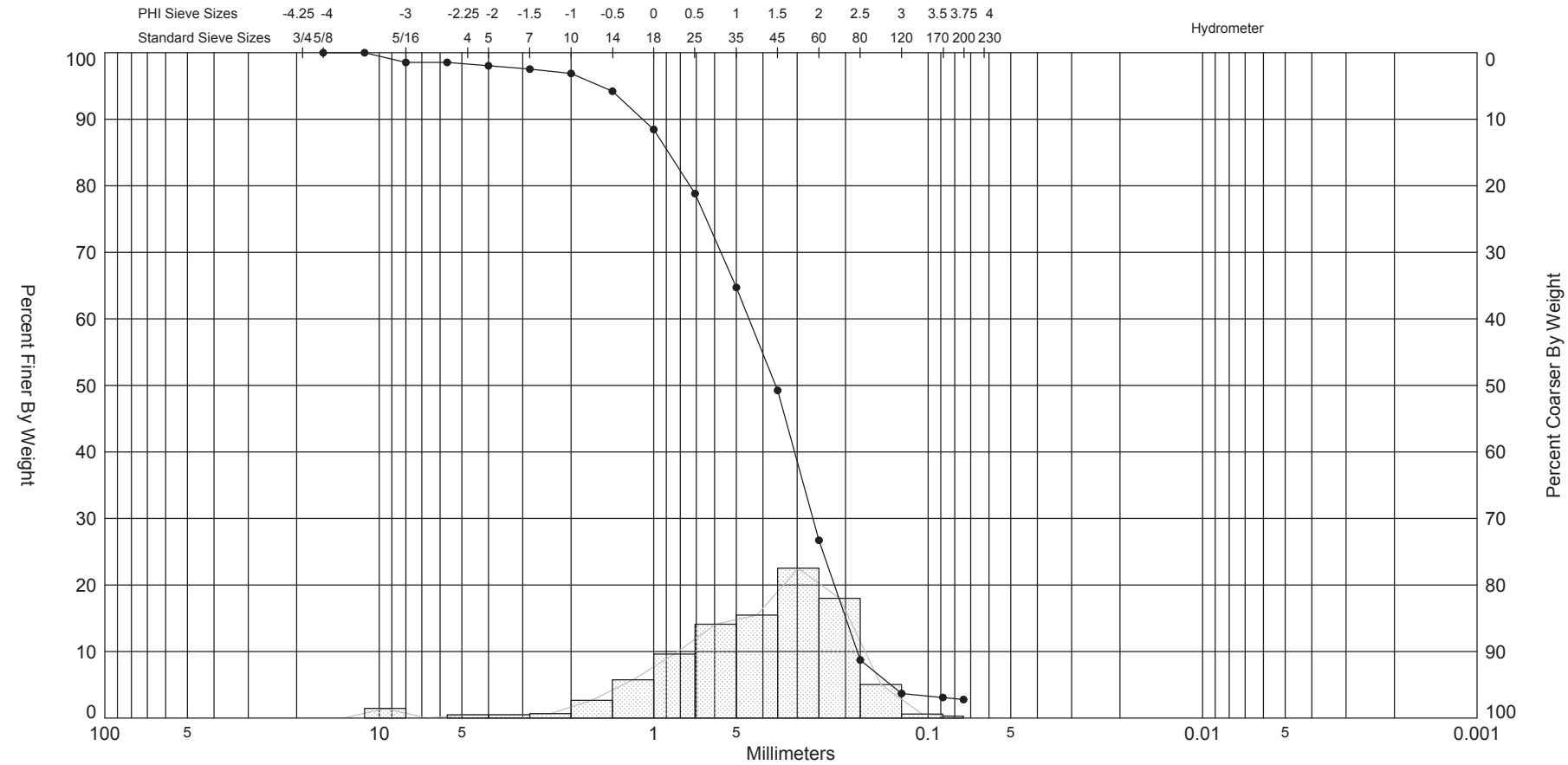

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-22 #3	—●—	-26.4	SW	#200 - 2.79			1.48	1.22	-1.28	5.81	1.11

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,460.4
Northing (Y, ft):	1,175,416.7
Horizontal System:	
Vertical System:	

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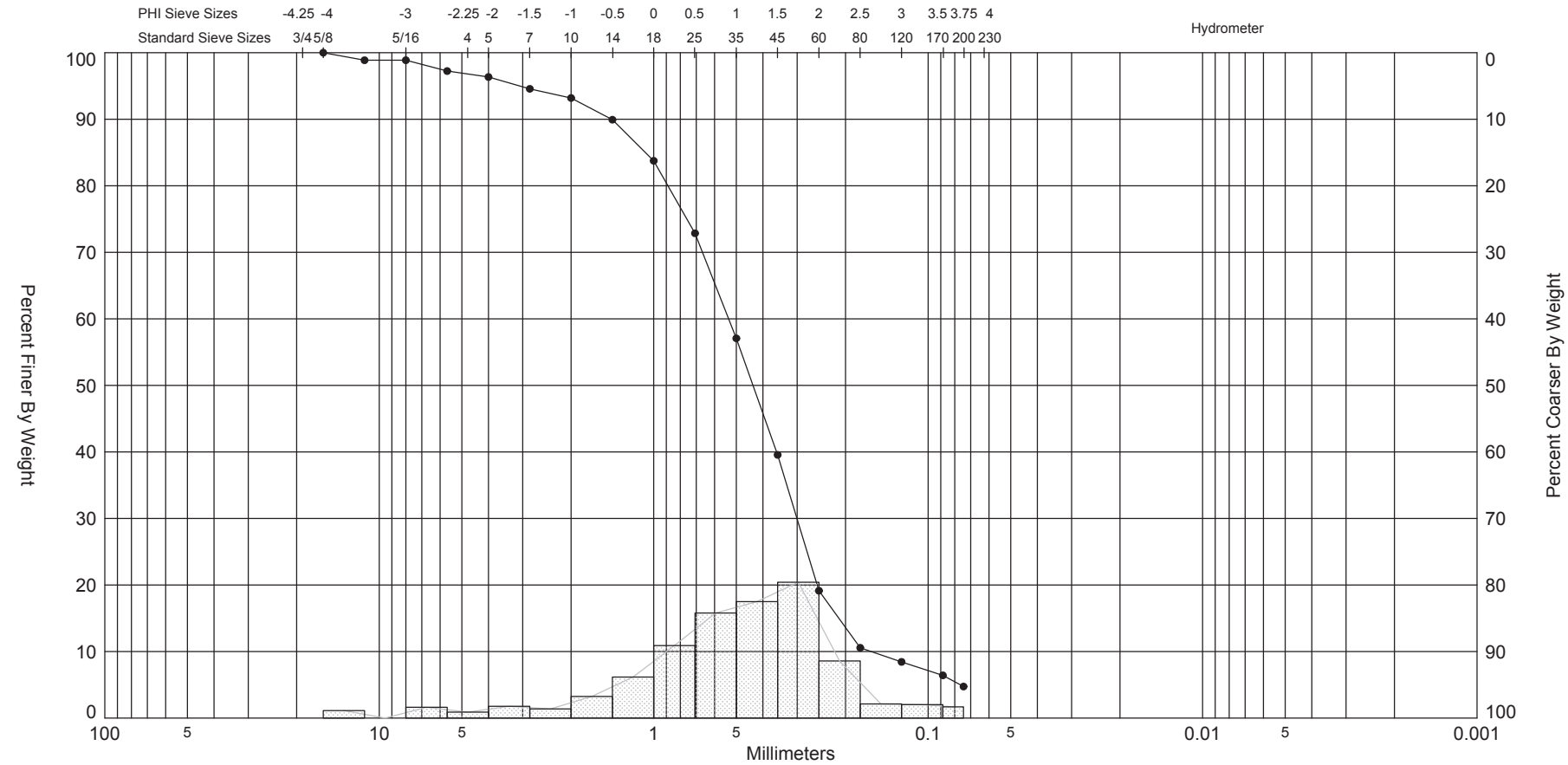

Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-22 #4	—●—	-29.4	SW	#200 - 4.74			1.2	0.95	-1.02	4.96	1.29

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,460.4
Northing (Y, ft):	1,175,416.7
Horizontal System:	
Vertical System:	

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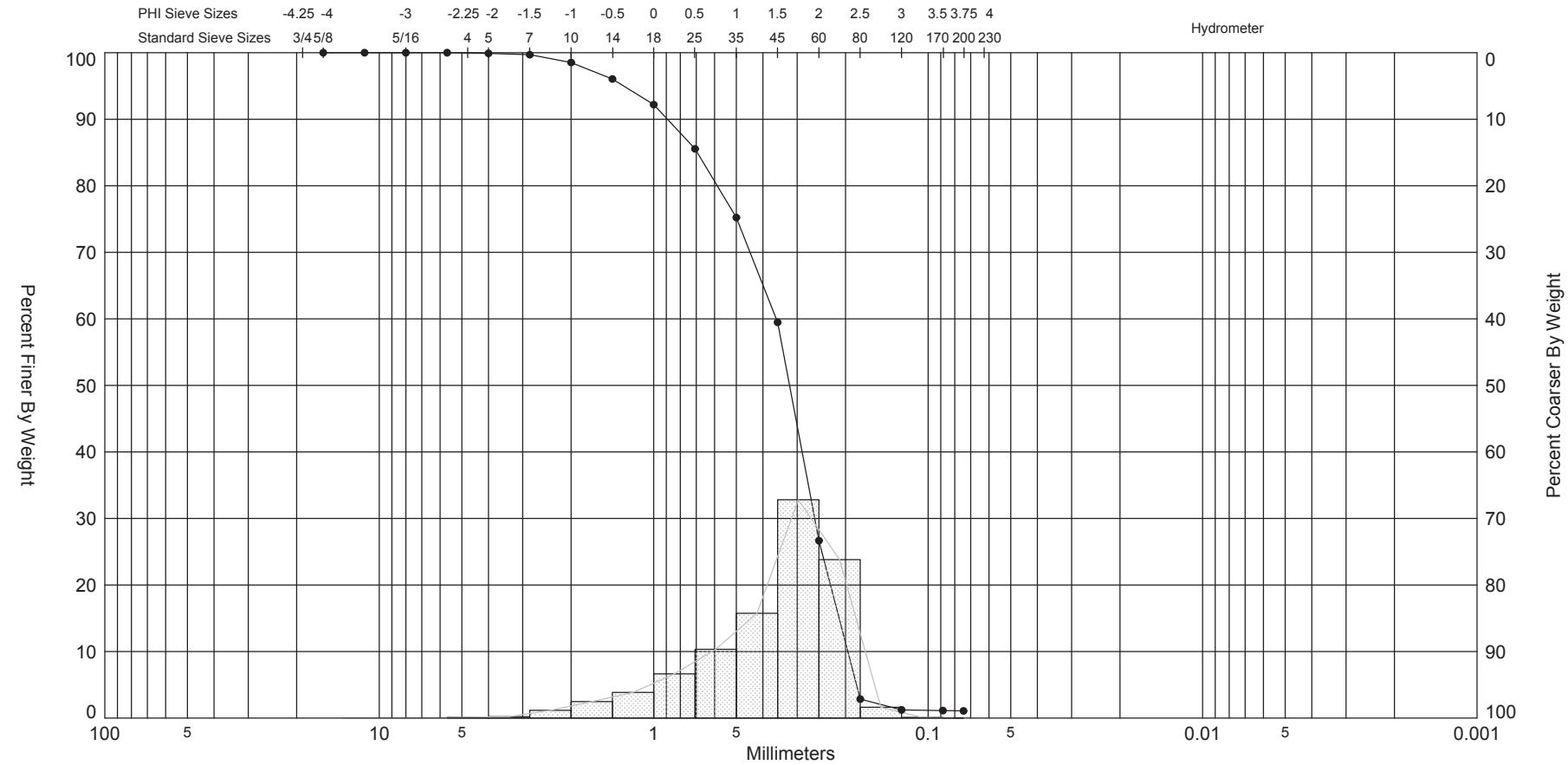

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-24 #1	—●—	-18.4	SP	#200 - 1.08			1.64	1.42	-1.15	4.15	0.85

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,256.7
Northing (Y, ft):	1,174,162.7
Horizontal System:	
Vertical System:	

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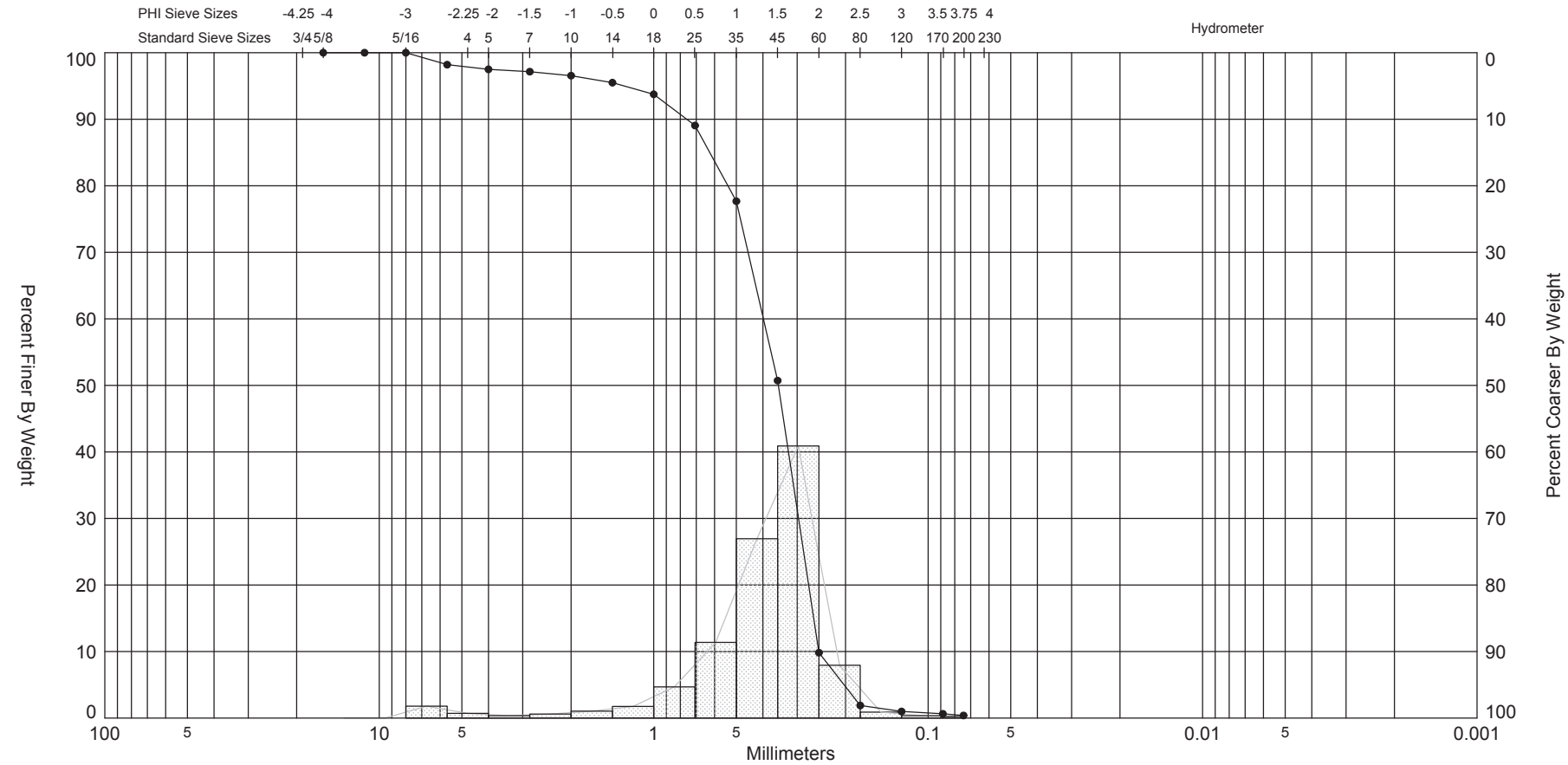

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-24 #2	—●—	-21.9	SW	#200 - 0.39			1.51	1.29	-2.27	10.21	0.91

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,256.7
Northing (Y, ft):	1,174,162.7
Horizontal System:	
Vertical System:	

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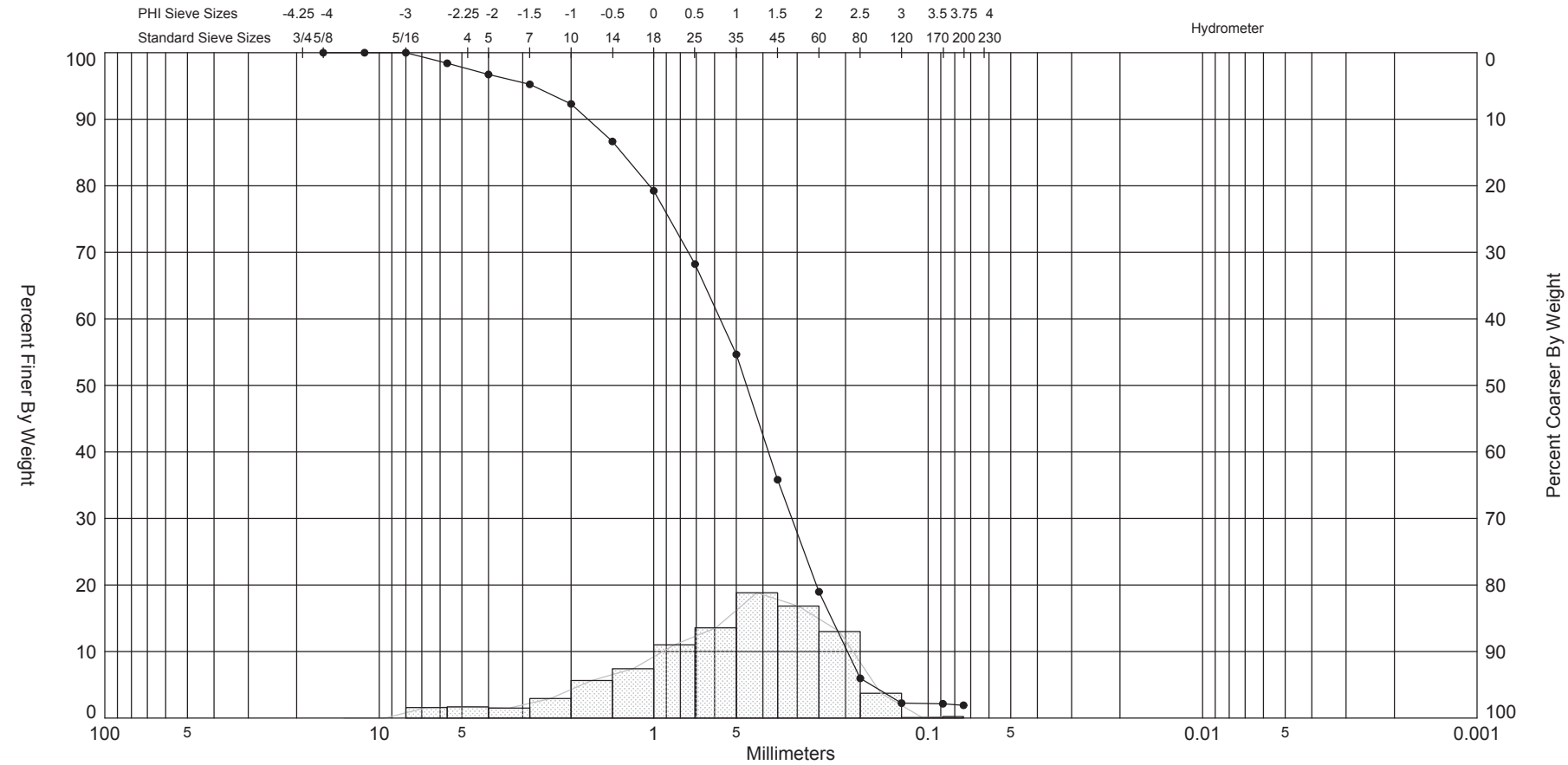

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-24 #3	—●—	-25.9	SW	#200 - 1.92			1.12	0.88	-0.82	3.44	1.22

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,256.7
Northing (Y, ft):	1,174,162.7
Horizontal System:	
Vertical System:	

Comments:

Depths and elevations based on measured values

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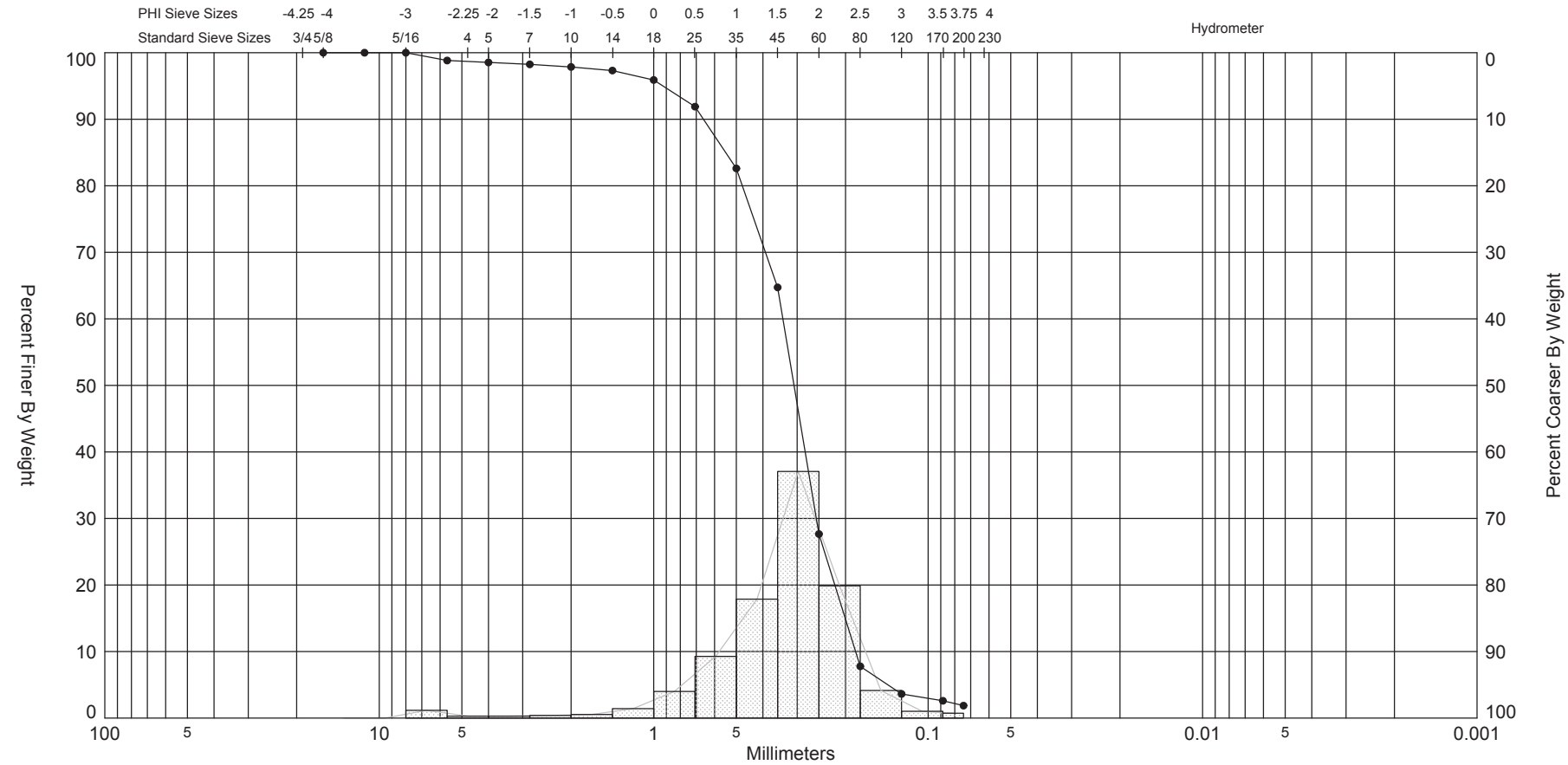

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-24 #4	—●—	-29.9	SW	#200 - 1.87			1.7	1.55	-1.9	9.86	0.89

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,256.7
Northing (Y, ft):	1,174,162.7
Horizontal System:	
Vertical System:	

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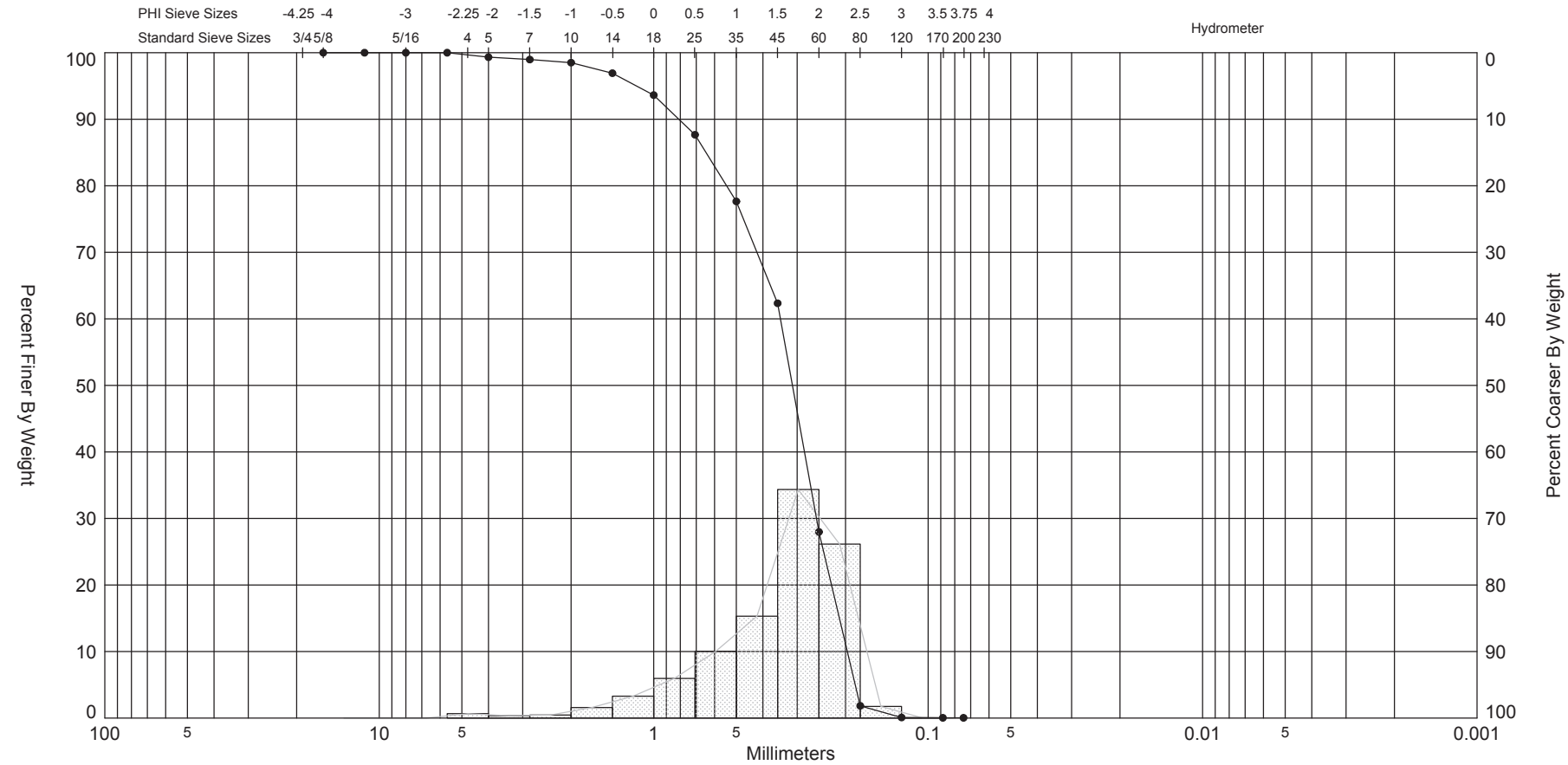

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-25 #1	—●—	-17.8	SP	#200 - 0.04			1.68	1.47	-1.49	5.89	0.84

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,065.1
Northing (Y, ft):	1,173,074.6
Horizontal System:	
Vertical System:	

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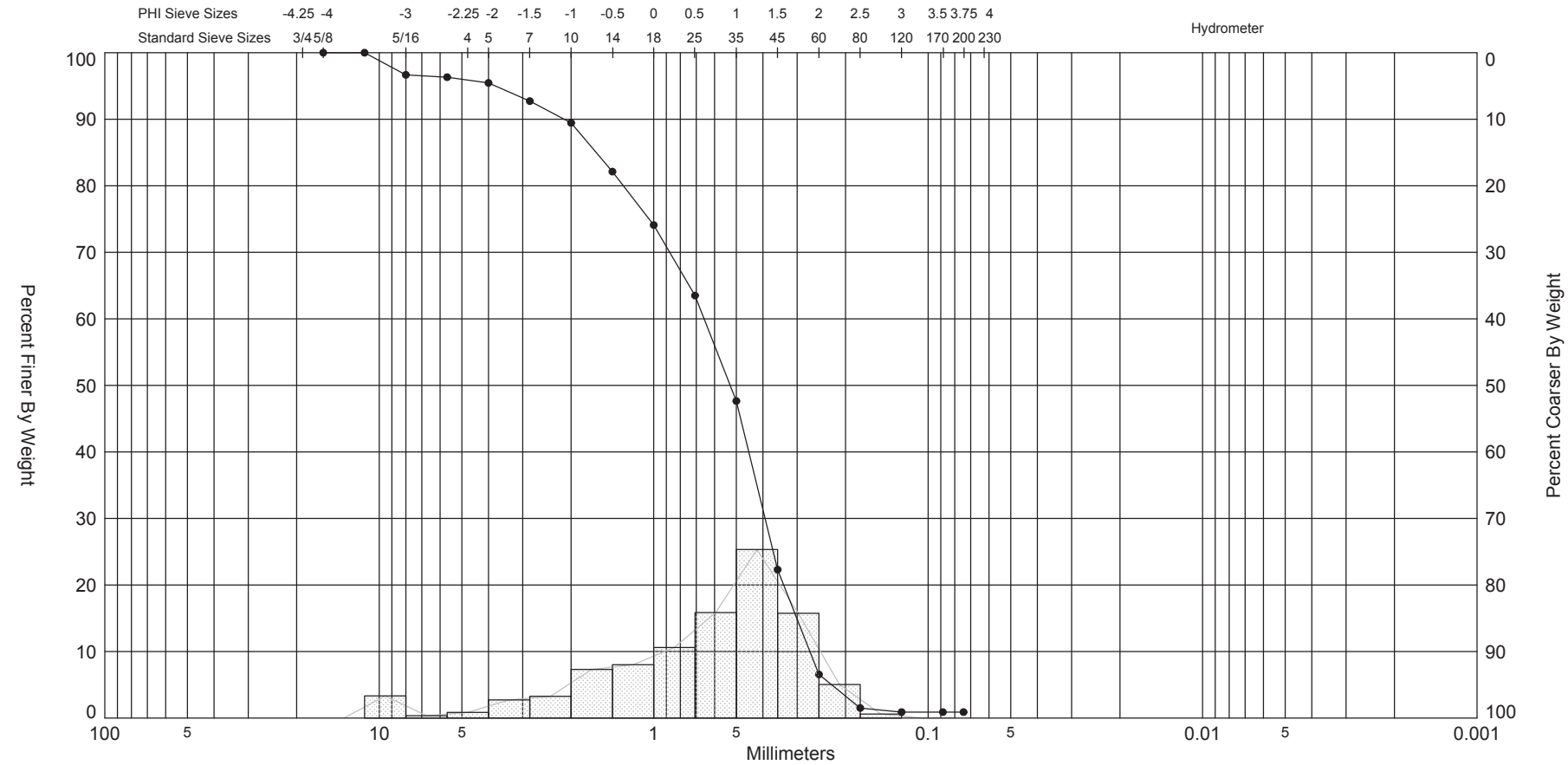

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-25 #2	—●—	-21.3	SW	#200 - 0.90			0.93	0.57	-1.18	4.27	1.25

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,065.1
Northing (Y, ft):	1,173,074.6
Horizontal System:	
Vertical System:	

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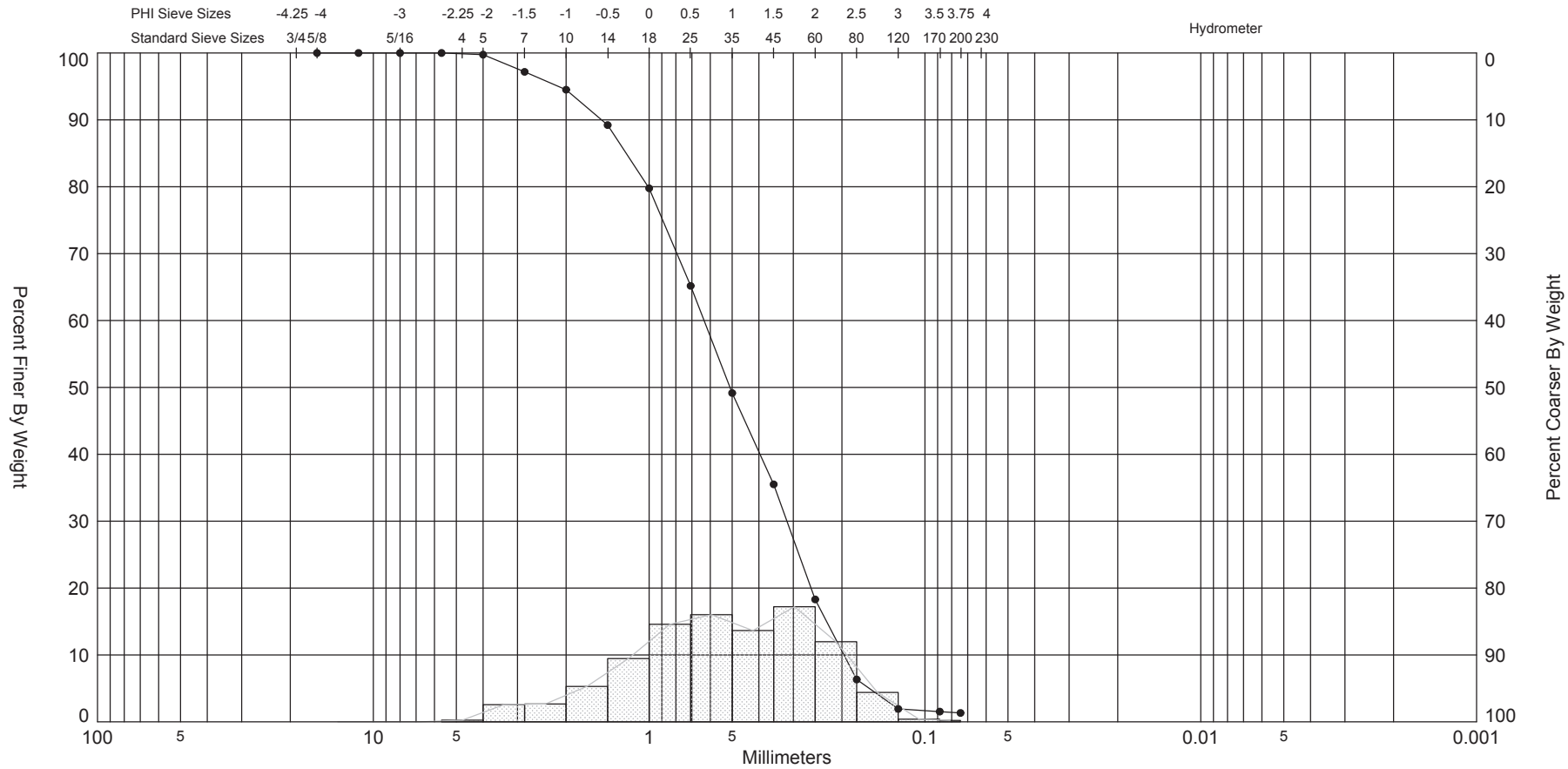

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-25 #3	—●—	-25.3	SW	#200 - 1.33			0.97	0.9	-0.36	2.64	1.11

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,065.1
Northing (Y, ft):	1,173,074.6
Horizontal System:	
Vertical System:	

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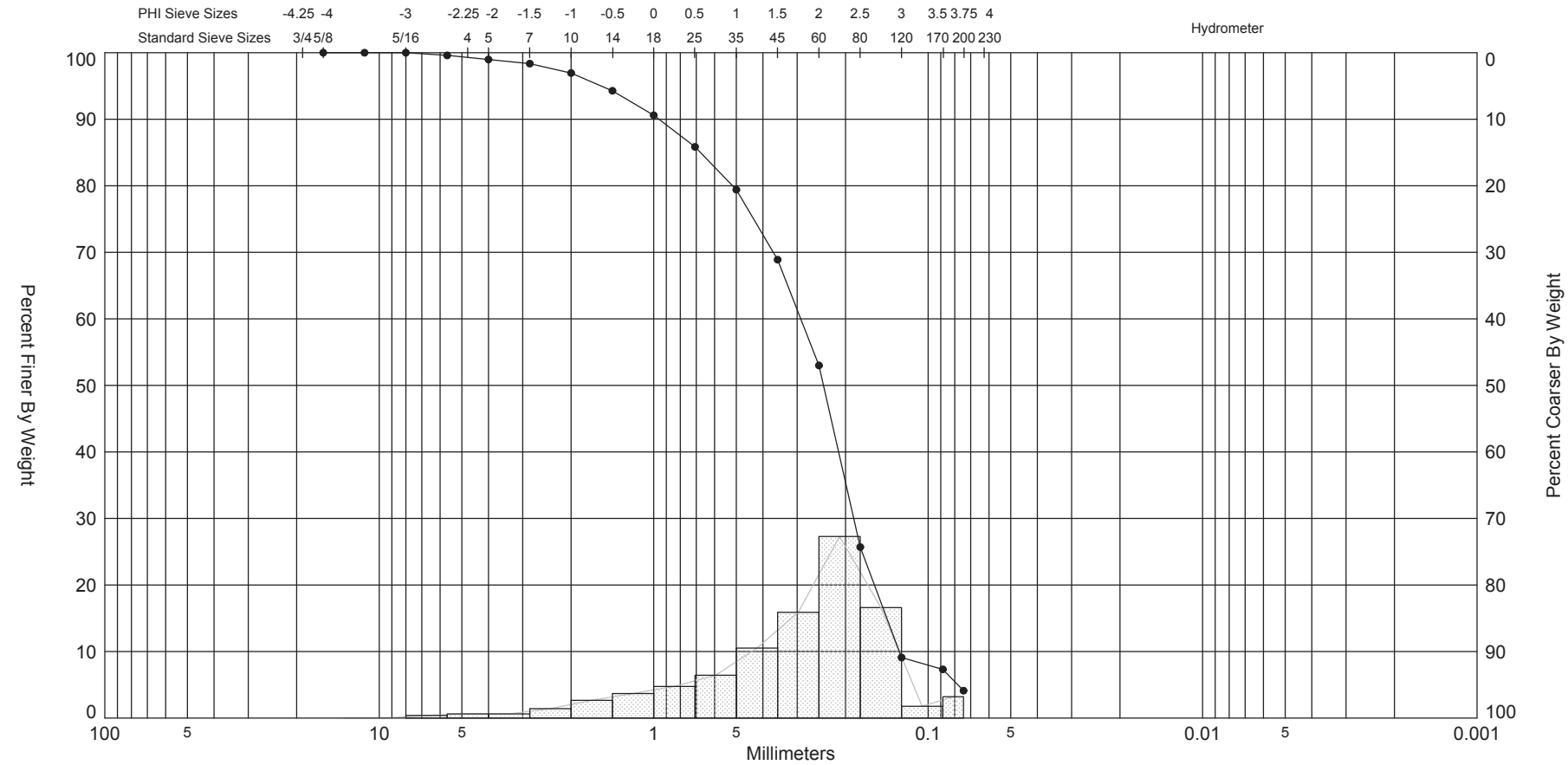

Gravel		Sand			Silt and Clay
Coarse	Fine	Coarse	Medium	Fine	

Sample	Symbol	Elev. (ft)	USCS	% Fines	% Organics	% Carbonates	Median	Mean	Skew	Kurt	Sort
IR-S-25 #4	—●—	-28.3	SW	#200 - 4.12			2.05	1.7	-1.15	4.43	1.16

Comments:

Depths and elevations based on measured values

Sample Information	
Project Name:	Indian River County
Analysis Date:	
Analyzed By:	SEA Inc.
Easting (X, ft):	726,065.1
Northing (Y, ft):	1,173,074.6
Horizontal System:	
Vertical System:	

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Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

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Project Name: Indian River County
Sample Name: IR-S-22 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,460.4	1,175,416.7		-18.9

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
22.15	22.07	0.05	0.00	#200 - 0.57			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.04	0.18	0.04	0.18
7	-1.50	2.83	0.02	0.09	0.06	0.27
10	-1.00	2.00	0.11	0.50	0.17	0.77
14	-0.50	1.41	0.37	1.67	0.54	2.44
18	0.00	1.00	0.80	3.61	1.34	6.05
25	0.50	0.71	1.51	6.82	2.85	12.87
35	1.00	0.50	2.65	11.96	5.50	24.83
45	1.50	0.35	3.90	17.61	9.40	42.44
60	2.00	0.25	7.05	31.83	16.45	74.27
80	2.50	0.18	5.26	23.75	21.71	98.02
120	3.00	0.13	0.29	1.31	22.00	99.33
170	3.50	0.09	0.01	0.05	22.01	99.38
200	3.75	0.07	0.01	0.05	22.02	99.43

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.44	2.20	2.02	1.62	1.00	0.63	-0.15

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.43	0.37	0.79	-1.08	4.25

Granularmetric Report

Depths and elevations based on measured values

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Project Name: Indian River County
Sample Name: IR-S-22 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,460.4	1,175,416.7		-22.4

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.91	19.63	0.05	0.00	#200 - 1.67			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.40	2.01	0.40	2.01
5	-2.00	4.00	0.10	0.50	0.50	2.51
7	-1.50	2.83	0.33	1.66	0.83	4.17
10	-1.00	2.00	0.53	2.66	1.36	6.83
14	-0.50	1.41	0.94	4.72	2.30	11.55
18	0.00	1.00	1.25	6.28	3.55	17.83
25	0.50	0.71	1.87	9.39	5.42	27.22
35	1.00	0.50	2.80	14.06	8.22	41.28
45	1.50	0.35	4.78	24.00	13.00	65.28
60	2.00	0.25	4.42	22.20	17.42	87.48
80	2.50	0.18	1.65	8.29	19.07	95.77
120	3.00	0.13	0.31	1.56	19.38	97.33
170	3.50	0.09	0.00	0.00	19.38	97.33
200	3.75	0.07	0.20	1.00	19.58	98.33

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.45	1.92	1.72	1.18	0.38	-0.15	-1.34

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.92	0.53	1.14	-1	4.3

Granularmetric Report

Depths and elevations based on measured values

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Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-22 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,460.4	1,175,416.7		-26.4

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.84	19.36	0.07	0.00	#200 - 2.79			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.29	1.46	0.29	1.46
3.5	-2.50	5.66	0.00	0.00	0.29	1.46
5	-2.00	4.00	0.10	0.50	0.39	1.96
7	-1.50	2.83	0.10	0.50	0.49	2.46
10	-1.00	2.00	0.13	0.66	0.62	3.12
14	-0.50	1.41	0.53	2.67	1.15	5.79
18	0.00	1.00	1.14	5.75	2.29	11.54
25	0.50	0.71	1.91	9.63	4.20	21.17
35	1.00	0.50	2.80	14.11	7.00	35.28
45	1.50	0.35	3.07	15.47	10.07	50.75
60	2.00	0.25	4.47	22.53	14.54	73.28
80	2.50	0.18	3.57	17.99	18.11	91.27
120	3.00	0.13	1.00	5.04	19.11	96.31
170	3.50	0.09	0.12	0.60	19.23	96.91
200	3.75	0.07	0.06	0.30	19.29	97.21

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.87	2.30	2.05	1.48	0.64	0.23	-0.65

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.22	0.43	1.11	-1.28	5.81

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-22 #4
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,460.4	1,175,416.7		-29.4

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.27	19.32	0.01	0.00	#200 - 4.74			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.23	1.13	0.23	1.13
5/16"	-3.00	8.00	0.00	0.00	0.23	1.13
3.5	-2.50	5.66	0.33	1.63	0.56	2.76
5	-2.00	4.00	0.18	0.89	0.74	3.65
7	-1.50	2.83	0.36	1.78	1.10	5.43
10	-1.00	2.00	0.28	1.38	1.38	6.81
14	-0.50	1.41	0.66	3.26	2.04	10.07
18	0.00	1.00	1.25	6.17	3.29	16.24
25	0.50	0.71	2.21	10.90	5.50	27.14
35	1.00	0.50	3.20	15.79	8.70	42.93
45	1.50	0.35	3.55	17.51	12.25	60.44
60	2.00	0.25	4.14	20.42	16.39	80.86
80	2.50	0.18	1.74	8.58	18.13	89.44
120	3.00	0.13	0.43	2.12	18.56	91.56
170	3.50	0.09	0.41	2.02	18.97	93.58
200	3.75	0.07	0.34	1.68	19.31	95.26

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.71	2.18	1.86	1.20	0.40	-0.02	-1.62

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.95	0.52	1.29	-1.02	4.96

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-24 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,256.7	1,174,162.7		-18.4

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.74	19.63	0.10	0.00	#200 - 1.08			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.02	0.10	0.02	0.10
7	-1.50	2.83	0.04	0.20	0.06	0.30
10	-1.00	2.00	0.23	1.17	0.29	1.47
14	-0.50	1.41	0.49	2.48	0.78	3.95
18	0.00	1.00	0.76	3.85	1.54	7.80
25	0.50	0.71	1.31	6.64	2.85	14.44
35	1.00	0.50	2.04	10.33	4.89	24.77
45	1.50	0.35	3.11	15.75	8.00	40.52
60	2.00	0.25	6.48	32.82	14.48	73.34
80	2.50	0.18	4.70	23.81	19.18	97.15
120	3.00	0.13	0.32	1.62	19.50	98.77
170	3.50	0.09	0.02	0.10	19.52	98.87
200	3.75	0.07	0.01	0.05	19.53	98.92

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.45	2.22	2.03	1.64	1.01	0.58	-0.36

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.42	0.37	0.85	-1.15	4.15

GRANULARMETRIC REPORT IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 1/16/08

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-24 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,256.7	1,174,162.7		-21.9

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.03	19.95	0.00	0.00	#200 - 0.39			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.36	1.80	0.36	1.80
5	-2.00	4.00	0.14	0.70	0.50	2.50
7	-1.50	2.83	0.07	0.35	0.57	2.85
10	-1.00	2.00	0.12	0.60	0.69	3.45
14	-0.50	1.41	0.21	1.05	0.90	4.50
18	0.00	1.00	0.35	1.75	1.25	6.25
25	0.50	0.71	0.94	4.69	2.19	10.94
35	1.00	0.50	2.28	11.38	4.47	22.32
45	1.50	0.35	5.40	26.96	9.87	49.28
60	2.00	0.25	8.19	40.89	18.06	90.17
80	2.50	0.18	1.59	7.94	19.65	98.11
120	3.00	0.13	0.18	0.90	19.83	99.01
170	3.50	0.09	0.07	0.35	19.90	99.36
200	3.75	0.07	0.05	0.25	19.95	99.61

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.30	1.92	1.81	1.51	1.05	0.72	-0.36

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.29	0.41	0.91	-2.27	10.21

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-24 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,256.7	1,174,162.7		-25.9

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
21.44	21.03	0.00	0.00	#200 - 1.92			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.34	1.59	0.34	1.59
5	-2.00	4.00	0.36	1.68	0.70	3.27
7	-1.50	2.83	0.32	1.49	1.02	4.76
10	-1.00	2.00	0.63	2.94	1.65	7.70
14	-0.50	1.41	1.21	5.64	2.86	13.34
18	0.00	1.00	1.59	7.42	4.45	20.76
25	0.50	0.71	2.36	11.01	6.81	31.77
35	1.00	0.50	2.91	13.57	9.72	45.34
45	1.50	0.35	4.04	18.84	13.76	64.18
60	2.00	0.25	3.61	16.84	17.37	81.02
80	2.50	0.18	2.79	13.01	20.16	94.03
120	3.00	0.13	0.80	3.73	20.96	97.76
170	3.50	0.09	0.02	0.09	20.98	97.85
200	3.75	0.07	0.05	0.23	21.03	98.08

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.63	2.11	1.82	1.12	0.19	-0.32	-1.46

Moment Statistics	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
	0.88	0.54	1.22	-0.82	3.44

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-24 #4
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,256.7	1,174,162.7		-29.9

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.47	20.09	0.00	0.00	#200 - 1.87			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.24	1.17	0.24	1.17
5	-2.00	4.00	0.06	0.29	0.30	1.46
7	-1.50	2.83	0.06	0.29	0.36	1.75
10	-1.00	2.00	0.08	0.39	0.44	2.14
14	-0.50	1.41	0.11	0.54	0.55	2.68
18	0.00	1.00	0.29	1.42	0.84	4.10
25	0.50	0.71	0.82	4.01	1.66	8.11
35	1.00	0.50	1.90	9.28	3.56	17.39
45	1.50	0.35	3.66	17.88	7.22	35.27
60	2.00	0.25	7.59	37.07	14.81	72.34
80	2.50	0.18	4.07	19.88	18.88	92.22
120	3.00	0.13	0.85	4.15	19.73	96.37
170	3.50	0.09	0.21	1.03	19.94	97.40
200	3.75	0.07	0.15	0.73	20.09	98.13

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.83	2.29	2.07	1.70	1.21	0.93	0.11

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.55	0.34	0.89	-1.9	9.86

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-25 #1
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,065.1	1,173,074.6		-17.8

USCS:	Munsell:	Comments:
SP		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.47	19.47	0.00	0.05	#200 - 0.04			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.13	0.67	0.13	0.67
7	-1.50	2.83	0.07	0.36	0.20	1.03
10	-1.00	2.00	0.09	0.46	0.29	1.49
14	-0.50	1.41	0.31	1.59	0.60	3.08
18	0.00	1.00	0.64	3.29	1.24	6.37
25	0.50	0.71	1.16	5.96	2.40	12.33
35	1.00	0.50	1.95	10.02	4.35	22.35
45	1.50	0.35	2.98	15.31	7.33	37.66
60	2.00	0.25	6.69	34.36	14.02	72.02
80	2.50	0.18	5.09	26.14	19.11	98.16
120	3.00	0.13	0.34	1.75	19.45	99.91
170	3.50	0.09	0.01	0.05	19.46	99.96
200	3.75	0.07	0.00	0.00	19.46	99.96

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.44	2.23	2.06	1.68	1.09	0.68	-0.21

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.47	0.36	0.84	-1.49	5.89

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-25 #2
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,065.1	1,173,074.6		-21.3

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
19.81	19.66	0.03	0.00	#200 - 0.90			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.66	3.33	0.66	3.33
3.5	-2.50	5.66	0.07	0.35	0.73	3.68
5	-2.00	4.00	0.17	0.86	0.90	4.54
7	-1.50	2.83	0.54	2.73	1.44	7.27
10	-1.00	2.00	0.65	3.28	2.09	10.55
14	-0.50	1.41	1.45	7.32	3.54	17.87
18	0.00	1.00	1.59	8.03	5.13	25.90
25	0.50	0.71	2.10	10.60	7.23	36.50
35	1.00	0.50	3.14	15.85	10.37	52.35
45	1.50	0.35	5.02	25.34	15.39	77.69
60	2.00	0.25	3.12	15.75	18.51	93.44
80	2.50	0.18	1.00	5.05	19.51	98.49
120	3.00	0.13	0.12	0.61	19.63	99.10
170	3.50	0.09	0.00	0.00	19.63	99.10
200	3.75	0.07	0.00	0.00	19.63	99.10

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.15	1.70	1.45	0.93	-0.06	-0.63	-1.92

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.57	0.67	1.25	-1.18	4.27

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-25 #3
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,065.1	1,173,074.6		-25.3

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
20.22	19.95	0.00	0.00	#200 - 1.33			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.00	0.00	0.00	0.00
5	-2.00	4.00	0.05	0.25	0.05	0.25
7	-1.50	2.83	0.52	2.57	0.57	2.82
10	-1.00	2.00	0.54	2.67	1.11	5.49
14	-0.50	1.41	1.07	5.29	2.18	10.78
18	0.00	1.00	1.91	9.45	4.09	20.23
25	0.50	0.71	2.95	14.59	7.04	34.82
35	1.00	0.50	3.24	16.02	10.28	50.84
45	1.50	0.35	2.76	13.65	13.04	64.49
60	2.00	0.25	3.48	17.21	16.52	81.70
80	2.50	0.18	2.42	11.97	18.94	93.67
120	3.00	0.13	0.89	4.40	19.83	98.07
170	3.50	0.09	0.08	0.40	19.91	98.47
200	3.75	0.07	0.04	0.20	19.95	98.67

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
2.65	2.10	1.81	0.97	0.16	-0.22	-1.09

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	0.9	0.54	1.11	-0.36	2.64

Granularmetric Report

Depths and elevations based on measured values

COASTAL TECH
Coastal Geology & Sediments Laboratory

715-E North Dr.
Melbourne, Fl. 32934
Phone (321) 751-1135
Fax (321) 751-2343

Project Name: Indian River County
Sample Name: IR-S-25 #4
Analysis Date:
Analyzed By: SEA Inc.

Easting (ft):	Northing (ft):	Coordinate System:	Elevation (ft):
726,065.1	1,173,074.6		-28.3

USCS:	Munsell:	Comments:
SW		

Dry Weight (g):	Wash Weight (g):	Pan Retained (g):	Sieve Loss (%):	Fines (%):	Organics (%):	Carbonates (%):	Shells (%):
22.53	21.79	0.18	0.00	#200 - 4.12			

Sieve Number	Sieve Size (Phi)	Sieve Size (Millimeters)	Grams Retained	% Weight Retained	Cum. Grams Retained	C. % Weight Retained
5/8"	-4.00	16.00	0.00	0.00	0.00	0.00
11/16"	-3.50	11.31	0.00	0.00	0.00	0.00
5/16"	-3.00	8.00	0.00	0.00	0.00	0.00
3.5	-2.50	5.66	0.09	0.40	0.09	0.40
5	-2.00	4.00	0.14	0.62	0.23	1.02
7	-1.50	2.83	0.14	0.62	0.37	1.64
10	-1.00	2.00	0.32	1.42	0.69	3.06
14	-0.50	1.41	0.60	2.66	1.29	5.72
18	0.00	1.00	0.83	3.68	2.12	9.40
25	0.50	0.71	1.07	4.75	3.19	14.15
35	1.00	0.50	1.45	6.44	4.64	20.59
45	1.50	0.35	2.37	10.52	7.01	31.11
60	2.00	0.25	3.58	15.89	10.59	47.00
80	2.50	0.18	6.15	27.30	16.74	74.30
120	3.00	0.13	3.74	16.60	20.48	90.90
170	3.50	0.09	0.40	1.78	20.88	92.68
200	3.75	0.07	0.72	3.20	21.60	95.88

Phi 5	Phi 16	Phi 25	Phi 50	Phi 75	Phi 84	Phi 95
3.68	2.79	2.52	2.05	1.21	0.64	-0.64

Moment	Mean Phi	Mean mm	Sorting	Skewness	Kurtosis
Statistics	1.7	0.31	1.16	-1.15	4.43

GRANULARMETRIC REPORT IRC ADDITION SERVICES NATIVE BCH.GPJ FL DEP ROSS.GDT 1/16/08

Section 3h

Offshore Sand Sources

Sub-Area 3

Compositional & Color Analysis

Compositional & Color Analysis (Sub Area 3)[1]

Sample #	Organics [%]	CaCO3 [%]	Siliciclastic [%]	Wet Munsell Color	Description	Dry Munsell Color	Description
IRS 22: 3.0	1.6	67.3	31.1	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 22: 7.0	1.7	68.9	29.4	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 22: 11.0	1.8	69.2	29.0	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 24: 3.0	1.5	60.7	37.8	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 24: 5.0	1.5	62.5	36.0	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 24: 9.0	1.9	72.6	25.5	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 24: 11.0	1.7	67.4	30.9	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 25: 3.0	1.5	59.1	39.3	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 25: 7.0	1.7	68.4	29.9	10YR 6/2	Lt. Brnish Gray	10YR 7/1	Lt. Gray
IRS 25: 9.0	1.8	73.1	25.1	10YR 6/1.5	Lt. Brnish Gray	10YR 7/1	Lt. Gray

[1] Data from Indian River County, Sector 3 Beach & Dune Restoration Project – Design Document. Prepared by Coastal Tech, January 2008

Appendix B
Sediment QA/QC Plan - Upland

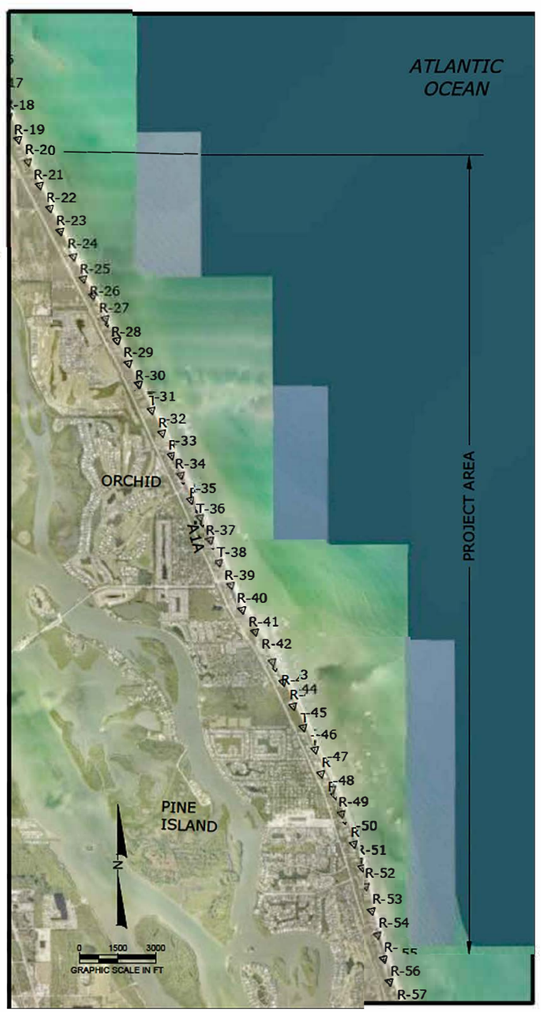
See electronic version of Sediment QA/QC Plan – Upland (Word format)

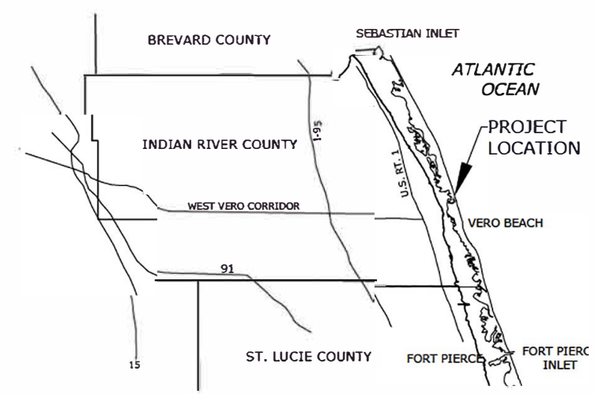
Appendix C
Sediment QA/QC Plan - Offshore

See electronic version of Sediment QA/QC Plan – Upland (Word format)

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
(IRC PROJECT NO. 1925)

INDIAN RIVER COUNTY, FLORIDA





SHEET INDEX

1	COVER SHEET
2-4	CONTROL DATA SHEETS
5	PROJECT OVERVIEW - APPROVED UPLAND SAND SOURCES
6	PROJECT OVERVIEW - OFFSHORE BORROW AREA
7	PROJECT OVERVIEW - ACCESS AREA
8-30	PLAN VIEWS
32-40	CROSS SECTIONS
41	TYPICAL SECTIONS
42	DUNE PLANTING DETAILS
43	BORROW AREA PLAN VIEW
44	BORROW AREA CROSS SECTIONS

PLAN VIEW LEGEND:

R-15	FDEP MONUMENT AND ID
	JULY 2018 MEAN HIGH WATER LINE
	PROJECT BASELINE
	FILL PLACEMENT
	2009 EROSION CONTROL LINE
	CONSTRUCTION ACCESS
	DUNE PLANTING
	2016 LANDWARD EDGE OF HARDBOTTOM (DIVER DEL
	2019 DIVER DELINEATED HARDBOTTOM

NOTE: PLANS SHOULD BE PLOTTED IN COLOR.

This item has been digitally signed and sealed by Douglas W. Mann, P.E. on the specified date using a digital signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Sheets 1-42, only.

DOUGLAS W. MANN
LICENSE
No 44046
STATE OF FLORIDA
PROFESSIONAL ENGINEER

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W. MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
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C.O.A. LA. #2531

REVISIONS

No.	Date	Description

Designed by: CP
Drawn by: KC
Date: 04/16/20
Checked by: DM
Reviewed by: CP
Submitted by: CP
Comm. No.: 631235714
Plot Scale:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

COVER SHEET

DRAWING NO.
CS-1

SHEET 1 OF 44

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
10+00	1264626.57	842851.59	100'	70.0
11+00	1264535.84	842893.64	100'	70.0
12+00	1264445.10	842935.68	100'	70.0
13+00	1264354.37	842977.73	100'	70.0
14+00	1264263.64	843019.77	100'	70.0
15+00	1264172.91	843061.82	100'	70.0
16+00	1264082.18	843103.86	100'	70.0
17+00	1263991.45	843145.91	100'	70.0
18+00	1263900.72	843187.95	100'	70.0
19+00	1263809.98	843230.00	91'	70.0
19+91	1263727.02	843268.45	109'	70.0
21+00	1263628.52	843314.09	100'	70.0
22+00	1263537.79	843356.14	100'	70.0
23+00	1263447.06	843398.18	100'	70.0
24+00	1263356.33	843440.23	100'	70.0
25+00	1263265.59	843482.27	100'	70.0
26+00	1263174.86	843524.32	100'	70.0
27+00	1263084.13	843566.36	100'	70.0
28+00	1262993.40	843608.41	100'	70.0
29+00	1262902.67	843650.45	109'	70.0
30+09	1262803.48	843696.41	91'	70.0
31+00	1262721.21	843734.54	100'	70.0
32+00	1262630.47	843776.59	100'	70.0
33+00	1262539.74	843818.63	100'	70.0
34+00	1262449.01	843860.68	100'	70.0
35+00	1262358.28	843902.72	100'	70.0
36+00	1262267.55	843944.77	100'	70.0
37+00	1262176.82	843986.81	100'	70.0
38+00	1262086.09	844028.86	100'	70.0
39+00	1261995.35	844070.90	100'	70.0
40+00	1261904.62	844112.95	31'	70.0
40+31	1261876.59	844125.94	69'	70.0
41+00	1261813.89	844154.99	100'	70.0
42+00	1261723.16	844197.04	100'	70.0
43+00	1261632.43	844239.08	100'	70.0
44+00	1261541.70	844281.13	100'	70.0
45+00	1261450.97	844323.17	100'	70.0
46+00	1261360.23	844365.22	100'	70.0
47+00	1261269.50	844407.27	100'	70.0
48+00	1261178.77	844449.31	100'	70.0
49+00	1261088.04	844491.36	100'	70.0
50+00	1260997.31	844533.40	31'	70.0
50+31	1260969.24	844546.41	69'	70.0
51+00	1260906.58	844575.45	100'	70.0
52+00	1260815.84	844617.49	100'	70.0
53+00	1260725.11	844659.54	100'	70.0
54+00	1260634.38	844701.58	100'	70.0
55+00	1260543.65	844743.63	100'	70.0
56+00	1260452.92	844785.67	100'	70.0
57+00	1260362.19	844827.72	100'	70.0
58+00	1260271.46	844869.76	100'	70.0

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
59+00	1260180.72	844911.81	100'	70.0
60+00	1260089.99	844953.85	100'	70.0
61+00	1259999.26	844995.90	49'	70.0
61+49	1259954.45	845016.66	51'	70.0
62+00	1259908.53	845037.94	100'	70.0
63+00	1259817.80	845079.99	100'	70.0
64+00	1259727.07	845122.03	100'	70.0
65+00	1259636.34	845164.08	100'	70.0
66+00	1259545.60	845206.12	100'	70.0
67+00	1259454.87	845248.17	100'	70.0
68+00	1259364.14	845290.21	100'	70.0
69+00	1259273.41	845332.26	100'	70.0
70+00	1259182.68	845374.30	112'	70.0
71+12	1259080.75	845421.54	88'	70.0
72+00	1259004.69	845465.12	100'	70.0
73+00	1258917.94	845514.85	100'	70.0
74+00	1258831.18	845564.58	100'	70.0
75+00	1258744.42	845614.31	100'	70.0
76+00	1258657.66	845664.04	100'	70.0
77+00	1258570.90	845713.77	100'	70.0
78+00	1258484.14	845763.50	71'	70.0
78+71	1258422.35	845798.92	29'	70.0
79+00	1258397.38	845813.23	100'	70.0
80+00	1258310.63	845862.95	100'	70.0
81+00	1258223.87	845912.68	100'	70.0
82+00	1258137.11	845962.41	100'	70.0
83+00	1258050.35	846012.14	100'	70.0
84+00	1257963.59	846061.87	100'	70.0
85+00	1257876.83	846111.60	100'	70.0
86+00	1257790.08	846161.33	100'	70.0
87+00	1257703.32	846211.06	100'	70.0
88+00	1257616.56	846260.79	100'	70.0
89+00	1257529.80	846310.52	21'	70.0
89+21	1257511.77	846320.85	79'	70.0
90+00	1257441.38	846357.19	100'	70.0
91+00	1257352.53	846403.07	100'	70.0
92+00	1257263.67	846448.95	100'	70.0
93+00	1257174.82	846494.83	100'	70.0
94+00	1257085.96	846540.70	100'	70.0
95+00	1256997.10	846586.58	100'	70.0
96+00	1256908.25	846632.46	100'	70.0
97+00	1256819.39	846678.34	100'	70.0
98+00	1256730.54	846724.21	75'	70.0
98+75	1256663.79	846758.68	25'	70.0
99+00	1256641.68	846770.09	100'	70.0
100+00	1256552.83	846815.97	100'	70.0
101+00	1256463.97	846861.85	100'	70.0
102+00	1256375.12	846907.72	100'	70.0
103+00	1256286.26	846953.60	100'	70.0
104+00	1256197.41	846999.48	100'	70.0
105+00	1256108.55	847045.36	100'	70.0

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
106+00	1256019.70	847091.24	100'	70.0
107+00	1255930.84	847137.11	100'	70.0
108+00	1255841.99	847182.99	95'	70.0
108+95	1255757.58	847226.57	105'	70.0
110+00	1255664.28	847274.75	100'	70.0
111+00	1255575.42	847320.62	100'	70.0
112+00	1255486.57	847366.50	100'	70.0
113+00	1255397.71	847412.38	100'	70.0
114+00	1255308.86	847458.26	100'	70.0
115+00	1255220.00	847504.13	100'	70.0
116+00	1255131.15	847550.01	100'	70.0
117+00	1255042.29	847595.89	100'	70.0
118+00	1254953.44	847641.77	35'	70.0
118+35	1254922.42	847657.78	65'	70.0
119+00	1254863.68	847685.84	100'	70.0
120+00	1254773.45	847728.95	100'	70.0
121+00	1254683.22	847772.06	100'	70.0
122+00	1254592.99	847815.17	100'	70.0
123+00	1254502.76	847858.28	100'	70.0
124+00	1254412.53	847901.39	100'	70.0
125+00	1254322.30	847944.50	100'	70.0
126+00	1254232.07	847987.61	100'	70.0
127+00	1254141.84	848030.72	92'	70.0
127+92	1254058.55	848070.51	108'	70.0
129+00	1253961.38	848116.94	100'	70.0
130+00	1253871.15	848160.05	100'	70.0
131+00	1253780.92	848203.16	100'	70.0
132+00	1253690.69	848246.27	100'	70.0
133+00	1253600.46	848289.38	100'	70.0
134+00	1253510.23	848332.49	100'	70.0
135+00	1253420.00	848375.60	100'	70.0
136+00	1253329.77	848418.71	100'	70.0
137+00	1253239.53	848461.82	84'	70.0
137+84	1253164.07	848497.87	116'	70.0
139+00	1253057.96	848545.63	100'	70.0
140+00	1252966.77	848586.67	100'	70.0
141+00	1252875.58	848627.71	100'	70.0
142+00	1252784.39	848668.75	100'	70.0
143+00	1252693.20	848709.79	100'	70.0
144+00	1252602.01	848750.83	100'	70.0
145+00	1252510.82	848791.87	100'	70.0
146+00	1252419.63	848832.91	100'	70.0
147+00	1252328.44	848873.96	45'	70.0
147+45	1252287.75	848892.27	55'	70.0
148+00	1252237.25	848915.00	100'	70.0
149+00	1252146.05	848956.04	100'	70.0
150+00	1252054.86	848997.08	100'	70.0
151+00	1251963.67	849038.12	100'	70.0
152+00	1251872.48	849079.16	100'	70.0
153+00	1251781.29	849120.20	100'	70.0
154+00	1251690.10	849161.24	100'	70.0

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
155+00	1251598.91	849202.28	100'	70.0
156+00	1251507.72	849243.32	100'	70.0
157+00	1251416.53	849284.36	100'	70.0
158+00	1251325.34	849325.41	100'	70.0
159+00	1251234.45	849367.09	100'	70.0
160+00	1251143.55	849408.77	100'	70.0
161+00	1251052.65	849450.45	100'	70.0
162+00	1250961.75	849492.13	100'	70.0
163+00	1250870.85	849533.81	100'	70.0
164+00	1250779.95	849575.50	100'	70.0
165+00	1250689.05	849617.18	100'	70.0
166+00	1250598.15	849658.86	63'	70.0
166+63	1250541.07	849685.03	37'	70.0
167+00	1250507.25	849700.54	100'	70.0
168+00	1250416.35	849742.22	100'	70.0
169+00	1250325.46	849783.91	100'	70.0
170+00	1250234.56	849825.59	100'	70.0
171+00	1250143.66	849867.27	100'	70.0
172+00	1250052.76	849908.95	100'	70.0
173+00	1249961.86	849950.63	100'	70.0
174+00	1249870.96	849992.32	100'	70.0
175+00	1249780.06	850034.00	100'	70.0
176+00	1249689.16	850075.68	45'	70.0
176+45	1249648.32	850094.41	55'	70.0
177+00	1249598.26	850117.36	100'	70.0
178+00	1249507.36	850159.04	100'	70.0
179+00	1249416.47	850200.72	100'	70.0
180+00	1249325.57	850242.41	100'	70.0
181+00	1249234.67	850284.09	100'	70.0
182+00	1249143.77	850325.77	100'	70.0
183+00	1249052.87	850367.45	100'	70.0
184+00	1248961.97	850409.13	100'	70.0
185+00	1248871.07	850450.82	118'	70.0
186+18	1248763.43	850500.17	82'	70.0
187+00	1248689.27	850534.18	100'	70.0
188+00	1248598.37	850575.86	100'	70.0

NOTES:

1. ALL PAY PROFILES SHALL BE SURVEYED AT THE AZIMUTH SHOWN IN THE PAY PROFILES TABLE.
2. CONTRACTOR WILL ONLY BE PAID FOR SAND PLACED WITHIN THE LINES AND GRADES AS SHOWN ON SHEETS PV-1 TO PV-24.
3. COORDINATES ARE IN FEET BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
4. ELEVATIONS ARE IN FEET REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
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C.O.A. LA. #2531
www.APTIM.com

Revisions: No. | Date | Description

Designed by: CP | Checked by: DM
Drawn by: CP | Reviewed by: CP
Date: 04/16/20 | Submitted by: CP
Plot Scale: AS NOTED | Comm. No.: 631235714
Reference files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
CONTROL DATA SHEET

DRAWING NO.
CD-1

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
189+00	1248507.48	850617.54	100'	70.0
190+00	1248416.58	850659.23	100'	70.0
191+00	1248325.68	850700.91	100'	70.0
192+00	1248234.78	850742.59	100'	70.0
193+00	1248143.88	850784.27	100'	70.0
194+00	1248052.98	850825.95	100'	70.0
195+00	1247962.08	850867.63	79'	70.0
196+00	1247870.59	850907.88	100'	70.0
196+79	1247890.10	850900.64	21'	70.0
197+00	1247776.82	850942.62	100'	70.0
198+00	1247683.05	850977.36	100'	70.0
199+00	1247589.28	851012.11	100'	70.0
200+00	1247495.51	851046.85	100'	70.0
201+00	1247401.73	851081.59	100'	70.0
202+00	1247307.96	851116.34	100'	70.0
203+00	1247214.19	851151.08	100'	70.0
204+00	1247120.42	851185.82	100'	70.0
205+00	1247026.65	851220.56	81'	70.0
205+81	1246950.30	851248.85	119'	70.0
207+00	1246844.32	851302.04	100'	70.0
208+00	1246754.95	851346.89	100'	70.0
209+00	1246665.57	851391.75	100'	70.0
210+00	1246576.19	851436.60	100'	70.0
211+00	1246486.82	851481.46	100'	70.0
212+00	1246397.44	851526.31	100'	70.0
213+00	1246308.07	851571.17	100'	70.0
214+00	1246218.69	851616.02	100'	70.0
215+00	1246129.31	851660.87	100'	70.0
216+00	1246039.94	851705.73	67'	70.0
216+67	1245980.24	851735.69	33'	70.0
217+00	1245952.34	851753.69	100'	70.0
218+00	1245868.31	851807.91	100'	70.0
219+00	1245784.29	851862.13	100'	70.0
220+00	1245700.26	851916.35	100'	70.0
221+00	1245616.24	851970.58	100'	70.0
222+00	1245532.22	852024.80	100'	70.0
223+00	1245448.19	852079.02	100'	70.0
224+00	1245364.17	852133.24	100'	70.0
225+00	1245280.14	852187.46	100'	70.0
226+00	1245196.12	852241.68	71'	70.0
226+71	1245136.87	852279.91	29'	70.0
227+00	1245110.92	852293.92	100'	70.0
228+00	1245022.93	852341.43	100'	70.0
229+00	1244934.93	852388.94	100'	70.0
230+00	1244846.94	852436.45	100'	70.0
231+00	1244758.95	852483.96	100'	70.0
232+00	1244670.95	852531.47	100'	70.0
233+00	1244582.96	852578.97	100'	70.0
234+00	1244494.97	852626.48	100'	70.0
235+00	1244406.97	852673.99	100'	70.0
236+00	1244318.98	852721.50	100'	70.0

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
237+00	1244230.99	852769.01	100'	70.0
238+00	1244142.99	852816.52	100'	70.0
239+00	1244055.00	852864.03	100'	70.0
240+00	1243967.00	852911.54	32'	70.0
240+32	1243939.11	852926.60	68'	70.0
241+00	1243878.12	852957.35	100'	70.0
242+00	1243788.83	853002.37	100'	70.0
243+00	1243699.54	853047.40	100'	70.0
244+00	1243610.25	853092.42	100'	70.0
245+00	1243520.96	853137.44	100'	70.0
246+00	1243431.67	853182.46	100'	70.0
247+00	1243342.38	853227.49	100'	70.0
248+00	1243253.09	853272.51	100'	70.0
249+00	1243163.79	853317.53	100'	70.0
250+00	1243074.50	853362.56	100'	70.0
251+00	1242985.21	853407.58	100'	70.0
252+00	1242895.92	853452.60	100'	70.0
253+00	1242806.63	853497.62	100'	70.0
254+00	1242717.34	853542.65	100'	70.0
255+00	1242628.05	853587.67	100'	70.0
256+00	1242538.75	853632.69	100'	70.0
257+00	1242449.46	853677.72	30'	70.0
257+30	1242422.74	853691.19	70'	70.0
258+00	1242360.17	853722.74	100'	70.0
259+00	1242270.88	853767.76	100'	70.0
260+00	1242181.59	853812.78	100'	70.0
261+00	1242092.30	853857.81	100'	70.0
262+00	1242003.01	853902.83	100'	70.0
263+00	1241913.72	853947.85	100'	70.0
264+00	1241824.42	853992.88	100'	70.0
265+00	1241735.13	854037.90	100'	70.0
266+00	1241645.84	854082.92	64'	70.0
266+64	1241589.03	854111.56	36'	70.0
267+00	1241555.83	854126.44	100'	70.0
268+00	1241464.57	854167.32	100'	70.0
269+00	1241373.31	854208.20	100'	70.0
270+00	1241282.05	854249.09	100'	70.0
271+00	1241190.79	854289.97	100'	70.0
272+00	1241099.53	854330.85	100'	70.0
273+00	1241008.27	854371.74	100'	70.0
274+00	1240917.01	854412.62	100'	70.0
275+00	1240825.75	854453.50	100'	70.0
276+00	1240734.49	854494.39	46'	70.0
276+46	1240692.59	854513.15	54'	70.0
277+00	1240643.22	854535.27	100'	70.0
278+00	1240551.96	854576.15	100'	70.0
279+00	1240460.70	854617.04	100'	70.0
280+00	1240369.44	854657.92	100'	70.0
281+00	1240278.18	854698.80	100'	70.0
282+00	1240186.92	854739.69	100'	70.0
283+00	1240095.66	854780.57	100'	70.0

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
284+00	1240004.40	854821.45	100'	70.0
285+00	1239913.14	854862.34	100'	70.0
286+00	1239821.88	854903.22	22'	70.0
286+22	1239801.73	854912.25	78'	70.0
287+00	1239730.18	854943.11	100'	70.0
288+00	1239638.35	854982.71	100'	70.0
289+00	1239546.53	855022.31	100'	70.0
290+00	1239454.70	855061.91	100'	70.0
291+00	1239362.88	855101.52	100'	70.0
292+00	1239271.06	855141.12	100'	70.0
293+00	1239179.23	855180.72	100'	70.0
294+00	1239087.41	855220.32	100'	70.0
295+00	1238995.58	855259.92	111'	70.0
296+11	1238893.29	855304.04	89'	70.0
297+00	1238811.94	855339.13	100'	70.0
298+00	1238720.11	855378.73	100'	70.0
299+00	1238628.29	855418.33	100'	70.0
300+00	1238536.46	855457.93	100'	70.0
301+00	1238444.64	855497.54	100'	70.0
302+00	1238352.81	855537.14	100'	70.0
303+00	1238260.99	855576.74	100'	70.0
304+00	1238169.17	855616.34	100'	70.0
305+00	1238077.34	855655.94	100'	70.0
306+00	1237985.52	855695.55	47'	70.0
306+47	1237942.01	855714.30	53'	70.0
307+00	1237892.40	855731.86	100'	70.0
308+00	1237798.13	855765.21	100'	70.0
309+00	1237703.86	855798.57	100'	70.0
310+00	1237609.58	855831.92	100'	70.0
311+00	1237515.31	855865.28	100'	70.0
312+00	1237421.04	855898.63	100'	70.0
313+00	1237326.76	855931.99	100'	70.0
314+00	1237232.49	855965.35	100'	70.0
315+00	1237138.22	855998.70	100'	70.0
316+00	1237043.95	856032.06	67'	70.0
316+67	1236980.49	856054.51	33'	70.0
317+00	1236949.67	856065.41	100'	70.0
318+00	1236855.40	856098.77	100'	70.0
319+00	1236761.13	856132.13	100'	70.0
320+00	1236666.85	856165.48	100'	70.0
321+00	1236572.58	856198.84	100'	70.0
322+00	1236478.31	856232.19	100'	70.0
323+00	1236384.04	856265.55	100'	70.0
324+00	1236289.76	856298.91	100'	70.0
325+00	1236195.49	856332.26	100'	70.0
326+00	1236101.22	856365.62	52'	70.0
326+52	1236052.49	856382.86	48'	70.0
327+00	1236005.52	856394.15	100'	70.0
328+00	1235908.28	856417.51	100'	70.0
329+00	1235811.05	856440.86	100'	70.0
330+00	1235713.81	856464.22	100'	70.0

PAY PROFILES				
STATION	NORTHING	EASTING	PERPENDICULAR DISTANCE TO NEXT STATION	AZIMUTH (DEGREES)
331+00	1235616.58	856487.58	100'	70.0
332+00	1235519.34	856510.93	100'	70.0
333+00	1235422.11	856534.29	100'	70.0
335+00	1235227.64	856581.00	100'	70.0
336+00	1235130.41	856604.38	84'	70.0
336+84	1235049.06	856624.35	116'	70.0
338+00	1234935.94	856651.07	100'	70.0
339+00	1234838.71	856674.43	100'	70.0
340+00	1234741.47	856697.78	100'	70.0
341+00	1234644.24	856721.14	100'	70.0
342+00	1234547.01	856744.50	100'	70.0
343+00	1234449.77	856767.85	100'	70.0
344+00	1234352.54	856791.21	100'	70.0
345+00	1234255.30	856814.57	100'	70.0
346+00	1234158.07	856837.92	100'	70.0
347+00	1234060.83	856861.28	100'	70.0
348+00	1233963.60	856884.64	100'	70.0
349+00	1233866.37	856907.99	100'	70.0
350+00	1233769.13	856931.35	100'	70.0
351+00	1233671.90	856954.70	100'	70.0
352+00	1233574.66	856978.06	100'	70.0
353+00	1233477.43	857001.42	100'	70.0
354+00	1233380.20	857024.77	100'	70.0
355+00	1233282.96	857048.13	100'	70.0
356+00	1233185.73	857071.49	70'	70.0
356+70	1233117.61	857087.85	0'	70.0

NOTES:

1. ALL PAY PROFILES SHALL BE SURVEYED AT THE AZIMUTH SHOWN IN THE PAY PROFILES TABLE.
2. CONTRACTOR WILL ONLY BE PAID FOR SAND PLACED WITHIN THE LINES AND GRADES AS SHOWN ON SHEETS PV-1 TO PV-24.
3. COORDINATES ARE IN FEET BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
4. ELEVATIONS ARE IN FEET REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
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C.O.A. LA. #2531

Revisions: No. | Date | Description

Reference Files:
Designed by: CP
Drawn by: CP
Date: 04/16/20
Plot Scale: AS NOTED
Checked by: DW
Reviewed by: CP
Submitted by: CP
Comm. No.: 631235714

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
CONTROL DATA SHEET

DRAWING NO.
CD-2

FDEP R-MONUMENTS

STATION	RANGE	NORTHING	EASTING	ELEVATION	AZIMUTH	STAMPING
R-20	0	1264644	842898.8	8.52	70°	R-20 IND. R. 72
R-21	0	1263722	843254.5	8.04	70°	R-21 IND. R. 72
R-22	0	1262824	843751.7	8.14	70°	R-22 IND. R. 72
R-22	0	1262779	843652.7	12.53	70°	R-22 IND. R. -110 1986
R-23	0	1261888	844158.1	8.45	70°	R23 IR 97
R-24	0	1260976	844565.8	11.75	70°	R24 IR 97
R-25	0	1259968	845052.9	10.15	70°	R-25 IND. R. 72
R-26	0	1259089	845441.6	8.9	70°	R-26 IND. R. RESET-00-1986
R-27	0	1258429	845818	10	70°	R-27 IND. R. 72
R-28	0	1257512	846320.9	12.73	70°	R-28 IND. R. 72
R-29	0	1256682	846807.7	13.84	70°	R-29 IND. R. 72
R-30	0	1255774	847271.1	16.99	70°	R-30 IND. R. 72
R-31	0	1254930	847677.8	18.02	70°	T-31 IND. R. 1978
R-32	0	1254060	848087	14.16	70°	R-32 IND. R. 72
R-33	0	1253164	848497.9	16.47	70°	R-33 IND. R. 72
R-34	0	1252279	848868.8	13.87	70°	R-34 IND. R. 72
R-35	0	1251317	849305.3	15.16	70°	R-35 IND. R. 72
R-36	0	1250523	849634.5	12.96	70°	T-36 IND. R. 1978
R-37	0	1249637	850067.1	11.89	70°	R-37 IND. R. 72
R-38	0	1248753	850470.1	14.92	70°	T-38 IND. R. 1978
R-39	0	1247858	850813.7	13.12	70°	R-39 IND. R. RESET-00-1986
R-40	0	1246965	851288.1	---	70°	R40 IR 97
R-41	0	1245993	851770	15.85	70°	R-41 IND. R. 72
R-42	0	1245137	852279.9	17.65	70°	R-42 IND. R. 72
R-43	0	1243939	852926.6	15.66	70°	R-43 IND. R. 1986
R-44	0	1243353	853257.5	13.04	70°	R44 IR 97
R-45	0	1242409	853652.5	13.22	70°	T-45 IND. R. 1978
R-46	0	1241568	854053.3	13.95	70°	T-46 IND. R. 1978
R-47	0	1240694	854515.6	---	70°	R47 IR 97
R-48	0	1239743	854750.4	15.53	70°	R48 IR 97
R-49	0	1238891	855298.9	12.85	70°	R-49 IND. R. 72
R-50	0	1237923	855660.9	13.13	70°	R-50 IND. R. 72
R-51	0	1236972	856032.2	16.28	70°	R-51 IND. R. 72
R-51	0	1236979	856050.8	15.12	70°	R-51 O/S RNG. 20 2001
R-52	0	1236045	856362.9	13.86	70°	R-52 IND. R. 72
R-53	0	1235049	856624.4	15.78	70°	R-53 IND. R. +96 1986
R-54	0	1234074	856897.5	14	70°	R-54 IND. R. 72
R-55	0	1233118	857087.9	15.01	70°	R-55 IND. R. 72

BENCHMARK CONTROL POINTS
SECOND ORDER CONTROL (A-MONUMENTS)

FDEP MONUMENT ID	NORTHING	EASTING	ELEVATION (FT, NAVD88)	STAMPING
A-09	1260281.76	844426.04	6.93	88-78-A09
A-10	1255223.74	847007.70	8.2	88-78-A10
A-11	1251561.73	848670.12	7.94	88-78-A11
A-12	1248469.92	850063.84	5.53	88-78-A12
A-15	1238793.85	854935.12	9.84	88-78-A15
A-16	1234676.88	856148.19	8.85	88-78-A16

WATER LEVEL TABLE

TIDAL DATUM	ELEVATION (FT, NAVD88)
MEAN HIGH WATER (MHW)	+0.60
MEAN LOW WATER (MLW)	-2.82

NOTES:

1. COORDINATES ARE IN FEET BASED ON THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
2. ELEVATIONS ARE IN FEET REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. R-MONUMENT AND WATER LEVEL DATA FOR REFERENCE ONLY. ALL CONTROL SHALL BE SET BY SECOND ORDER A-MONUMENTS.
4. TIDAL DATUMS AT INDIAN RIVER COUNTY, ATLANTIC OCEAN WERE OBTAINED FROM THE LAND BOUNDARY INFORMATION SYSTEM (LABINS), BASED ON EPOCH 1983-2001, TIDE INTERPOLATION POINT #101033, QUAD MAP NAME SEBASTIAN.

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
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BOCA RATON, FLORIDA 33431
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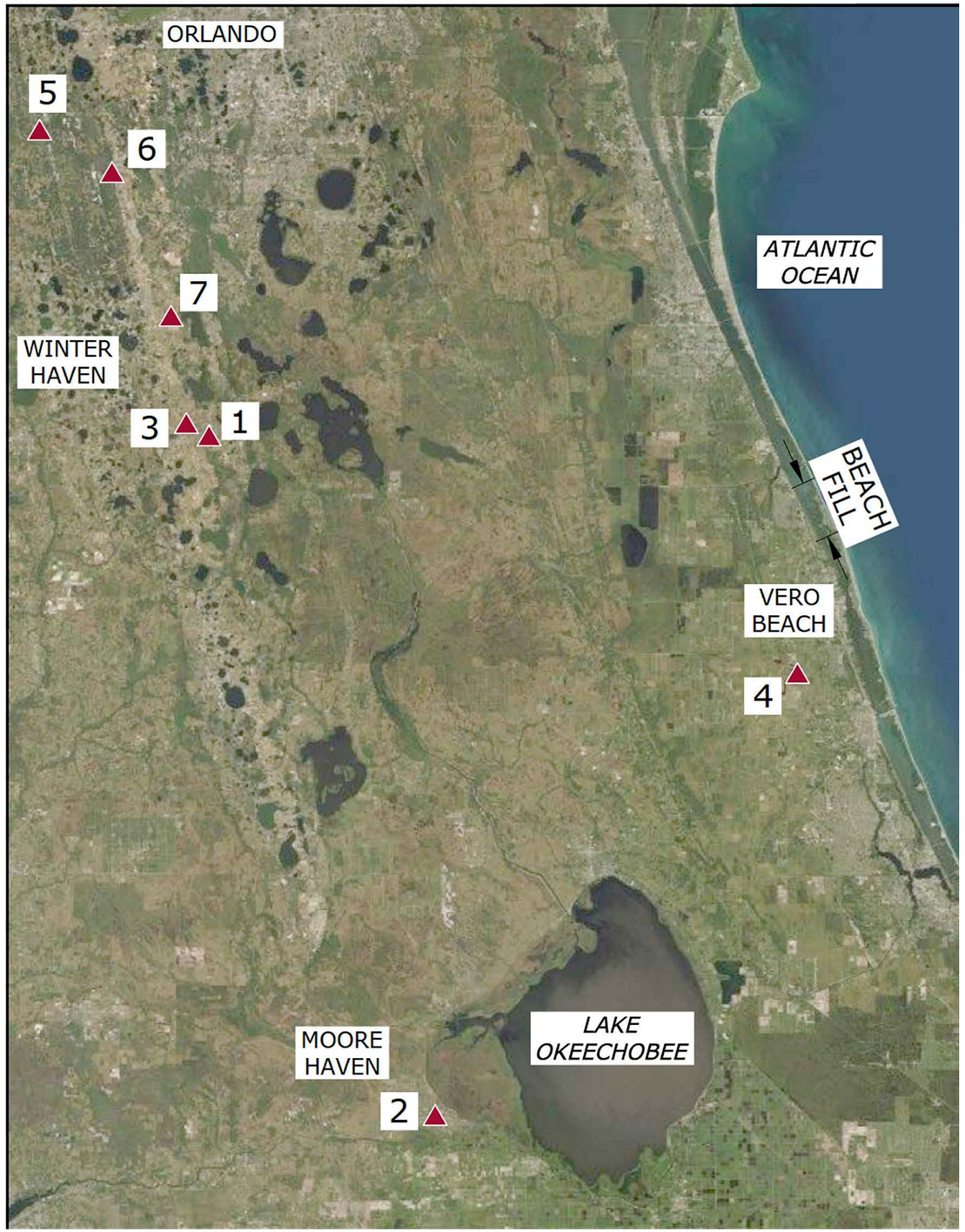
FAX (561) 391-9116
C.O.A. FL. #8317
C.O.A. LA. #2531
www.APTIM.com

REVISIONS
No. Date Description

Designed by: CP
Drawn by: CP
Date: 04/16/20
Plot Scale: AS NOTED
Checked by: DM
Reviewed by: CP
Submitted by: CP
Comm. No.: 631235714
Reference files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
CONTROL DATA SHEET

DRAWING NO.
CD-3



N

0 37500 75000
GRAPHIC SCALE IN FT

UPLAND SAND SOURCES

1. VULCAN – DIAMOND MINE
   205 STORY ROAD
   LAKE WALES, FL 33898
2. VULCAN – WITHERSPOON MINE
   7425 W. STATE ROAD 78
   MOORE HAVEN, FL 33471
3. VULCAN – SANDLAND MINE
   2200 BURNS AVENUE
   LAKE WALES, FL 33898
4. STEWART – FORT PIERCE MINE
   13575 INDRIO ROAD
   FORT PIERCE, FL 34945
5. JAHNA – INDEPENDENT MINE
   8455 COUNTY ROAD 474
   CLERMONT, FL 34714
6. JAHNA – GREEN BAY MINE
   4949 SAND MINE ROAD
   DAVENPORT, FL 33897
7. JAHNA – HAINES CITY MINE
   4910 JAHNA SAND MINE ROAD
   HAINES CITY, FL 33844

NOTES:

1. AERIAL PHOTOGRAPHY: JANUARY 2020

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W MANN, P.E. NO. 44046 DATE

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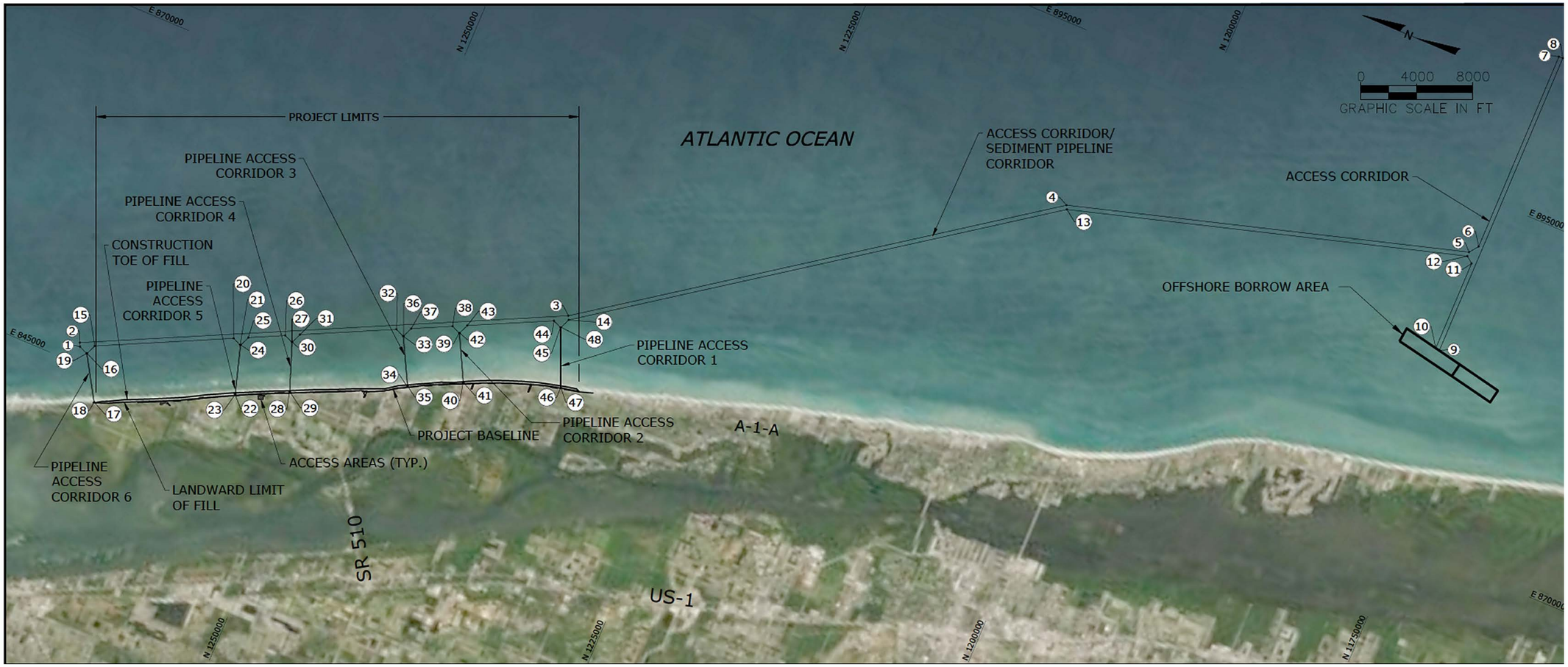
C.O.A. FL. #9317

REVISIONS
Description

Designed by: CP
Drawn by: KC
Date: 04/16/20
Plot Scale: As Shown
Checked by: DM
Reviewed by: CP
Submitted by: CP
Comm. No.: 494362
Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
PROJECT OVERVIEW

DRAWING NO.
OV-1



ACCESS CORRIDOR/SEDIMENT PIPELINE CORRIDOR COORDINATES		
POINT NO.	EASTING	NORTHING
1	846186.4	1267210.7
2	846456.0	1267342.4
3	861796.0	1235935.5
4	882907.5	1206228.8
5	891000.1	1178444.0
6	891639.9	1177964.0
7	906345.3	1177964.0
8	906360.2	1177664.0
9	883694.4	1177664.0
10	883755.3	1177964.0
11	890327.4	1177964.0
12	890687.6	1178444.0
13	882635.3	1206090.6
14	861526.5	1235803.8

ACCESS CORRIDOR/SEDIMENT PIPELINE CORRIDOR COORDINATES		
POINT NO.	EASTING	NORTHING
15	846647.5	1266266.8
16	845953.0	1266560.0
17	842926.0	1264719.0
18	842900.0	1264761.0
19	845930.8	1266605.4
20	851009.4	1257334.7
21	850754.0	1256730.0
22	847379.0	1255717.0
23	847393.5	1255668.8
24	850776.0	1256684.0
25	851470.5	1256390.8
26	852629.4	1254019.7
27	852374.0	1253414.0
28	849026.0	1252185.0

ACCESS CORRIDOR/SEDIMENT PIPELINE CORRIDOR COORDINATES		
POINT NO.	EASTING	NORTHING
29	849043.0	1252138.0
30	852396.0	1253369.0
31	853090.5	1253075.8
32	856120.4	1246872.7
33	855865.0	1246267.0
34	852656.0	1244574.0
35	852679.2	1244530.1
36	855887.0	1246222.0
37	856581.5	1245928.8
38	857882.4	1243263.7
39	857626.8	1242658.4
40	854456.0	1241013.0
41	854479.0	1240969.0
42	857649.0	1242613.0

ACCESS CORRIDOR/SEDIMENT PIPELINE CORRIDOR COORDINATES		
POINT NO.	EASTING	NORTHING
43	858343.5	1242319.8
44	861065.4	1236747.7
45	860809.8	1236142.4
46	856817.0	1234456.0
47	856836.4	1234410.2
48	860832.0	1236097.0

NOTES:

1. SIX PIPELINE CORRIDOR OPTIONS ARE AVAILABLE FOR USE BY THE CONTRACTOR. A MAXIMUM OF FOUR OF THE SIX PIPELINE CORRIDORS SHALL BE UTILIZED BY THE CONTRACTOR.
2. AERIAL PHOTOGRAPHY: 2020 INDIAN RIVER COUNTY.
3. COORDINATES SHOWN HEREON ARE IN FEET REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
4. SEE TP-16.5 FOR SEDIMENT PIPELINE INSTALLATION REQUIREMENTS.

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W MANN, P.E. NO. 44046 DATE

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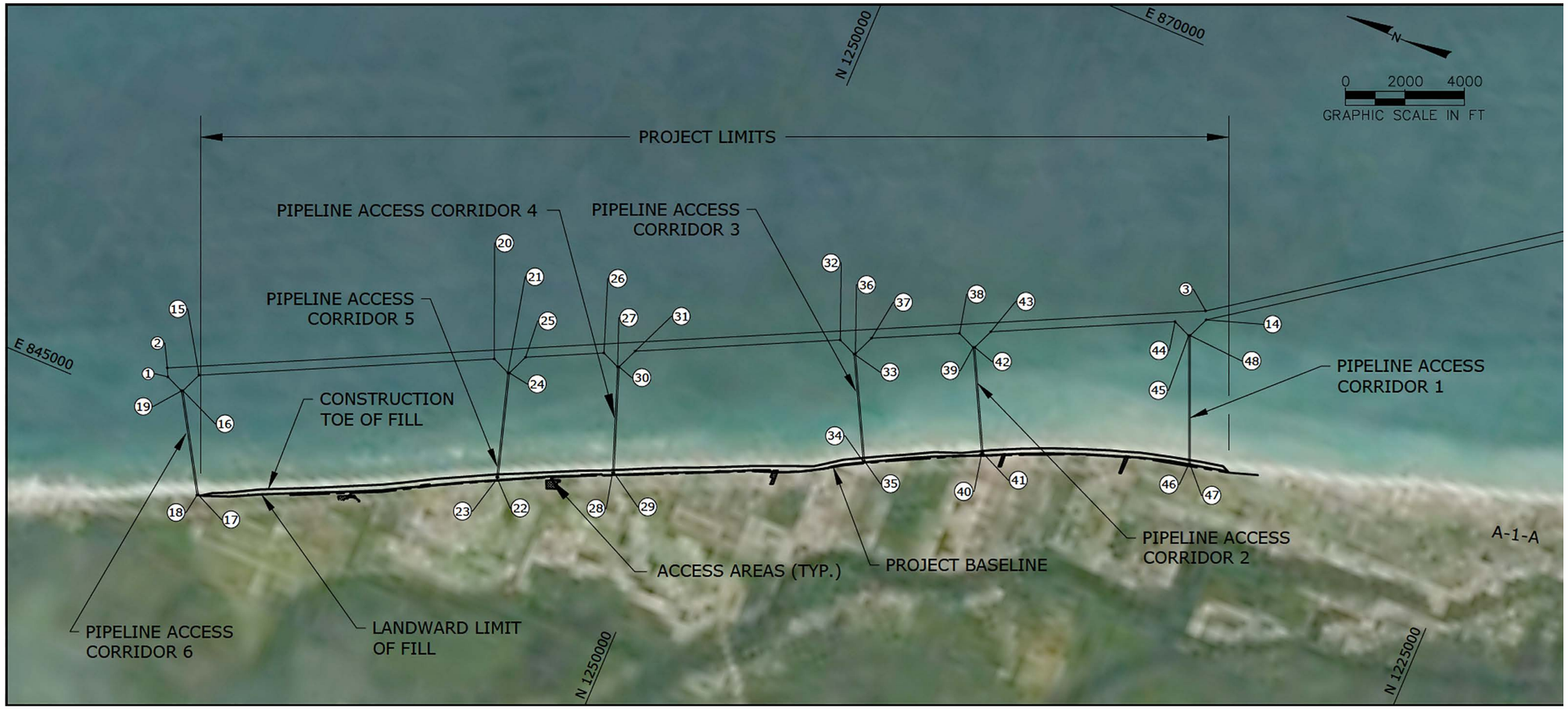
C.O.A. FL. #9317
C.O.A. LA. #2631

REVISIONS
Description

Designed by: CP
Checked by: DM
Drawn by:
Reviewed by: CP
Date: 04/16/20
Submitted by: CP
Plot Scale:
Comm. No.:
Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
PROJECT OVERVIEW
OFFSHORE BARROW AREA

DRAWING NO.
OV-2



NOTES:

1. SIX PIPELINE CORRIDOR OPTIONS ARE AVAILABLE FOR USE BY THE CONTRACTOR. A MAXIMUM OF FOUR OF THE SIX PIPELINE CORRIDORS SHALL BE UTILIZED BY THE CONTRACTOR.
2. AERIAL PHOTOGRAPHY: 2020 INDIAN RIVER COUNTY.
3. COORDINATES SHOWN HEREON ARE IN FEET REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
4. SEE TP-16.5 FOR SEDIMENT PIPELINE INSTALLATION REQUIREMENTS.
5. SEE SHEET 6 FOR COORDINATE TABLES.

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
2481 N.W. BOCA RATON BOULEVARD
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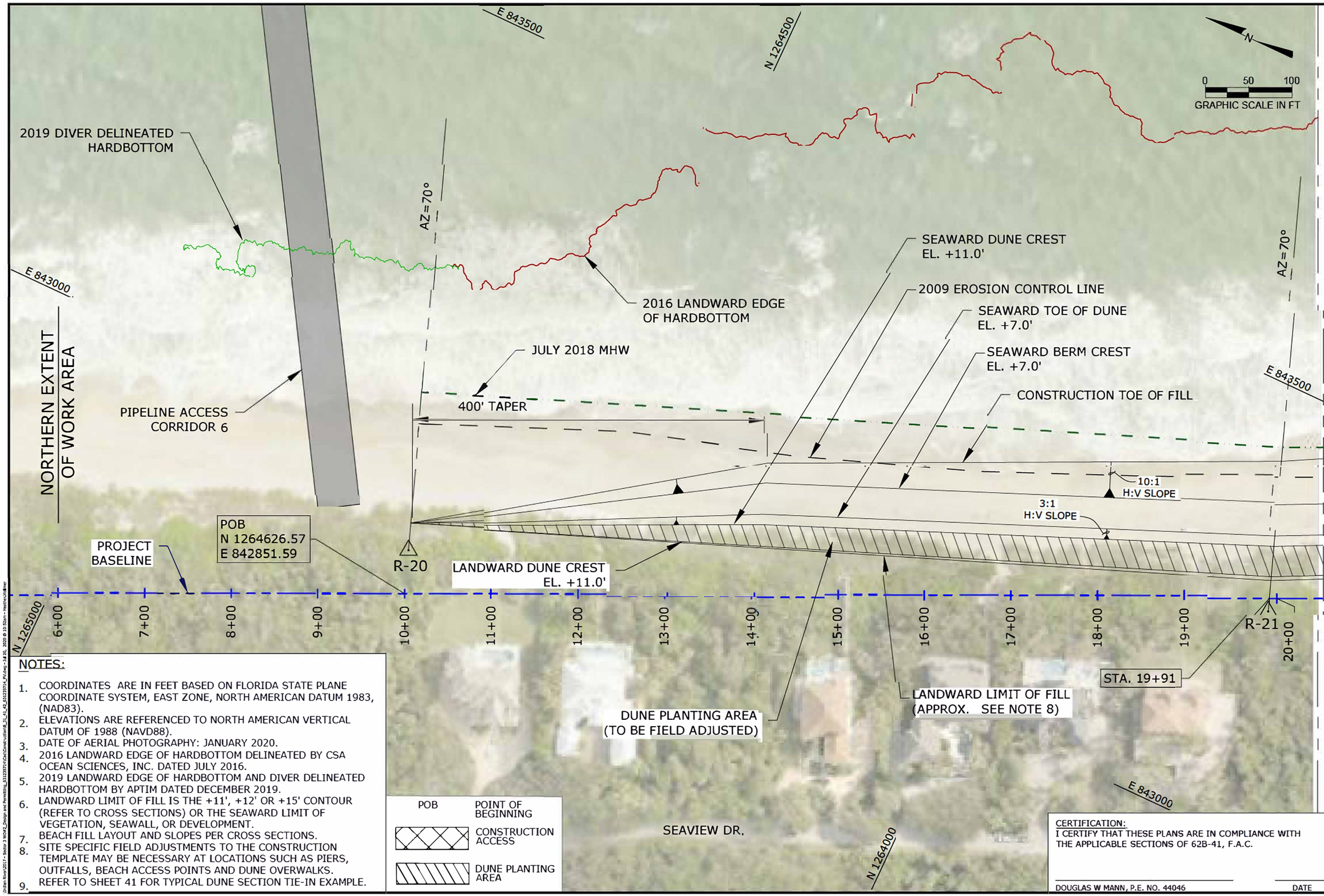
www.APTIM.com
PH. (561) 391-9102
FAX (561) 391-9116
C.O.A. FL. #9317
C.O.A. LA. #2631

REVISIONS
Description

Designed by: CP
Drawn by:
Checked by: DM
Reviewed by: CP
Date: 04/16/20
Submitted by: CP
Plot Scale:
Comm. No.:
Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
PROJECT OVERVIEW
OFFSHORE BARROW AREA

DRAWING NO.
OV-3



NOTES:

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9. REFER TO SHEET 41 FOR TYPICAL DUNE SECTION TIE-IN EXAMPLE.

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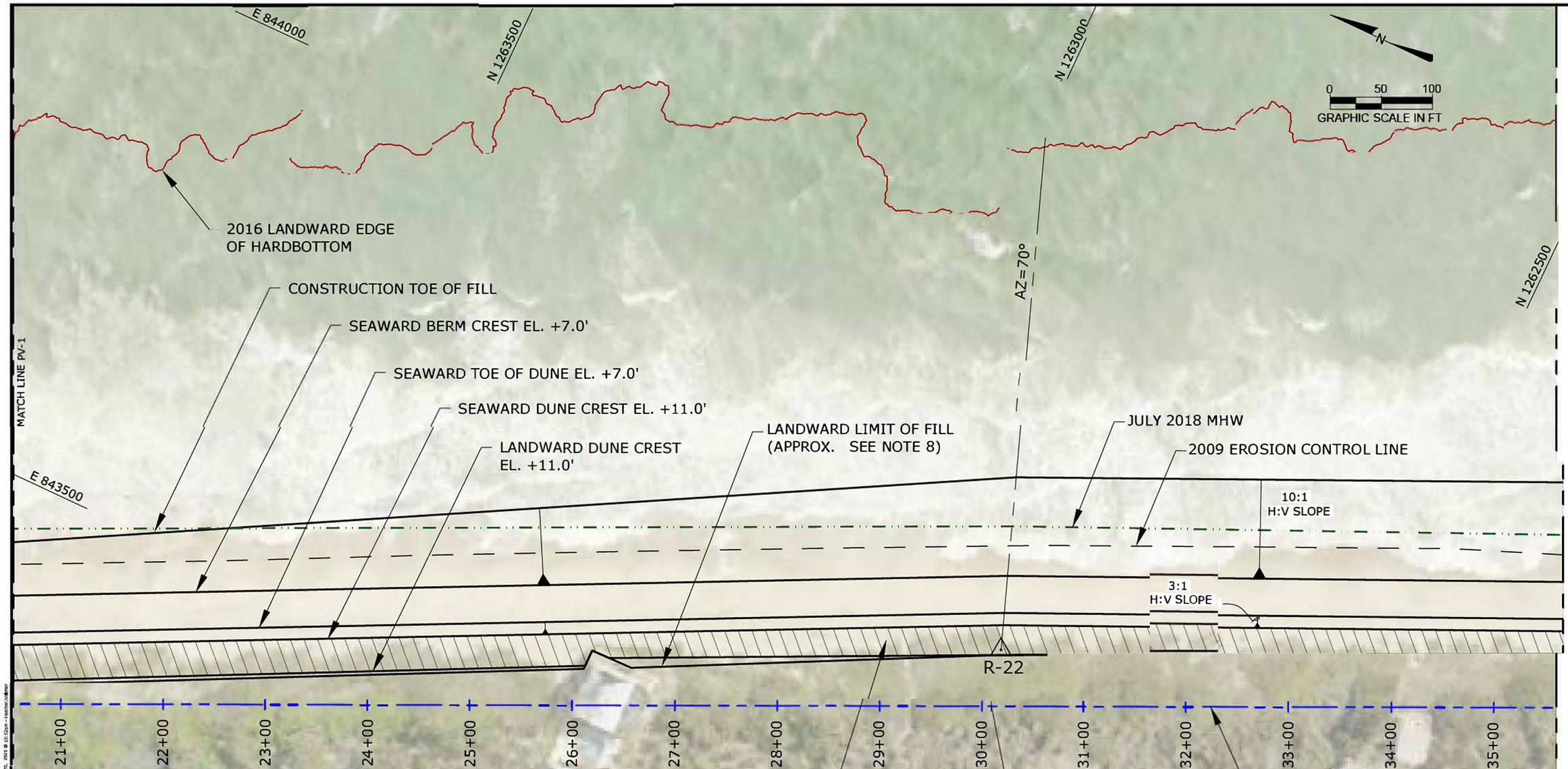
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-1



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CONSTRUCTION ACCESS

DUNE PLANTING AREA

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REVISIONS

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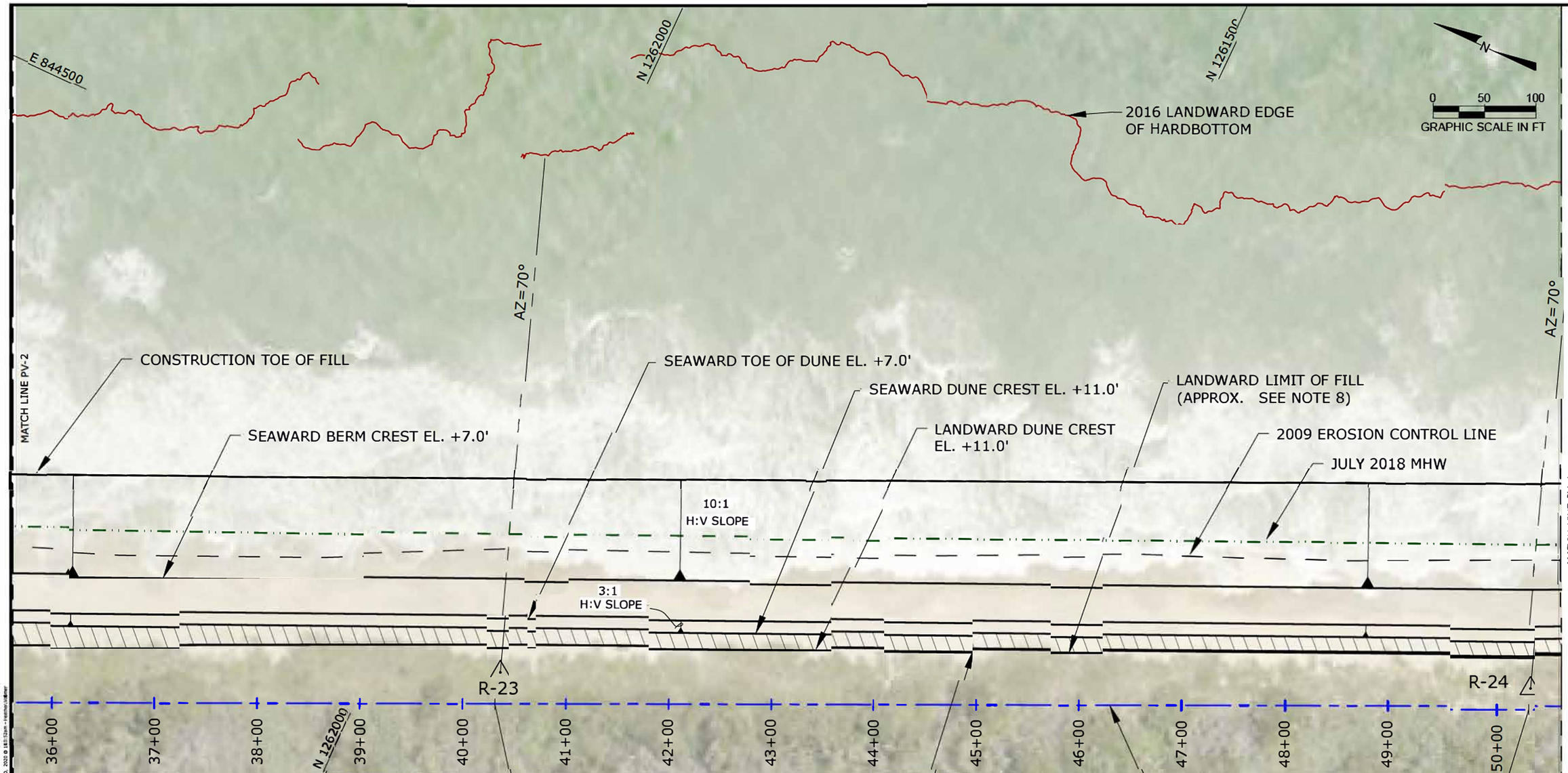
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-2

SHEET 9 OF 44



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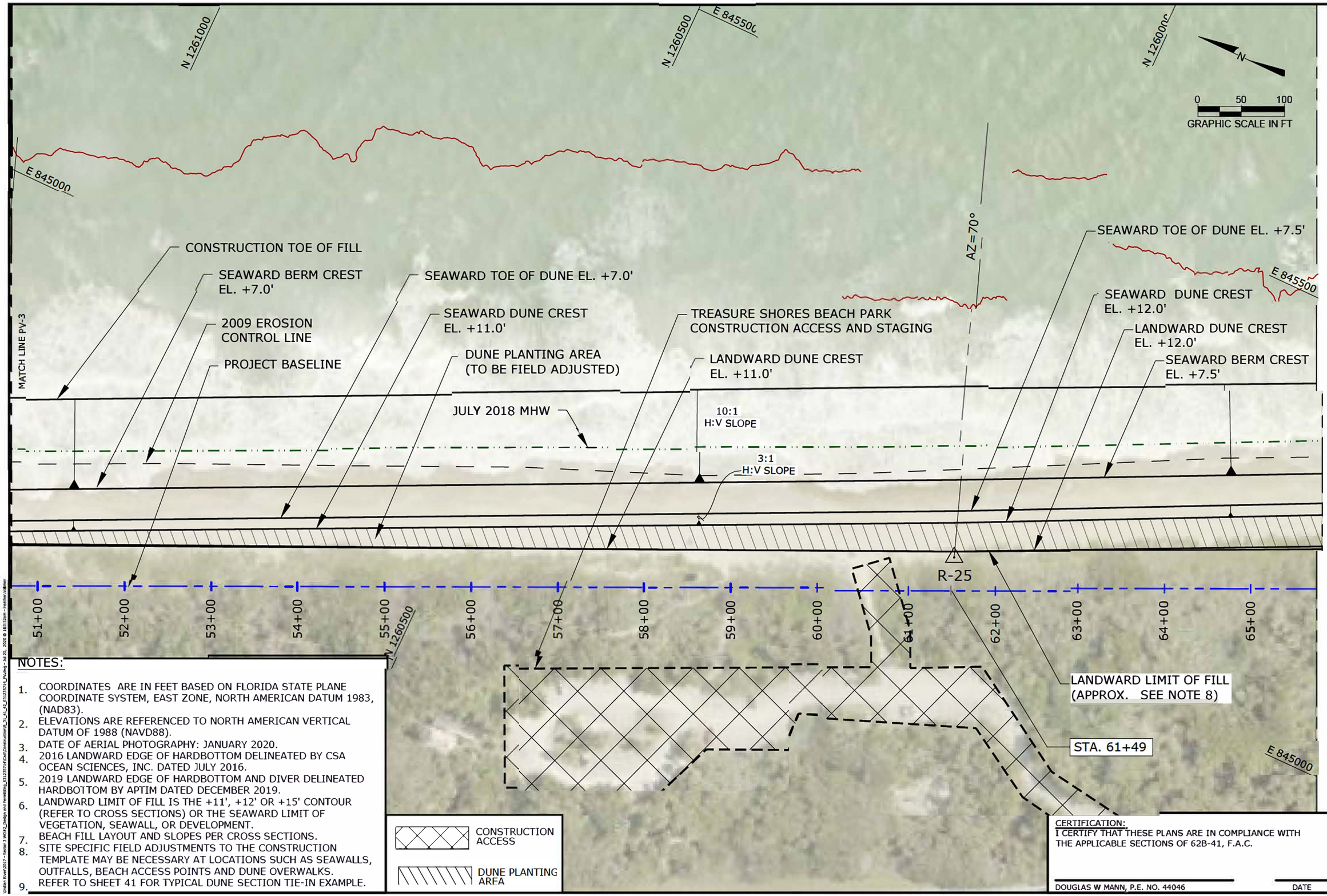
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-3

SHEET 10 OF 44



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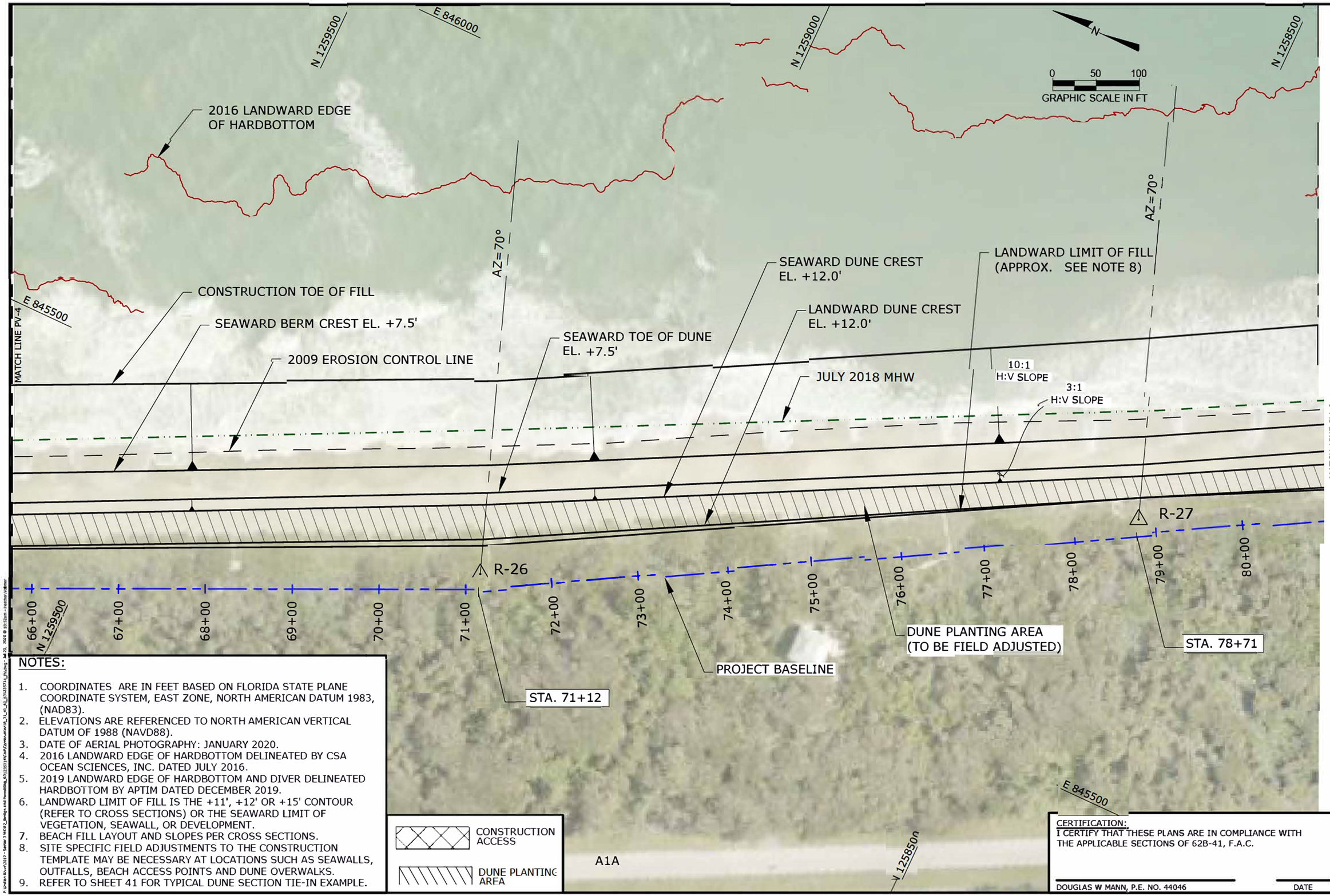
Date: 04/16/20
Submitted by: CP
Not Scale
Comm. No.:

Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-4

SHEET 11 OF 44



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CONSTRUCTION ACCESS

DUNE PLANTING AREA

CERTIFICATION:
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C.O.A. FL. #8317

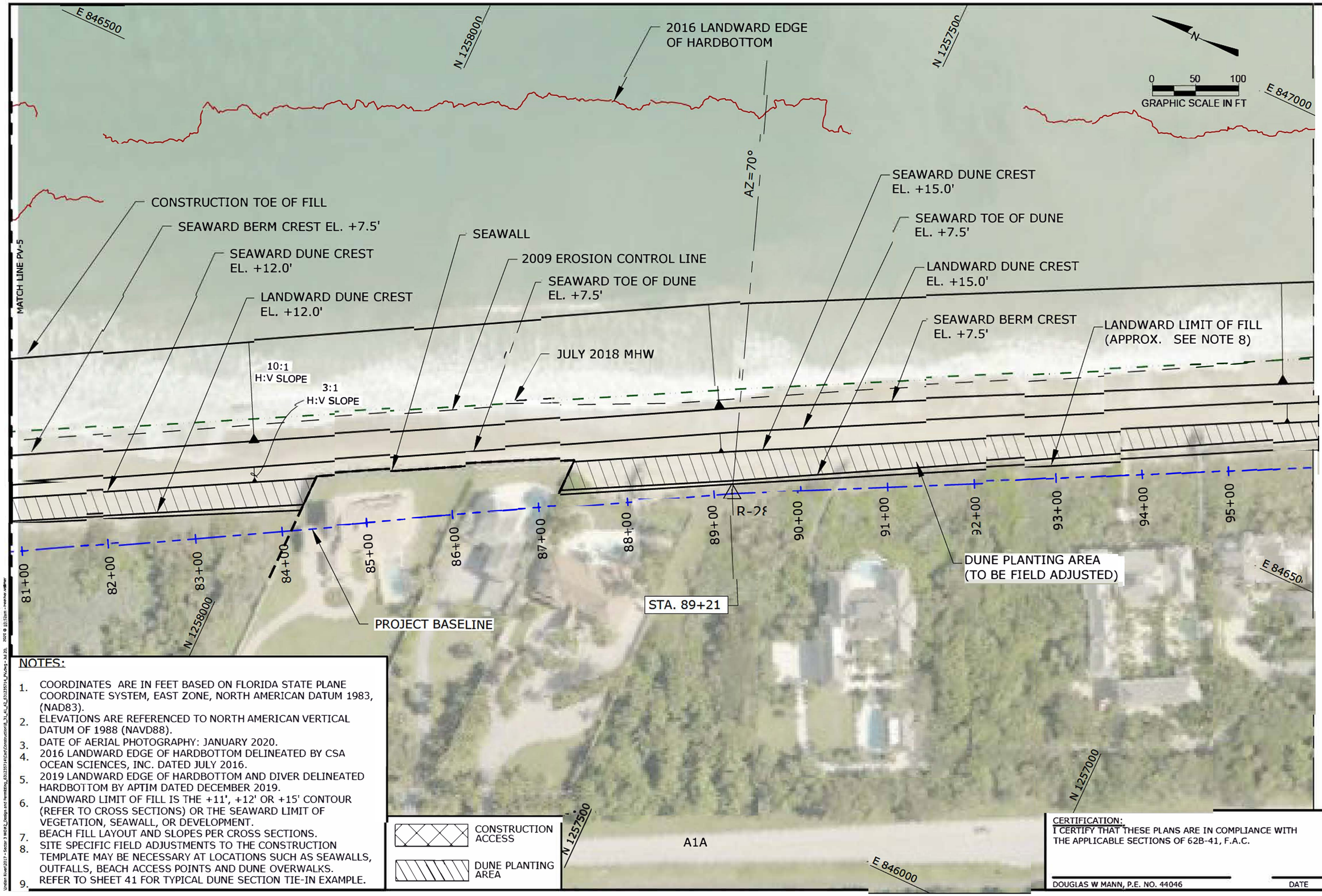
REVISIONS

Checked by: DM
Reviewed by: CP
Submitted by: CP
Date: 04/16/20
Scale:
Proj. No.: 631235714

Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-5



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BOCA RATON, FLORIDA 33431
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #9317

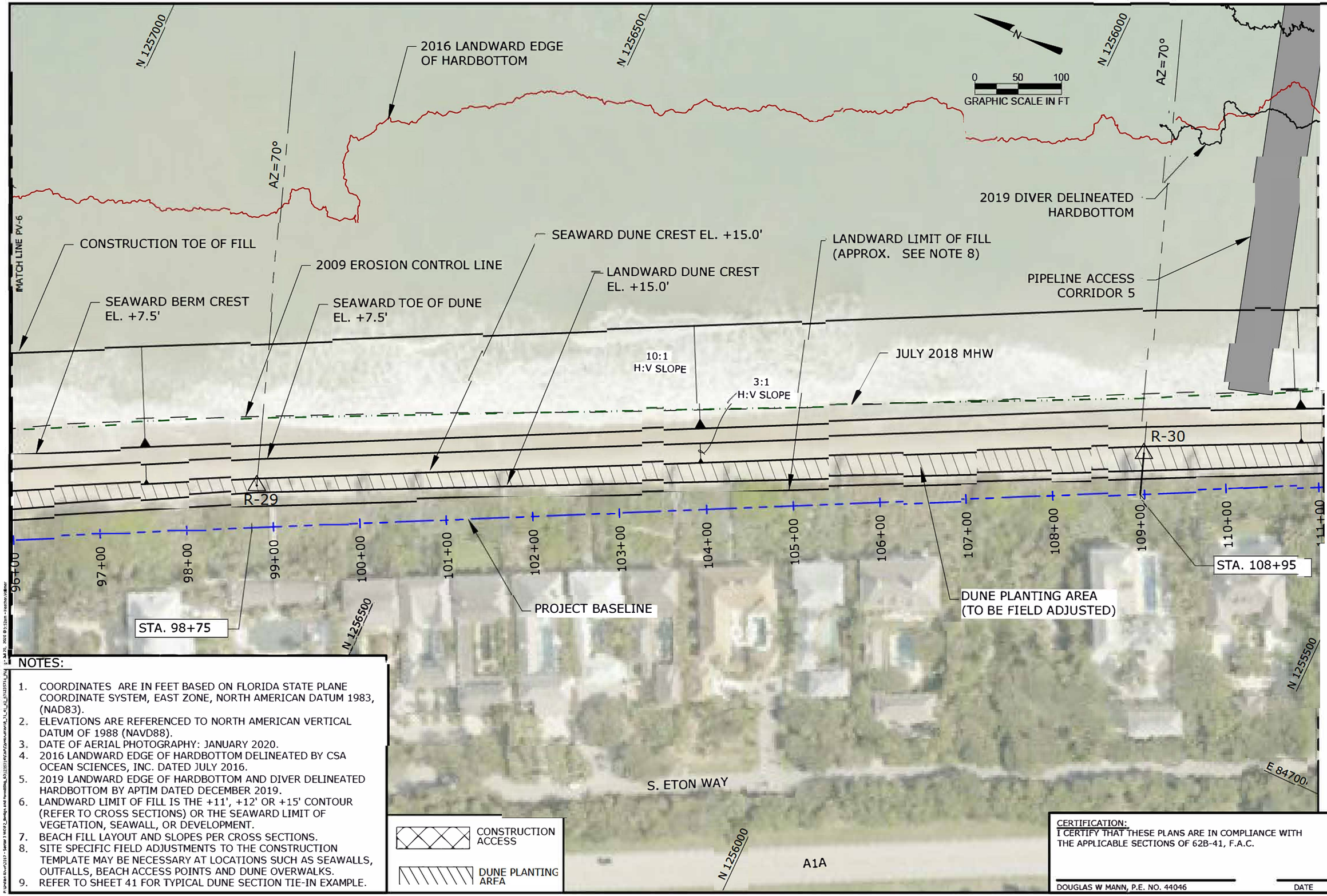
Revision	Description

Reference Files:

designed by: CP
drawn by: KC
date: 04/16/20
lot Scale:
checked by: DM
reviewed by: CP
submitted by: CP
Jobnm. No.:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-6



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SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-7

PIPELINE ACCESS CORRIDOR 5

N 1255500 | E 848000

2016 LANDWARD EDGE OF HARDBOTTOM

N 1255000

N 1254500

N

0 50 100
GRAPHIC SCALE IN FT

AZ=70°

2019 DIVER DELINEATED HARDBOTTOM

CONSTRUCTION TOE OF FILL

SEAWARD DUNE CREST
EL. +15.0'

LANDWARD LIMIT OF FILL
(APPROX. SEE NOTE 8)

MATCH LINE PV-7

SEAWARD BERM CREST
EL. +7.5'

SEAWARD TOE OF DUNE
EL. +7.5'

LANDWARD DUNE CREST
EL. +15.0'

2009 EROSION CONTROL LINE

JULY 2018 MHW

E 847500

10:1
H:V SLOPE

3:1
H:V SLOPE

MATCH LINE PV-9

T-31

112+00 113+00 114+00 115+00 116+00 117+00 118+00 119+00 120+00 121+00 122+00 123+00 124+00 125+00 126+00

N 1255500

PROJECT BASELINE

STA. 118+35

DUNE PLANTING AREA
(TO BE FIELD ADJUSTED)

S. ETON WAY

E 847500

N 1254500

A1A

NOTES:

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CONSTRUCTION ACCESS

DUNE PLANTING AREA

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REVISIONS

No.	Description

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Reference files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-8

SHEET 15 OF 44

E 848500
N 1254000
N 1253500
E 849000
N
0 50 100
GRAPHIC SCALE IN FT
E 849000
N 1253000
AZ=70°
AZ=70°
2016 LANDWARD EDGE OF HARDBOTTOM
CONSTRUCTION TOE OF FILL
2009 EROSION CONTROL LINE
SEAWARD BERM CREST EL. +7.5'
SEAWARD TOE OF DUNE EL. +7.5'
JULY 2018 MHW
SEAWARD DUNE CREST EL. +15.0'
LANDWARD DUNE CREST EL. +15.0'
10:1 H:V SLOPE
LANDWARD LIMIT OF FILL (APPROX. SEE NOTE 8)
SEAWALL
3:1 H:V SLOPE
MATCH LINE PV-8
MATCH LINE PV-10
R-32
R-33
127+00
128+00
129+00
130+00
131+00
132+00
133+00
134+00
135+00
136+00
137+00
138+00
139+00
140+00
141+00
STA. 127+92
STA. 137+84
PROJECT BASELINE
GOLDEN SANDS BEACH PARK CONSTRUCTION ACCESS AND STAGING
DUNE PLANTING AREA (TO BE FIELD ADJUSTED)
E 848500
SANDERLING LN
N 1253500
N 1253000
E 848000

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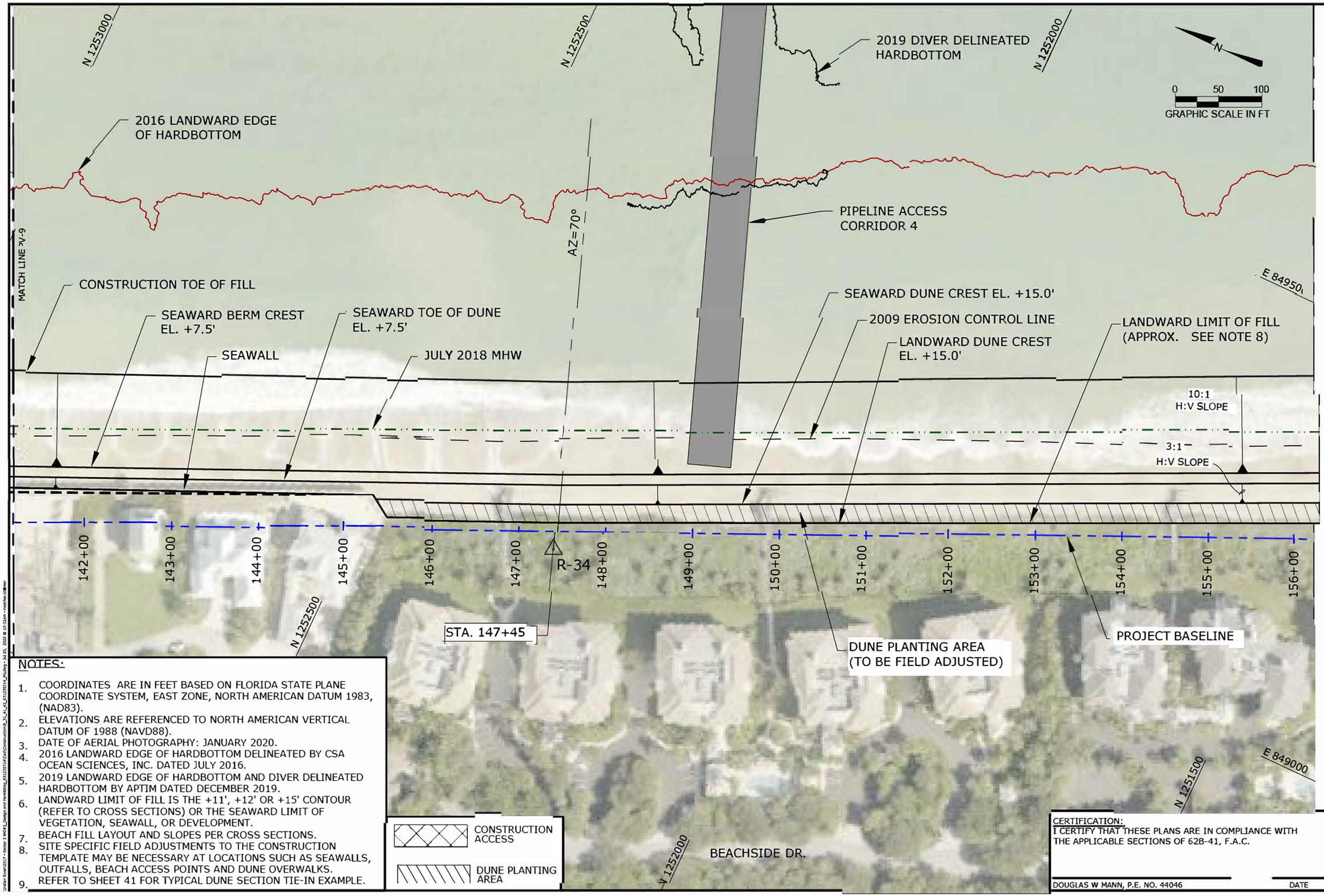
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-9



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9. REFER TO SHEET 41 FOR TYPICAL DUNE SECTION TIE-IN EXAMPLE.

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

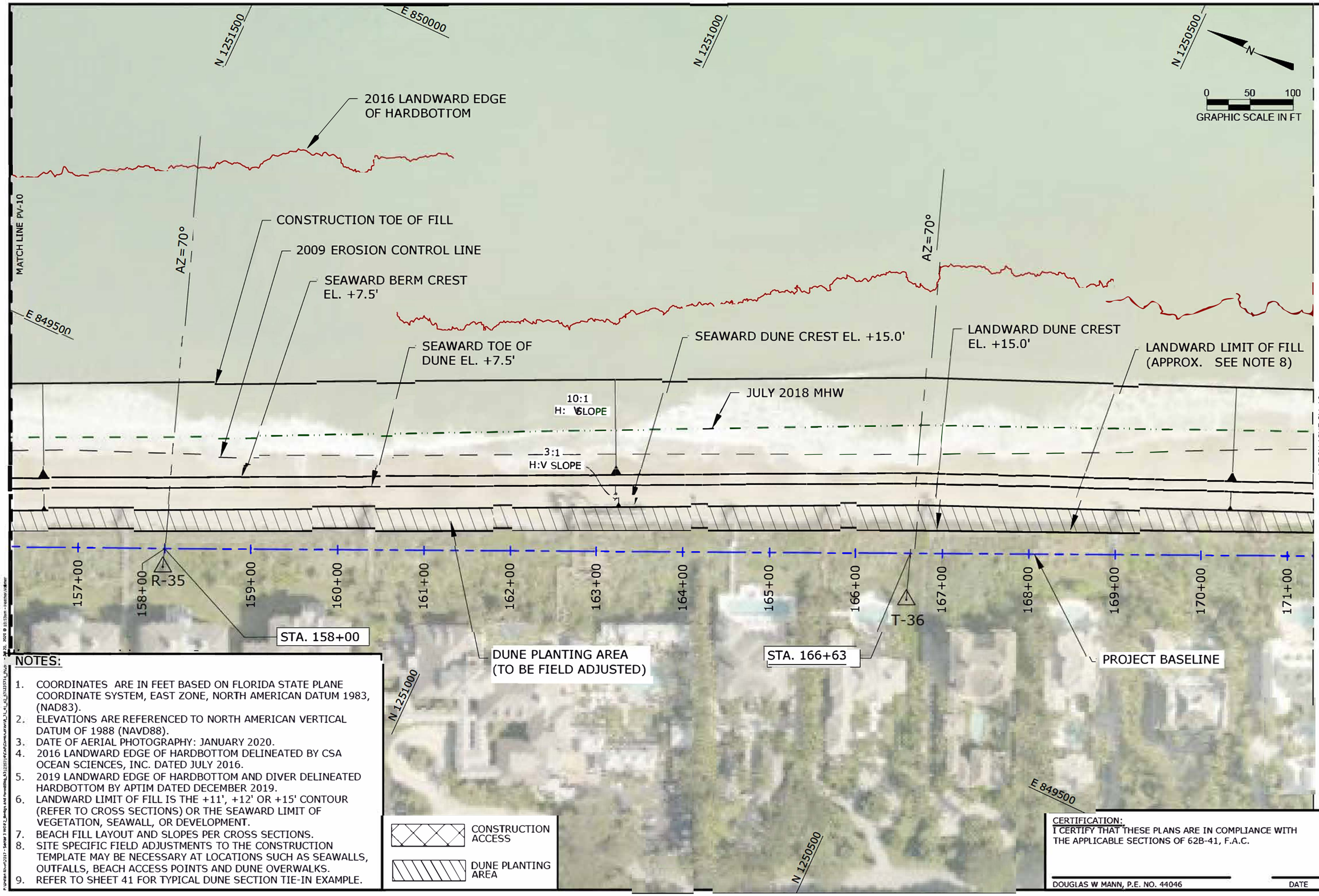
DOUGLAS W MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #8317

Designed by: CP
Drawn by: KC
Date: 04/16/20
Plot Scale:
Checked by: DM
Reviewed by: CP
Submitted by: CP
Comm. No.:
Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-10



NOTES:

1. COORDINATES ARE IN FEET BASED ON FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM 1983, (NAD83).
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REVISIONS
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SECTOR 3
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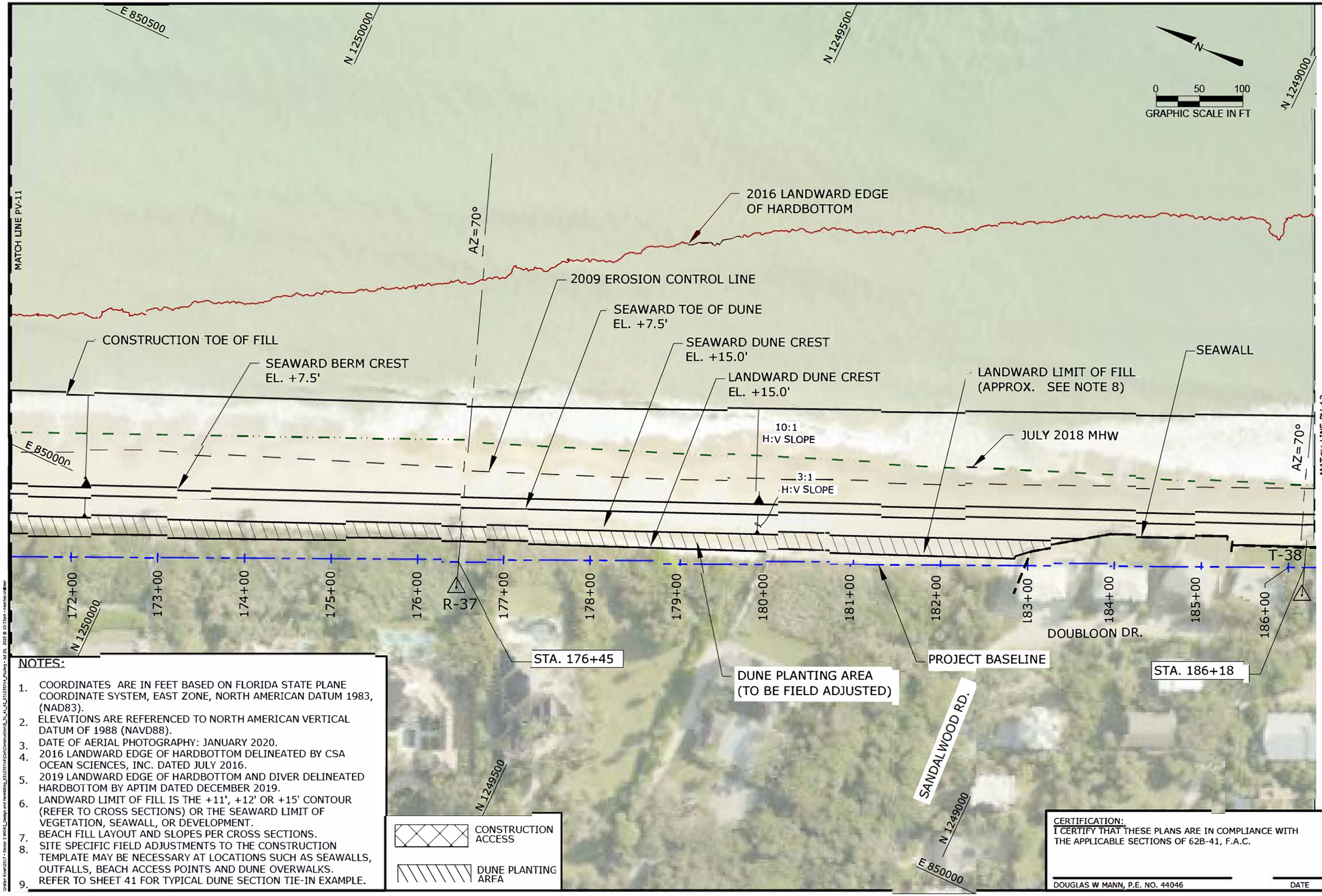
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-11



NOTES:

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REVISIONS

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Designed by: CP
Drawn by: KC
Date: 04/16/20
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Reviewed by: CP
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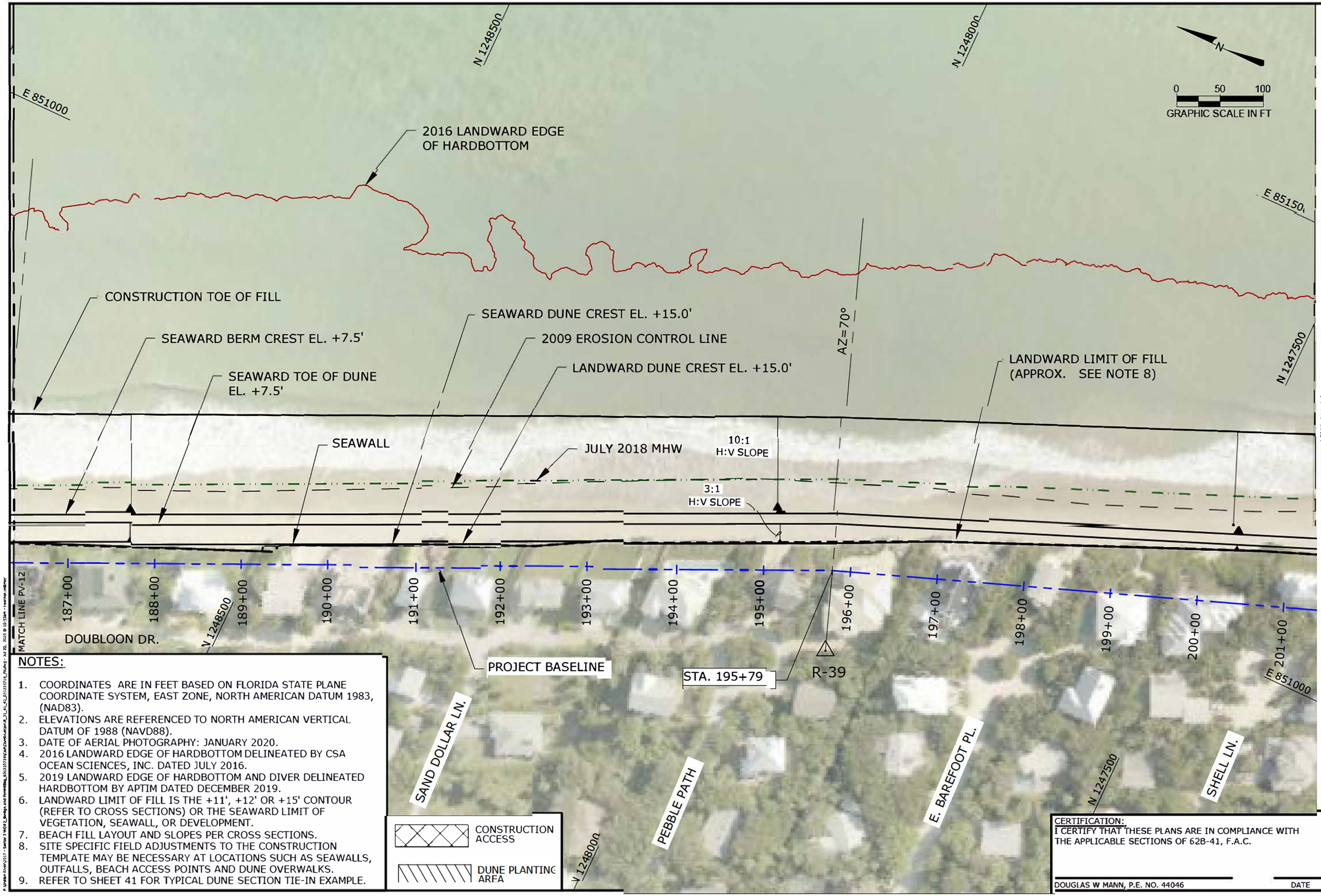
Comm. No.:

Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-12

SHEET 19 OF 44



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REVISIONS

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Reference files:

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SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-13

SHEET 20 OF 44

NOTES:

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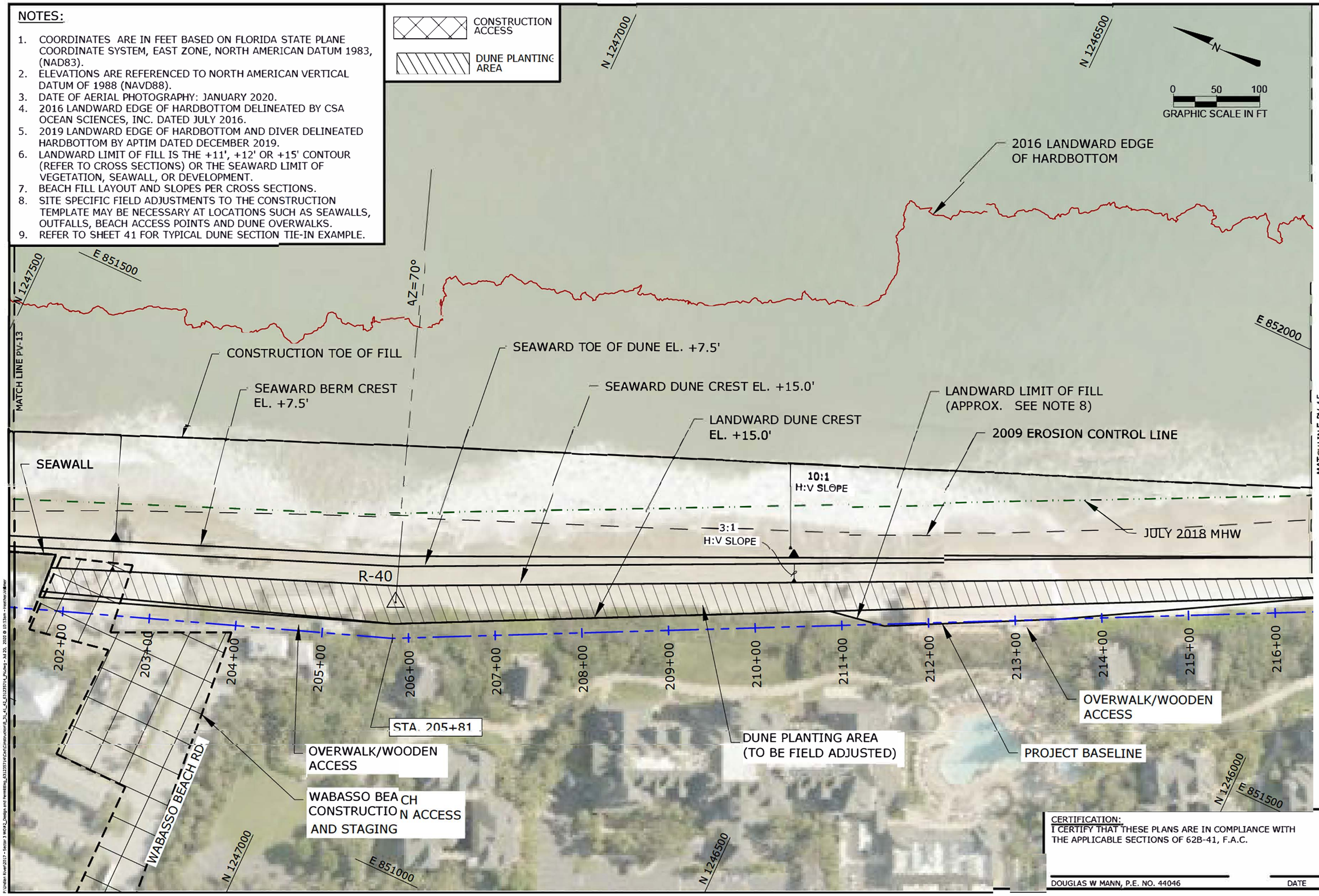

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Drawn by: KC
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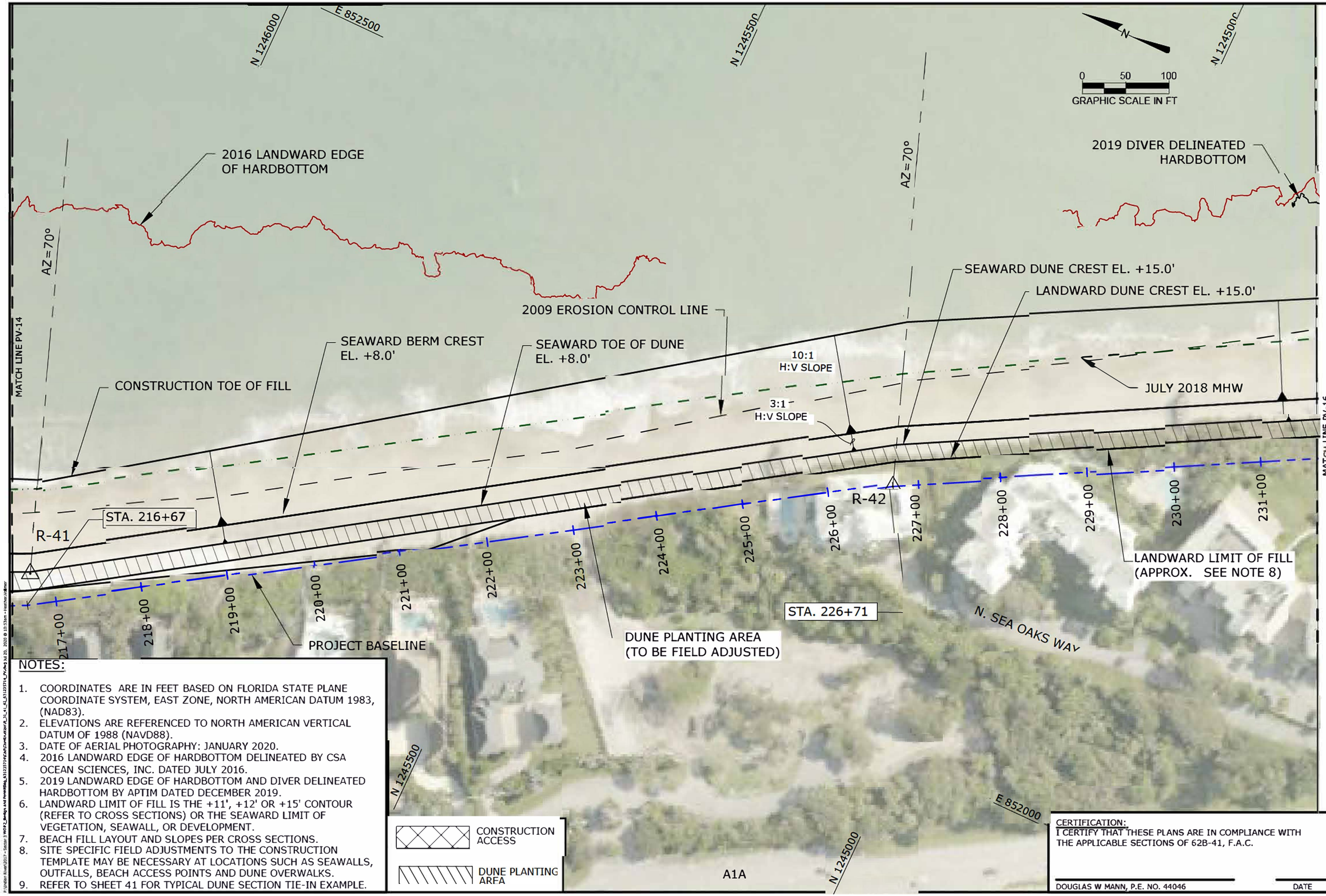
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-14

SHEET 21 OF 44



NOTES:

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REVISIONS

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Drawn by: KC
Date: 04/16/20
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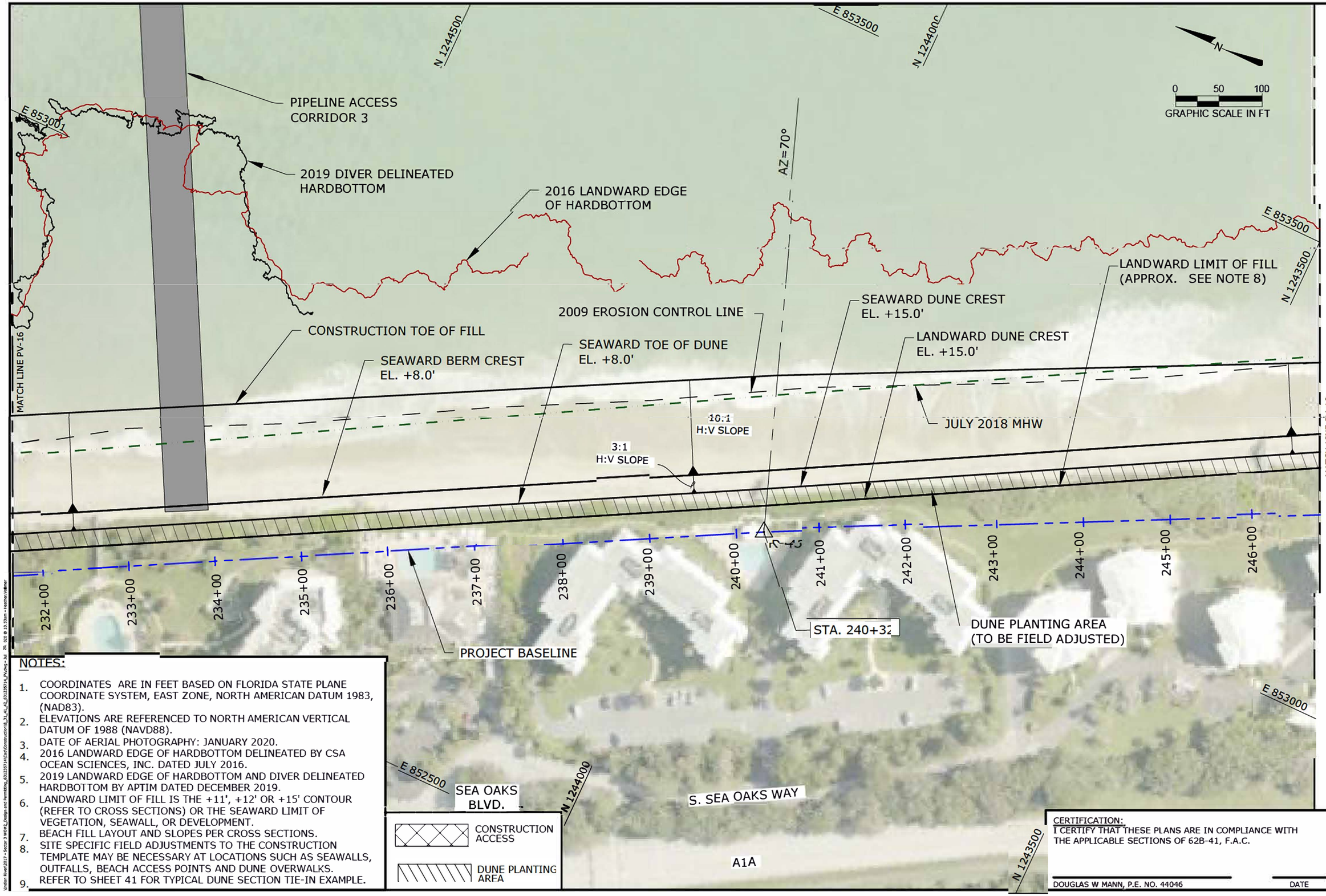
Reference files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-15

SHEET 22 OF 44



NOTES:

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CONSTRUCTION ACCESS

DUNE PLANTING AREA

CERTIFICATION:
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BOCA RATON, FLORIDA 33431
PH. (561) 391-8102
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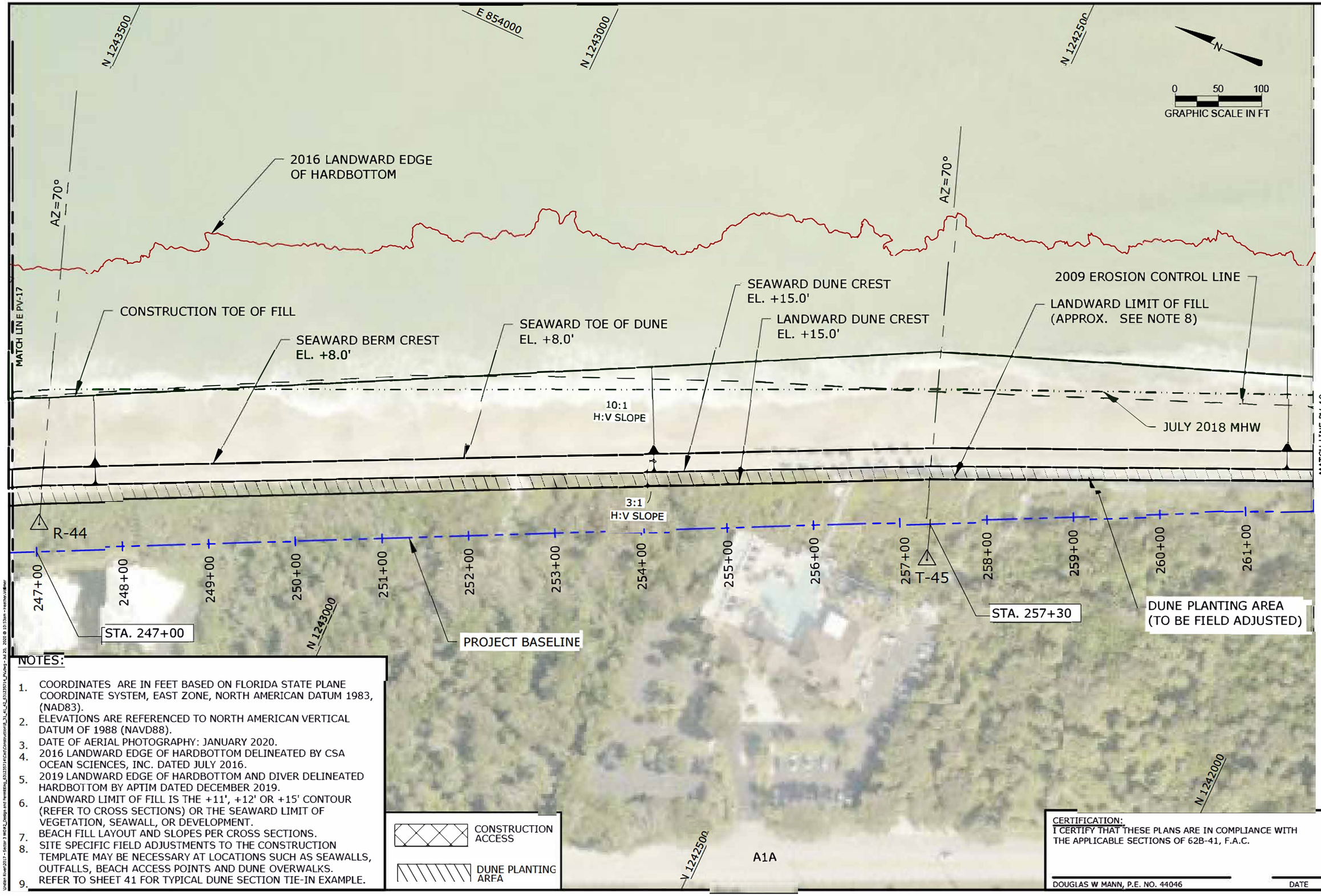
C.O.A. FL. #8317

Designed by: CP	Checked by: DM
Drawn by: KC	Reviewed by: CP
Date: 04/16/20	Submitted by: CP
Plot Scale:	Comm. No.:

Reference Files:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-16



NOTES:

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CONSTRUCTION ACCESS

DUNE PLANTING AREA

CERTIFICATION:
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PH. (561) 391-8102
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C.O.A. FL. #8317

REVISIONS

Description

Designed by: CP
Drawn by: KC
Date: 04/16/20
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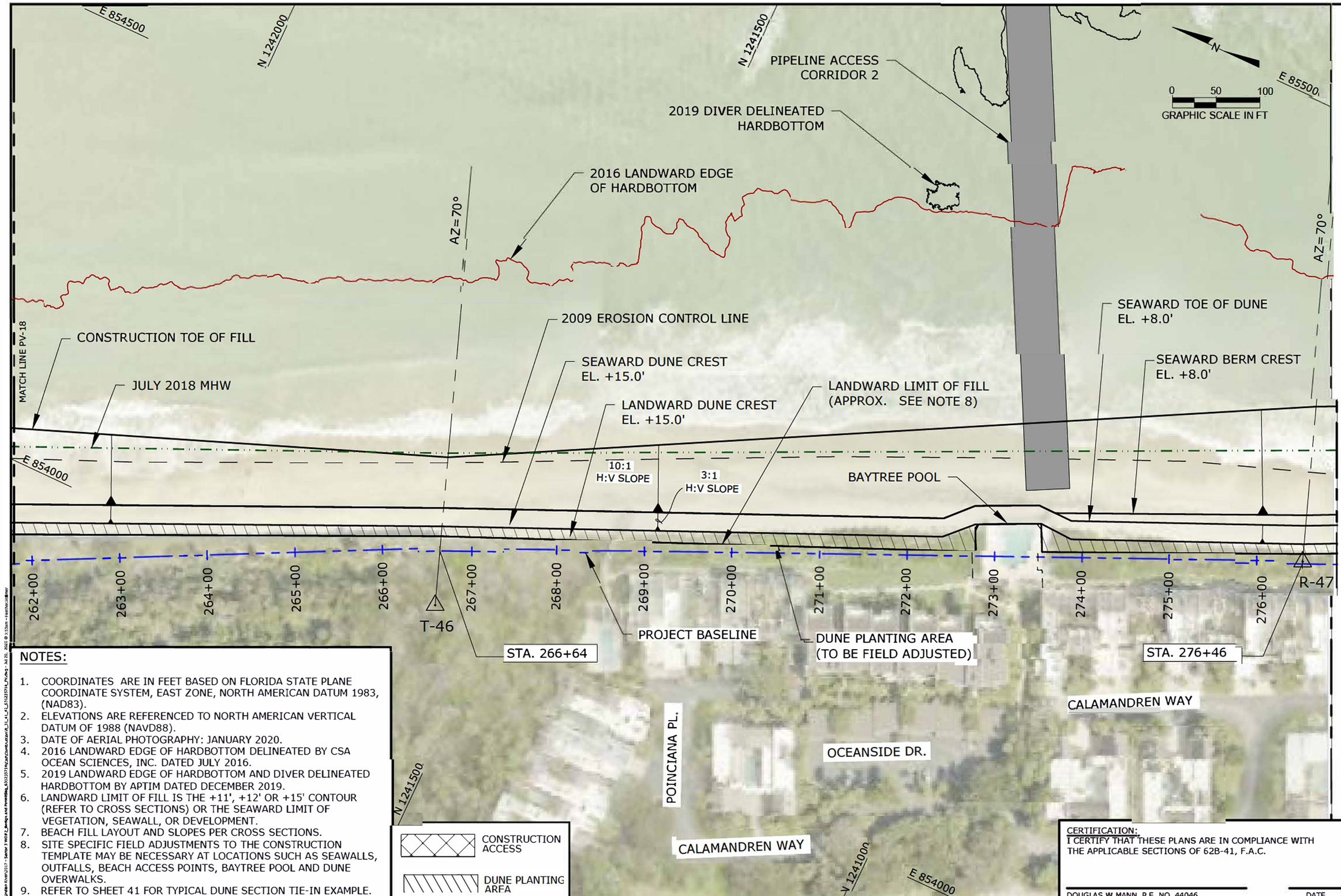
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-17

SHEET 24 OF 44



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Designed by: CP
Drawn by: KC
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SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-18

NOTES:

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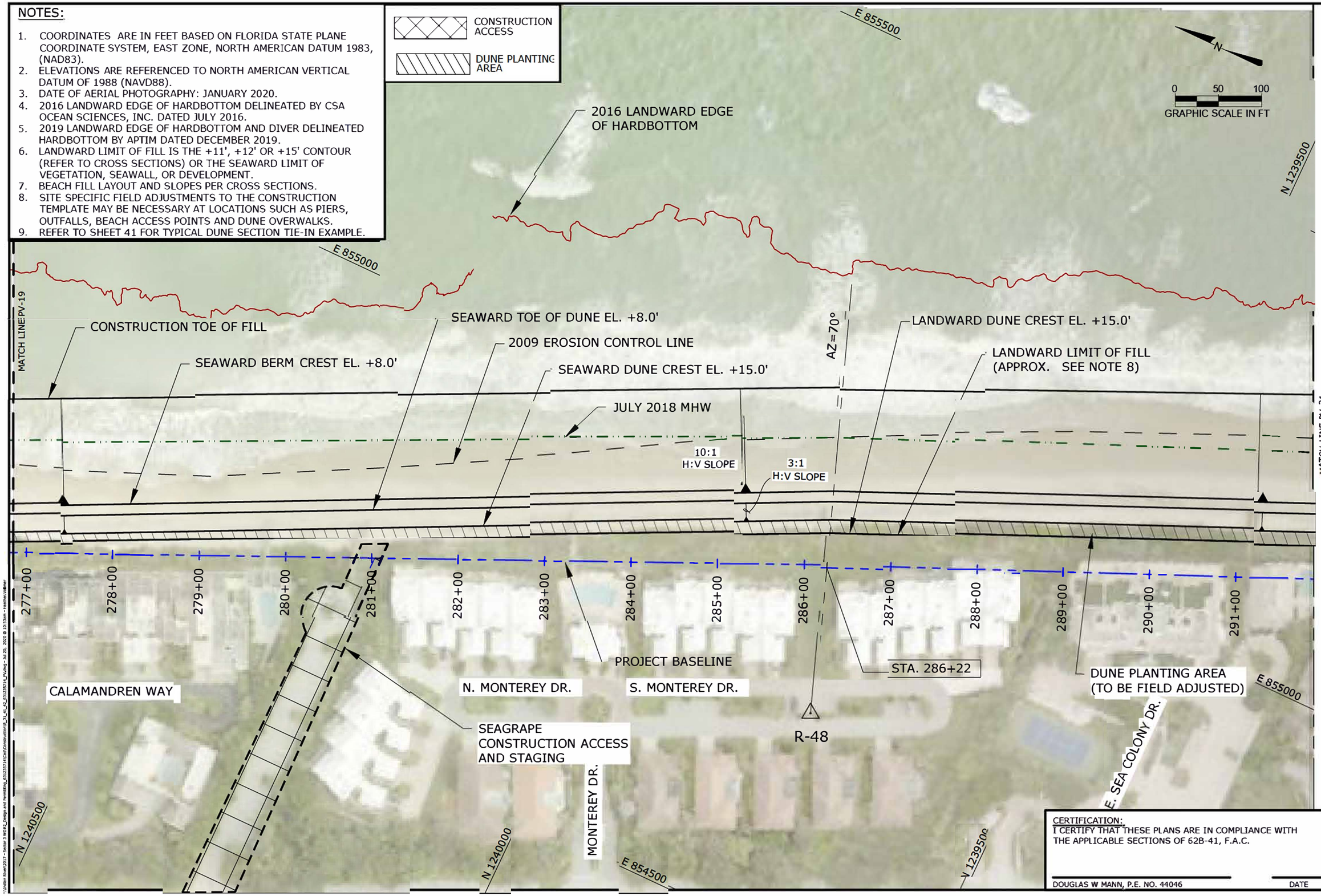

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REVISIONS

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Reference Files:

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AS NOTED	631235714

SECTOR 3
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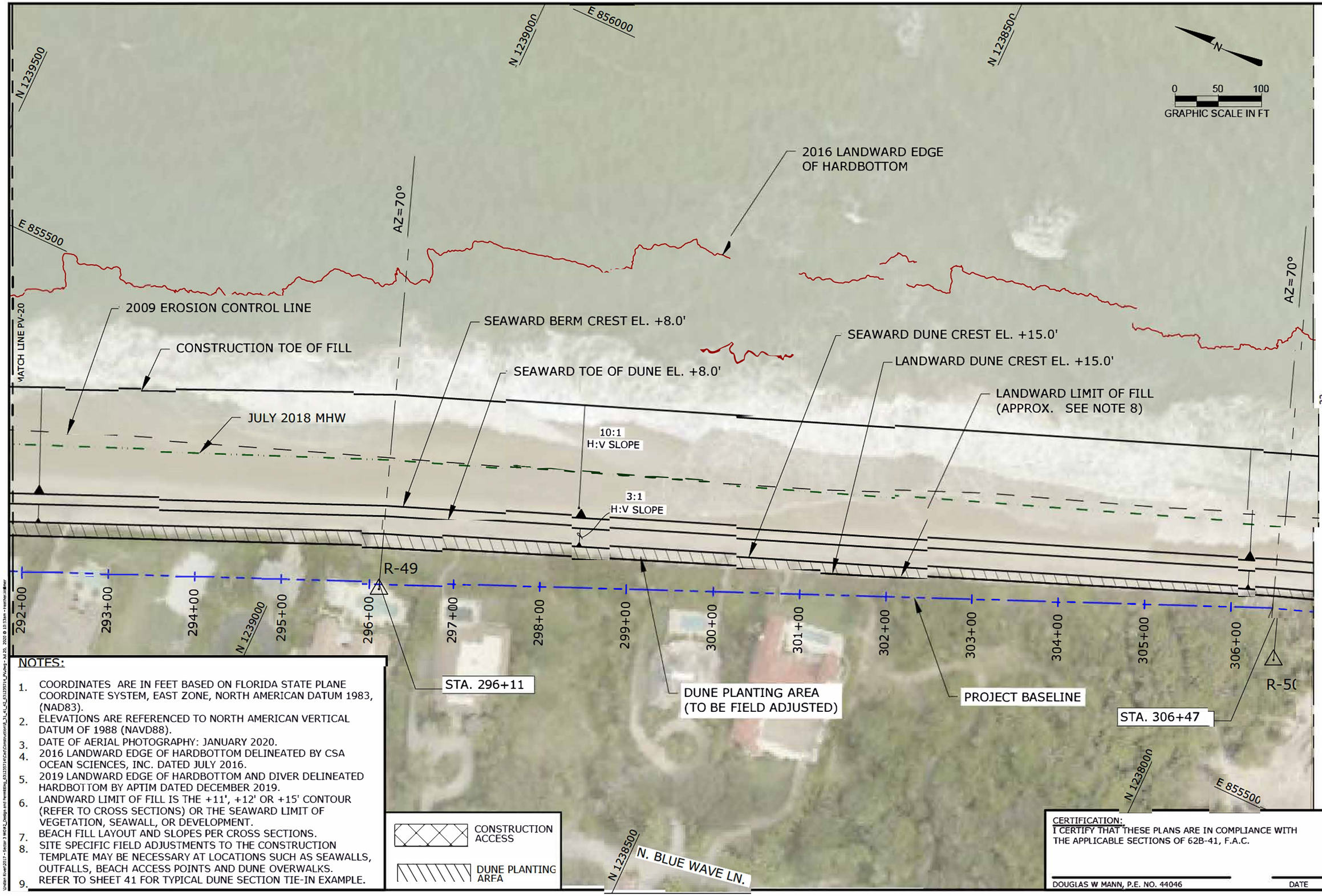
PV-19



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CONSTRUCTION ACCESS

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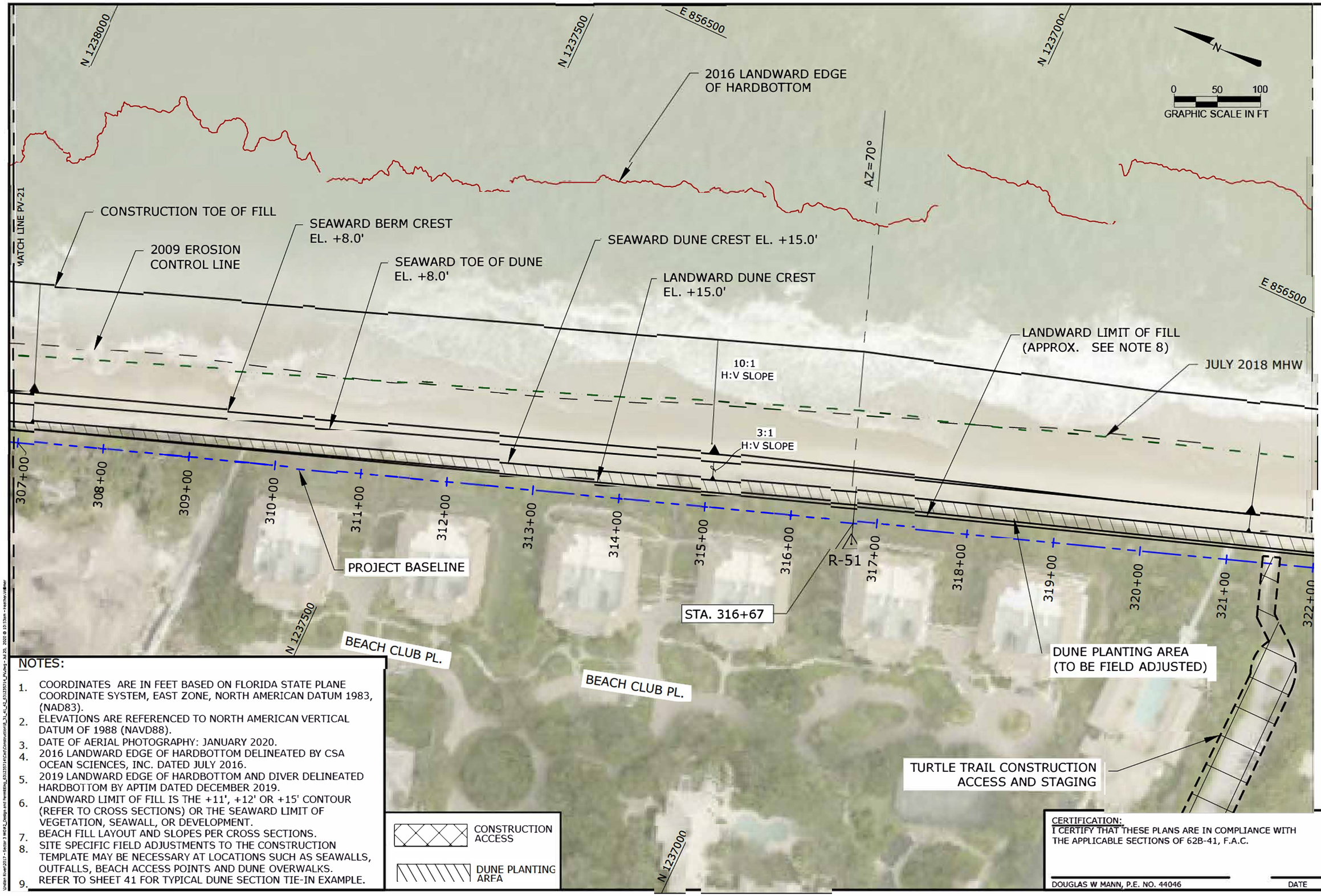

NOTES:

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9. REFER TO SHEET 41 FOR TYPICAL DUNE SECTION TIE-IN EXAMPLE.

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

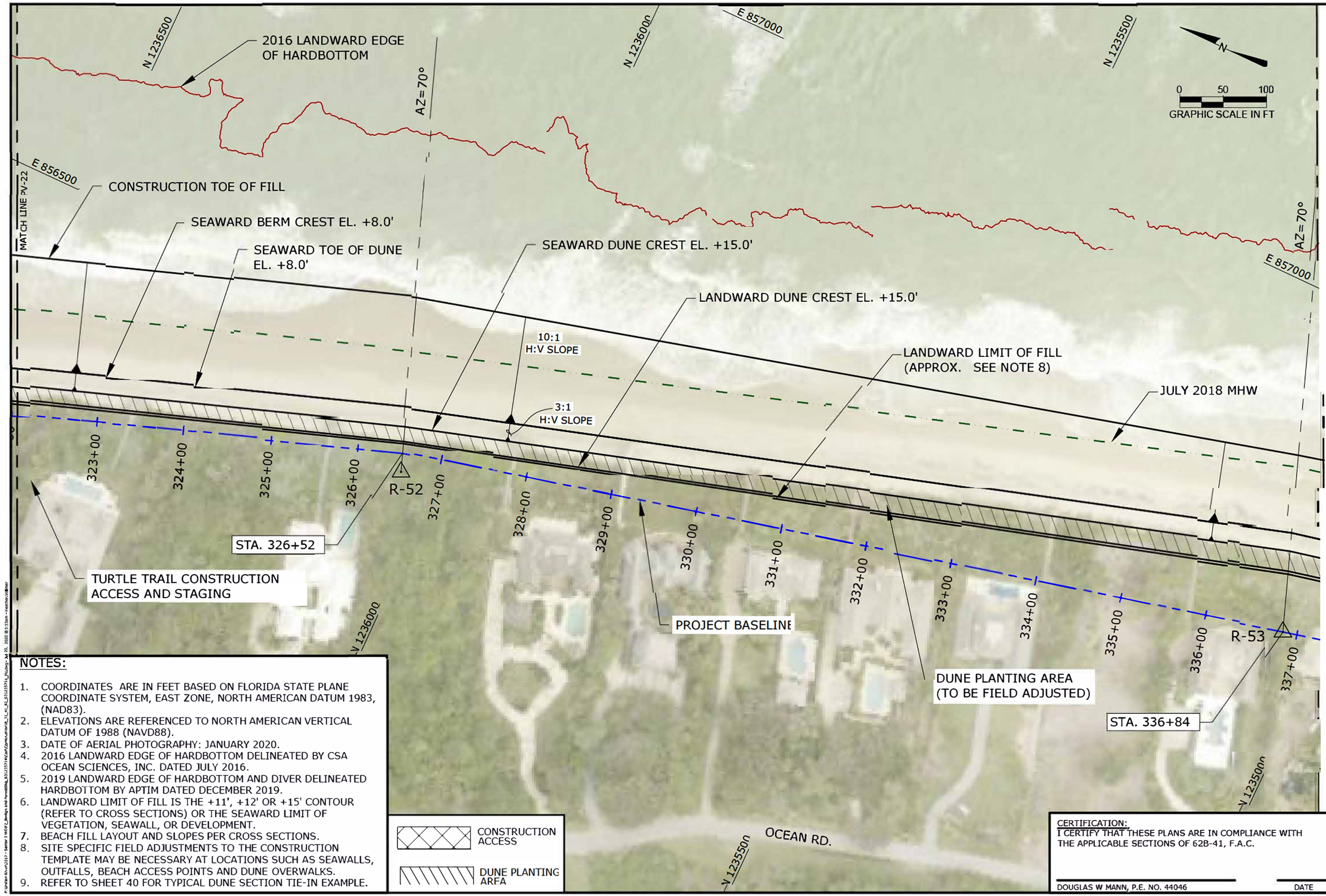
DOUGLAS W MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #8317

Reviewed by: DM
Reviewed by: CP
Submitted by: CP
Comm. No.:
Description
Reference Files:
Designed by: CP
Drawn by: KC
Date: 04/16/20
Plot Scale:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-21



NOTES:

1. COORDINATES ARE IN FEET BASED ON FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM 1983, (NAD83).
2. ELEVATIONS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
3. DATE OF AERIAL PHOTOGRAPHY: JANUARY 2020.
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CONSTRUCTION ACCESS

DUNE PLANTING AREA

CERTIFICATION:
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SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-22

SHEET 29 OF 44

N 1235000
N 1234500
E 857500
N 1234000
E 857000
E 856500
E 857500
E 857000
N 1234500
N 1234000

2016 LANDWARD EDGE OF HARDBOTTOM

CONSTRUCTION TOE OF FILL

SEAWARD BERM CREST
L. +8.0'

SEAWARD TOE OF DUNE
EL. +8.0'

PIPELINE ACCESS CORRIDOR 1

SEAWARD DUNE CREST
EL. +15.0'

LANDWARD DUNE CREST
EL. +15.0'

JULY 2018 MHW

AZ=70°

10:1
H:V SLOPE

3:1
H:V SLOPE

LANDWARD LIMIT OF FILL
(APPROX. SEE NOTE 8)

MATCH LINE PV-23

MATCH LINE PV-25

338+00
339+00
340+00
341+00
342+00
343+00
344+00
345+00
346+00
347+00
348+00
349+00
350+00
351+00
352+00

R-54

PROJECT BASELINE

STA. 347+00

DUNE PLANTING AREA
(TO BE FIELD ADJUSTED)

OCEAN RD.

0 50 100
GRAPHIC SCALE IN FT

N

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CONSTRUCTION ACCESS

DUNE PLANTING AREA

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Description	Date	Revision

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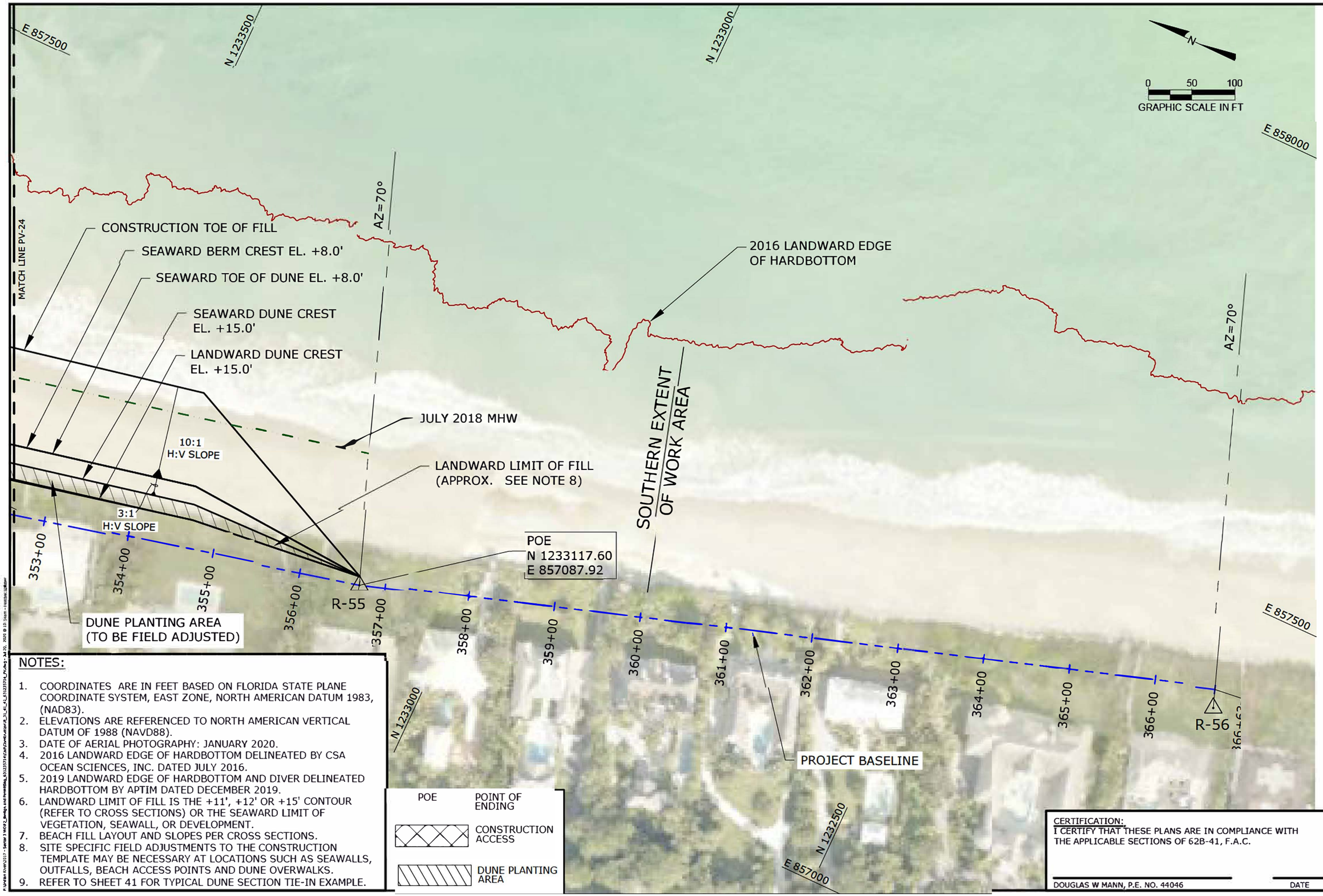
Drawn by: KC
Date: 04/16/20
Plot Scale:
Checked by: DM
Reviewed by: CP
Submitted by: CP
Comm. No.:

SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-23

SHEET 30 OF 44



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POE POINT OF ENDING

CONSTRUCTION ACCESS

DUNE PLANTING AREA

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REVISIONS
Description

Designed by: CP
Drawn by: KC
Date: 04/16/20
Lot Scale:
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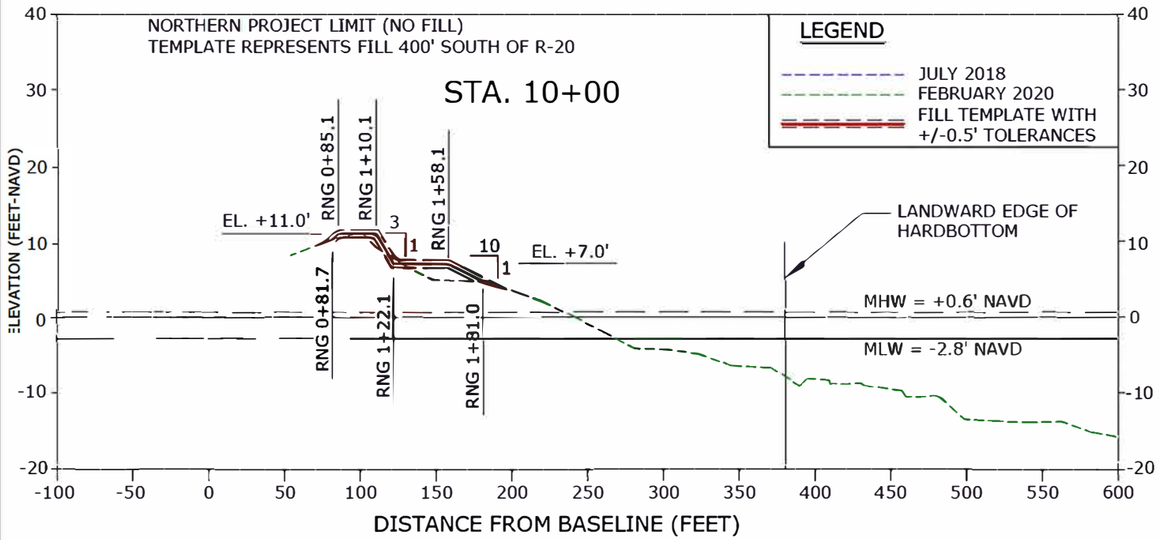
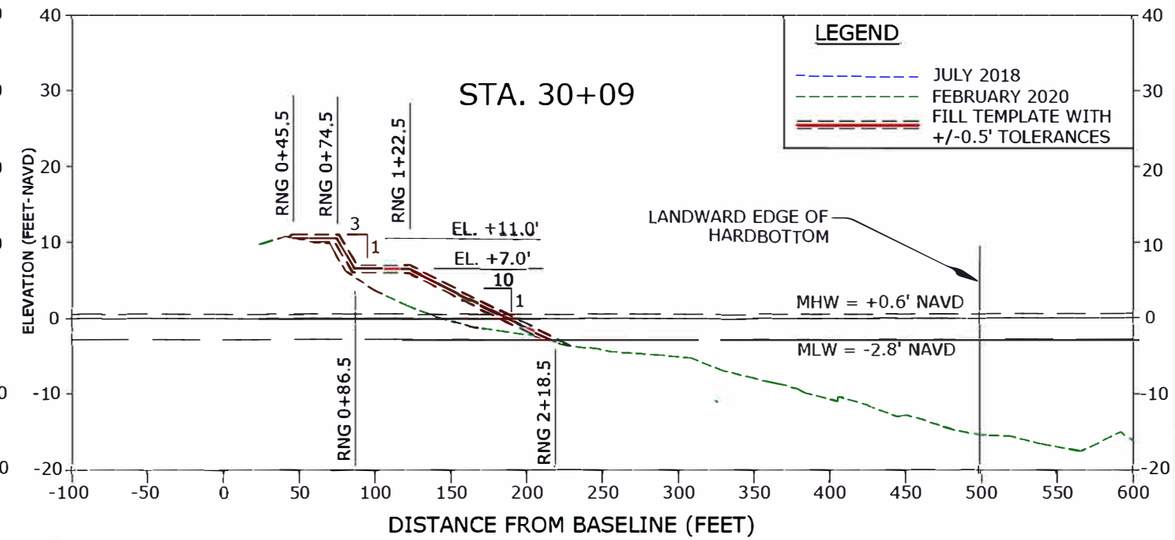
Reviewed by: CP
Submitted by: CP
Comm. No.:

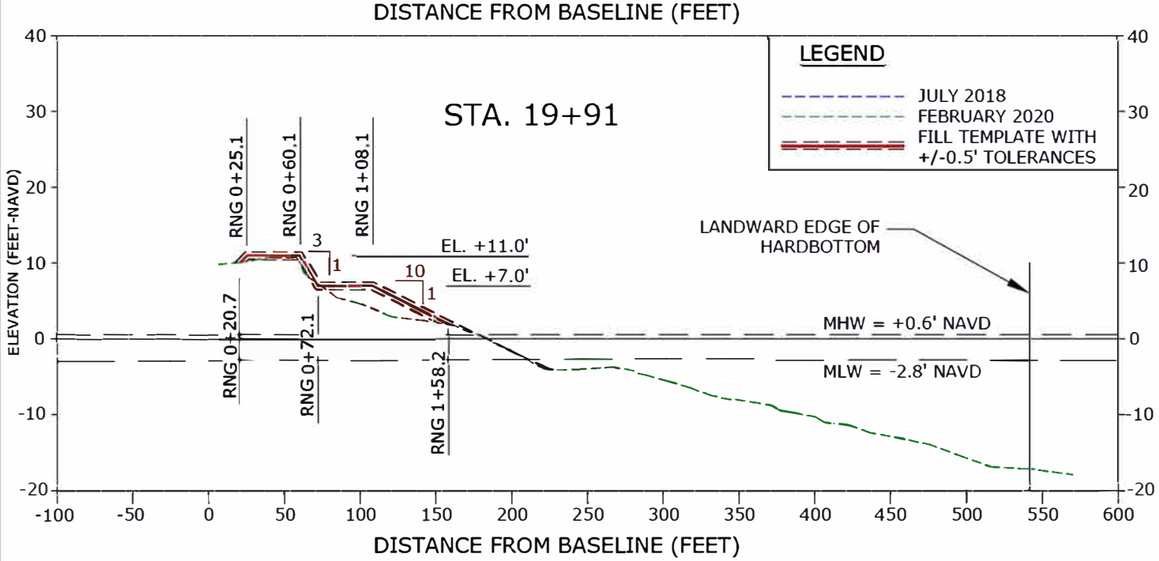
Reference Files:

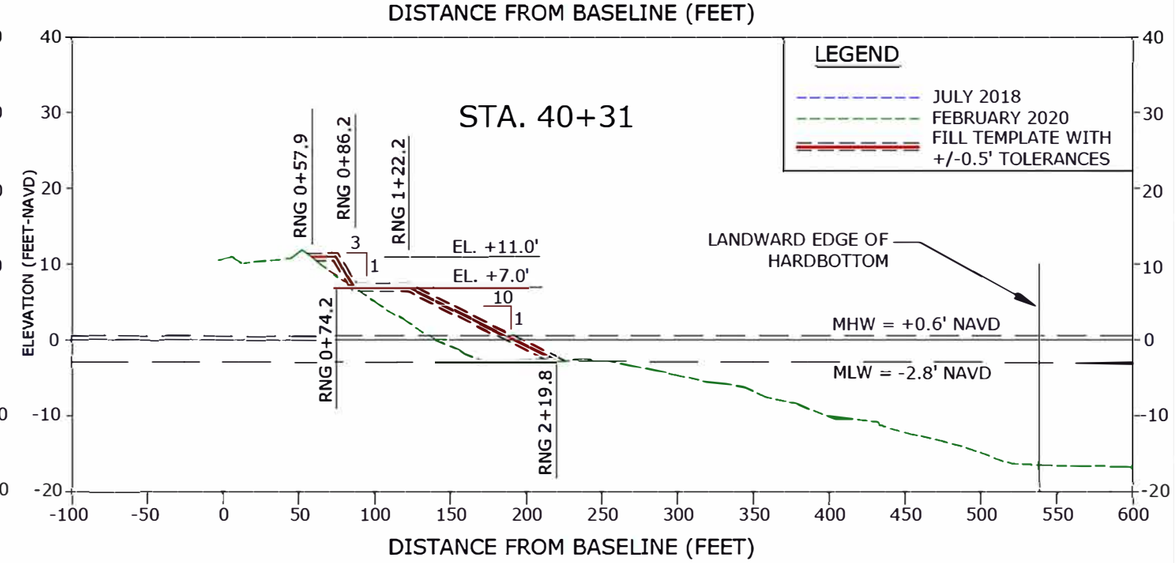
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
PV-24









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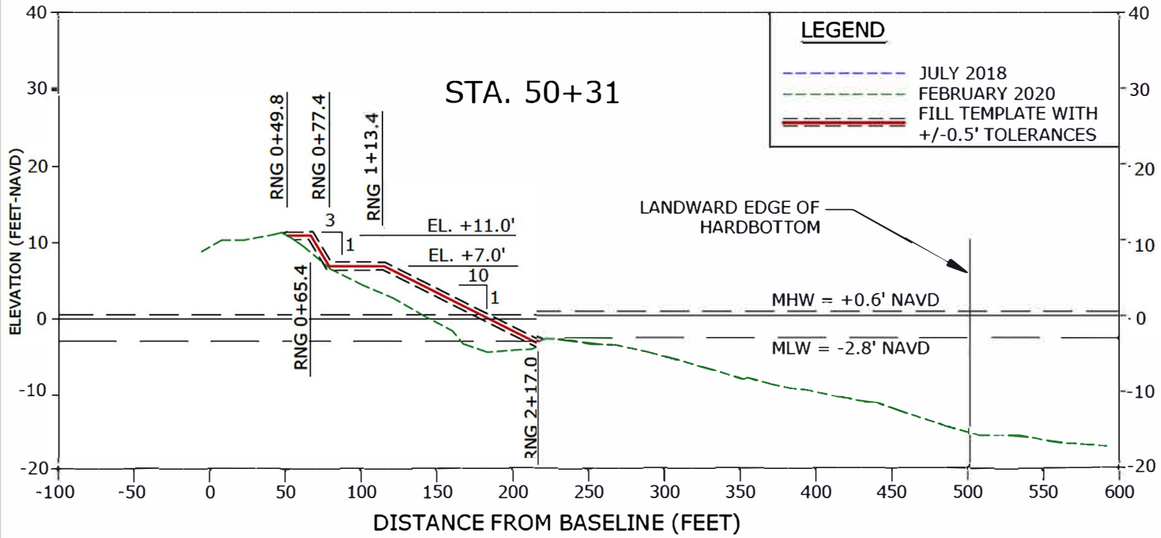
C.O.A. FL. #8317

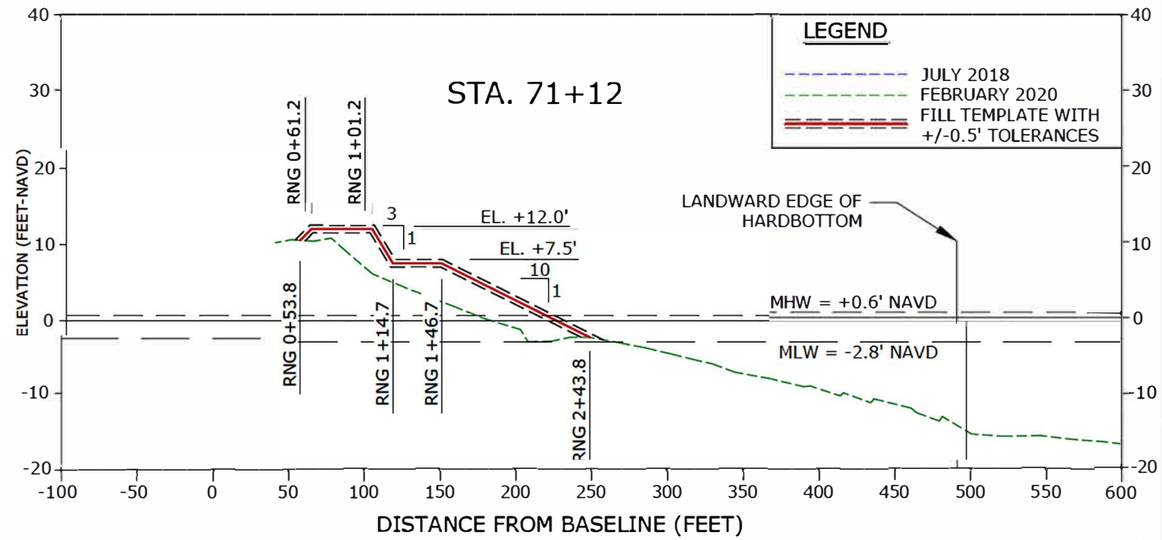
REVISIONS: No. | Date | Description

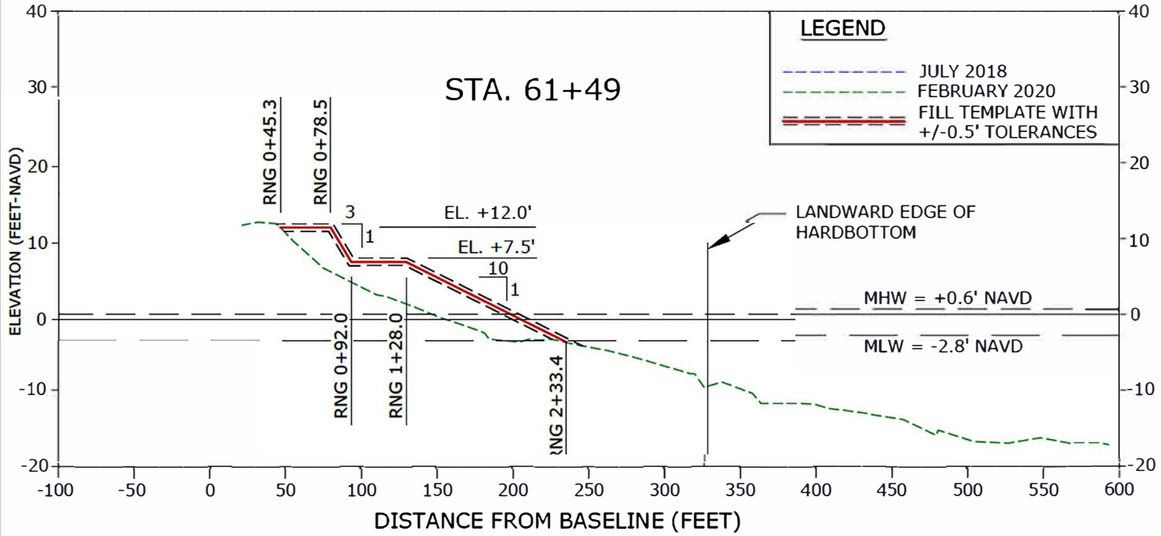
Designed by: CP | Checked by: DM | Reviewed by: CP | Submitted by: CP
Drawn by: KC | Date: 04/16/20 | Plot Scale: AS NOTED | Comm. No.: 631235714
Reference Files:

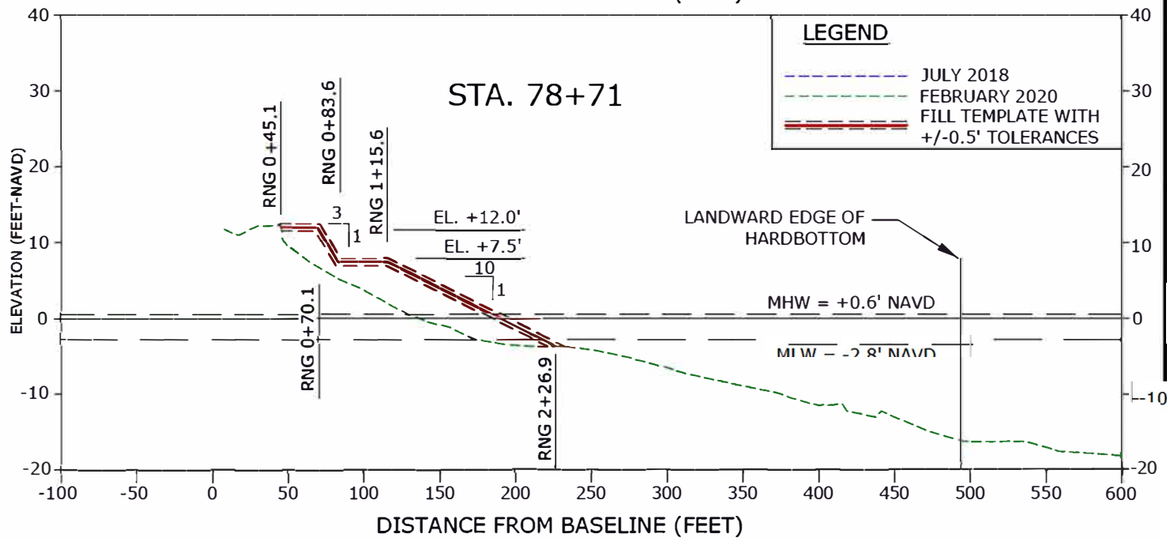
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
CROSS SECTIONS

DRAWING NO.
XS-1









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REVISIONS

No.	Date	Description

Designed by: CP
Drawn by: KC
Date: 04/16/20
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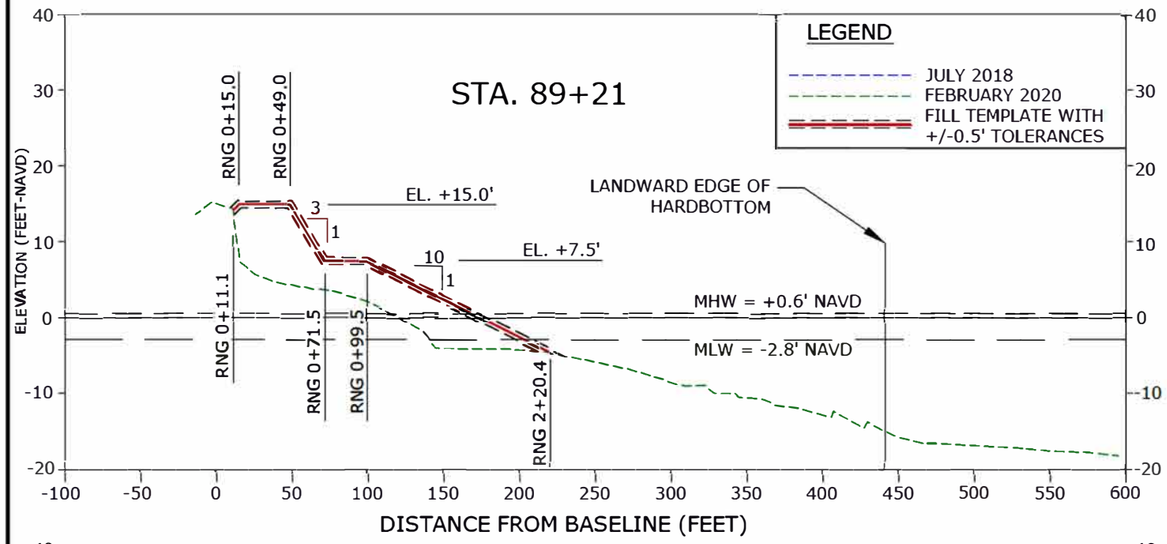
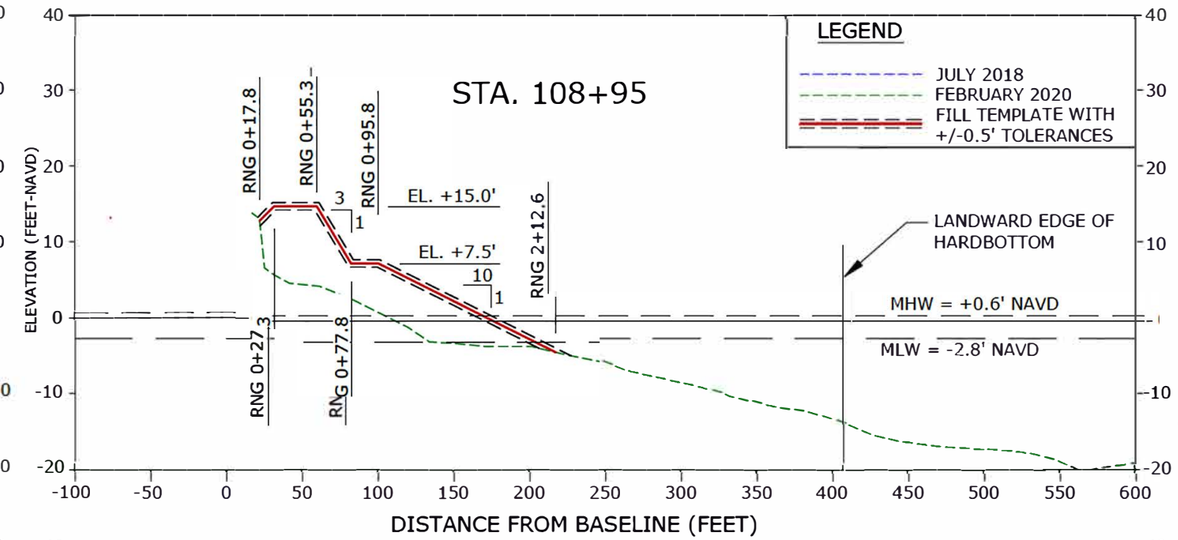
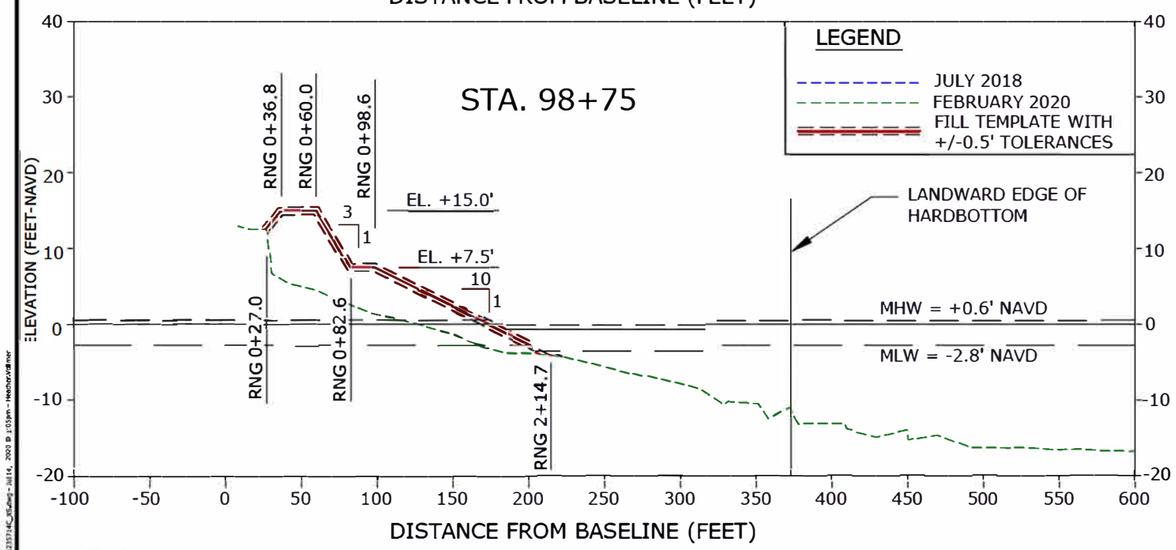
AS NOTED

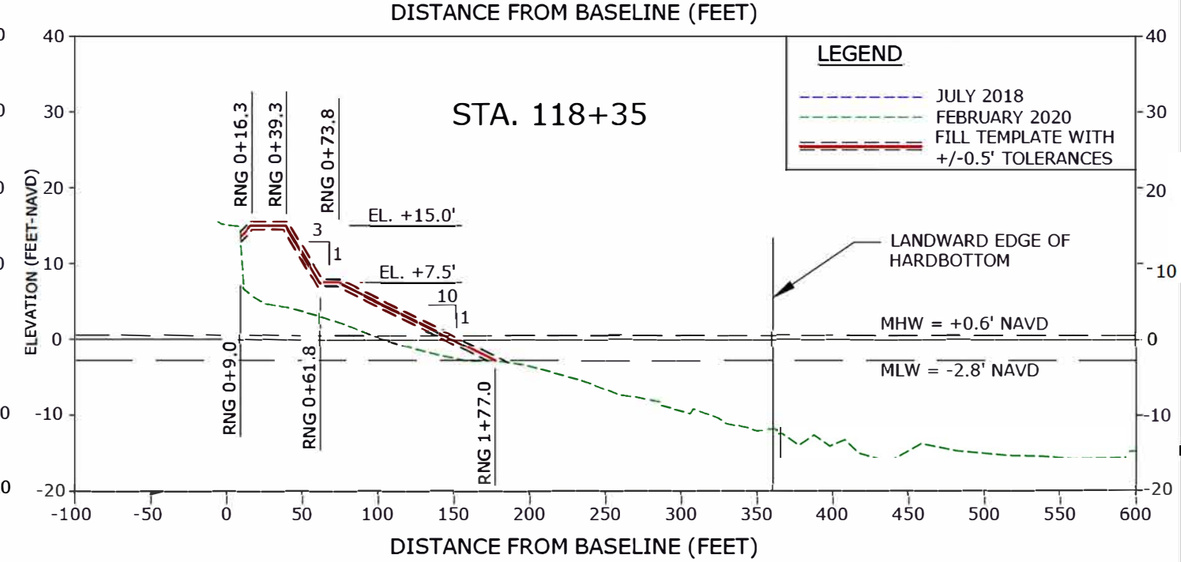
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
CROSS SECTIONS

DRAWING NO.
XS-2









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REVISIONS

Description

Designed by: CP
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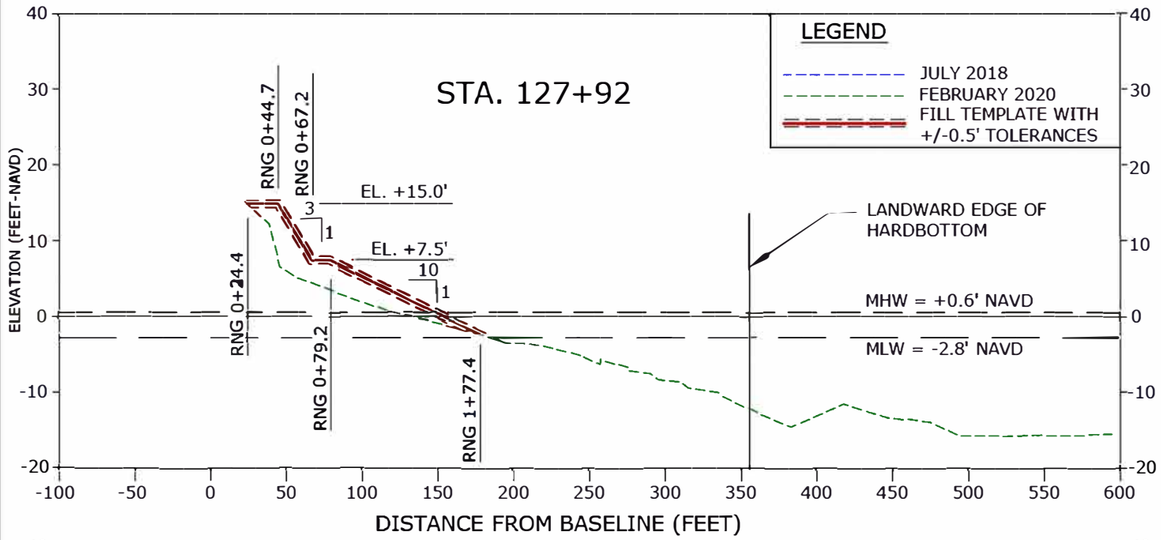
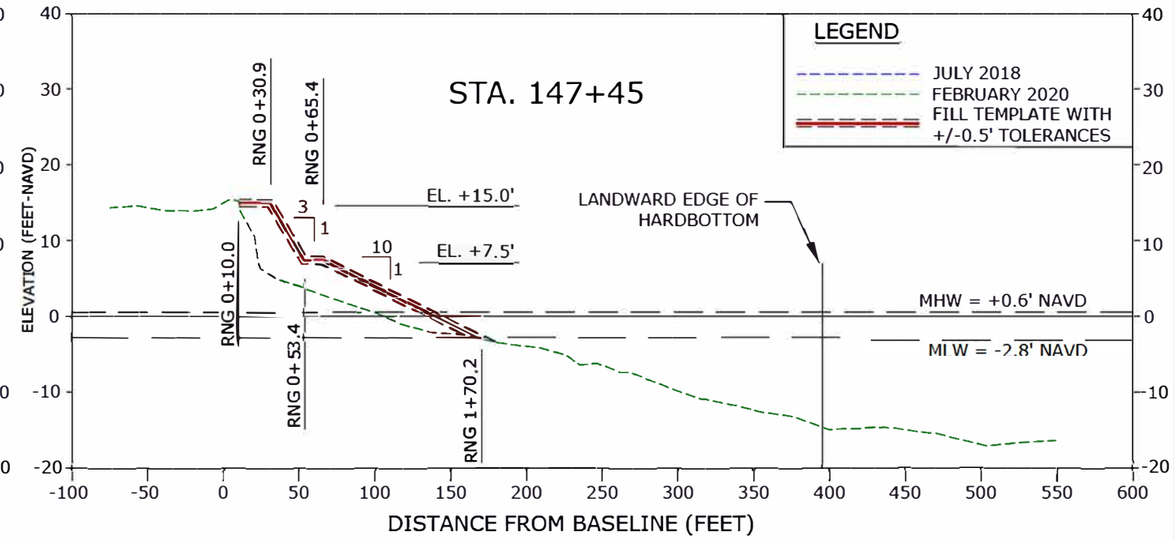
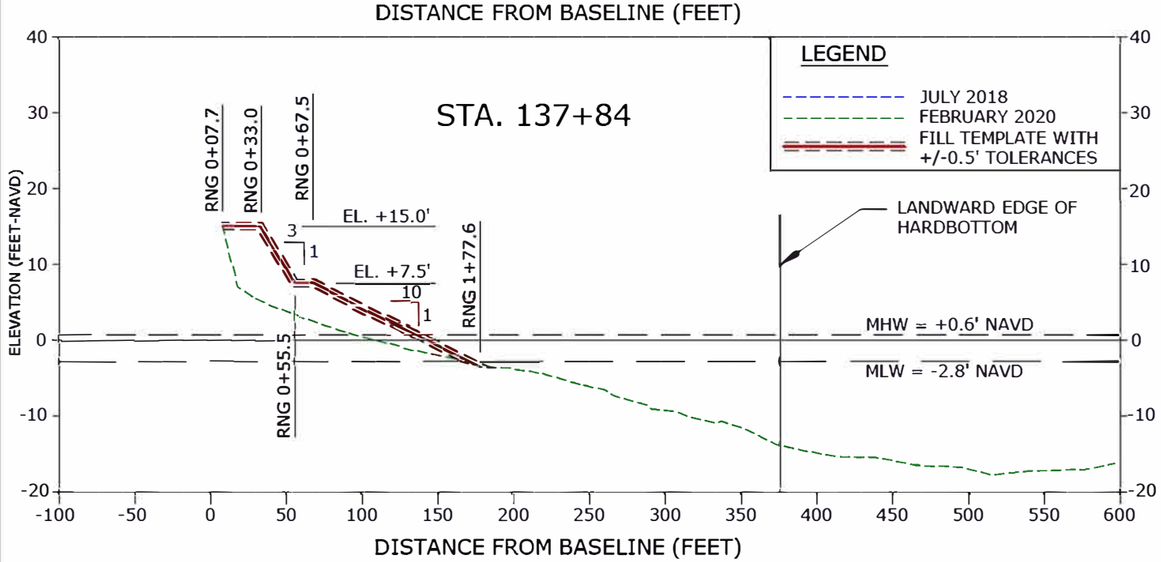
Reference Files:

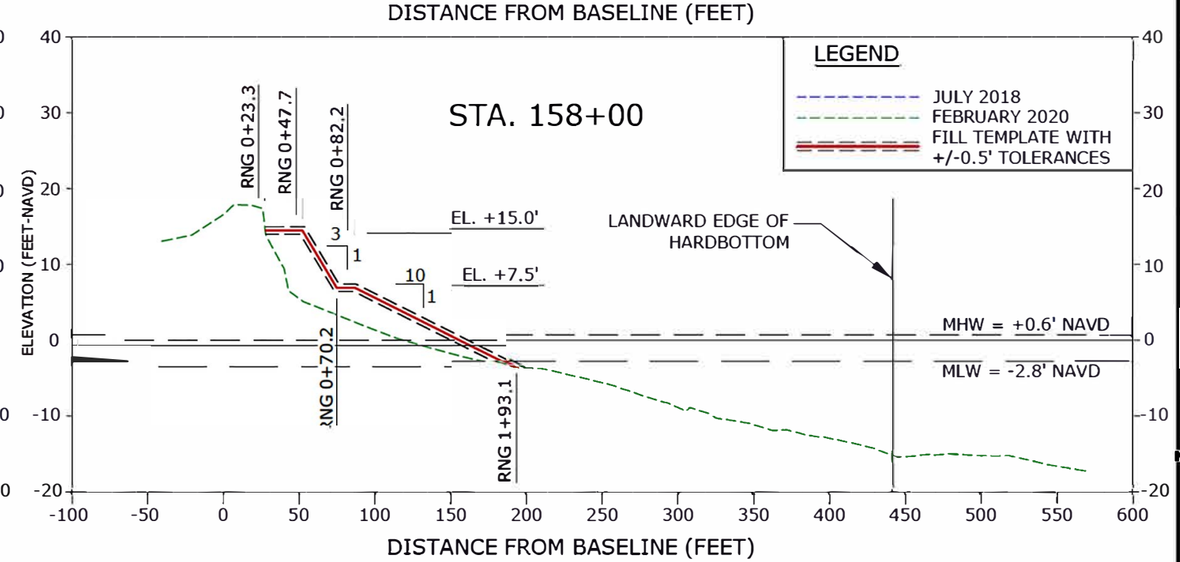
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
XS-3









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REVISIONS

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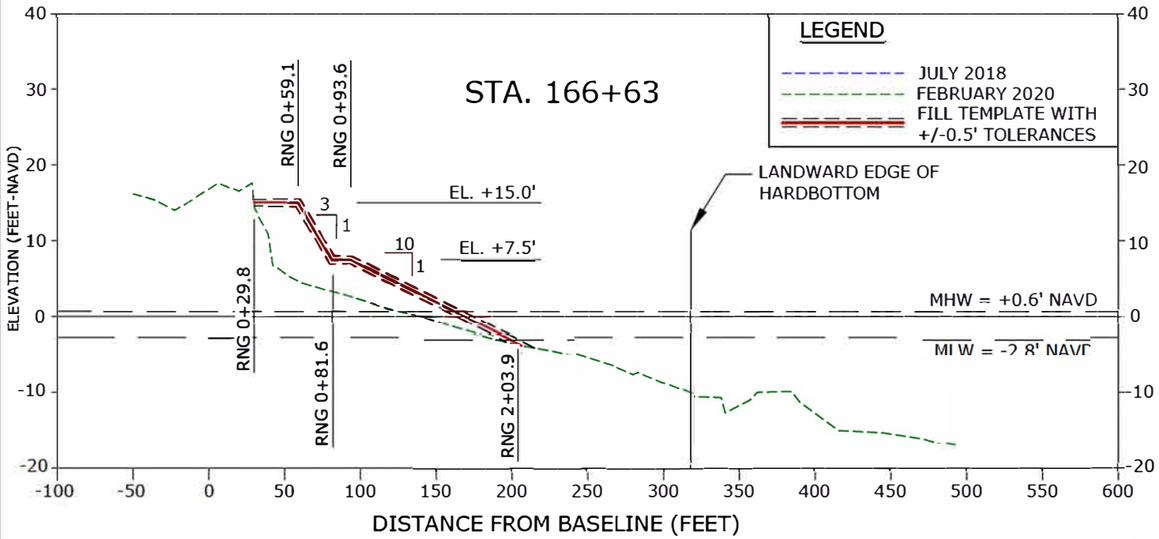
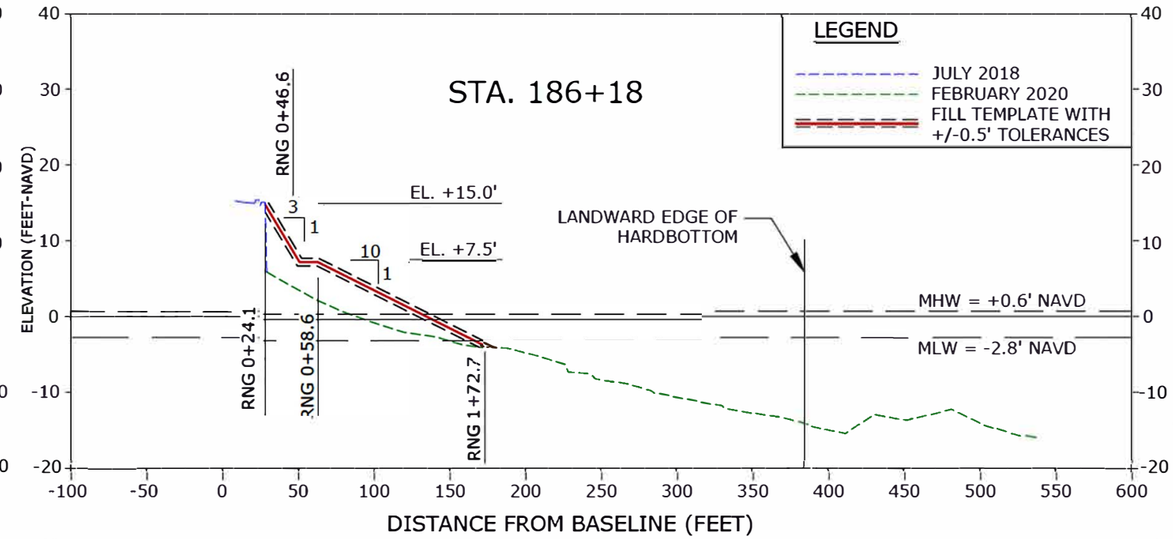
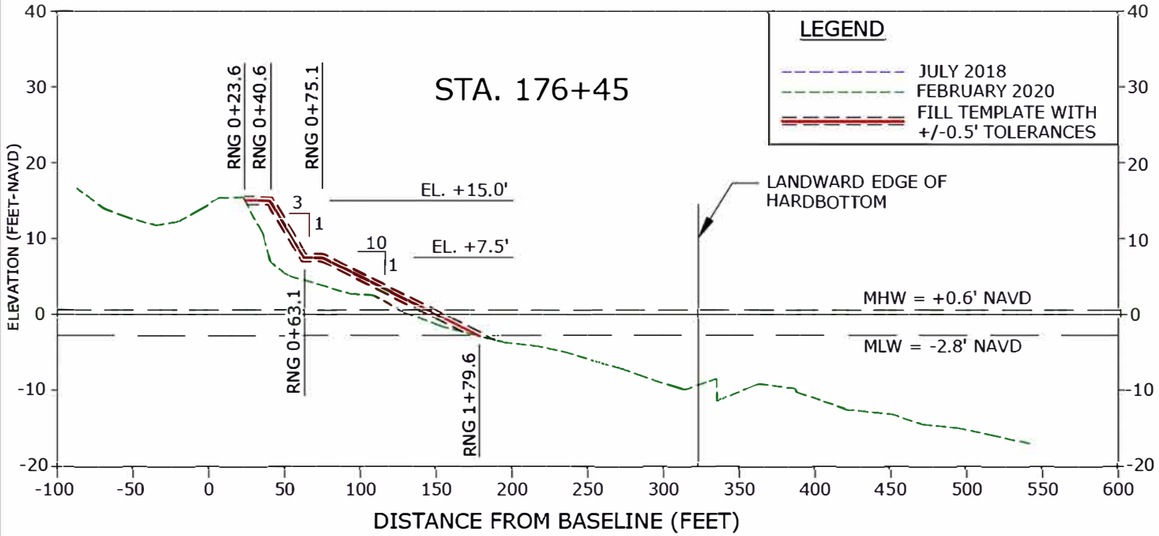
Reference Files:

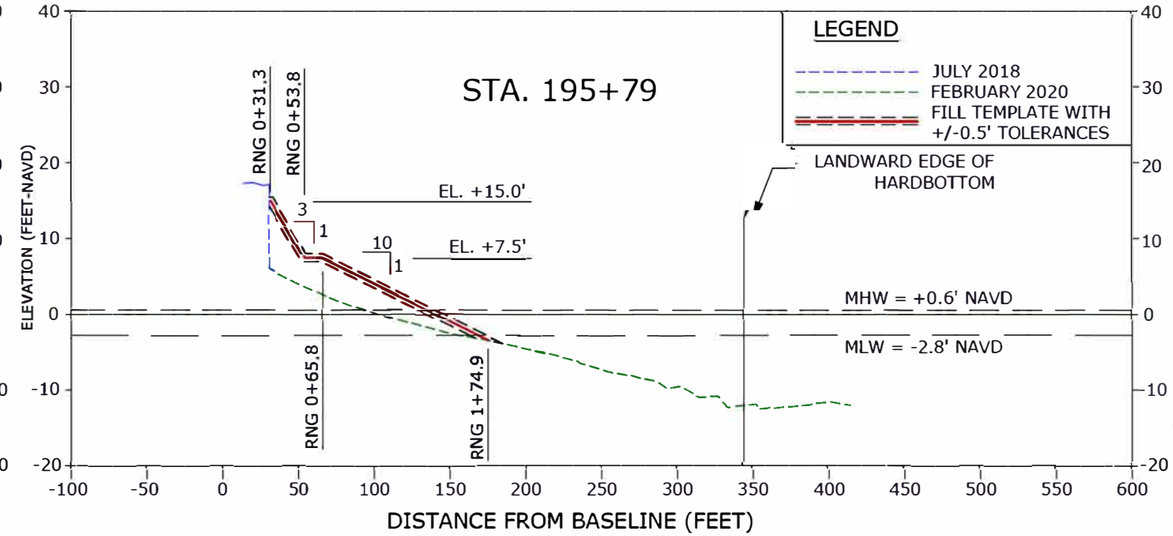
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
XS-4









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7. REFER TO SHEET 41 FOR TYPICAL DUNE SECTION TIE-IN EXAMPLE.

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B-41, F.A.C.

DOUGLAS W MANN, P.E. NO. 44046 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
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FAX (561) 391-9116
C.O.A. FL. #8317

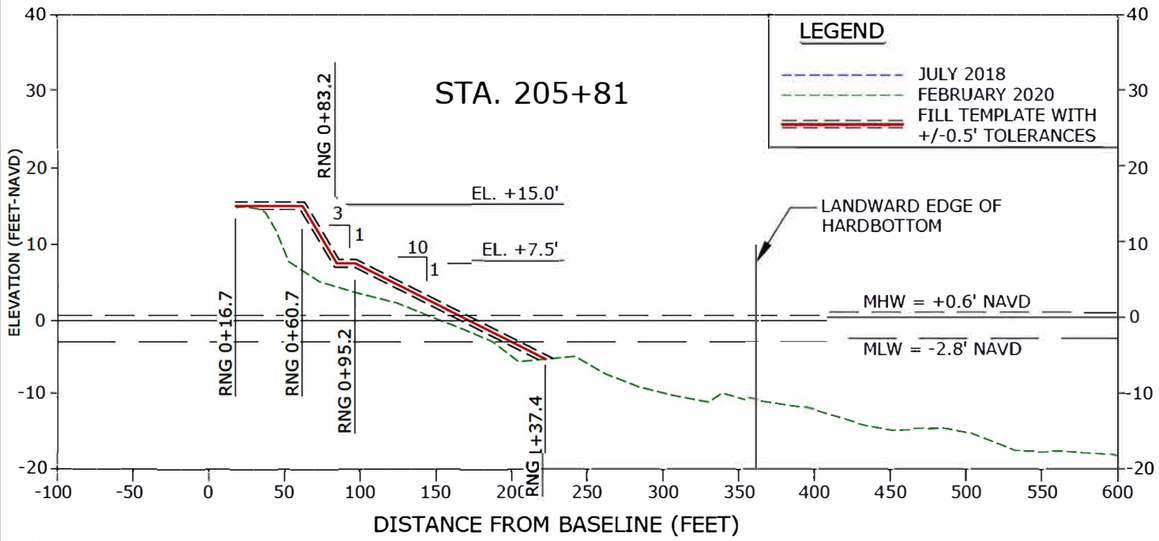
REVISIONS

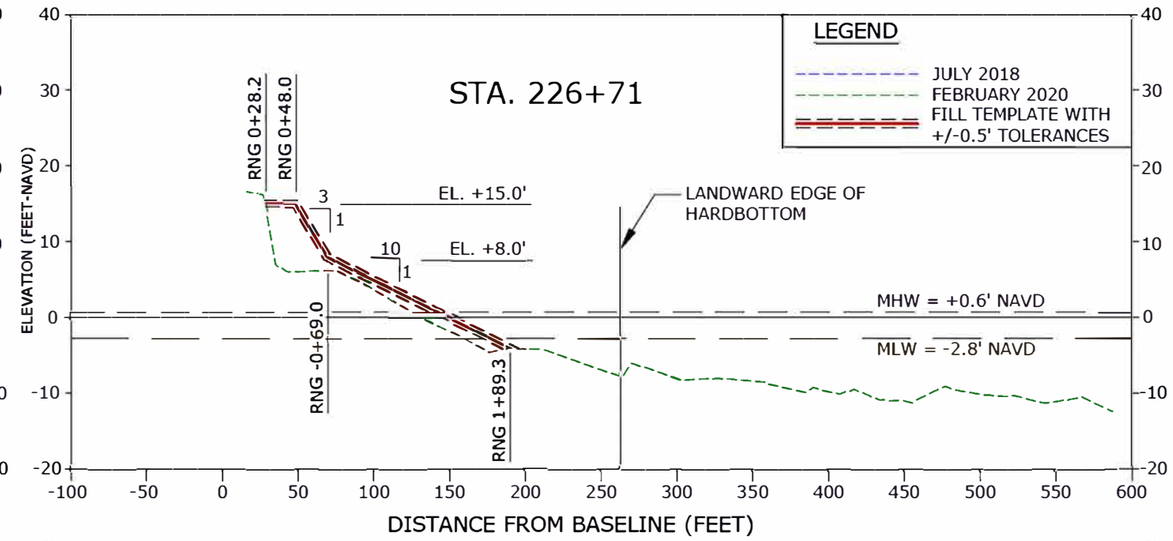
No.	Date	Description

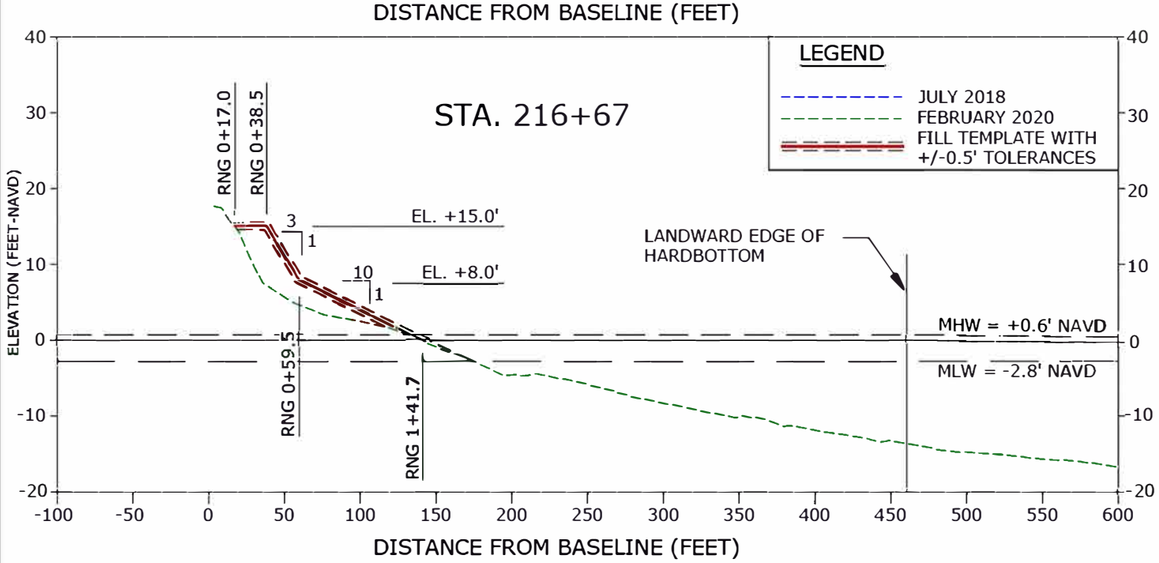
Designed by: CP
Drawn by: KC
Checked by: DM
Reviewed by: CP
Submitted by: CP
Date: 04/16/20
Plot Scale: AS NOTED
Comm. No.: 631235714
Reference Files:

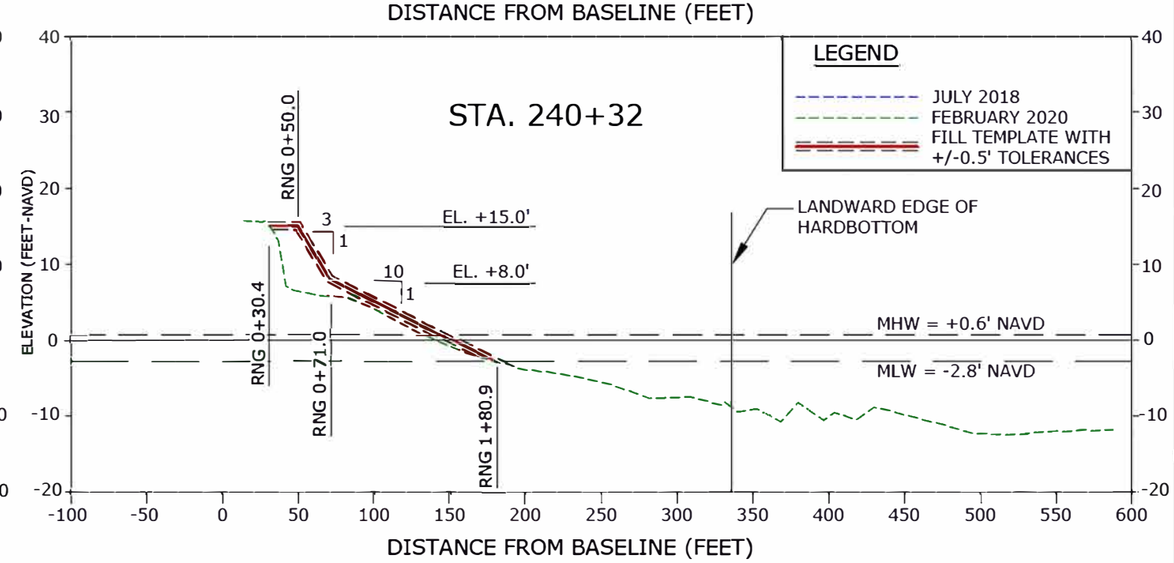
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

DRAWING NO.
XS-5









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INDIAN RIVER COUNTY, FLORIDA
CROSS SECTIONS

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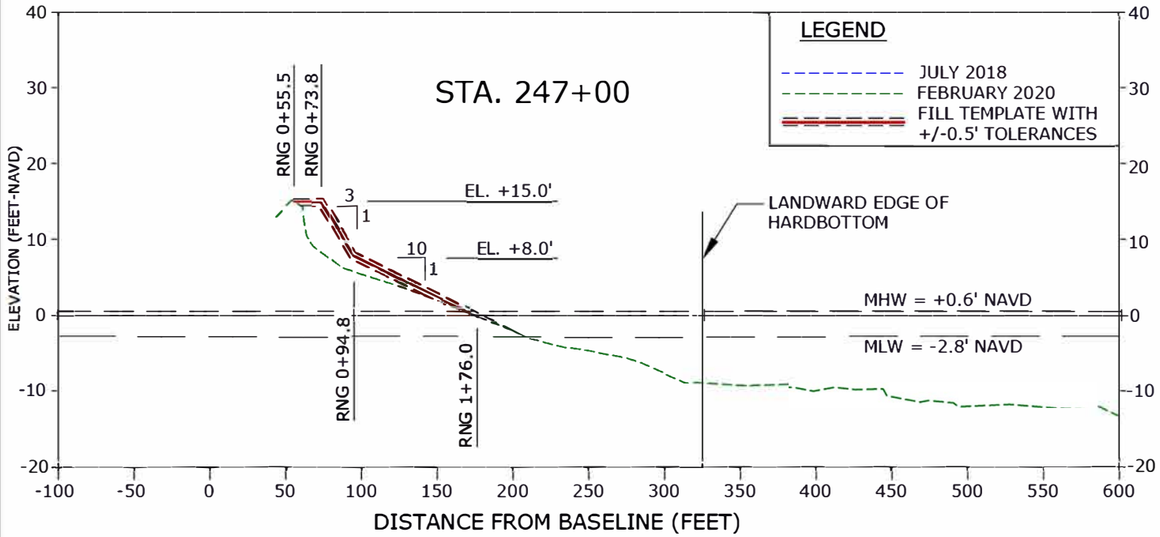

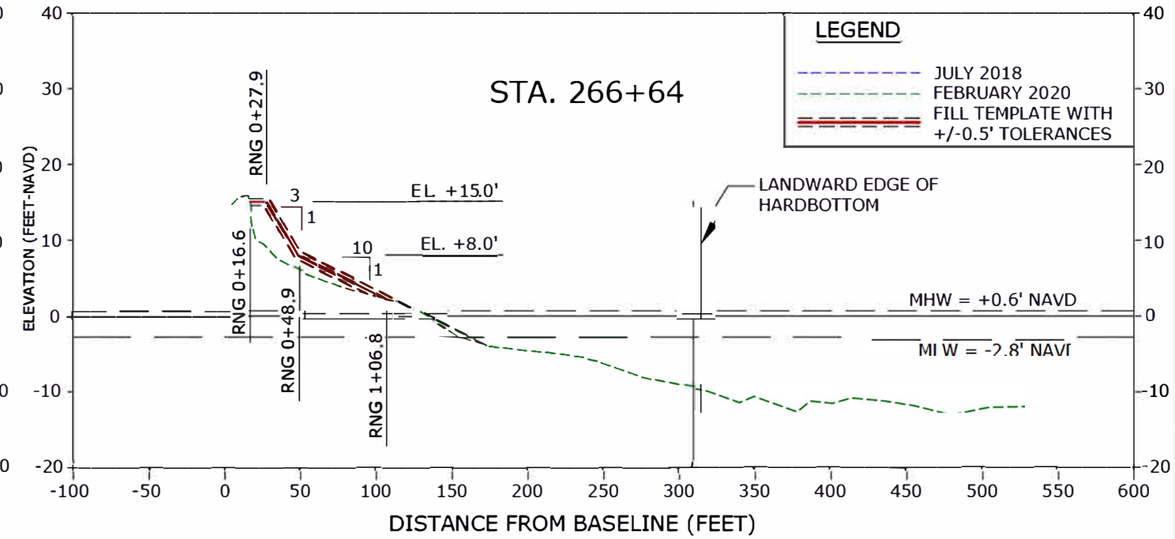

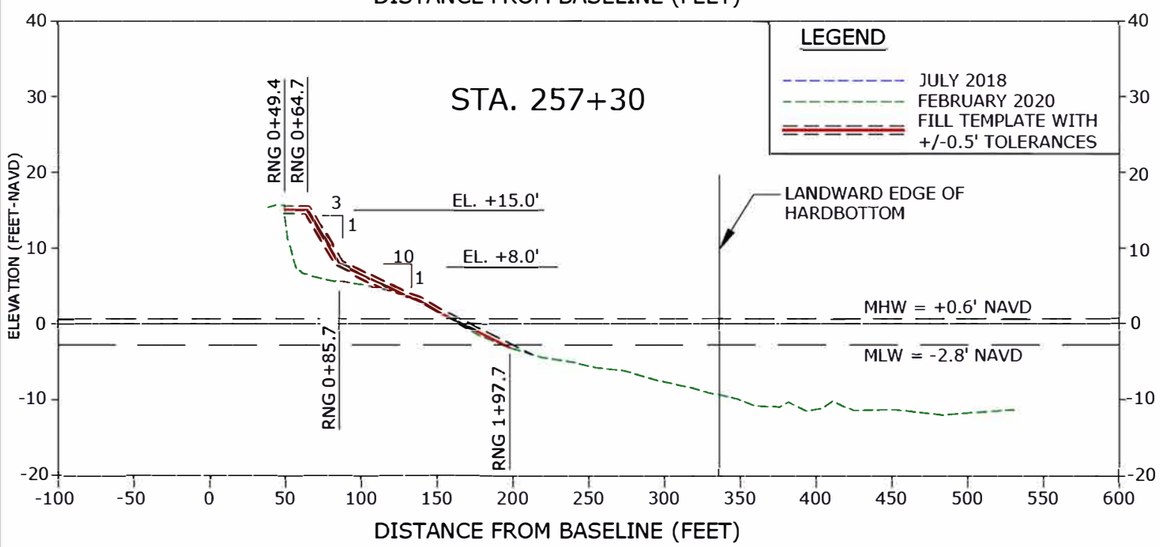

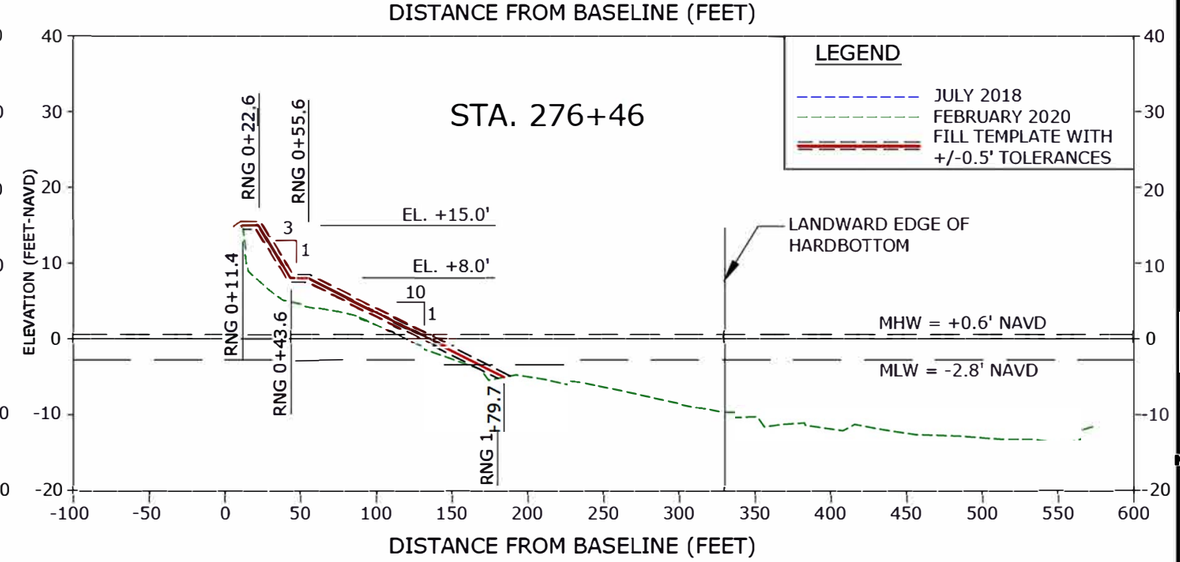

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INDIAN RIVER COUNTY, FLORIDA
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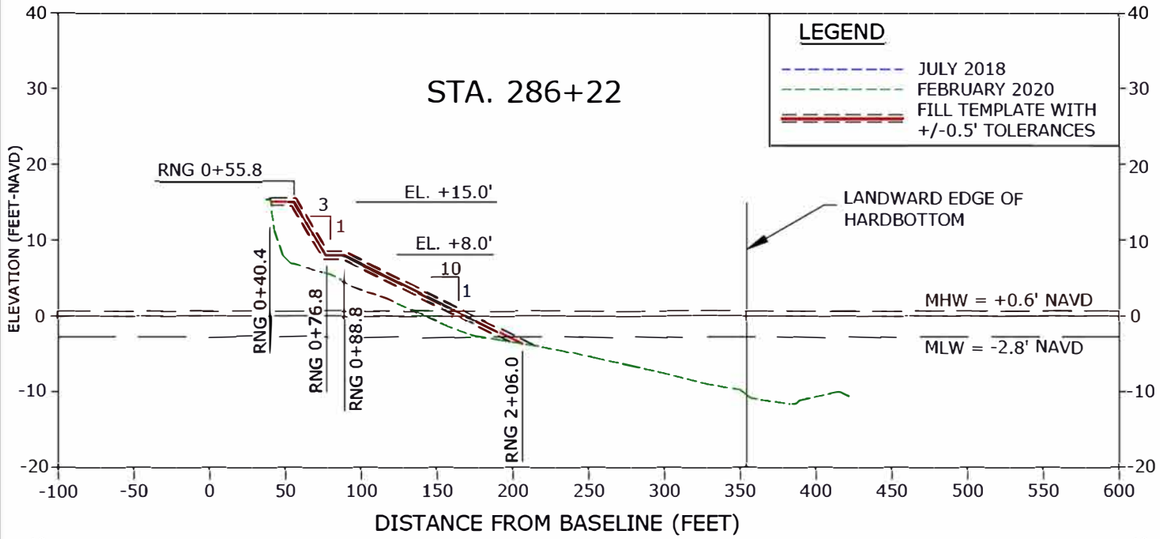

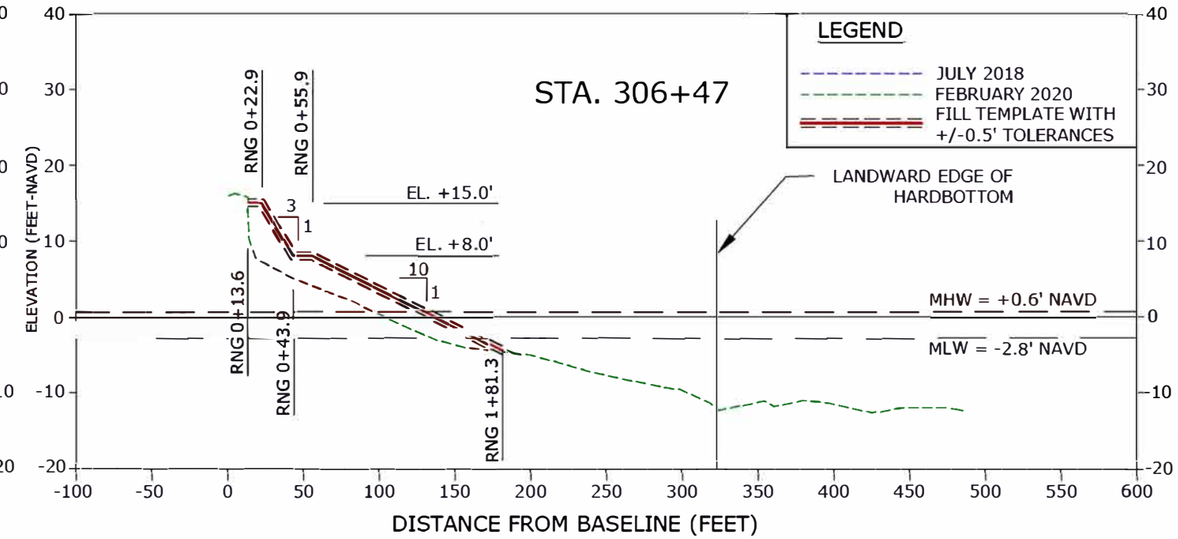

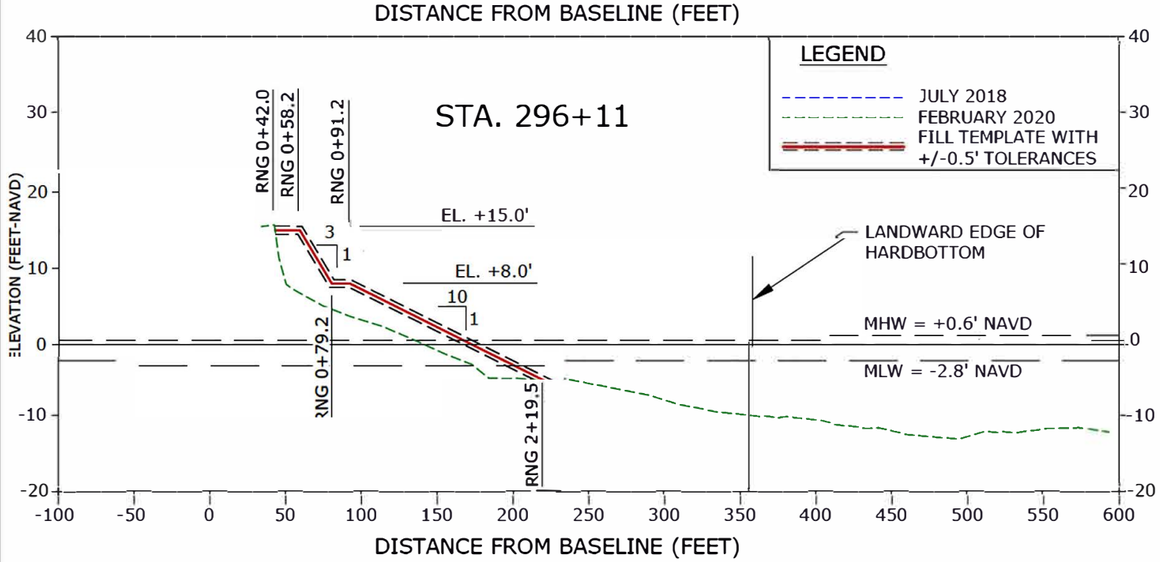

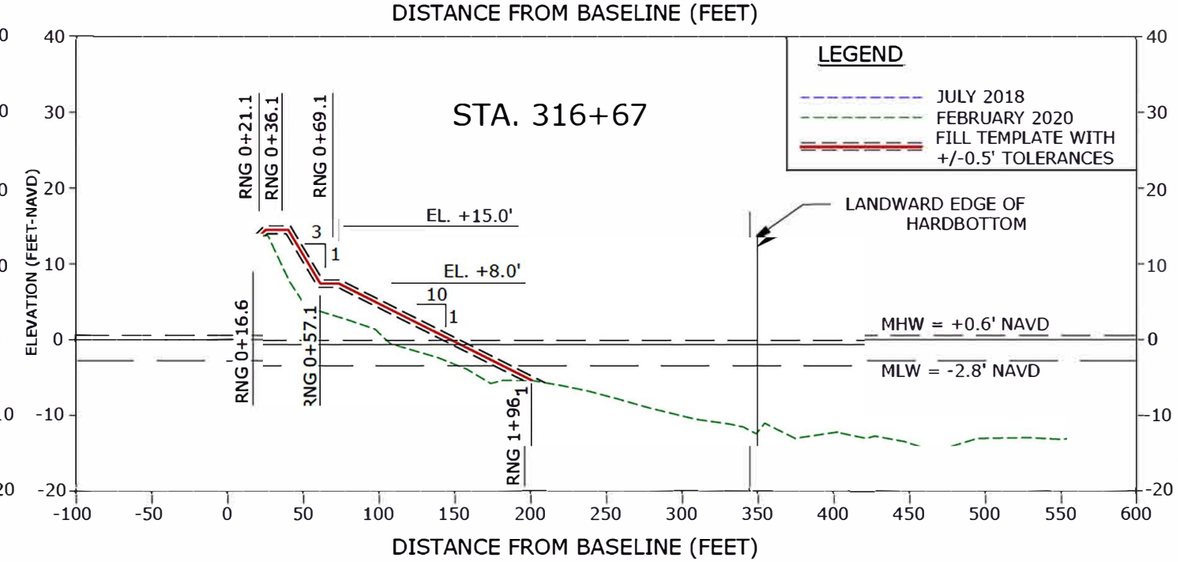

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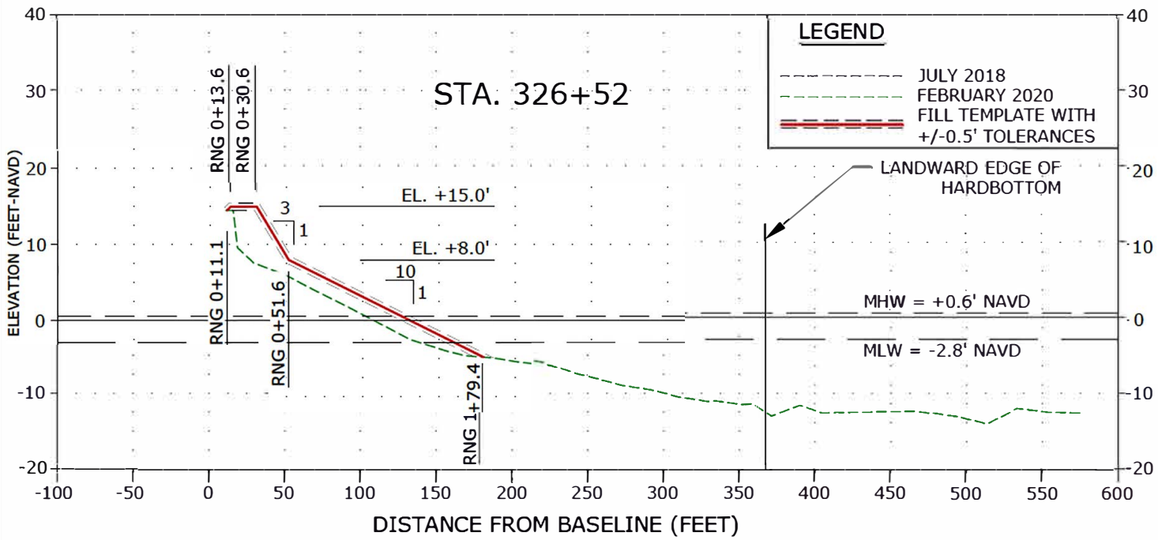

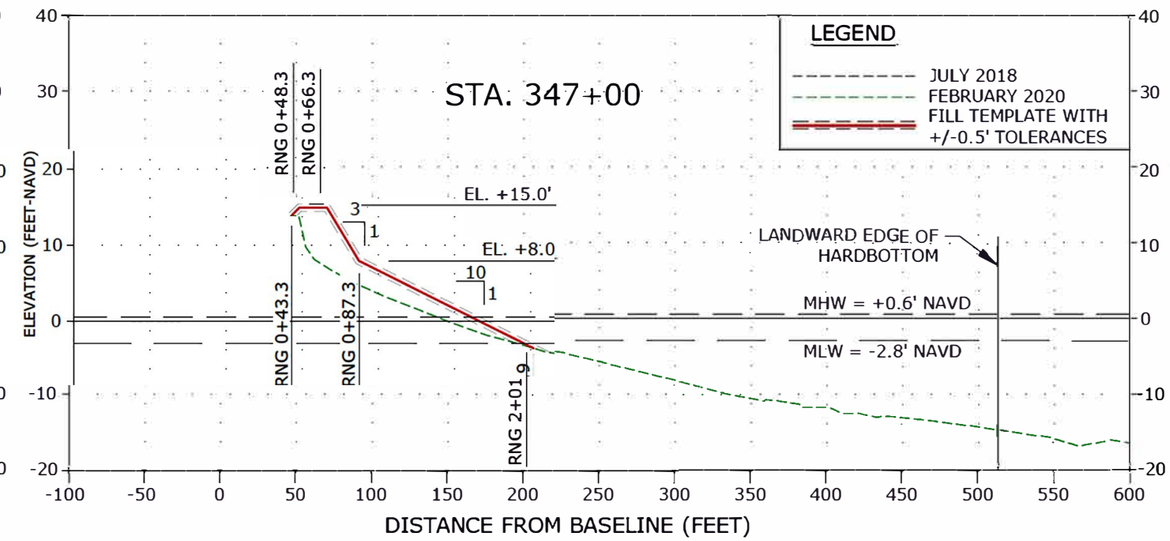

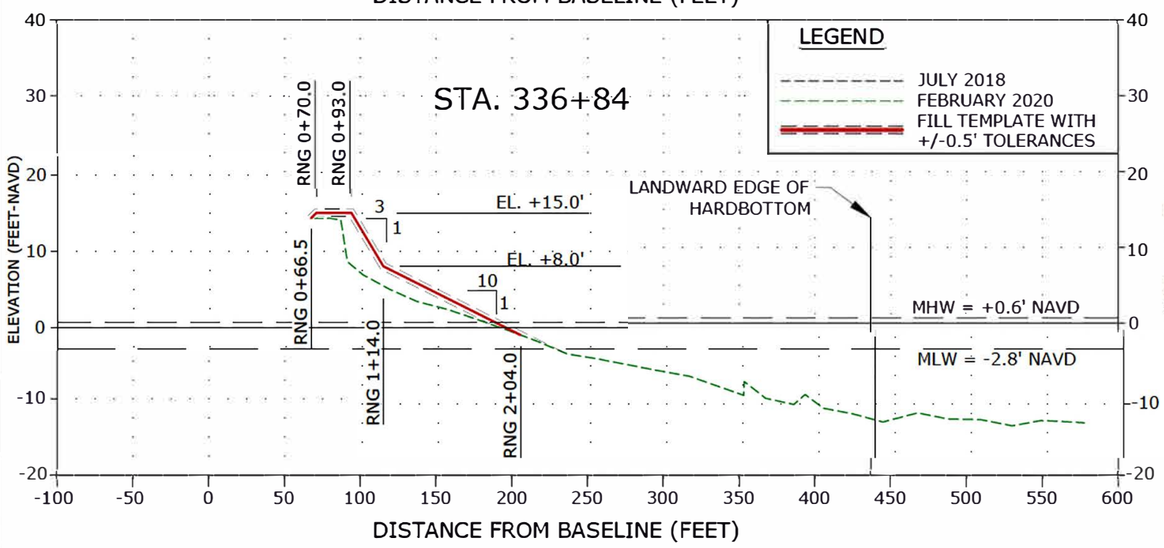

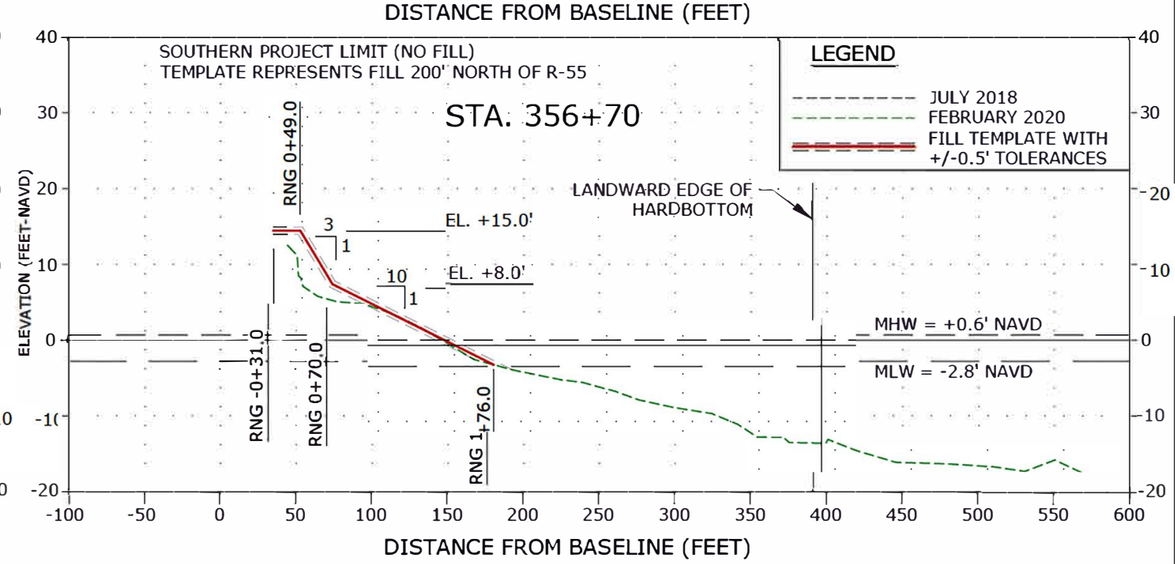

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CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA

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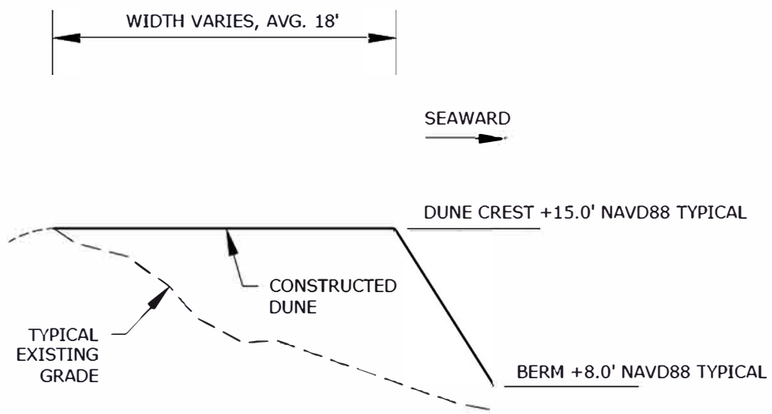
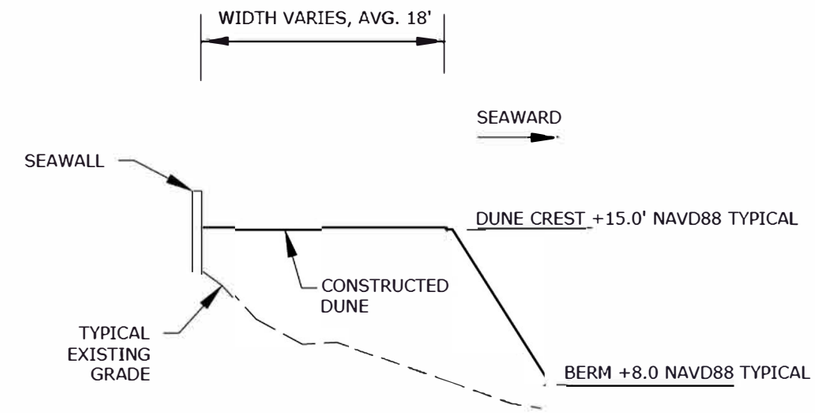
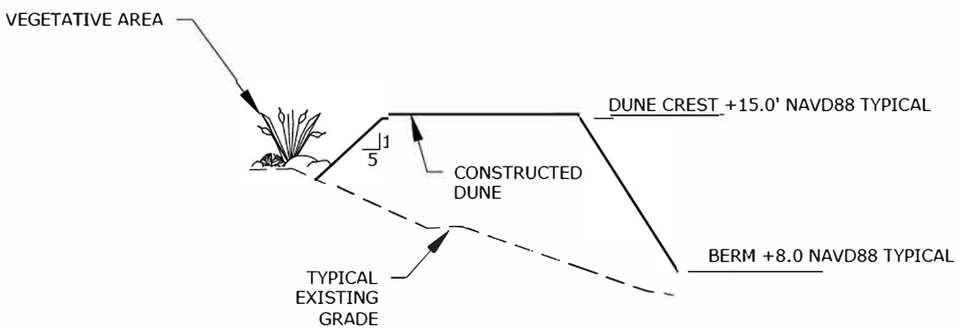


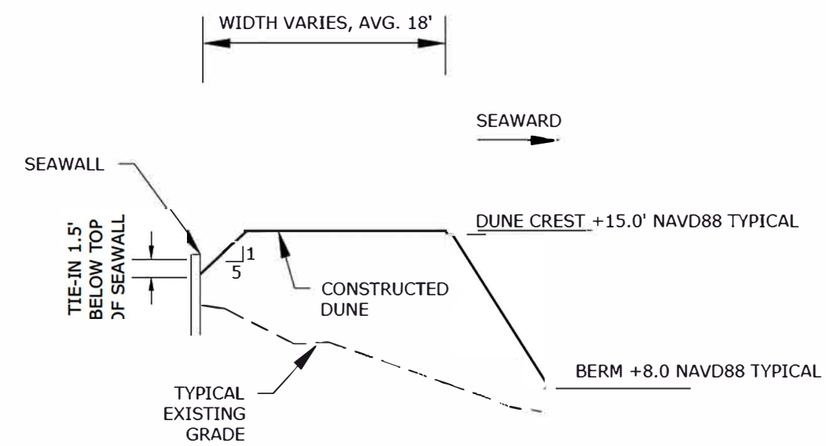
TYPICAL DUNE TIE-IN TO EXISTING GRADE
CROSS SECTION
NOT TO SCALE



TYPICAL DUNE TIE-IN TO EXISTING SEAWALLS WITH ELEVATIONS
GREATER THAN 15.0' NAVD88
CROSS SECTION
NOT TO SCALE



TYPICAL DUNE TIE-IN TO EXISTING VEGETATIVE AREAS WITH
ELEVATIONS LESS THAN 15.0' NAVD88
CROSS SECTION
NOT TO SCALE



TYPICAL DUNE TIE-IN TO EXISTING SEAWALLS WITH ELEVATIONS
LESS THAN 15.0' NAVD88
CROSS SECTION
NOT TO SCALE

NOTES:

1. SITE SPECIFIC FIELD ADJUSTMENTS TO THE CONSTRUCTION TEMPLATE MAY BE NECESSARY AT LOCATIONS SUCH AS SEAWALLS, OUTFALLS, BEACH ACCESS POINTS AND DUNE OVERWALKS.
2. DUNE CREST ELEVATION VARIES BETWEEN +11.0', +12.0', AND +15.0' NAVD88 DEPENDING ON LOCATION. REFER TO CROSS SECTIONS FOR DUNE CREST ELEVATIONS.
3. BERM CREST ELEVATION VARIES BETWEEN +7.0', +7.5', AND +8.0' NAVD88 DEPENDING ON LOCATION. REFER TO CROSS SECTIONS FOR BERM CREST ELEVATIONS.

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REVISIONS 1

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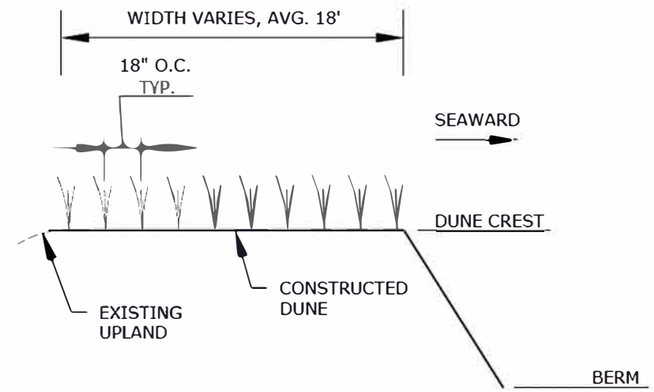
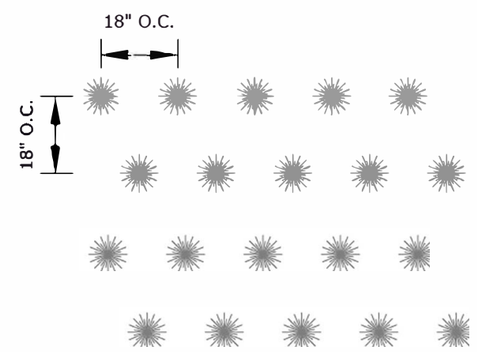
DRAWING NO.
D-1

PLANTING DETAIL					
PLANT TYPE	SCIENTIFIC NAME	PERCENT DISTRIBUTION	QUANTITY (APPROX.)	SIZE	SPACING
SEA OATS	UNIOLA PANICULATA	80% to 85%	160,568	LINER	18" O.C.
BITTER PANICGRASS	PANICUM AMARUM	10% TO 15%	20,071	LINER	18" O.C.
RAILROAD VINE	IPOMOEA PES-CAPRAE	4% TO 8% (RELATIVELY EQUAL ABUNDANCE OF EACH)	10,036	LINER	18" O.C.
DUNE SUNFLOWER	HELIANTHUS DEBILIS		10,035	LINER	18" O.C.



TYPICAL DUNE PLANTING
CROSS SECTION
NOT TO SCALE



TYPICAL DUNE PLANTING
STAGGERED LAYOUT
NOT TO SCALE

NOTES:

1. CONTRACTOR SHALL FIELD LOCATE DUNE AREA PRIOR TO PLANTING. TEMPORARY STAKES DENOTING SEAWARD LIMITS SHALL BE PROVIDED. CONTRACTOR SHALL OBTAIN APPROVAL OF LOCATION FROM COUNTY OR ENGINEER PRIOR TO PLANTING.
2. PLANTS SHALL BE INSTALLED FOLLOWING GOOD HORTICULTURE PRACTICES WITH A SLOW RELEASE FERTILIZER IN EACH HOLE.
3. CONTRACTOR SHALL PROVIDE INITIAL WATERING. CONTRACTOR SHALL COORDINATE WITH COUNTY REGARDING USE OF LOCAL COUNTY SOURCES, OTHERWISE CONTRACTOR SHALL PROVIDE WATER. CONTRACTOR SHALL PROVIDE SUPPLEMENTAL WATERING AS NEEDED FOR 30 DAYS DEPENDING ON RAINFALL. AT END OF 30 DAYS, CONTRACTOR SHALL PROVIDE COUNTY WITH WRITTEN WATERING INSTRUCTIONS.
4. CONTRACTOR SHALL WARRANTY PLANTS AT THE FOLLOWING SCHEDULE:
   0-30 DAYS 100% SURVIVING
   30-90 DAYS 80% SURVIVING
5. CONTRACTOR SHALL MONITOR PLANTING MONTHLY FOR 3 MONTHS. AT THE END OF 3 MONTHS, A SUMMARY REPORT OF SURVIVAL AND RECOMMENDATION FOR MAINTENANCE SHALL BE PROVIDED TO COUNTY.
6. ALL DUNE VEGETATION WORK SHALL BE IN COMPLIANCE WITH ALL FDEP PERMIT REQUIREMENTS.
7. NO EXISTING VEGETATION TO BE REMOVED.
8. THE ROOT BALL FOR BOTH GRASSES SPECIES SHALL BE NO LESS THANK 1" X 1" X 2.5" DEPTH. THE ROOT BALL FOR THE THREE GROUND COVER SPECIES SHALL BE NO LESS THAN 1.5" X 1.5" X 2.5" DEPTH.
9. UNIOLA PANICULATA LINERS SHALL BE MULTI-STEMMED PLANTS (AT LEAST 2 STEMS). IPOMOEA PES-CAPRAE LINERS SHALL BE MULTI-STEMMED PLANTS (AT LEAST 2 STEAMS). HELIANTHUS DEBILIS LINERS SHALL BE MULTI-STEMMED PLANTS (AT LEAST 2 STEMS). PANICUM AMARUM LINERS CAN BE SINGLE-STEMMED PLANTS. THE PLANT MATERIAL IN EACH LINER CONSTITUTES ONE DUNE GRASS PLANT, REGARDLESS OF THE NUMBER OF VIABLE STEMS IN THE LINER.
10. THE LINERS FOR BOTH GRASSES SPECIES SHALL BE NO LESS THAN 12' TALL FROM THE TOP OF THE ROOT BALL TO THE TIP OF THE LONGEST LEAVE. THE LINERS FOR ALL THREE SPECIES OF GROUND COVERS SHALL BE NO LESS THANK 6" TALL FROM THE TOP OF THE ROOT BALL TO THE TIP OF THE LONGEST LEAVE.

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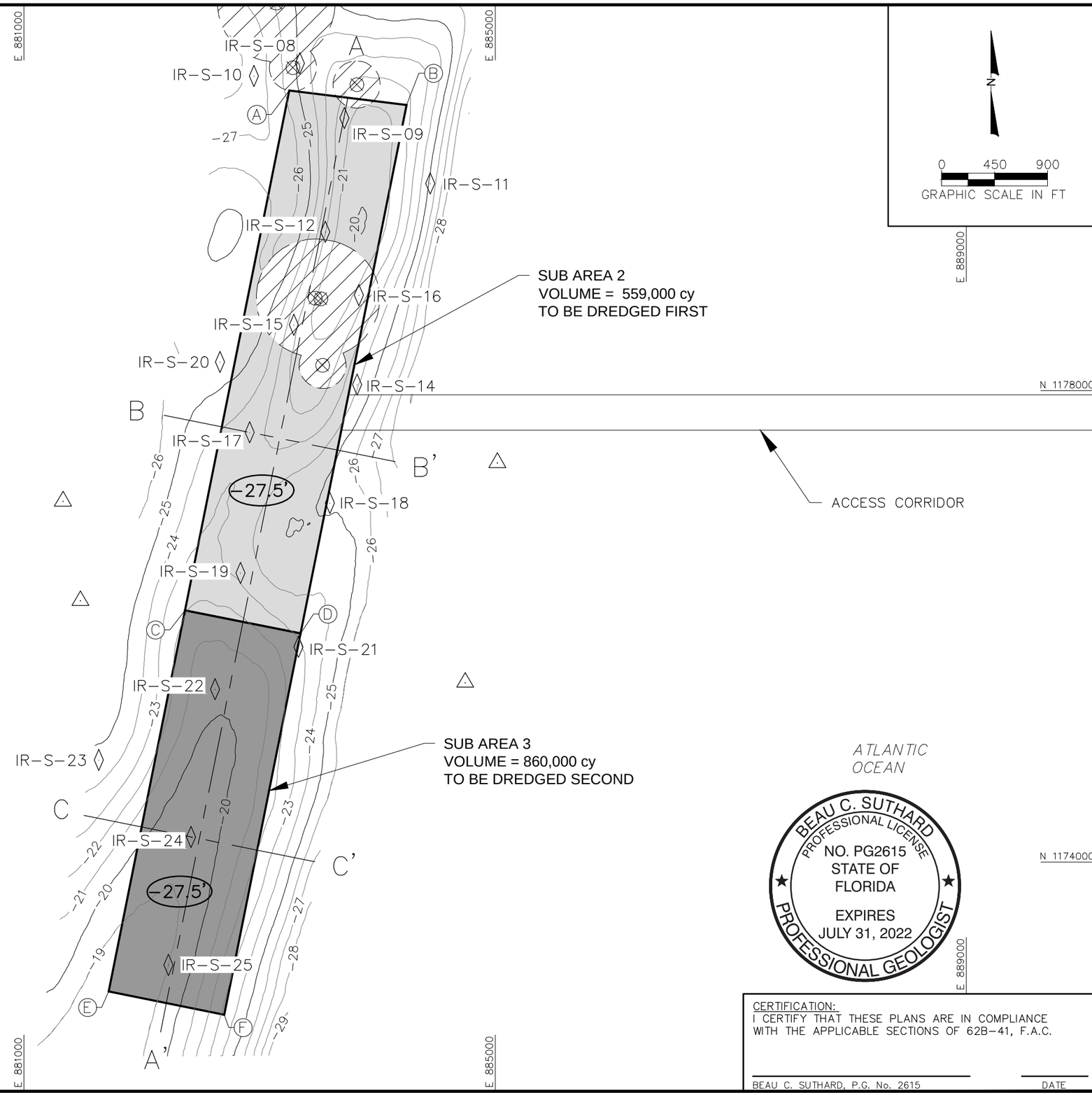
BORROW AREA COORDINATE LOCATIONS

CORNER	NORTHING	EASTING
A	1180547.5	883253.0
B	1180426.0	884248.6
C	1176135.4	882367.8
D	1175938.7	883348.3
E	1172899.8	881718.7
F	1172703.1	882699.2



LEGEND:

- (-27.5') DESIGN ELEVATION
- SUB AREA 2 BORROW AREA
- SUB AREA 3 BORROW AREA
- 1999 VIBRACORE
- 2019 DIVER VERIFIED HARDBOTTOM
- MAGNETIC ANOMALIES
- MAGNETIC ANOMALY NO DREDGE ZONE

NOTES:

1. ELEVATIONS ARE IN FEET REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. COORDINATES ARE IN FEET REFERENCED TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, EAST ZONE, NORTH AMERICAN DATUM OF 1983 (NAD83).
3. CONTOURS GENERATED FROM A SURVEY CONDUCTED BY APTIM ENVIRONMENTAL AND INFRASTRUCTURE, LLC. DATED JANUARY, 2019.
4. MAGNETOMETER SURVEY CONDUCTED BY MORGAN & EKLUND DATED MAY 10–12, 2000.
5. VIBRACORES WERE COLLECTED BY ALPINE SEISMIC SURVEY, INC. (AOSS) 1999.

BEAU C. SUTHARD
PROFESSIONAL LICENSE
NO. PG2615
STATE OF FLORIDA
EXPIRES JULY 31, 2022
PROFESSIONAL GEOLOGIST

CERTIFICATION:
I CERTIFY THAT THESE PLANS ARE IN COMPLIANCE WITH THE APPLICABLE SECTIONS OF 62B–41, F.A.C.

BEAU C. SUTHARD, P.G. No. 2615 DATE

APTIM ENVIRONMENTAL & INFRASTRUCTURE, LLC
2481 N.W. BOCA RATON BOULEVARD
BOCA RATON, FLORIDA 33431
www.APTIM.com
PH. (561) 391-8102
FAX (561) 391-9116
C.O.A. FL. #9317
C.O.A. LA. #2531

REVISIONS

No.	Date	Description

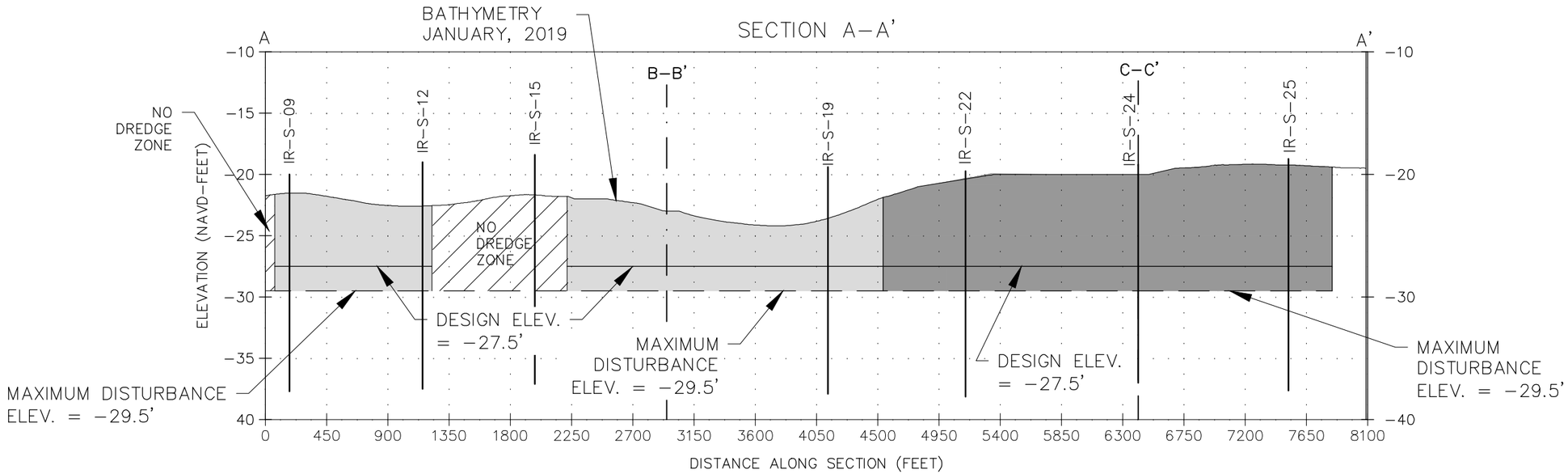
Designed by: CP
Drawn by: KM
Date: 04/16/20
Pilot Scale: AS NOTED
Checked by: DM
Reviewed by: CP
Submitted by: CP
Comm. No.: 631235714

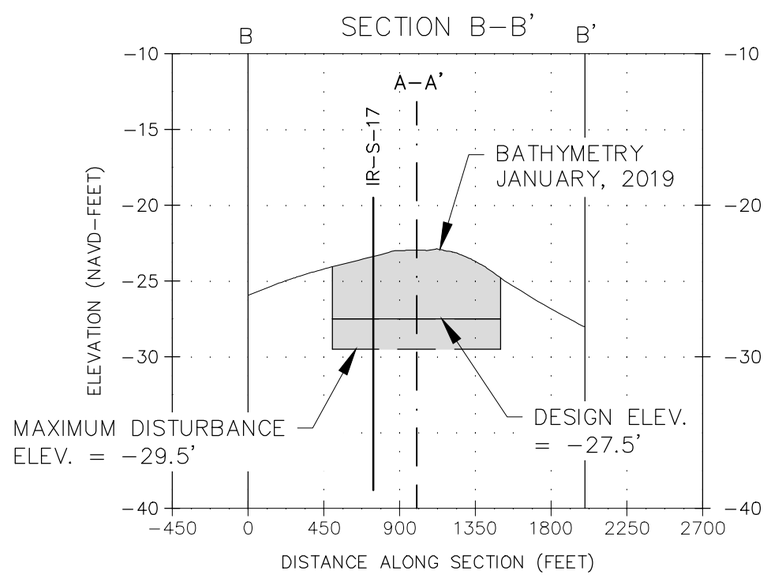
Reference Files:

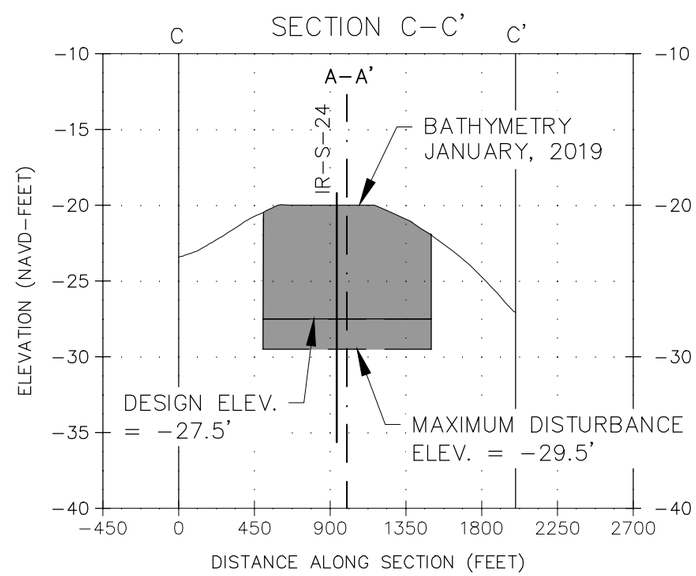
SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
BORROW AREA PLAN VIEW

DRAWING NO.
BA–PV

P:\Indian River\2017 – Sector 3 IRWP_Design and Permitting_631235714\Civil\Construction\A3_44_631235714C_BA.dwg – Jun 29, 2020 @ 3:36pm – Kimberly.Christoff







LEGEND:

SUB AREA 2 BORROW AREA

SUB AREA 3 BORROW AREA

NOTES:

1. ELEVATIONS ARE IN FEET REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).
2. THE DESIGN ELEVATIONS ARE THE MAXIMUM ELEVATIONS ALLOWED WITHIN THE BORROW AREA PER THE PERMITS AND BASED ON THE AD SURVEY.
3. THE CONTRACTOR MAY DISTURB UP TO TWO (2) FEET BENEATH THE DESIGN ELEVATIONS WITH THEIR EQUIPMENT. UNDER NO CIRCUMSTANCES SHALL THE CONTRACTOR ALLOW SEDIMENT DISTURBANCE TO OCCUR BELOW THE MAXIMUM DISTURBANCE ELEVATIONS.
4. CORES MAY NOT FALL DIRECTLY ON THE CROSS SECTION LINES, BUT ARE LOCATED SUFFICIENTLY CLOSE TO REPRESENT SIMILAR MATERIAL.
5. SEE SHEET 42 FOR THE LOCATION OF CROSS SECTION LINES.

0 5 10
VERTICAL SCALE IN FT

0 450 900
HORIZONTAL SCALE IN FT

BEAU C. SUTHARD
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STATE OF
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SECTOR 3
BEACH AND DUNE RENOURISHMENT PROJECT
CONSTRUCTION PLANS
INDIAN RIVER COUNTY, FLORIDA
BORROW AREA CROSS SECTIONS

DRAWING NO.
BA–XS

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