



**TENTH AMENDMENT TO AGREEMENT BETWEEN BROWARD COUNTY AND FOTH  
INFRASTRUCTURE & ENVIRONMENT, LLC, FOR CONSULTANT SERVICES FOR PORT  
EVERGLADES INLET SAND MANAGEMENT FEASIBILITY AND ENGINEERING AND DESIGN STUDY**

This Tenth Amendment ("Amendment") is entered into between Broward County, a political subdivision of the State of Florida ("County"), and Foth Infrastructure & Environment, LLC, a foreign limited liability company registered to transact business in the State of Florida ("Consultant") (County and Consultant collectively referred to as the "Parties").

**RECITALS**

A. The Parties entered into the Agreement between Broward County and Olsen Associates, Inc., for consultant services for Port Everglades Inlet Sand Management Feasibility and Engineering and Design Study, dated January 8, 2002 (the "Original Agreement"), to provide consultant services related to preparation of a Port Everglades sand bypassing feasibility and engineering and design study.

B. The Original Agreement was amended by a First Amendment, dated July 8, 2003, which added to the Scope of Services, amount of compensation, and time for performance. A Second Amendment, dated August 19, 2005, extended the term to allow for review time by the State of Florida and to develop a Scope of Work for the next phase of services. A Third Amendment, dated June 20, 2006, incorporated services related to selection of a preferred sand bypassing plan, design development, NEPA documentation, permit application submittal, response to regulatory agency comments, and agency coordination and liaison services. A Fourth Amendment, dated November 13, 2008, provided a no-cost, ten (10) month extension to complete Phase II of the services. A Fifth Amendment dated October 27, 2009, provided a no-cost, twelve (12) month extension to provide additional technical information to regulatory agencies and stakeholders, and for completion of Phase II of the services. A Sixth Amendment, dated October 26, 2010, provided for a three (3) year extension for permitting, establishment of an Erosion Control Line, design surveys, final design, contractor bid assistance, preconstruction related field work, and an increase in compensation. A Seventh Amendment, dated July 29, 2013, modified the sand trap design to avoid the need for blasting, allowed for more excavation, provided for verification of the revised design, additional geotechnical work, biological surveys of the expanded project footprint, additional modeling, revisions to permit application materials, and carried over certain other outstanding project tasks. An Eighth Amendment, dated September 13, 2022, provided a design update, restructuring of bid and contract documents, bidding assistance, assessment of project performance, completion of economic performance, completion of an economic update for current cost data and expected future conditions to sea level rise, and additional time for performance. A Ninth Amendment, dated April 18, 2024, authorized pre-, during, and post-construction services (including administration, physical, and biological monitoring) as additional optional services. The Original Agreement, as amended by the First through Ninth Amendments, is referred to herein as the "Agreement."

C. In July 2024, Foth acquired Olsen. The County, Olsen, and Foth executed a Consent to Assignment on January 16, 2025.

D. The Parties now desire to further amend the Agreement to provide additional permit-required biological monitoring services for the federally listed Queen conch and additional turbidity monitoring services to accommodate the dredging contractor's schedule. If approved, this Amendment would add \$2,043,844 to the maximum amount payable under this Agreement.

Now, therefore, for good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Parties agree as follows:

1. The above Recitals are true and correct and are incorporated herein by reference. All capitalized terms not expressly defined within this Amendment shall retain the meaning ascribed to such terms in the Agreement.
2. Unless otherwise expressly stated herein, amendments to the Agreement made pursuant to this Amendment are indicated herein by use of strikethroughs to indicate deletions and bold/underlining to indicate additions. Except as modified herein, all remaining terms and conditions of the Agreement shall remain in full force and effect.
3. Section 5.1 of the Agreement is amended as follows:

5.1 AMOUNT AND METHOD OF COMPENSATION. County agrees to pay Consultant as compensation for performance of all services as related to Exhibit "A-6" required under the terms of this Agreement a Lump Sum of Five Hundred Eighty-Eight Thousand Eight Hundred Forty-One and 00/100 Dollars (\$588,841.00). The maximum hourly rates shown on Exhibit "A-6", total amounts for each task, and total Lump Sum amount are subject to change annually beginning on January 1, 2014, and on each calendar year thereafter upon written request by Consultant and subject to approval by the Contract Administrator. Any increase in these rates shall be (i) limited to the lesser of the change in cost of living, measured by the change in the Consumer Price Index ("CPI") as described below, or three percent (3%) and (ii) subject to the appropriation and availability of funds in accordance with Chapter 129, Florida Statutes. The increase or decrease in CPI shall be calculated as follows: the difference of CPI current period less CPI previous period, divided by CPI previous period, times one hundred (100). The CPI current period shall mean the most recent published monthly index prior to each January 1<sup>st</sup>. The CPI previous period shall mean for the same month of the prior year. All CPI indices shall be obtained from the U.S. Department of Labor table for Consumer Price Index - All Urban Consumers (Series ID CUURA320SA0) for the area of Miami-Fort Lauderdale, FL (All Items), with a base period of 1982-84 = 100. Any changes to the hourly rates, total amounts for each task, and total Lump Sum amount shall be set forth in the Consultant's written request and, if approved, reflected in an amendment to this paragraph and Exhibit "A-6" executed by the Contract Administrator and the Consultant. It is understood that the method of compensation for services outlined in Exhibit "A-6" is that of Lump Sum which means that Consultant shall



perform all services set forth for a total compensation in the amount stated above. Lump sum compensation amounts for Exhibit "A-6" services include expenses incurred by Consultant. No reimbursement of Consultant expenses is authorized for services related to Exhibit "A-6."

For all goods and services provided under Exhibit "~~A-7~~" "**A-8**" of this Agreement, County will pay Consultant up to a maximum amount as follows:

<u>Categories</u>	<u>Not-To-Exceed Amount</u>
<u>Goods and Services</u>	<del>\$5,547,891</del> \$6,983,581
<u>Reimbursable Expenses</u>	<u>\$147,200</u>
<u>Optional Services</u>	<del>\$4,303,641</del> \$4,911,795
<u>TOTAL NOT TO EXCEED</u>	<del>\$9,998,732</del> \$12,042,576

Payment shall be made only for Exhibit "~~A-7~~" "**A-8**" Services actually performed and completed pursuant to this Agreement as set forth in Total Cost Summary included in Exhibit "~~A-7~~," "**A-8**," which amount shall be accepted by Contractor as full compensation for all such Exhibit "~~A-7~~" "**A-8**" Services. Contractor acknowledges that the amounts set forth in this Agreement are the maximum amounts payable and constitute a limitation upon County's obligation to compensate Contractor for Exhibit "~~A-7~~" "**A-8**" Services. These maximum amounts, however, do not constitute a limitation of any sort upon Contractor's obligation to perform all Services.

4. Section 8.37 of the Agreement is added as follows (bold/underlining omitted):

8.37 ANTI-HUMAN TRAFFICKING. By execution of this Agreement by the undersigned authorized representative of Contractor, Contractor hereby attests under penalty of perjury that Contractor does not use coercion for labor or services, as such terms are defined in Section 787.06, Florida Statutes; under penalties of perjury, the undersigned authorized representative of Contractor declares that they have read the foregoing statement and that the facts stated in it are true.

5. Exhibit A-7 is hereby deleted in its entirety and replaced by Exhibit A-8, attached hereto and incorporated herein. All references to Exhibit A-7 are hereby replaced with Exhibit A-8.

6. In the event of any conflict or ambiguity between this Amendment and the Agreement, the Parties agree that this Amendment shall control. The Agreement, as amended herein by this Amendment, incorporates and includes all prior negotiations, correspondence, conversations, agreements, and understandings applicable to the matters contained herein, and the Parties agree that there are no commitments, agreements, or understandings concerning the subject matter hereof that are not contained in the Agreement as amended in this Amendment. Accordingly, the Parties agree that no deviation from the terms hereof shall be predicated upon any prior representations or agreements, whether oral or written.

7. Preparation of this Amendment has been a joint effort of the Parties and the resulting document shall not, solely as a matter of judicial construction, be construed more severely against one of the Parties than any other.
8. Consultant acknowledges that through the date this Amendment is executed by Consultant, Consultant has no claims or disputes against County with respect to any of the matters covered by the Agreement.
9. The effective date of this Amendment shall be the date of complete execution by the Parties.
10. This Amendment may be executed in multiple originals or in counterparts, whether signed physically or electronically; each of which shall be deemed to be an original, and all of which, taken together, shall constitute one and the same agreement.

*(The remainder of this page is blank.)*



IN WITNESS WHEREOF, the Parties hereto have made and executed this Amendment: Broward County through its Board of County Commissioners, signing by and through its Mayor or Vice-Mayor, authorized to execute same by Board action on the \_\_\_\_ day of \_\_\_\_\_, 20\_\_; and Foth Infrastructure & Environment, LLC, signing by and through its duly authorized representative.

COUNTY

ATTEST:

BROWARD COUNTY, by and through  
its Board of County Commissioners

By: \_\_\_\_\_  
Broward County Administrator, as  
ex officio Clerk of the Broward County  
Board of County Commissioners

By: \_\_\_\_\_  
Mayor  
\_\_\_\_ day of \_\_\_\_\_, 20\_\_

Approved as to form by  
Andrew J. Meyers  
Broward County Attorney  
115 South Andrews Avenue, Suite 423  
Fort Lauderdale, Florida 33301  
Telephone: (954) 357-7600

Jennifer  
Brown  
By \_\_\_\_\_  
Jennifer D. Brown (Date)  
Senior Assistant County Attorney

Digitally signed by  
Jennifer Brown  
Date: 2025.08.27  
14:29:53 -04'00'

MAITE  
AZCOITIA  
By \_\_\_\_\_  
Maite Azcoitia (Date)  
Deputy County Attorney

Digitally signed by MAITE  
AZCOITIA  
Date: 2025.08.28  
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JDB/gmb  
DRAFT Foth Sand Bypass Tenth Amendment  
08/22/2025  
#70056.0027

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FOTH INFRASTRUCTURE & ENVIRONMENT, LLC

By: Carrie L. Voskuil  
Authorized Signer

Carrie L. Voskuil  
Senior Contracts Manager (SD)  
Print Name and Title

26 day of August, 2025

By: Chris G. Creed  
Authorized Signer

Christopher G. Creed, P.E.  
Senior Coastal Engineer and Client Team Leader  
Print Name and Title

27 day of August, 2025



Exhibit "A-8"

**ADDITIONAL SCOPE OF SERVICES FOR PORT EVERGLADES INLET SAND MANAGEMENT  
(RLI #022100-RB)**

*Amendment 10: PRE-CONSTRUCTION, CONSTRUCTION, & POST-CONSTRUCTION SERVICES*

**PREAMBLE:** This Additional Scope of Services (A-8 Scope) provides for coastal engineering and biological services during the pre-construction, construction, and post-construction (years 0 through 5) timeframe for the Port Everglades Sand Bypass Project (Project). The principal elements of the Project will be constructed through four (4) independent construction contracts. The principal elements are dredging, jetty improvements, boulder mitigation, and rubble clearing mitigation. **Figure A** depicts the location of the Project and the task areas.

The A-8 Scope includes four (4) years of post-construction monitoring and reporting tasks required for permit compliance and tasks to support one maintenance dredging event of the sand trap. County anticipates the maintenance dredging event to occur approximately three (3) years after the initial construction of the sand trap.

**Tables 1-4** summarize the tasks covered under A-8 Scope. A-8 Scope is divided into five (5) parts. **Part I** details the coastal engineering services, including physical surveys, field observation, monitoring, and reporting, required for the initial construction of the Project. **Part II** details the biological services for the initial construction event and follows the August 2020 Minimization, Mitigation, and Monitoring Plan ("Plan") approved by Florida Department of Environmental Protection ("FDEP") and National Marine Fisheries Service ("NMFS") Queen Conch Monitoring Plan. **Parts III and IV** include the coastal engineering and biological tasks that support one maintenance dredging and subsequent monitoring tasks that fall within the 5-year timeframe. **Part V** provides for permit requires services during construction related to the Queen Conch, which was listed as Threatened under the Endangered Species Act in February 2024. Consultant shall use qualified employees or subconsultants to perform the tasks described herein. The tasks reference the following permits: FDEP JCP #0289308-004-JC and U.S. Army Corps of Engineers ("USACE") SAJ-2008-02034 SP-LCK.

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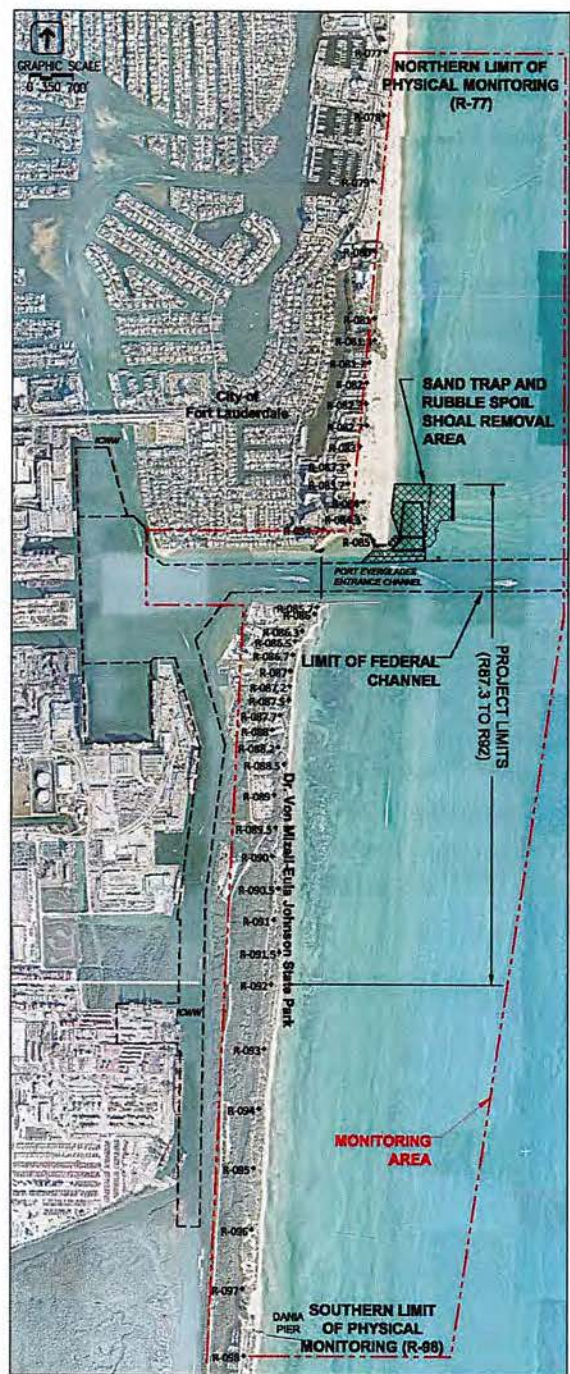


Figure A: Port Everglades Sand Bypass Project Location.



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*Amendment 10: PRE-CONSTRUCTION, CONSTRUCTION, & POST-CONSTRUCTION SERVICES*

**Table 1:** Tasks for Amendment 10, Part I.

<b>PART I: ENGINEERING SERVICES</b>	
<b>Task No.</b>	<b>Task</b>
1	Pre-Construction Physical Monitoring Survey
2	Construction Services – Sand Trap and Rubble Shoal Dredging / Jetty / Mitigation / Rubble Clearing
3	Contingency – Construction Services (AW)
4	Water Quality Monitoring - Dredging (35 Weeks)
5	Water Quality Monitoring - Rubble Clearing (16 Weeks)
6	Contingency – Water Quality Monitoring (20 Weeks)
7	Permit Modification
8	Post-Construction Report
9	Physical Monitoring: Immediate Post-Construction
10	Intermediate Post-Construction Multibeam Survey of Sand Trap and Inlet Channel (6-months)
11	Physical Monitoring: 1-Yr Post-Construction
12	Intermediate Post-Construction Multibeam Survey of Sand Trap and Inlet Channel (18-months)
13	Physical Monitoring: 2-Yr Post-Construction
14	Intermediate Post-Construction Multibeam Survey of Sand Trap and Inlet Channel (30-months)
15	Physical Monitoring: 3-Yr Post-Construction
16	Intermediate Post-Construction Multibeam Survey of Sand Trap and Inlet Channel (42-months)
17	Physical Monitoring: 4-Yr Post-Construction
18	Intermediate Post-Construction Multibeam Survey of Sand Trap and Inlet Channel (54-months)
19	Physical Monitoring: 5-Yr Post-Construction

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**Table 2:** Tasks for Amendment 10, Part II.

<b>PART II: ENVIRONMENTAL SERVICES</b>	
<b>Task No.</b>	<b>Task</b>
20	Nonlisted Coral Species and Relocation and Queen Conch Surveys/Relocations – Direct Impact Area (Corals, Conch, Urchins)
21	Contingency – Nonlisted Coral Colony Removal and Relocation (AW)
22	Nonlisted Coral Relocation Monitoring: Immediate Post-Relocation Baseline (Time Zero) Survey
23	Nonlisted Coral Relocation Monitoring: Six-Month Post-Relocation Survey
24	Nonlisted Coral Relocation Monitoring: Year 1 Post-Relocation Survey
25	Nonlisted Coral Relocation Monitoring: Year 3 Post-Relocation Survey
26	Listed Coral Species ( <i>Acropora Cervicornis</i> ): Pre-Construction Survey
27	Listed Coral Species ( <i>Acropora Cervicornis</i> ) Colony/Fragment Relocation
28	Contingency – Listed Coral Colony Removal and Relocation (AW)
29	Contingency – Listed Coral Fragment Removal and Relocation and Fragment Outplanting from Nursery (AW)
30	Listed Coral Relocation Monitoring: Immediate Post-Relocation Baseline (Time Zero) And One Week Post-Relocation Survey of Colony Transplants and Reference Colonies
31	Listed Coral Relocation Monitoring: Three Month Post-Relocation Survey of Colony Transplants and Reference Colonies
32	Listed Coral Relocation Monitoring: Six-Month Post-Relocation Survey of Colony Transplants and Reference Colonies
33	Listed Coral Relocation Monitoring: One-Year Post-Relocation Survey of Colony Transplants and Reference Colonies
34	Coral Nursery Management
35	Outplanting of <i>Acropora Cervicornis</i> Colonies (AW)
36	Pre-Construction Baseline Survey of Nearshore Hardbottom and Queen Conch Monitoring Within / Adjacent to the Turbidity Mixing Zone
37	Pre-Construction Survey of Listed Corals on Nearshore Hardbottom Within the Turbidity Mixing Zone
38	Pre-Construction Survey of Sedimentation at Listed Coral Sites Within the Turbidity Mixing Zone
39	Pre-Construction Seagrass Survey Within the Turbidity Mixing Zone
40	During-Construction Sedimentation Surveys of Nearshore Hardbottom and Queen Conch Monitoring Within / Adjacent to the Turbidity Mixing Zone
41	Contingency – 20 Week During-Construction Monitoring if Sand Trap Excavation Extends Up To 55 Weeks (AW)
42	Contingency – During-Construction Monitoring Based on Sedimentation Triggers (AW)
43	Immediate Post-Construction Monitoring of Nearshore Hardbottom and Queen Conch Within / Adjacent to the Turbidity Mixing Zone



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*Amendment 10: PRE-CONSTRUCTION, CONSTRUCTION, & POST-CONSTRUCTION SERVICES*

**Table 2 (continued):** Tasks for Amendment 10, Part II.

<b>PART II: ENVIRONMENTAL SERVICES</b>	
<b>Task No.</b>	<b>Task</b>
44	Immediate Post-Construction Survey of Seagrass Habitats Within the Turbidity Mixing Zone
45	Contingency – Immediate Post-Construction Monitoring and Data Analyses Based on Sedimentation Impacts (AW)
46	Immediate Post-Construction Biological Monitoring Report - Nearshore Hardbottom and Queen Conch
47	Immediate Post-Construction Surveys of Listed Coral Sites Within the Turbidity Mixing Zone
48	0.3-Acre Offshore Artificial Reef Mitigation Site Surveys
49	Mitigation Artificial Reef Construction Supervision (AW)
50	As-Built Immediate Post-Construction Surveys of the 0.3-Acre And 0.2-Acre Artificial Reef Coral Nurseries
51	During-Construction Mitigation Surface Rubble Inspections
52	Mitigation Success Monitoring - Creation of Rubble / Colonized Pavement from Clearing/Rubble Removal- Year 1 Post-Construction Benthic Habitat Map
53	Mitigation Success Monitoring - Creation of Rubble / Colonized Pavement from Clearing/Rubble Removal- Year 2 Post-Construction Benthic Habitat Map
54	Mitigation Success Monitoring - Creation of Rubble / Colonized Pavement from Clearing/Rubble Removal- Year 3 Post-Construction Benthic Habitat Map
55	Mitigation Success Monitoring - Creation of Rubble / Colonized Pavement from Clearing/Rubble Removal- Year 5 Post-Construction Benthic Habitat Map (AW)
56	Contingency – Aerial Photography for Mitigation Success Monitoring (AW) - Years 1, 2, 3, and 5
57	Baseline Coral Harvest/Relocation, Monitoring and Nursery Maintenance
58	Year 1 Coral Harvest/Relocation, Monitoring and Nursery Maintenance
59	Year 2 Coral Harvest/Relocation, Monitoring and Nursery Maintenance
60	Year 3 Coral Harvest/Relocation, Monitoring and Nursery Maintenance

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(RLI #022100-RB)**

*Amendment 10: PRE-CONSTRUCTION, CONSTRUCTION, & POST-CONSTRUCTION SERVICES*

**Table 3:** Tasks for Amendment 10, Part III.

<b>PART III: COASTAL ENGINEERING SERVICES</b>	
<b>Task No.</b>	<b>Task</b>
61	Planning, Engineering, Design, and Permit Management (AW)
62	Geotechnical Investigation (AW)
63	Final Design and Plans and Specifications (AW)
64	Bid Support (AW)
65	Construction Services (12 weeks) (AW)
66	Contingency – Construction Services (4 Weeks) (AW)
67	Water Quality Monitoring (12 Weeks) (AW)
68	Sediment QA/QC Monitoring and Compliance (AW)
69	Post-Construction Report (AW)



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**Table 4:** Tasks for Amendment 10, Part IV.

<b>PART IV: ENVIRONMENTAL SERVICES</b>	
<b>Task No.</b>	<b>Task</b>
70	Permanent Monitoring Station Establishment and Baseline Hardbottom Monitoring- Sand Trap Maintenance Dredging Mixing Zone (AW)
71	Weekly During-Construction Hardbottom Surveys During the First Sand Trap Maintenance Dredging Event (AW)
72	Contingency During-Construction Sedimentation Triggered Monitoring During the First Sand Trap Maintenance Dredging Event (AW)
73	Immediate Post-Construction Hardbottom Monitoring in the Turbidity Mixing Zone- First Sand Trap Maintenance Dredging Event (AW)
74	Immediate Post-Construction Hardbottom Monitoring – Beach Fill Placement Following the First Maintenance Dredging Event (AW)
75	Immediate Post-Construction Biological Monitoring Report - First Sand Trap Maintenance Dredging Event (AW)
76	Year 1 Post-Construction Hardbottom Monitoring – Beach Fill Placement Following the First Maintenance Dredging Event (AW)
77	Year 1 Post-Construction Biological Monitoring Report - First Sand Trap Maintenance Dredging Event (AW)
78	Year 2 Post-Construction Hardbottom Monitoring – Beach Fill Placement Following the First Maintenance Dredging Event (AW)
79	Year 2 Post-Construction Biological Monitoring Report – First Sand Trap Maintenance Dredging Event (AW)
80	Year 3 Post-Construction Hardbottom Monitoring – Beach Fill Placement Following the First Maintenance Dredging Event (AW)
81	Year 3 Post-Construction Biological Monitoring Report - First Sand Trap Maintenance Dredging Event (AW)

**Table 5:** Tasks for Amendment 10, Part V.

<b>PART V: ADDITIONAL QUEEN CONCH WORK</b>	
<b>Task No.</b>	<b>Task</b>
82	Post-Relocation Receiver Site Surveys
83	Weekly 50-m Buffer Area Surveys

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ADDITIONAL SCOPE OF SERVICES FOR PORT EVERGLADES INLET SAND MANAGEMENT  
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*Amendment 10: PRE-CONSTRUCTION, CONSTRUCTION, & POST-CONSTRUCTION SERVICES*

**PART I: COASTAL ENGINEERING SERVICES - INITIAL SAND TRAP CONSTRUCTION**

**1. PRE-CONSTRUCTION PHYSICAL MONITORING SURVEY**

- 1.1 **Multibeam Survey.** Consultant shall conduct a pre-construction multibeam hydrographic survey in accordance with the approved Physical Monitoring Plan. The survey will document the pre-construction condition of the sand trap and inlet channel. Consultant shall provide all necessary materials and equipment to perform the required work activity. Consultant shall also supply the supervisory, professional, and technical services personnel required to manage, document, and process all data associated with the acquisition and processing of the survey data.

**Survey Deliverables.** Consultant shall provide County and FDEP with a digital copy of the following products:

- 1.1.1 Survey report from the Florida licensed surveyor certifying to the FDEP that the survey meets the technical standards of Chapter 5J-17, Florida Administrative Code ("F.A.C.").
  - (a) Copies of all checked, standard survey field books, computation and reduction files, and abstracted final positions.
  - (b) A quality control/quality assurance ("QA/QC") report detailing a QA/QC procedure and any findings, corrections, and results of that procedure.
  - (c) ACSII file containing raw x, y, z data points.
  - (d) Digital copy of cross-section and plan view data plots.
  - (e) Complete federally compliant metadata file that includes the data collection methodology and processing procedures used in accordance with standards set forth by the Federal Geographic Data Committee. Metadata shall include all QA/QC procedures utilized to ensure the quality of the data and shall be delivered in digital format.
  - (f) Field books shall be scanned and pages amassed into a PDF document.
  - (g) Elevation data will be provided in North American Vertical Datum of 1988 (NAVD88) datum.
- 1.2 Consultant shall use the multibeam survey data for comparison to the post-construction survey data and future project performance analyses.

**Deliverables.** The deliverable includes an electronic memo summarizing the results of the survey per the Physical Monitoring Plan. Consultant will submit the memo and data to

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*Amendment 10: PRE-CONSTRUCTION, CONSTRUCTION, & POST-CONSTRUCTION SERVICES*

County and FDEP.

**2. CONSTRUCTION SERVICES**

**2.1 CONSTRUCTION CONTRACT ADMINISTRATION – SAND TRAP AND RUBBLE  
SHOAL DREDGING AND DISPOSAL (THIRTY-FIVE (35) Weeks)**

**2.1.1 Pre-construction Conference.** Consultant shall meet with Contract Administrator and dredging Contractor to review the Project Permits. Consultant shall coordinate, prepare for, and attend a pre-construction conference to review the construction methodology and the specific conditions and monitoring requirements of the Permits. Consultant shall invite Contractor, Contractor's subcontractors, FDEP and FWC staff, County's marine turtle permit holder, and other involved parties and stakeholders to the pre-construction conference. At the conference, Consultant shall conduct a brief overview of the work and reiterate communications and reporting protocols for the duration of Contractor's mobilization, construction, and demobilization activities. The conference shall be held at least seven (7) days prior to the commencement date of construction. Consultant shall coordinate with FDEP, USACE Regulatory and NMFS at least twenty-one (21) days prior to the intended commencement date for the dredging activities. A minimum ten (10) days advance written notification shall be provided to the parties advising of the date, time, location, and teleconference number of the pre-construction conference. After the pre-construction conference, Consultant shall request a 'Notice to Proceed' from FDEP.

**Deliverable:** Deliverables include written notification of planned pre-construction meeting details, holding the pre-construction conference, meeting minutes, and the notice to proceed.

**2.1.2 Notice of Commencement.** At least fifteen (15) days before beginning dredging, Consultant must provide notice to County that commencement notification should be sent to FDEP Beaches, Inlets and Ports Program, USACE Regulatory and NMFS. Consultant shall confirm that notice was sent.

**Deliverable.** Deliverables include one (1) electronic written notice.



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- 2.1.3 **Notice of Deviations.** Consultant shall notify County, FDEP Beaches, Inlets and Ports Program, and USACE Regulatory via email of any anticipated deviation from the FDEP and/or USACE Permits before implementing the deviation to enable FDEP, USACE and County determine if a modification of the Permit is required pursuant to Rule 62B-49.008, F.A.C.

**Deliverable.** Deliverables include the one (1) electronic written notice.

- 2.1.4 **Notice of Non-Compliance.** Consultant shall immediately notify County via email of any non-compliance with any condition or limitation specified in the Permits. Within twenty-four (24) hours of the noncompliance notification, Consultant shall transmit a written report to County detailing the non-compliance; identifying the cause of noncompliance; the period of noncompliance, including dates and times; and steps taken to remedy the noncompliance; or, 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.

**Deliverable.** Deliverables include the email notice and written report.

- 2.1.5 **Certification of Completion.** Within sixty (60) days of completing the dredging authorized by the Permit, Consultant shall submit to County a written statement of completion and certification by a registered professional engineer. The certification shall state that the dredging activities authorized by the Permits were performed in compliance with the plans and specifications approved in the Permits and all conditions of the Permits or shall describe any deviations from the plans and specifications and permit conditions. When the completed activity differs substantially from the permitted plans, any substantial deviations shall be noted and explained on two (2) copies of as-built drawings.

**Deliverable.** Deliverables include the one (1) electronic copy of Consultant's certification and one (1) electronic copy of the as-built drawings of any feature whose construction deviated from the permit permitted plans, specifications, or conditions.

- 2.1.6 **Review of Contractor's Pre-Construction Submittals.** Consultant obtain the following documents from Contractor:
- Daily Report

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- Operations Plan
- Quality Control Plan
- Structure Inspection and Vibration Monitoring Plan and Qualifications
- Environmental Protection Plan
- Storm Contingency Plan
- Material Submittals Vessel Certification
- Accident Prevention Plan
- Dive Safety & Operations Plan

Upon receipt of the above-listed documents, Consultant shall review the same and determine whether the documents meet permit requirement and/or industry standards. If the document does not meet these conditions, Consultant shall return the documents to Contractor for edits consistent with Consultant's comments. Once Contractor provides an acceptable document to Consultant, Consultant shall distribute the document to the County.

**Deliverables.** Deliverables shall include email correspondence that documents were reviewed and accepted.

- 2.1.7 **Review of Contractor's Requests for Payment.** Consultant shall review Contractor progress and pay surveys, volume calculations, and pay requests for all work elements. Consultant shall review the Contractor's periodic payment invoices for accuracy of computation and completeness and make recommendations to County. Consultant shall assist County in evaluating the periodic and final payments to the Contractor. Consultant will review pay requests and make a recommendation to County regarding payment within five (5) days of receipt of the pay request. Consultant shall assist County in assembling the documentation needed for State reimbursement or cost sharing.

**Deliverable.** The deliverables include letters of recommendation for payment from Consultant to County regarding Contractor's pay requests.

- 2.1.8 **Records Management.** Consultant shall ensure that complete copies of all Permits, including all conditions, attachments, modifications, time

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extensions, and the approved plans and specifications, are kept at the site of the permitted activity. Consultant shall maintain detailed field logbooks and construction files (notebooks and file folders with copies of all documentation).

**Deliverable.** Upon completion of construction activities, Consultant shall conduct final file management review and transfer to County one (1) copy of the files for archival of records at County's request.

- 2.1.9 **Project Closeout.** Following notification by Contractor that dredge activities are complete and all payment quantities are approved and accepted by County, Consultant shall conduct a final visual inspection of the work and staging areas and prepare a punch list of remaining equipment and material to be removed from the project site and the activities required for restoration of access and staging areas. Consultant shall furnish the list to County and Contractor within fourteen (14) calendar days to ensure control of final clean up.

**Deliverable.** Deliverable is a punch list.

- 2.1.10 Following notice from Contractor that it completed final clean-up, Consultant shall conduct a final inspection within seven (7) calendar days of notice of the staging areas. If Contractor's equipment, construction fencing, supplies, and debris are completely removed and access and staging areas restored, then Consultant shall forward a recommendation to County that it make the final payment to Contractor.

**Deliverable.** Deliverable is a recommendation for final payment.

**2.2 CONSTRUCTION OBSERVATIONS – SAND TRAP AND RUBBLE SHOAL DREDGING AND DISPOSAL (THIRTY (35) Weeks)**

- 2.2.1 **Inspection.** Consultant shall monitor daily progress of the work and track Contractor delays from mobilization through demobilization of the project site. The purpose of this monitoring is to ensure that work is compliant with the construction plans, contract documents, and permit authorizations granted for the dredging. Consultant shall monitor the dredging contractor's daily activities through report and surveys provided by Contractor since all work will occur offshore. A full-time construction

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site representative is not required. Consultant shall notify County as appropriate.

**2.2.2 On-Call & Periodic On-Site Representation.** Consultant shall be available on an 'on-call' basis throughout the dredging period to address questions and required administrative matters.

**2.2.3** Consultant shall obtain and review the Contractor's quality control reports (daily reports) from mobilization through demobilization from the project site.

Consultant shall designate Project Engineer(s), who shall visit the site on a weekly basis, on average, throughout the period of construction. The Project Engineer shall serve as liaison between Contractor and County during all phases of construction. The Project Engineer shall be available to address questions concerning the plans and specifications and address other issues requiring coordination or liaison.

The Project Engineer shall attend, either in person or virtually, periodic progress meetings with Contractor as appropriate during construction. It is expected that a progress meeting will be held by Contractor at least weekly during the construction period.

Consultant shall email a weekly report to County summarizing the progress of construction and compliance with the Permits and Contract, including but not limited the amount of work performed and by whom, problems encountered, method to correct problems, errors, omissions, deviations from Contract Documents, and weather conditions.

**Deliverable.** Deliverables include on-site presence during construction, daily reports, documentation of construction operations (including appropriate photographs), and a weekly summary report of construction progress.

**2.3 CONSTRUCTION CONTRACT ADMINISTRATION - JETTY (TWENTY-SIX (26) Weeks)**

**2.3.1 Pre-construction Conference.** Consultant shall meet with Contract Administrator and jetty improvement Contractor to review the Project Permits for the jetty improvements prior to commencement of the activity



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authorized by the Permits. Consultant shall coordinate, prepare for, and attend a pre-construction conference to review the construction methodology, and the specific conditions and monitoring requirements of the Permits. Consultant shall invite jetty improvement Contractor, Contractor's subcontractors, FDEP and FWC staff, County's marine turtle permit holder, and other involved parties and stakeholders. At the conference, Consultant shall conduct a brief overview of the jetty improvement work and reiterate communications and reporting protocols for the duration of Contractor's mobilization, construction, and demobilization activities. The conference shall be held at least seven (7) calendar days before construction begins. Consultant shall coordinate with FDEP and USACE Regulatory at least twenty-one (21) days prior to the intended commencement date for the onsite construction activities. A minimum ten (10) days advance written notification shall be provided to the parties advising of the date, time, location, and teleconference number of the pre-construction conference. After the conference, Consultant shall request a 'Notice to Proceed' from FDEP.

**Deliverable.** Deliverables include written notification of planned pre-construction meeting details, and meeting minutes.

- 2.3.2 **Notice of Commencement.** At least fifteen (15) days before commencement, Consultant must notify County to send a commencement notification to FDEP Beaches, Inlets and Ports Program and USACE. Consultant shall confirm that notice was sent.

**Deliverable.** Deliverables include one (1) electronic written notice.

- 2.3.3 **Notice of Deviations.** Consultant shall email County and FDEP Beaches, Inlets and Ports Program of any anticipated deviation from the FDEP permit prior to implementation so FDEP can determine if a permit modification is required.

**Deliverable.** Deliverables include the one (1) electronic written notice.

- 2.3.4 **Notice of Non-Compliance.** Consultant shall immediately email County of any noncompliance with any permit condition or limitation. Within twenty-four (24) hours of the noncompliance notification, Consultant shall transmit a written report to County contain describing the noncompliance;

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the cause of noncompliance; the period of noncompliance, including dates and times; and steps taken to remedy the non-compliance; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the non-compliance.

**Deliverable.** Deliverables include the email notice and written notice.

- 2.3.5 **Certification of Completion.** Within sixty (60) days after completion of construction, Consultant shall submit a written statement of completion and certification by a registered professional engineer to County. The certification shall state that the activities authorized by the permits were performed in compliance with the permitted plans and specifications and permit conditions or shall describe any deviations from the permitted plans, specifications, and conditions. When the completed activity differs substantially from the permitted plans, the substantial deviations shall be noted and explained on 'as-built' drawings.

**Deliverable.** Deliverables include the one (1) hard copy and one (1) electronic copy of Consultant's certification and five (5) original copies of the as-built drawings, if necessary.

- 2.3.6 **Review of Contractor's Pre-Construction Submittals.** Consultant shall obtain the following documents from Contractor:

- Daily Report
- Operations Plan
- Quality Control Plan
- Structure Inspection and Vibration Monitoring Plan and Qualifications
- Environmental Protection Plan
- Storm Contingency Plan
- Material Submittals
- Vessel Certification
- Accident Prevention Plan
- Dive Safety & Operations Plan

Upon receipt of the above-listed documents, Consultant shall review the same and determine whether the documents meet permit requirement and/or industry standards. If the document does not meet these

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conditions, Consultant shall return the documents to Contractor for edits consistent with Consultant's comments. Once Contractor provides an acceptable document to Consultant, Consultant shall distribute the document to the County.

**Deliverables.** Deliverables shall include email correspondence that documents were reviewed and accepted.

- 2.3.7 **Review of Contractor's Requests for Payment.** Consultant shall review Contractor's progress and pay surveys, weigh tickets, volume calculations, and pay requests for all work elements. Consultant shall review the Contractor's periodic payment invoices for accuracy of computation and completeness and make recommendations to County. Consultant shall assist County in evaluating the periodic and final payments to the Contractor. Consultant will review pay requests and make a recommendation to County regarding payment within five (5) days of receipt of the pay request. Consultant shall assist County in assembling the documentation needed for State reimbursement or cost sharing.

**Deliverable.** The deliverables include letters of recommendation from Consultant to County regarding payment to Contractor.

- 2.3.8 **Records Management.** Consultant shall ensure a complete copy of the permit, including conditions, attachments, modifications, time extensions, and the approved plans and specifications, are kept at the permitted activity's work site. Consultant shall maintain detailed field logbooks and construction files (notebooks and file folders with copies of all documentation).

**Deliverable.** Upon completion of construction activities, Consultant shall conduct final file management and transfer to County one (1) copy of the files for archival of records.

- 2.3.9 **Project Closeout.** Following notification by the Contractor that construction activities are complete and acceptance of all payment sections by the County, Consultant shall conduct a final visual inspection of the work and staging areas and prepare a punch list of remaining equipment and material to be removed from the project sites and the activities required for restoration of access and staging areas. This list shall

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be furnished to County and Contractor to ensure control of final clean up.

Following notice from Contractor that final clean-up has been completed, Consultant shall conduct a final inspection of the beach and staging areas. If Contractor's equipment, construction fencing, supplies, and debris are completely removed and access and staging areas restored, Consultant shall forward a recommendation to County make the final payment to Contractor.

**Deliverable.** Deliverables include a punch list and recommendation for final payment.

**2.4 CONSTRUCTION OBSERVATIONS – JETTY (TWENTY-SIX (26) Weeks)**

- 2.4.1 **Daily On-site Inspection.** Consultant shall designate Site Representative(s) to be present at jetty construction work areas up to ten (10) hours per day, six (6) days per week, for the duration of construction activities. The Site Representative(s) shall ensure that construction complies with the construction plans, contract documents, and permit authorizations granted for the work. The Site Representative shall monitor daily progress of the work and track Contractor delays through the duration of the project, mobilization through demobilization of the project site.
- 2.4.2 **On-Call & Periodic On-Site Representation.** Consultant shall be on-call throughout the construction period to monitor construction activities and be available to address questions and required administrative matters.
- 2.4.3 Consultant, via the Site Representative(s), shall monitor daily progress of the work, track Contractor activities, and notify County as appropriate.
- 2.4.4 Consultant shall obtain and review the Contractor's quality control reports (daily reports) through the duration of the project, from mobilization through demobilization of the project site.
- 2.4.5 Consultant shall designate Project Engineer(s), who shall visit the site on a weekly basis throughout the construction period. The Project Engineer shall serve as liaison between Contractor and County during all construction phases. The Project Engineer shall be available to address questions concerning the plans, specifications, and other issues requiring



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coordination or liaison.

- 2.4.6 The Project Engineer(s) and Site Representative(s), as may be required, shall attend periodic progress meetings with the Contractor as appropriate during construction. County expects Contractor to hold weekly progress meetings during the construction period.
- 2.4.7 Consultant shall email a weekly report to County, summarizing the progress of construction and compliance with the permits and Contract, including workforce, amount of work performed and by whom, equipment, problems encountered, method to correct problems, errors, omissions, deviations from Contract, and weather conditions.

**Deliverable.** Deliverables include on-site presence during construction, daily reports, documentation of construction operations (including photographs), and a weekly summary report of construction progress.

**2.5 CONSTRUCTION CONTRACT ADMINISTRATION and SITE VISITS – MITIGATION REEFS (FOUR (4) WEEKS) (Authorization Withheld)**

- 2.5.1 **Pre-construction Conference.** Consultant shall meet with the Contract Administrator and the mitigation reef contractor to review the Project Permits prior to commencement of the activity authorized by the Permits. Consultant shall coordinate, prepare for, and attend a pre-construction conference to review the construction methodology and the specific conditions and monitoring requirements of the Permits and FDEP Minimization, Mitigation and Monitoring Plan ("MMM Plan"). Consultant shall invite the Contractor, Contractor's subcontractors, FDEP and FWC staff, County's marine turtle permit holder, and other involved parties and stakeholders to the pre-construction conference. At the conference, Consultant shall conduct a brief overview of the Work and reiterate communications and reporting protocols for the duration of Contractor's mobilization, construction, and demobilization activities. The conference shall be held at least seven (7) days prior to the commencement date of construction. Consultant shall coordinate with FDEP, USACE Regulatory NMFS at least twenty-one (21) days prior to the intended commencement date. At least ten (10) days advance written notification shall be provided to the parties advising of the date, time, location, and teleconference number of the pre-construction conference. After the pre-construction

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conference, Consultant shall request a 'Notice to Proceed' from FDEP.

**Deliverable.** Deliverables include written notification of planned pre-construction meeting details, holding the pre-construction conference, meeting minutes, and the notice to proceed.

- 2.5.2 **Notice of Commencement.** At least fifteen (15) days before mitigation reef construction commencement Consultant must provide notice to County that commencement notification should be sent to FDEP Beaches, Inlets and Ports Program, USACE Regulatory and NMFS. Consultant shall confirm that notice was sent.

**Deliverable.** Deliverables include one (1) electronic written notice.

- 2.5.3 **Notice of Deviations.** Consultant shall notify County, FDEP Beaches, Inlets and Ports Program, and USACE Regulatory via email of any anticipated deviation from the FDEP and/or USACE Permits before implementing the deviation to enable FDEP, USACE and County determine if a modification of the permit is required pursuant to Rule 62B-49.008, F.A.C.

**Deliverable.** Deliverables include the one (1) electronic written notice.

- 2.5.4 **Notice of Non-Compliance.** Consultant shall immediately notify County via email of any noncompliance with any condition or limitation specified in the permits. Within twenty-four (24) hours of the noncompliance notification, Consultant shall transmit a written report to County detailing the noncompliance; identifying the cause of noncompliance; the period of noncompliance, including dates and times; and steps taken to remedy the noncompliance; or, 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.

**Deliverable.** Deliverables include the written notice.

- 2.5.5 **Certification of Completion.** Within sixty (60) days of completing construction of the mitigation reefs authorized by the Permit, Consultant shall submit to County a written statement of completion and certification by a registered professional engineer. The certification shall state that the construction activities authorized by the permits were performed in

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compliance with the plans and specifications approved in the Permits and all conditions of the Permits or shall describe any deviations from the plans and specifications and permit conditions. When the completed activity differs substantially from the permitted plans, any substantial deviations shall be noted and explained on two (2) copies of as-built drawings.

**Deliverable.** Deliverables include the one (1) electronic copy of Consultant's certification and one (1) electronic copy of the as-built drawings of any feature whose construction deviated from the permit, permitted plans, specifications, or conditions.

**2.5.6 Review of Contractor's Pre-Construction Submittals.** Consultant shall obtain, comment on, and coordinate the acceptance and distribution of the following submittals required by the Contractor:

- Daily Report
- Operations Plan
- Quality Control Plan
- Structure Inspection and Vibration Monitoring Plan and Qualifications
- Environmental Protection Plan
- Storm Contingency Plan
- Material Submittals
- Vessel Certification
- Accident Prevention Plan
- Dive Safety & Operations Plan

Upon receipt of the above-listed documents, Consultant shall review the same and determine whether the documents meet permit requirement and/or industry standards. If the document does not meet these conditions, Consultant shall return the documents to Contractor for edits consistent with Contractor's comments. Once Contractor provides an acceptable document to Consultant, Consultant shall distribute the document to the County.

**Deliverables.** Deliverables shall include email correspondence that documents were reviewed and accepted.

**2.5.7 Review of Contractor's Requests for Payment.** Consultant shall review Contractor's progress and pay surveys, weigh tickets, volume calculations,

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and pay requests for all work elements. Consultant shall review the Contractor's periodic payment invoices for accuracy of computation and completeness and make recommendations to the County. Consultant shall assist County in evaluating the periodic and final payments to the Contractor. Consultant will review pay requests and make a recommendation to County regarding payment within five (5) business days of receipt of the pay request. Consultant shall assist County in assembling the documentation needed for State reimbursement or cost sharing.

**Deliverable.** The deliverables include letters of recommendation for payment from Consultant to County regarding Contractor's pay requests.

- 2.5.8 **Records Management.** Consultant shall ensure that complete copies of all Permits, including all conditions, attachments, modifications, time extensions, and the approved plans and specifications, are kept at the site of the permitted activity. Consultant shall maintain detailed field logbooks and construction files (notebooks and file folders with copies of all documentation).

**Deliverable.** Upon completion of construction activities, Consultant shall conduct final file management review and transfer to County one (1) copy of the files for archival of records at County's request.

- 2.5.9 **Project Closeout.** Following notification by Contractor that mitigation reef construction activities are complete and all payment quantities are approved and accepted by County, Consultant shall conduct a final visual inspection of the Work and staging areas and prepare a punch list of remaining equipment and material to be removed from the project site and the activities required for restoration of access and staging areas. Consultant shall furnish the list to County and Contractor within fourteen (14) calendar days to ensure control of final clean up.

**Deliverable.** Deliverable is a punch list.

- 2.5.10 Following notice from Contractor that it completed final clean-up, Consultant shall conduct a final inspection within seven (7) calendar days of notice of the staging areas. If Contractor's equipment, construction fencing, supplies, and debris are completely removed and access and



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staging areas restored, then Consultant shall forward a recommendation to County that it make the final payment to Contractor.

**Deliverable.** Deliverable is a recommendation for final payment.

- 2.5.11 **On-Call & Periodic On-Site Representation.** Consultant shall be on-call throughout the construction period to monitor construction activities and be available to address questions and required administrative matters.
- 2.5.12 Consultant, via the Site Representative(s), shall monitor daily progress of the work, track Contractor activities, and notify County as appropriate.
- 2.5.13 Consultant shall obtain and review the Contractor's quality control reports (daily reports) through the duration of the project, from mobilization through demobilization of the project site.
- 2.5.14 Consultant shall designate Project Engineer(s), who shall visit the site on a weekly basis throughout the construction period. The Project Engineer shall serve as liaison between Contractor and County during all construction phases. The Project Engineer shall be available to address questions concerning the plans, specifications, and other issues requiring coordination or liaison.
- 2.5.15 The Project Engineer(s) and Site Representative(s), as may be required, shall attend periodic progress meetings with the Contractor as appropriate during construction. County expects CONTRACTOR to hold weekly progress meetings during the construction period.
- 2.5.16 Consultant shall email a weekly report to County, summarizing the progress of construction and compliance with the Permits and Contract, including workforce, amount of work performed and by whom, equipment, problems encountered, method to correct problems, errors, omissions, deviations from Contract, and weather conditions.

**Deliverable.** Deliverables include on-site presence during construction, daily reports, documentation of construction operations (including photographs), and a weekly summary report of construction progress.

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**2.6 CONSTRUCTION CONTRACT ADMINISTRATION and SITE VISITS – RUBBLE  
CLEARING (SIXTEEN (16) Weeks)**

**2.6.1 Pre-construction Conference.** Consultant shall meet with the Contract Administrator and the rubble clearing construction Contractor to review the Project Permits prior to commencement of the activity authorized by the Permits. Consultant shall coordinate, prepare for, and attend a pre-construction conference to review the construction methodology and the specific conditions and monitoring requirements of the Permits, including the MMM Plan. Consultant shall invite CONTRACTOR, CONTRACTOR's subcontractors, FDEP and FWC staff, County's marine turtle permit holder, and other involved parties and stakeholders to the pre-construction conference. At the conference, Consultant shall conduct a brief overview of the Work and reiterate communications and reporting protocols for the duration of Contractor's mobilization, construction, and demobilization activities. The conference shall be held at least seven (7) days prior to the commencement date of construction. Consultant shall coordinate with FDEP, USACE Regulatory and NMFS at least twenty-one (21) days prior to the intended commencement date for the construction activities. At least ten (10) days advance written notification shall be provided to the parties advising of the date, time, location, and teleconference number of the pre-construction conference. After the pre-construction conference, Consultant shall request a 'Notice to Proceed' from FDEP.

**Deliverable.** Deliverables include written notification of planned pre-construction meeting details, holding the pre-construction conference, meeting minutes, and the notice to proceed.

**2.6.2 Notice of Commencement.** At least fifteen (15) days before beginning rubble clearing construction activities, Consultant must provide notice to County that commencement notification should be sent to FDEP Beaches, Inlets and Ports Program, USACE Regulatory and NMFS. Consultant shall confirm that notice was sent.

**Deliverable.** Deliverables include one (1) electronic written notice.

**2.6.3 Notice of Deviations.** Consultant shall notify County, FDEP Beaches, Inlets and Ports Program, and USACE Regulatory via email of any anticipated

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deviation from the FDEP and/or USACE Permits before implementing the deviation to enable FDEP, USACE and County determine if a modification of the permit is required pursuant to Rule 62B-49.008, F.A.C.

**Deliverable.** Deliverables include one (1) electronic written notice.

- 2.6.4 **Notice of Non-Compliance.** Consultant shall immediately notify County via email of any noncompliance with any condition or limitation specified in the Permits. Within twenty-four (24) hours of the noncompliance notification, Consultant shall transmit a written report to County detailing the noncompliance; identifying the cause of noncompliance; the period of noncompliance, including dates and times; and steps taken to remedy the noncompliance; or, 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.

**Deliverable.** Deliverables include the email notice and written report.

- 2.6.5 **Certification of Completion.** Within sixty (60) days of completing the rubble clearing authorized by the Permit, Consultant shall submit to County a written statement of completion and certification by a registered professional engineer. The certification shall state that the rubble clearing activities authorized by the Permits were performed in compliance with the plans and specifications approved in the Permits and all conditions of the permits or shall describe any deviations from the plans and specifications and Permit conditions. When the completed activity differs substantially from the permitted plans, any substantial deviations shall be noted and explained on two (2) copies of as-built drawings.

**Deliverable.** Deliverables include the one (1) electronic copy of Consultant's certification and one (1) electronic copy of the as-built drawings of any feature whose construction deviated from the permit, permitted plans, specifications, or conditions.

- 2.6.6 **Review of Contractor's Pre-Construction Submittals.** Consultant shall obtain, comment on, and coordinate the acceptance and distribution of the following submittals required by the Contractor:
- Daily Report
  - Operations Plan

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- Quality Control Plan
- Structure Inspection and Vibration Monitoring Plan and Qualifications
- Environmental Protection Plan
- Storm Contingency Plan
- Material Submittals
- Vessel Certification
- Accident Prevention Plan
- Dive Safety & Operations Plan

Upon receipt of the above-listed documents, Consultant shall review the same and determine whether the documents meet permit requirement and/or industry standards. If the document does not meet these conditions, Consultant shall return the documents to Contractor for edits consistent with Consultant's comments. Once Contractor provides an acceptable document to Consultant, Consultant shall distribute the document to the County.

**Deliverables.** Deliverables shall include email correspondence that documents were reviewed and accepted.

- 2.6.7 **Review of Contractor's Requests for Payment.** Consultant shall review Contractor progress and pay surveys, weigh tickets, volume calculations, and pay requests for all work elements. Consultant shall review the Contractor's periodic payment invoices for accuracy of computation and completeness and make recommendations to County. Consultant shall assist County in evaluating the periodic and final payments to the Contractor. Consultant will review pay requests and make a recommendation to County regarding payment within five (5) business days of receipt of the pay request. Consultant shall assist County in assembling the documentation needed for State reimbursement or cost sharing.

**Deliverable.** The deliverables include letters of recommendation for payment from Consultant to County regarding Contractor's pay requests.

- 2.6.8 **Records Management.** Consultant shall ensure that complete copies of all Permits, including all conditions, attachments, modifications, time extensions, and the approved plans and specifications, are kept at the site



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of the permitted activity. Consultant shall maintain detailed field logbooks and construction files (notebooks and file folders with copies of all documentation).

**Deliverable.** Upon completion of construction activities, Consultant shall conduct final file management review and transfer to County one (1) copy of the files for archival of records at County's request.

- 2.6.9 **Project Closeout.** Following notification by Contractor that construction activities are complete, and all payment quantities are approved and accepted by County, Consultant shall conduct a final visual inspection of the Work and staging areas and prepare a punch list of remaining equipment and material to be removed from the project site and the activities required for restoration of access and staging areas. Consultant shall furnish the list to County and Contractor within fourteen (14) calendar days to ensure control of final clean up.

**Deliverable.** Deliverable is a punch list.

- 2.6.10 Following notice from Contractor that it completed final clean-up, Consultant shall conduct a final inspection within seven (7) calendar days of notice of the staging areas. If Contractor's equipment, construction fencing, supplies, and debris are completely removed and access and staging areas restored, then Consultant shall forward a recommendation to County that it make the final payment to Contractor.

**Deliverable.** Deliverable is a recommendation for final payment.

- 2.6.11 **On-Call & Periodic On-Site Representation.** Consultant shall be on an on-call basis throughout the period of construction to monitor construction activities and be available to address questions and required administrative matters.
- 2.6.12 Through the Site Representatives, Consultant shall monitor progress of the work, track the Contractor activities, and notify County as appropriate in accordance with issued permit authorizations.
- 2.6.13 Consultant shall obtain and review the Contractor's quality control reports (daily reports) through the duration of the project, from mobilization

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through demobilization from the project site.

2.6.14 Consultant shall designate a representative, who shall visit the site on a regular basis, on average, throughout the period of construction. The Project Engineer shall serve as liaison between the Contractor and County during all phases of construction. The Project Engineer shall be available to address questions concerning the plans and specifications and address other issues requiring coordination or liaison.

2.6.15 The Project Engineer and representative(s), as may be required, shall attend periodic progress meetings with the Contractor as appropriate during construction. It is expected that progress meetings will be held by the Contractor no less frequently than one (1) weekly during the period of construction.

2.6.16 Consultant shall submit a weekly report (via email) to County that summarizes the progress of construction and compliance with the permits and Contract, including, but not limited to: workforce, amount of work performed and by whom, equipment, problems encountered, methods to correct problems, errors, omissions, deviations from Contract Documents, and weather conditions.

**Deliverable.** Deliverables include on-site presence during construction, daily reports, documentation of construction operations including photographs, and a weekly summary report of construction progress.

**3. CONTINGENCY – CONSTRUCTION SERVICES (Authorization Withheld)**

This task provides for unanticipated professional services that may be required to assist County with completion of any of the project elements during the respective construction periods. County and Consultant will negotiate the scope and budget for these contingency services on an as needed basis.

**4. WATER QUALITY MONITORING – DREDGING (THIRTY-FIVE (35) Weeks)**

4.1 **Pre-Construction Submittals.** Consultant shall prepare and submit to the County and FDEP the turbidity monitoring scope of work and turbidity monitor qualifications, as mandated in the FDEP Permit, including the MMM Plan.

4.2 **Daily Monitoring.** Consultant shall hire and manage a qualified third-party

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subconsultant to conduct daily water quality monitoring in accordance with FDEP Permit and Plan while dredging is occurring for the project. When dredging activities occur, Consultant shall provide twenty-six (26) weeks of daily water quality monitoring services.

- 4.3 **Weekly Report Submittals to FDEP.** Consultant shall submit weekly summary reports of water quality data and any water quality violations in accordance with the FDEP Permit.

**Deliverables.** Deliverables are electronic submittals to FDEP, including the turbidity monitor qualifications, the turbidity monitoring scope of work, daily reports and weekly summary reports.

**5. WATER QUALITY MONITORING – RUBBLE CLEARING (SIXTEEN (16) Weeks)**

- 5.1 **Pre-Construction Submittals.** Consultant shall prepare the turbidity monitoring scope of work and turbidity monitor qualifications and submit the same to the County and FDEP.
- 5.2 **Daily Monitoring.** This task shall provide water quality monitoring services in addition to those outlined in **Task 4.2**. Consultant shall hire and manage a qualified third-party subconsultant to conduct daily water quality monitoring in accordance with FDEP Permit and Plan while dredging is occurring for the project. When dredging activities occur, Consultant shall provide sixteen (16) additional weeks of daily water quality monitoring services.
- 5.3 **Weekly Report Submittals to FDEP.** This task shall provide weekly water quality reporting in addition to those outlined in **Task 4.2**. This task provides an additional sixteen (16) weeks of water quality reporting services, if needed.

**Deliverables.** If needed, deliverables are electronic submittals to FDEP, including the turbidity monitor qualifications, the turbidity monitoring scope of work, daily reports and weekly summary reports.

**6. CONTINGENCY – WATER QUALITY MONITORING (TWENTY (20) Weeks) (Authorization Withheld)**

- 6.1 **Daily Monitoring.** This task shall provide water quality monitoring services in addition to those outlined in **Task 4.2**. Consultant shall contract with and manage

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a qualified third-party subconsultant to provide up to twenty (20) additional weeks of daily water quality monitoring per FDEP permit and Plan, if needed.

- 6.2 **Weekly Report Submittals to FDEP.** This task shall provide weekly water quality reporting in addition to those outlined in **Task 4.2**. This task provides for an additional twenty (20) weeks of water quality reporting services, if needed.

#### **7. PERMIT MODIFICATION**

Consultant shall prepare, submit, and work to facilitate review by FDEP and USACE of one (1) permit modification application. The scope of the modification request will be developed through coordination with County, FDEP, and USACE.

Such modification will consist of coordination with the USACE and NMFS to update the Biological Assessment ("BA") and develop permit-required monitoring plans to address the recent listings of Queen Conch and listed scleractinian coral critical habitat under the Endangered Species Act. The NMFS issued their Biological Opinion ("BO") for the Port Everglades Sand Bypass Project in March 2020. Since issuance of the BO, Queen Conch (*Aliger strombus*) was listed as Threatened under the Endangered Species Act and critical habitat was designated for five scleractinian coral species known to occur on southeast Florida reefs, and critical habitat for the green sea turtle was proposed along both coasts of Florida. Since the newlylisted species and critical habitat have the potential to be affected by the sand bypass project, reinitiation of consultation with NMFS is required under the Endangered Species Act.

The NMFS BO requires modification to address the new species and critical habitat designated since issuance of the USACE Federal permit. Consultant will update the BA for the Project to evaluate potential impacts to the species and critical habitat listed since the 2020 BO and provide minimization and avoidance measures. Consultant will conduct surveys for Queen Conch in the sand trap direct impact area and surrounding 50-m buffer to determine the approximate size of the Queen Conch population (**Task 20**). Consultant will coordinate with the NMFS to identify suitable relocation receiver sites and develop a Queen Conch Relocation and Monitoring Plan for avoidance and minimization of impacts to Queen Conch.

**Deliverables.** Deliverables for this task are the revised BA document in PDF format, email summaries of agency meetings and project coordination, and a Final Queen Conch Relocation and Monitoring Plan (PDF format) approved by the NMFS. Deliverables may include signed and sealed permit drawings and an electronic copy of the formal request to FDEP and USACE, if necessary.



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**8. POST-CONSTRUCTION REPORT**

Consultant shall prepare a post-construction report that addresses all aspects of the sand bypass project, as constructed. At a minimum, Consultant must include documentation of Contractor productivity, construction and placement techniques, weather conditions during execution of the work, factors affecting Contractor's productivity, a summary of the bid results, elements of the total cost to construct, public interest issues occurring during the period of construction, and other factors potentially affecting future operation and performance of the sand bypass project. Consultant shall assess, analyze, and summarize Contractor related data obtained from daily reports, project specific reporting submittals, internal reports, surveys, etc. If appropriate, the data should be formulated in a graphic format for visual interpretation by layman. Documentation of the as-built conditions of project features based upon both Contractor and Consultant surveys must also be included.

**Deliverable.** Deliverables to County and FDEP are one (1) PDF copy of the report with appendices. The PDF copy of the report will be provided on electronic media (CD, thumb drive, ftp site, etc.) suitable for distribution.

**9. PHYSICAL MONITORING: IMMEDIATE POST-CONSTRUCTION**

FDEP Beaches, Inlets and Ports Program provided a set of technical specifications for the collection and submittal of coastal monitoring data (FDEP, 2001). Consultant shall apply these technical specifications in the planning, collection, processing, and submittal of the monitoring data described herein. FDEP established additional guidelines for beach erosion control projects. The physical monitoring described herein meets or exceeds those requirements. The Physical Monitoring Plan includes:

1. Comprehensive surveys of the beach, inlet, and project improvements by a certified Hydrographic Surveyor and Professional Surveyor and Mapper;
2. Analysis of beach and inlet changes and development of a cumulative comparative database to evaluate sand bypass project performance and assist in planning future sand bypass events; and
3. A detailed Annual Report of Findings for consideration by County, state and federal agencies, and the general public.

- 9.1 **Beach Profile Survey.** Consultant shall conduct an immediate post-construction beach profile survey per the approved Physical Monitoring Plan. Consultant shall provide all necessary materials and equipment to perform the required work activity. Consultant shall also supply the supervisory, professional, and technical services personnel required to manage, document, and process all data associated

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with the acquisition and processing of the survey data.

- 9.2 **Multibeam Survey.** Consultant shall conduct a multibeam survey per the approved Physical Monitoring Plan. Consultant shall provide all necessary materials and equipment to perform the required work activity. Consultant shall also supply the supervisory, professional, and technical services personnel required to manage, document, and process all data associated with the acquisition and processing of the survey data.
- 9.3 **Structure Survey.** Consultant shall conduct an immediate post-construction survey of the north jetty extension, north jetty improvements, and interior groin per the approved Physical Monitoring Plan. Consultant shall provide all necessary materials and equipment to perform the required work activity. Consultant shall also supply the supervisory, professional, and technical services personnel required to manage, document, and process all data associated with the acquisition and processing of the survey data.
- 9.4 **Survey Deliverables.** Deliverables to County and FDEP are a digital copy of the following products:
- (a) Survey report from the Florida licensed surveyor certifying to the Department that the survey meets the technical standards of Chapter 61G17-6, F.A.C.
  - (b) Copies of all checked, standard survey field books, computation and reduction files, and abstracted final positions.
  - (c) Monument Information Report (Given/Used/Found Report) regarding monumentation that includes a list of provided, found, and used monuments and TBM identification, stamping, coordinates, elevations, and profile azimuths.
  - (d) A QA/QC report detailing the QA/QC procedure and any findings, corrections, and results of that procedure, including cross-sectional plots of each profile and plan view plot of the data with an approximate mean high water (MHW) contour.
  - (e) ASCII file containing raw x, y, z profile data points.
  - (f) ASCII files containing the profile data processed into the FDEP x, y, z format, if x, y, z data is collected, and the DEP distance and depth format. The FDEP format includes data and header records.
  - (g) ASCII file containing the monument identification, stamping, coordinates and elevations.
  - (h) Digital copy of cross-section and plan view data plots.

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- (i) Complete federally compliant metadata file, including methodology of the data collection and processing procedures used in accordance with standards set forth by the Federal Geographic Data Committee. Metadata shall include all QA/QC procedures utilized to ensure the quality of the data and shall be delivered digitally on CD.
- (j) Field books shall be scanned and pages amassed into a PDF document for digital submittal on CD.
- (k) Data will be provided in NAVD88 datum.

9.5 **Analysis and Reporting.** Consistent with the approved Physical Monitoring Plan, Consultant shall prepare an immediate post-project condition memo. The memo must document the immediate post-construction conditions and establish the comparative baseline for beach, sand trap, and inlet channel conditions and project performance conditions. The memo will include graphic presentations of conditions.

**Deliverable.** Deliverable to County and FDEP is one (1) PDF copy of the final memo provided on electronic media (CD, thumb drive, ftp site, etc.) suitable for distribution.

**10. INTERMEDIATE POST-CONSTRUCTION MULTI-BEAM HYDROGRAPHIC SURVEY (6-months)**

Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 1**. Consultant shall conduct this task six (6) months post-construction.

**11. PHYSICAL MONITORING: 1-YR POST-CONSTRUCTION**

FDEP's Beaches, Inlets and Ports Program provided a set of technical specifications for the collection and submittal of coastal monitoring data (FDEP, 2001). Consultant shall apply these technical specifications in the planning, collection, processing, and submittal of the monitoring data described herein. FDEP established additional guidelines for beach erosion control projects. The physical monitoring described herein meets or exceeds those requirements. The Physical Monitoring Plan includes:

- 1. Comprehensive surveys of the beach, inlet, and project improvements by a certified Hydrographic Surveyor and Professional Surveyor and Mapper;
- 2. Analysis of beach and inlet changes and development of a cumulative comparative database to evaluate sand bypass project performance and assist in planning future sand bypass events; and
- 3. A detailed Annual Report of Findings for consideration by County, state and federal agencies, and the general public.

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- 11.1 **Beach Profile Survey.** Consultant shall conduct a beach profile survey per the approved Physical Monitoring Plan. Consultant shall provide the necessary materials and equipment to perform this task. Consultant shall also supply supervisory, professional, and technical services personnel to manage, document, and process all survey data.
- 11.2 **Multibeam Survey.** Consultant shall conduct a multibeam survey per the approved Physical Monitoring Plan. Consultant shall provide all necessary materials and equipment to perform this activity. Consultant shall also supply the supervisory, professional, and technical services personnel required to manage, document, and process all survey data.
- 11.3 **Structure Survey.** Consultant shall conduct an immediate post-construction survey of the north jetty extension, north jetty improvements, and interior groin per the approved Physical Monitoring Plan. Consultant shall provide all necessary materials and equipment to perform the activity. Consultant shall also supply the supervisory, professional, and technical services personnel required to manage, document, and process all survey data.
- 11.4 **Analysis and Reporting.** Consistent with the approved Physical Monitoring Plan, Consultant shall prepare a detailed annual project monitoring report. The report shall summarize the annual and cumulative data and assess project performance. Recommendations for future management activities that may be required will be incorporated as necessary and appropriate at the time of the analysis. The report must include graphic presentations of temporal and cumulative changes of beach contours over time. Volumetric changes at each survey profile and throughout the limits of fill shall be computed and presented in tabular and graphic forms. Aerial photography provided by County will be utilized to further analyze shoreline changes. Analyses shall discuss shoreline change trends, sand trap and inlet channel shoal rates and patterns, and available sand capacity within the permit beach fill template south of the inlet where sand bypass material will be placed. Consultant shall include a discussion of potential cause and effect relationships, storm impacts (if applicable), other littoral impacts, a local sediment budget for the area of interest, and changes to the nearshore edge location compared to observed beach change. Major report(s) of findings will be submitted annually ninety (90) days after each annual monitoring survey.

**Deliverable.** Deliverables to County and FDEP are three (3) hardcopies and one (1) PDF copy of the annual report with appendices. The PDF copy of the report will be



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provided on electronic media (CD, thumb drive, ftp site, etc.) suitable for distribution.

- 12. INTERMEDIATE POST-CONSTRUCTION MULTI-BEAM HYDROGRAPHIC SURVEY (18-months)**  
Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 1**. Consultant shall conduct this task eighteen (18) months post-construction.
- 13. PHYSICAL MONITORING: 2-YEAR POST-CONSTRUCTION**  
Consultant shall use the same methodology and provide the same deliverables as detailed in **Task 11**. Consultant shall conduct this task two (2) years post-construction.
- 14. INTERMEDIATE POST-CONSTRUCTION MULTI-BEAM HYDROGRAPHIC SURVEY (30-months)**  
Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 1**. Consultant shall conduct this task eighteen (18) months post-construction.
- 15. PHYSICAL MONITORING: 3-YEAR POST-CONSTRUCTION**  
Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 11**. Consultant shall conduct this task three (3) years post-construction.
- 16. INTERMEDIATE POST-CONSTRUCTION MULTI-BEAM HYDROGRAPHIC SURVEY (42-months)**  
Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 1**. Consultant shall conduct this task eighteen (18) months post-construction.
- 17. PHYSICAL MONITORING: 4-YEAR POST-CONSTRUCTION**  
Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 11**. Consultant shall conduct this task four (4) years post-construction.
- 18. INTERMEDIATE POST-CONSTRUCTION MULTI-BEAM HYDROGRAPHIC SURVEY (54-months)**  
Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 1**. Consultant shall conduct this task fifty-four (54) months after construction of the sand trap and associated inlet improvements.
- 19. PHYSICAL MONITORING: 5-YEAR POST-CONSTRUCTION**  
Consultant shall use the same methodology and provide the same deliverable as detailed in **Task 17**. Consultant shall conduct this task five (5) years after construction of the sand trap and associated inlet improvements.

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**PART II: ENVIRONMENTAL SERVICES - INITIAL SAND TRAP CONSTRUCTION**

**A. DIRECT IMPACT AREA - IMPACT AVOIDANCE/MINIMIZATION**

All below tasks involving scleractinian coral and octocoral colony relocation include acquisition of a Special Activity License ("SAL") from FWCC. All monitoring, reporting and notification tasks will be performed in accordance with the FDEP Permit, including the MMM Plan, and NMFS BO.

**PRE-CONSTRUCTION CLEARANCE OF DIRECT IMPACT AREA AND CORAL TRANSPLANTATION MONITORING**

**20. NONLISTED CORAL SPECIES RELOCATION AND QUEEN CONCH SURVEYS/RELOCATIONS  
- DIRECT IMPACT AREA (corals, conch, urchins) FDEP Permit No. 0289308-004-JC  
Condition No. 27, MMM Plan Section 2.1**

Consultant shall survey the direct impact area and 10-m buffer area around the direct impact area to locate qualifying scleractinian coral and octocoral colonies for relocation (see Figure 1 below). Qualifying stony coral colonies have a maximum size (diameter) greater than or equal to 10 cm of live tissue and qualifying octocorals are 15 cm in height or greater. Colonies that exhibit obvious signs of disease or bleaching will not be harvested. Although colonies of the federally listed coral, *Acropora cervicornis*, were not observed in the direct impact area during any of the reconnaissance surveys, all healthy colonies of *A. cervicornis* or any other listed coral species present during the search and relocation effort of the direct impact area, regardless of size, shall be collected and relocated according to the requirements of Section 2.1.1.3.1 of the MMM Plan and monitored according to the requirements of the NMFS BO.

All hardbottom habitats within the direct impact area and 10-m buffer (except for the Inlet Channel Wall) shall be included in the coral colony search and removal area. Within this area, Consultant shall use 50-m diameter plots to define smaller, more manageable collection areas. Prior to field work, the project GIS database shall be used to overlay the 50-m diameter plots on the benthic habitat map to ensure the entire search area is covered. The center point for each plot shall be recorded and used to define each *in situ* collection site. A copy of the GIS database will be provided to County prior to in situ work. At each collection site, divers shall swim survey tapes 25-m out from the center point on north, east, south, and west compass headings to further subdivide each collection site into quadrants. A diver shall be assigned to each quadrant.

During coral colony collection, individuals of long-spined sea urchins (*Diadema antillarum*) shall be collected at the 50-m diameter coral relocation plots. All collection

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and relocation activities shall be done in accordance with the requirements of Section 2.1.2 of the MMM Plan. Adult long-spined urchins shall be relocated to the *A. cervicornis* receiver sites (see Figures 7 and 8 of the NMFS BO or receiver sites for non-Acroporid scleractinian corals at the Broward County Segment III mitigation boulder reef (Figure 12 of the MMM Plan). Long-spined urchins shall be relocated to receiver areas on the day of collection.

For this task, the number of scleractinian corals greater than or equal to 10-cm of live tissue is estimated to be approximately one thousand nine hundred (1,900) colonies (estimate based on 2007/2014 density data). The number of octocoral colonies greater than 15-cm in height is difficult to estimate because the baseline surveys did not use this size class. The expected number of octocoral colonies greater than 15-cm in height is two hundred (200) to three hundred (300). A relocation rate of fifty (50) colonies/day has been used as the basis for development of the expected time required to perform all coral relocation.

For the total of approximately two thousand one hundred (2,100) to two thousand two hundred (2,200) scleractinian coral and octocoral colonies and expected numbers of queen conch/long-spined urchins, relocation should take approximately forty-five (45) days to complete. This relocation rate assumes that the receiver site is the Segment III mitigation artificial reef offshore of FDEP R-monuments R-101 to R-103 (Figure 12 of the MMM Plan) or the Segment II mitigation artificial reef located offshore of R-48 to R-49 in Fort Lauderdale. A contingency task is included in **Task 21** below should the number of corals which require relocation exceed two thousand one hundred (2,100) colonies or the number of field days exceeds forty-five (45) days.

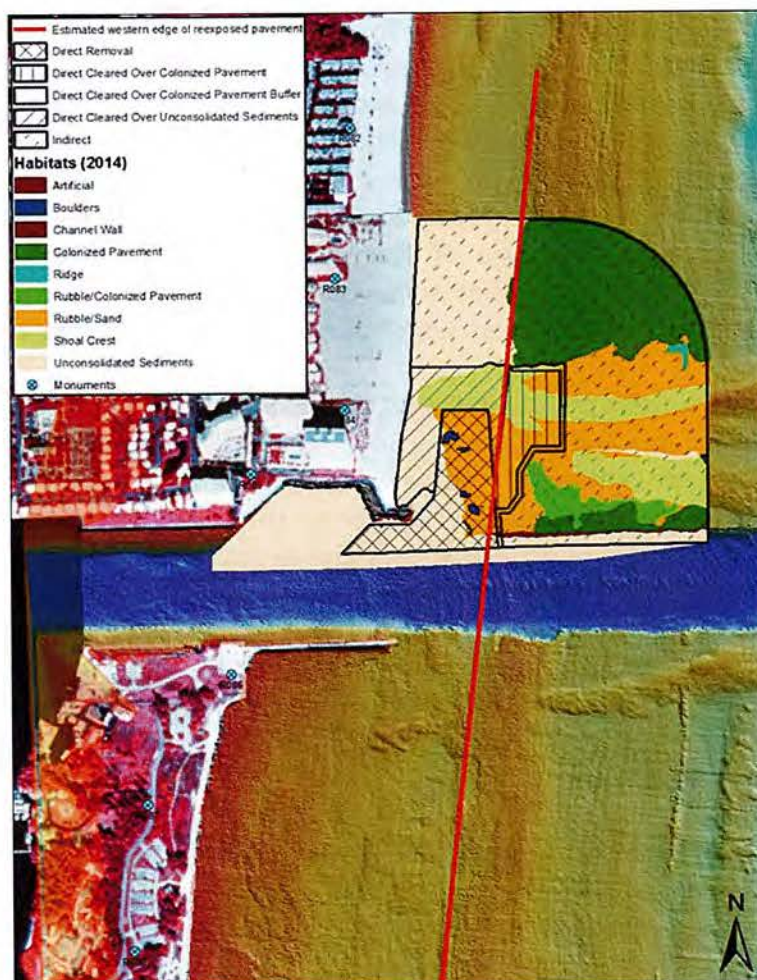
Prior to Queen Conch (*Strombus gigas*) relocation, Consultant, through a qualified subconsultant, shall verify one (1) or two (2) receiver sites on nearshore hardbottom with unconsolidated surface rubble in Segment II, not to exceed 10,000 m<sup>2</sup> (100 m x 100 m), in approximately seventeen (17) ft water depth, about nine (9) miles north of the Sand Bypass project area. DGPS coordinates will be collected at the corners and center of each site.



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**Figure 1.** Benthic habitat map for the Port Everglades Sand Bypass Project showing the direct and indirect impact areas. The red line estimates the western edge of rubble/colonized pavement habitat following rubble clearing activities.

Consultant, through a qualified subconsultant, will also survey receiver site(s) biweekly for two (2) months (total of four (4) surveys) prior to relocation of Queen Conch from the direct impact area and surrounding 50-m buffer. The number of live Queen Conch present at each site will be counted, life stage will be identified, and general benthic landscape features and behaviors will be noted. The number of dead conch (empty shells) will be enumerated.



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Within thirty (30) days of commencement of dredging activities Consultant, through a qualified subconsultant, shall survey the direct impact area with surrounding 50-m buffer for the presence of Queen Conch. A team of four (4) scientific divers will conduct transect surveys and/or radial surveys which extend 50 m around each center point determined by underwater visibility at the time of the survey. The survey will provide complete visual coverage of the bottom. The number of Queen Conch present and life stage (adult, sub-adult, and juvenile) will be recorded. The purpose of this survey is to establish the approximate population size of Queen Conch and plan for relocation activities. Consultant, through a qualified subconsultant, shall apply for and obtain the SAL to harvest and relocate the Queen Conch based on the results of this survey.

Within one (1) week prior to initiation of sand trap dredging, all Queen Conch within the direct impact area and surrounding 50-m buffer will be harvested by SCUBA divers and relocated to the authorized receiver site(s). Transport, tagging, and release of Queen Conch at the relocation site(s) will occur on the same day as collection. The collected conch will be transferred from holding crates to coolers of aerated seawater on board the survey vessel. Animals will be kept out of direct sunlight during transport, which will be less than one hour. All relocated Queen Conch will be tagged using conventional Floy tag attached with monel wire to shell spire prior to release at the receiver site. Morphometric data including siphonal (shell) length (cm) and lip thickness (cm) will be measured, and life stage will be categorized as a juvenile, sub-adult or mature adult (presence of flaring lip) at the time of release.

**Deliverables.** Brief work progress summaries will be emailed weekly to FDEP, USACE, and County staff during relocation activities. All summary data files, maps, and GIS shapefiles shall be submitted to County, FDEP, USACE, and NMFS within sixty (60) days of completion of field data collection. Data will include:

#### Stony Corals and Octocorals

- Summary tables with number of relocated colonies by species and size.
- Summary tables with number of relocated colonies on unconsolidated rubble, number of colonies removed from hard substrate, and number of intact colonies and number of fragmented colonies during harvest.
- GIS shapefiles of receiver sites and monitoring areas (tagged boulders) with an overall map of tagged boulders.
- Still photo library of coral harvest and transplantation and monitored transplants at the receiver sites at the Segment III mitigation artificial reef.

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Long spined Urchins

- Summary table with number of relocated long-spined urchins
- GPS coordinates of the receiver sites for relocated urchins
- Still photo library of long-spined urchins at the impact site and receiver sites

Queen Conch

- DGPS coordinates, GIS shapefiles, and site verification data for the receiver site(s) on nearshore hardbottom with unconsolidated rubble in Segment II.
- Raw and summary data from the four biweekly surveys of receiver sites over two (2) months prior to relocation which includes count of live and dead Queen Conch (empty shell) at the receiver site, life stage of all live Queen Conch and presence of egg masses at the receiver site, and benthic landscape features and behavioral observations at the receiver site(s).
- Overall count of relocated live Queen Conch by life stage
- Morphometric data (shell length, lip thickness, life stage) of all relocated Queen Conch with tag numbers and behavior/substrate at the impact site.)
- Still photo library of all tagged Queen Conch

**21. CONTINGENCY – NONLISTED CORAL COLONY REMOVAL AND RELOCATION, QUEEN CONCH and URCHIN RELOCATION and MONITORING (AUTHORIZATION WITHHELD)**

This task provides up to ten (10) additional field days for scleractinian coral, Queen Conch, and long-spined urchin relocation activities should they be required. Consultant shall use the methodology described in **Task 20** for this task.

**NONLISTED CORAL POST-RELOCATION MONITORING AND REPORTING SERVICES** (*FDEP Permit Condition No. 27; FDEP Minimization, Mitigation and Monitoring Plan Section 2.1.1.4.2 and 7.3*)

**22. NONLISTED CORAL RELOCATION MONITORING: IMMEDIATE POST-RELOCATION BASELINE (TIME ZERO) SURVEY**

Once the subset of relocated colonies is established, Consultant shall identify (species for scleractinian corals, genus for octocorals), measure (diameter for scleractinian corals, height for octocorals), record the colony condition, and photograph all colonies on each tagged boulder within one (1) month of completion of relocation activities. Consultant shall note percent bleaching, percent old and recent mortality, presence of disease, obvious signs of predation, and sedimentation (accumulation) in its colony condition description. Consultant shall also note whether a colony was relocated from rubble. If any ESA-listed colonies are relocated, monitoring of these colonies will be performed in conjunction with nonlisted colony monitoring. Consultant shall create a Microsoft Access database with the above-described information.

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**Deliverable.** Deliverables include a Microsoft Access database and exported Excel spreadsheets with the transplanted colony information, Excel summary tables with the transplantation data, a map of the coral transplants on the mitigation reef receiver sites, GIS shapefiles of the tagged boulders which contain the monitoring plots, and a still photo library of the coral transplants. The Access database, spreadsheets, and field datasheets scanned to PDF shall be submitted to County, FDEP and USACE thirty (30) days prior to sand trap construction activities commence and within sixty (60) days of completing the baseline pre-construction survey. Data shall be submitted either on a portable hard drive or via an FTP site.

**23. NONLISTED CORAL RELOCATION MONITORING: SIX-MONTH POST-RELOCATION SURVEY**

Consultant shall conduct the six-month post-relocation survey of the coral transplants on tagged boulders, prepare a summary report of the status of transplanted colonies (by species and genus, respectively) and any changes in status from the baseline survey (i.e., estimation of survivorship), and update the Microsoft Access database, still photo library, and Excel summary tables. Monitoring methods shall follow the methods used in the baseline survey (**Task 22**) to document colony survival, health, and growth.

**Deliverable.** Deliverables are a summary report of the six-month post-relocation survey and comparison to the baseline survey; an updated Microsoft Access database and still photo library, Excel summary tables; and scanned field datasheets in PDF format. The Access database and exported Excel datasheets, scanned field datasheets in PDF format and still photo library shall be submitted to County, FDEP and USACE within sixty (60) days of survey completion. The summary report shall be submitted within ninety (90) days of completion of the six-month relocation survey. Data shall be submitted either on a portable hard drive or via an FTP site.

**24. NONLISTED CORAL RELOCATION MONITORING: YEAR 1 POST-RELOCATION SURVEY**

Consultant shall conduct the Year 1 post-relocation survey of coral transplants on the tagged boulders. Monitoring methods shall follow the methods used in the baseline survey (**Task 22**) to document colony survival, health, and growth. A report shall be prepared which summarizes colony survivorship and provides survival, condition, and tissue mortality data in tabular and graphical form. The Year 1 report shall also describe any changes in status in comparison to previous surveys.

**Deliverable.** Deliverables are an updated Microsoft Access database and still-photo library for the Year 1 post-relocation survey and a Year 1 Summary report. The draft Year

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1 summary report shall be submitted to County for review within sixty (60) days following survey completion. The scanned field datasheets to PDF, Access database and exported Excel spreadsheets, Excel summary tables, and still photo library from the Year 1 post-relocation survey shall be submitted in digital format to County, FDEP and USACE within sixty (60) days, and the summary report shall be submitted within ninety (90) days of completion of the Year 1 post-relocation survey. Data shall be submitted either on a portable hard drive or via an FTP site.

**25. NONLISTED CORAL RELOCATION MONITORING: YEAR 3 POST-RELOCATION SURVEY**

Consultant shall conduct the Year 3 post-relocation survey of coral transplants on the tagged boulders. Monitoring methods shall follow the methods used in the baseline survey (**Task 22**) to document colony survival, health, and growth. A report shall be prepared which summarizes colony survivorship and provides survival, condition, and tissue mortality data in tabular and graphical form. The Year 3 report shall also describe any changes in status in comparison to all previous surveys.

**Deliverable.** Deliverables are an update to the Microsoft Access database and photo library for the Year 3 post-relocation survey and a cumulative Year 3 Summary Report. The draft Year 3 summary report shall be submitted to County for review within sixty (60) days following survey completion. The scanned field datasheets to PDF, Access database and exported Excel spreadsheets, Excel summary tables, and still photo library from the Year 3 post-relocation survey shall be submitted in digital format to County, FDEP and USACE within sixty (60) days, and the Year 3 summary report shall be submitted within ninety (90) days of completion of the Year 3 post-relocation survey. Data shall be submitted either on a portable hard drive or via an FTP site.

**B. INDIRECT IMPACT AREA- IMPACT AVOIDANCE/MINIMIZATION**

All below tasks involving scleractinian coral and octocoral colony relocation include acquisition of a SAL from FWCC. All monitoring, reporting, and notification tasks will be performed in accordance with the FDEP Permit, including the MMM Plan, and NMFS BO.

**PRE-CONSTRUCTION CLEARANCE OF INDIRECT IMPACT AREA** (*FDEP Permit Condition No. 27; FDEP MMM Plan Section 2.2; NMFS BO Sections 10 and 11, Appendix A and B*)

**26. LISTED CORAL SPECIES (*ACROPORA CERVICORNIS*): PRE-CONSTRUCTION SURVEY**

Consultant shall conduct a listed coral survey at five (5) sites inside the turbidity mixing zone where *A. cervicornis* was documented during pre-construction surveys (sites 1, 2, 4, 33, and 34; see Figure 13 of the Plan) within thirty (30) days prior to construction. The survey shall follow NMFS recommended protocol for listed coral species



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(NMFS BO, 2020) to document colony abundance, size, and condition. This method shall be applied to all seven (7) federally listed coral species; however, only *A. cervicornis* has been found at the natural hardbottom sites during surveys of the project area since 2007. Each of the five (5) sites is 1 (one) hectare (100 m x 100 m) and is centered around the 2014/2017 listed coral survey sites as presented in Figure 13 of the BMP. Consultant shall prepare an Excel spreadsheet with the survey results colony abundance by site/size. This spreadsheet shall be used to develop the final relocation and fragmentation plan pursuant to the NMFS BO and MMM Plan.

**Deliverable.** Deliverable is an Excel spreadsheet submitted to County, FDEP, USACE, and NMFS within thirty (30) days of survey completion.

**27. LISTED CORAL SPECIES (*ACROPORA CERVICORNIS*) COLONY/FRAGMENT RELOCATION**

Consultant shall relocate all *A. cervicornis* colonies greater than or equal to 5-cm in maximum dimension from Sites 1 and 4 (see Figure 13 of the Plan). As noted above in **Task 20**, any ESA-listed species colonies observed within the indirect impact area shall be relocated, regardless of size. Transplantation receiver sites are natural nearshore hardbottom in Fort Lauderdale located between FDEP profile monuments R-73 and R-75 and/or R-80 and R-81.5 (see Figures 7 and 8 of the NMFS BO). Surveys conducted in March 2021 suggest that the number of *A. cervicornis* colonies to be relocated from Sites 1 and 4 is approximately three thousand four hundred (3,400). Given the length of time that has passed since the March 2021 survey, this task assumes that the sites will support a minimum number of two thousand four hundred (2,400) corals at the time of relocation. Contingency tasks have been included in the event that **Task 26** documents up to three thousand four hundred (3,400) colonies of *A. cervicornis* (see **Tasks 28** and **29**). Colony collection shall adhere to the coral relocation protocol described in the NMFS BO. Colonies which exhibit obvious signs of disease or bleaching will not be removed for relocation.

Prior to relocation of *A. cervicornis* colonies from Sites 1 and 4, Consultant shall collect 5-cm fragments from all *A. cervicornis* colonies at Sites 1, 2, 4, 33, and 34, and place the fragments into the permitted coral nursery in Broward County in compliance with Terms and Conditions of the NMFS BO. Approximately one hundred (100) colonies are expected at Sites 2, 33, and 34. Fragments shall be collected from the axial tip of healthy branches using hand tools. Fragment collection shall adhere to the coral relocation protocol described in the NMFS BO. Any fragments larger than 5-cm shall be relocated according to relocation protocols and fragments less than or equal to 5-cm shall be relocated to the nursery.

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Prior to fragment collection, Consultant shall construct and deploy a sufficient number of PVC trees in the permitted Broward County coral nursery based on expected collection of two thousand five hundred (2,500) fragments from all five (5) sites. The floating PVC trees are used to suspend fragments on lines or frames and are attached to the seafloor bottom with anchors and suspended using subsurface floats.

Relocated colonies of *A. cervicornis* from Sites 1 and 4 shall be attached to the natural substratum following the requirements of the NMFS BO. *Acropora cervicornis* colonies to be monitored shall be transplanted into circular plots, 7-m in diameter each. Each plot shall have ten (10) to fifteen (15) colonies, and plots shall be separated by 10- to 20-m. Individual spacing between transplanted colonies shall not exceed 0.75-m.

This task provides for the construction and installation of PVC trees, collection and relocation of two thousand five hundred (2,500) fragments of *A. cervicornis* from Sites 1, 2, 4, 33, and thirty four (34) into the nursery, attachment of two thousand five hundred (2,500) fragments to the PVC trees in the permitted nursery, and collection and relocation of up to two thousand four hundred (2,400) colonies of *A. cervicornis* from Sites 1 and 4 to plots on natural nearshore hardbottom north of the project area (Figures 7 and 8 of the NMFS BO). A relocation rate of two hundred (200) fragments/day to the nursery has been estimated which equates to relocation of two thousand four hundred (2,400) fragments in approximately twelve (12) field days. An estimated collection and relocation rate of *A. cervicornis* colonies to natural reef areas of one hundred (100) colonies per day will result in the relocation of two thousand (2,400) colonies in approximately twenty-four (24) field days. Two (2) contingency tasks are included in this scope of work (**Tasks 28 and 29**) should there be up to three thousand five hundred (3,500) fragments or colonies to be relocated as suggested by the March 2021 survey or should the number of field days required to relocate fragments exceed twelve (12) and/or colony relocation exceed twenty four (24) field days. Consultant shall prepare a summary table that documents the number of relocated colonies by size, number of fragments attached at the nursery, and maps that show the harvest and receiver location of the relocated colonies.

**Deliverable.** Deliverables are the coral relocation described above and summary table documenting the number of relocated colonies by size, number of fragments attached at the nursery, and maps showing the harvest and receiver location of the relocated colonies. Coordinates and GIS shape files of the center of colony receiver plots and trees in the nursery shall be provided to County, USACE, and NMFS within thirty (30) days following completion of relocation activities.

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**28. CONTINGENCY – LISTED CORAL COLONY REMOVAL AND RELOCATION (AUTHORIZATION WITHHELD)**

This task provides for up to an additional ten (10) field days of *A. cervicornis* relocation activities from Sites 1 and 4 if the number of colonies for relocation is approximately 3,400 as suggested by the March 2021 survey. The methodology described in **Task 27** above shall be used for this task.

**29. CONTINGENCY – LISTED CORAL FRAGMENT REMOVAL AND RELOCATION AND FRAGMENT OUTPLANTING FROM NURSERY (AUTHORIZATION WITHHELD)**

This task provides for an additional fifteen (15) field days of *A. cervicornis* fragment collection and relocation from sites 1, 2, 4, 33, and 34 to the nursery if the number of fragments is approximately three thousand five hundred (3,500) as indicated by the March 2021 survey or if the number of fragments to be outplanted from the nursery exceeds one thousand four hundred (1,400) (see **Task 35**). The methodology as described in **Task 27** above shall be implemented for this task.

**30. LISTED CORAL RELOCATION MONITORING: IMMEDIATE POST-RELOCATION BASELINE (TIME ZERO) AND ONE (1) WEEK POST-RELOCATION SURVEY OF COLONY TRANSPLANTS AND REFERENCE COLONIES**

Consultant shall collect demographic information for the subset of corals to be monitored immediately following transplantation (time zero) and conduct a post-relocation survey within the first week following transplantation according to the requirements of Appendix A of the NMFS BO. According to the power analysis required by the BO, a maximum of five hundred (500) relocated colonies of *A. cervicornis* and two hundred fifty (250) reference colonies of *A. cervicornis* shall be monitored during each event. Colony demographic data shall be recorded for transplanted and reference colonies. Colonies shall be photo documented with a scale in the photographs. GPS locations of the center of reference monitoring plots shall be recorded.

The one-week post-transplantation monitoring report shall document attachment status (secure, loose, or missing). Any colonies that are not firmly attached to the bottom shall be re-attached to the bottom. The one-week survey shall observe and record presence, survivorship, and condition (disease, necrosis, fouling, sediment coverage).

Following the initial (time zero) and one-week post-relocation survey, Consultant shall prepare a single summary report that documents the *A. cervicornis* relocation effort, identifies the location and status of the tagged plots with relocated corals, and presents the monitoring data from both surveys. The report shall include a table with tag number, location, water depth, maximum length, number of branch tips, and percent mortality (in

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ten percent (10%) increments) for each of the transplants. GIS shape files of the monitoring plots shall be provided. The report shall also include photographs of the transplants and reference colonies. Comparisons shall be made between the reference sites and the relocation monitoring sites.

**Deliverable.** Deliverables are the single summary report documenting the *A. cervicornis* relocation effort, the locations and status of the tagged plots with relocated corals, and the monitoring data from both surveys; GIS shape files of the monitoring plots; and photographs of the transplants and reference colonies. The report and associated data shall be submitted in digital format to County, FDEP, USACE, and NMFS within thirty (30) days of completion of the one-week post-relocation survey.

**31. LISTED CORAL RELOCATION MONITORING: THREE (3) MONTH POST-RELOCATION SURVEY OF COLONY TRANSPLANTS AND REFERENCE COLONIES**

Consultant shall conduct the three-month post-relocation survey according to the requirements of Appendix A of the NMFS BO as summarized above under **Task 30**. The three-month survey shall document presence, survivorship, and condition (disease, necrosis, fouling, sediment coverage). Any colonies that are not firmly attached to the bottom at the time of the survey shall be re-attached to the bottom. The three-month survey shall observe and record for presence, survivorship, and condition (disease, necrosis, fouling, sediment coverage). Consultant shall prepare a summary report that documents survivorship and the status of the tagged plots with relocated corals. The report shall include a table with tag number, location, water depth, maximum length, number of branch tips, and percent mortality (in ten percent (10%) increments) for each of the transplant monitoring plots. The report shall also include photographs of the transplants and reference colonies. Comparisons shall be made between reference and relocation monitoring sites.

**Deliverable.** Deliverables are the 3-month post-relocation survey and summary report of the survey results. The report and associated data shall be submitted in digital format to County, FDEP, USACE, and NMFS within thirty (30) days of completion of the three-month post-relocation survey.

**32. LISTED CORAL RELOCATION MONITORING: SIX-MONTH POST-RELOCATION SURVEY OF COLONY TRANSPLANTS AND REFERENCE COLONIES**

Consultant shall conduct the six-month post-relocation survey according to the requirements of Appendix A of the NMFS BO as summarized above under **Task 30**. Any colonies that are not firmly attached to the bottom at the time of the survey shall be re-attached to the bottom. The six-month survey shall observe and record for presence,



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survivorship, and condition (disease, necrosis, fouling, sediment coverage). Consultant shall prepare a summary report that documents survivorship and status of the tagged monitoring plots with relocated corals. The report shall include a table with tag number, location, water depth, maximum length, number of branch tips, and percent mortality (in ten percent (10%) increments) for each transplantation plot. The report shall also include photographs of the transplants and reference colonies. Comparisons shall be made between reference and relocation monitoring sites.

**Deliverable.** Deliverables are the 6-month post relocation survey, summary report, and associated data which must be submitted in digital format to County, FDEP, USACE, and NMFS within thirty (30) days of completion of the six-month post-relocation survey.

**33. LISTED CORAL RELOCATION MONITORING: ONE-YEAR POST-RELOCATION SURVEY OF COLONY TRANSPLANTS AND REFERENCE COLONIES**

Consultant shall conduct the one-year post-relocation survey according to the requirements of Appendix A of the NMFS BO. The following tasks shall be conducted for the transplants on each tagged boulder and reference colonies: Colony demographic data shall be recorded as outlined in the Appendix A of the BO; and transplanted and reference colonies shall be photo documented with a scale in the photographs. Consultant shall prepare a summary report that documents survivorship and status of the relocated corals. The report shall include a table with tag numbers, locations, and water depth for each of the transplantation plots. The report shall also include the maximum length, number of branch tips, and percent mortality (in ten percent (10%) increments) of the colonies monitored in each plot. The report shall also include representative photographs of the transplants and reference colonies. The final one-year survey shall record and compare presence, survivorship, and condition (e.g., disease, necrosis, fouling, sediment coverage) among all post-transplantation monitoring events. Comparisons shall be made between reference and relocation monitoring sites.

**Deliverable.** Deliverables are the one-year post-relocation summary report. The report and associated data shall be submitted in digital format to County, FDEP, USACE, and NMFS within thirty (30) days of completion of the one-year post-relocation survey.

**34. CORAL NURSERY MANAGEMENT**

Consultant shall manage the nursery trees which hold the *A. cervicornis* fragments for eighteen (18) months for potential relocation for mitigation. Management includes monthly observations of the trees and the replacement of materials (lines, buoys, etc.) as needed and reattachment of fragments that may have become dislodged from the trees.

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**Deliverable.** Deliverables are the monthly logs of nursery maintenance events for the 18-month management period. These logs shall document major storm events which affect the nursery. The logs shall be submitted via email at 6-month intervals to County, FDEP, USACE, and NMFS.

- 35. OUTPLANTING OF ACROPORA CERVICORNIS COLONIES (AUTHORIZATION WITHHELD)**  
Should the one-year post-relocation monitoring report indicate that 1) less than eighty five percent (85%) of the transplanted colonies survive (survival means no net loss of tissue); 2) the results of the sedimentation monitoring at Sites 2, 33, or 34 indicate partial or total mortality during the immediate post-construction survey of the sand trap; or 3) the results of coral monitoring at Sites 2, 33, or 34 indicate mortality during the immediate post-construction survey (see Section E- **Task 47**), Consultant shall conduct outplanting of colonies from the nursery at a ratio of 1:1 (relocation survivorship or sedimentation) or a ratio of 1:1.15 (coral monitoring), following the requirements of the NMFS BO (Appendices A and B).

Outplanting for restoration shall occur at: 1) Sites 1 and 4 if post-construction sediment surveys indicate that suitable habitat for *A. cervicornis* remains; 2) Sites 2, 33, or 34 if suitable habitat remains; or 3) one (1) of the natural hardbottom *A. cervicornis* relocation sites if all other sites within the project area are not suitable at one-year post-construction. If required, restoration through outplanting shall be completed within two (2) years. Any corals remaining in the nursery after County's outplanting mitigation requirements have been met shall remain in the NSU nursery and shall be available to NSU for future restoration activities.

The total amount billed under this task will be based on the number of days required to meet the 1:1 or the 1:1.15 outplanting mitigation requirement with a maximum number of one thousand four hundred (1,400) fragments to be outplanted from the nursery. If the number of fragments to be outplanted exceeds one thousand four hundred (1,400), additional outplanting will be conducted under Contingency **Task 29**. This task also includes two (2) monitoring events of at least twenty percent (20%) of the transplanted fragments as typically required by the SAL for coral relocation. Consultant shall provide an Excel spreadsheet with the total number of outplanted colonies at each receiver site, maps and GIS shape files of the locations of the outplant receiver sites, and representative photographs of the outplanted colonies during the initial event.

**Deliverable.** Deliverables are the outplanting, an Excel spreadsheet documenting the total number of outplanted colonies at each receiver site, maps and GIS shape files of the locations of the outplant receiver sites, and representative photographs of the outplanted

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colonies during the initial event. The colony demographic data from the two (2) post-transplant monitoring events shall be submitted in digital format to County, FWCC, USACE, and NMFS within thirty (30) days following completion of the second monitoring event. Data shall be submitted in Microsoft Excel format via email or an FTP site.

**C. INDIRECT IMPACT AREA - PRE-CONSTRUCTION STATION INSTALLATION AND MONITORING** *(FDEP Permit Condition No. 27; MMM Plan Section 3.1; NMFS BO Appendix B and C)*

All monitoring, reporting and notification tasks will be performed in accordance with the FDEP Permit, including the MMM Plan, and NMFS BO.

**36. PRE-CONSTRUCTION BASELINE SURVEY OF NEARSHORE HARDBOTTOM AND QUEEN CONCH MONITORING WITHIN/ ADJACENT TO THE TURBIDITY MIXING ZONE**

**36.1 Transect / Station Installation**

Consultant shall install thirteen (13) permanent monitoring stations within the turbidity mixing zone immediately prior to sand trap construction and conduct the baseline biological monitoring survey of these stations (see Figure 2 below). All transect installation and monitoring shall be conducted in accordance with the MMM Plan (Section 3.1.1.1).

A single, permanent transect shall be established at each of the thirteen (13) monitoring stations. Permanent transects shall be of two (2) lengths: 50-m long or 150-m long. The 150-m transects shall only be established at the two (2) northernmost monitoring stations (Stations 1 and 38); 50-m transects shall be established at all other stations (see Figure 2 below). Transect orientations are station specific and shall be oriented as shown in Figure 2 and Table 1 of the Plan. Permanent markers shall be installed at the transects according to the FDEP Plan.

Three (3) transects shall be established in areas adjacent to the turbidity mixing zone- Stations 23 and 24 of County's nearshore hardbottom monitoring program and at the *A. cervicornis* monitoring station (see Figure 2 below). The pre-construction survey of the permanent transects at these stations shall consist of 1-m interval sediment depth measurements, high-definition digital still images along both sides of the three (3) transects, and qualitative video transects.

Stations 23 and 24 currently consist of 70-m permanent cross-shore transects. An additional 100-m shore-parallel permanent transect shall installed at both stations (see Figure 2 below). At Station 23, the additional 100-m transect shall start (zero

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[0] meter mark) at the midpoint (meter mark 35) of the existing 70-m transect. The transect shall extend 100-m to the south, towards the turbidity mixing zone. At Station 24, the additional 100-m shore-parallel transect shall start (zero [0] meter mark) at meter mark 25 of the existing 70-m cross-shore transect and shall extend 100-m to the north, towards the northern edge of the mixing zone. Permanent markers at these three (3) transects shall be installed at the locations specified in the MMM Plan.

Two (2) permanent transects, one (1) cross-shore and one (1) shore-parallel, shall be established at the Broward County Segment II Nourishment Project *A. cervicornis* monitoring station indicated by the red star in Figure 2 below. The cross-shore transect line shall be 50-m in length, and the shore-parallel shall be 100-m in length. The north-south transect shall extend 100-m to the south. Permanent markers at these two (2) transects shall be installed at the locations specified in the MMM Plan.

**36.2 Pre-Construction Baseline Survey**

The full length of each permanent transect shall be surveyed during the pre-construction (baseline) monitoring event. The pre-construction survey at the permanent transects shall consist of interval sediment depth measurements, quantitative photo surveys, scleractinian and octocoral belt transect surveys, and qualitative video transect surveys according to the protocol outlined in the FDEP Plan.

A 50-m long by 1-m wide belt transect shall be surveyed for scleractinian coral and octocoral abundance at each of the eleven (11) permanent 50-m stations during the pre-construction survey. The permanent transect at each monitoring station shall form one (1) side of the belt transect. For the two (2) stations with a 150-m transect (stations 1 and 38), only the 0–50-m transect shall be surveyed.

The pre-construction survey of the permanent transects at Stations 23 and 24 and the *A. cervicornis* monitoring station shall consist of 1-m interval sediment depth measurements, high-definition digital still images along both sides of the three (3) transects, and qualitative video transects.

Quantitative, still image analysis shall be performed at the 11 50-m permanent stations and first 50-m of the two (2) 150-m transects within the turbidity mixing zone using a point count method described in the Plan.



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The 13 50-m permanent monitoring stations within the turbidity mixing zone (Figure 14 of the MMM Plan) will be surveyed for Queen Conch in conjunction with the hardbottom benthic and sediment monitoring during the Pre-construction baseline survey. Queen Conch data to be collected during the pre-construction survey include:

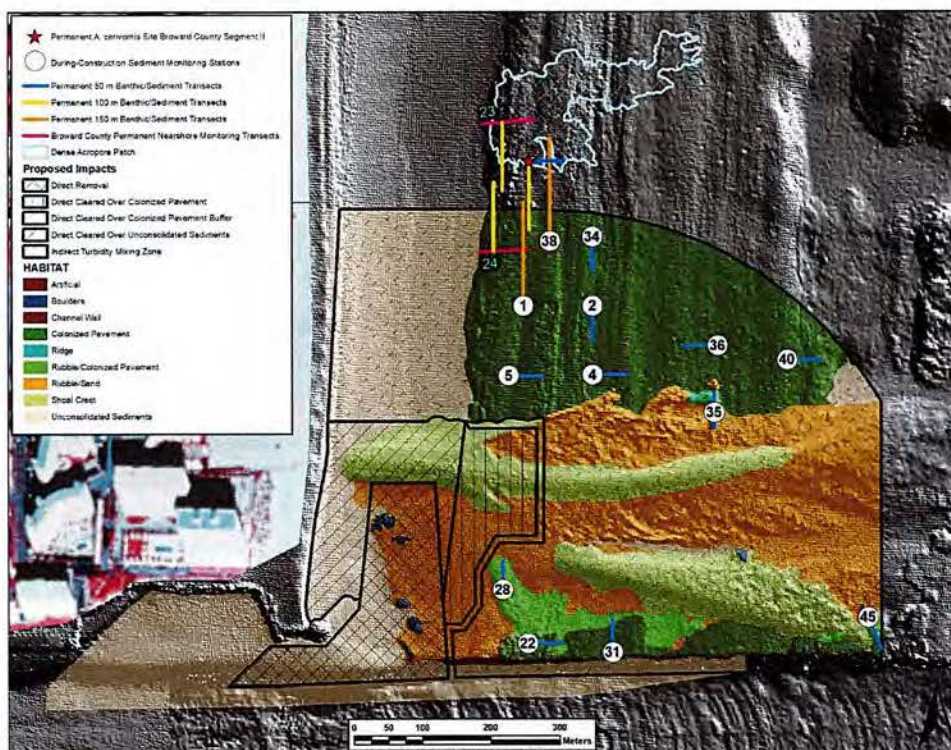
- Divers will conduct belt transects, surveying a maximum distance of 2 m (7 ft) left and right of the belt transect.
- Number of conch present along each belt transect will be counted.
- Morphometric data including siphonal (shell) length (cm) and lip thickness (cm) will be collected, and the life stage each conch will be categorized as a juvenile, sub-adult or mature adult (presence of flaring lip).
- General benthic landscape features and behaviors will be noted.
- Presence of egg masses will be noted.
- Presence of dead conch (empty shells) will be noted.

**Deliverable.** Pre-construction data shall be entered into a Microsoft Access database for data management and QA/QC review, and individual datasets shall be exported to Microsoft Excel workbooks. All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable. At least thirty (30) days prior to the commencement of sand trap excavation and within sixty (60) days of completion of the pre-construction monitoring, Consultant shall submit all raw pre-construction (baseline) data, including the still photo transect images and digital video transects, to County and FDEP in electronic format. Data shall be submitted on a single portable hard drive or via an FTP site.

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**Figure 2.** Permanent monitoring stations within and adjacent to the turbidity mixing zone for the Port Everglades Sand Bypass Project. Station numbers in white circles are within the turbidity mixing zone. The pink, 70-m long, west-east oriented transects at Stations 23 and 24 are also monitored in conjunction with Broward County's nearshore hardbottom monitoring program. The red star indicates the location of an *A. cervicornis* monitoring station that was monitored in conjunction with the Broward County Segment II nourishment project.

#### 37. PRE-CONSTRUCTION SURVEY OF LISTED CORALS ON NEARSHORE HARDBOTTOM WITHIN THE TURBIDITY MIXING ZONE

Consultant shall tag and conduct the pre-construction monitoring of ten percent (10%) of the *A. cervicornis* colonies at Sites 2, 33, and 34 (approximately twenty (20) colonies) within the turbidity mixing zone. All three (3) sites are 100-m by 100-m. The survey shall be conducted in accordance with the requirements in Appendix B of the NMFS BO. The following information shall be recorded for all tagged colonies during the pre-construction survey: species; dimensions (diameter or longer dimension in units); percentage live tissue and recent percent mortality in ten percent (10%) increments; still photography; sediment cover; and GPS coordinates (or similar means of accurately locating) each tagged colony.

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**Deliverable.** Deliverables are a site map with locations of the tagged colonies and pre-construction survey data entered into Microsoft Excel for data management and QA/QC review. All field datasheets shall be reviewed and scanned to digital format and submitted to County, FDEP, USACE, and NMFS within sixty (60) days of survey completion.

**38. PRE-CONSTRUCTION SURVEY OF SEDIMENTATION AT LISTED CORAL SITES WITHIN THE TURBIDITY MIXING ZONE**

Consultant shall conduct pre-construction sediment monitoring at Sites 1, 2, 4, 33, and 34 within the turbidity mixing zone. Sediment surveys shall be conducted no more than sixty (60) days prior to construction of the sand trap in accordance with the conditions of Appendix C of the NMFS BO. A grid pattern comprised of 100 x 100 m survey sites shall be superimposed over coral hardbottom areas within the five (5) sites. Four (4) permanent transects shall be established at each site, and each site shall be divided into four (4) quadrants. A 50-m permanent transect shall be placed on coral hardbottom within each quadrant and shall cover as much hardbottom as possible (large sand areas shall be avoided). Transects shall be placed so that the survey areas do not overlap and are not directly adjacent to each other. Permanent markers shall be placed at the 0-m and 50-m marks of the transects, and GPS coordinates shall be recorded at these transect ends.

**Deliverable.** Deliverables are a site map and GIS shape file depicting the locations of the permanent transects and display coral critical habitat essential feature within project areas (benthic habitat layer). Pre-construction sediment monitoring data shall be entered into Microsoft Excel for data management and QA/QC review. The map, shapefile, all field datasheets scanned to PDF, and Excel worksheets shall be submitted to County, FDEP, USACE, and NMFS within sixty (60) days of survey completion.

**39. PRE-CONSTRUCTION SEAGRASS SURVEY WITHIN THE TURBIDITY MIXING ZONE**

Consultant shall conduct a pre-construction survey of seagrass beds comprised of *Halophila decipiens* along the north side of Port Everglades Inlet within the turbidity mixing zone. The edge (boundary) of each seagrass bed shall be mapped (delineated) immediately prior to the commencement of sand trap excavation. During the edge mapping survey, divers shall swim around the full extent of each seagrass bed while towing a buoy equipped with a GNSS receiver which wirelessly transmits corrected positions to a radio on the survey vessel. The receiving radio is interfaced with ArcPad or HYPACK navigation software on the survey vessel.



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**Deliverable.** Consultant shall prepare and submit a site map showing seagrass beds during the pre-construction survey and a GIS shape file of seagrass bed locations shall be to County, FDEP, and USACE at least thirty (30) days prior to the commencement of sand trap excavation and within sixty (60) days of completion of the pre-construction seagrass monitoring event. The monitoring data shall be presented in the immediate post-construction monitoring report (see **Task 46**).

**D. INDIRECT IMPACT AREA - DURING-CONSTRUCTION TURBIDITY MIXING ZONE MONITORING** (FDEP Permit Condition No. 27; MMM Plan Section 3.1)

All monitoring, reporting and notification tasks will be performed in accordance with the FDEP Permit, including the MMM Plan, and NMFS BO.

**40. DURING-CONSTRUCTION SEDIMENTATION SURVEYS OF NEARSHORE HARDBOTTOM AND QUEEN CONCH MONITORING WITHIN/ADJACENT TO THE TURBIDITY MIXING ZONE**

Consultant shall conduct weekly surveys at the thirteen (13) permanent stations during dredging operations. All monitoring shall be conducted in accordance with the MMM Plan. It is expected that weekly surveys will require two (2) field days/week to complete due to the number of stations required to be surveyed.

The full length of the eleven (11) permanent 50-m transects shall be surveyed during each weekly during-construction survey. However, unless during-construction monitoring indicates sedimentation impacts (see **Task 42**), only the first 50-m of stations 1 and 38 (the two (2) 150-m transects) shall be surveyed during each weekly during-construction survey. The weekly during-construction surveys shall consist of interval sediment depth measurements at 1-m intervals along each transect inclusive of sand patches. Three (3) sediment depth measurements shall be taken at each 1-m interval – one (1) measurement on the center of the line, one 0.5-m to the left of the line, and another 0.5-m to the right of the line. For each measurement, a stainless-steel ruler graduated in millimeters (measuring at least 30-cm in length) shall be pressed through the sediment until the ruler reaches the surface of hard substratum or is totally immersed in sand. Depth measurements will be recorded to the nearest half centimeter (*e.g.*, 0-cm, 0.5-cm, 1-cm, 1.5-cm, etc.). Measurements greater than 30-cm shall be recorded as greater than 30-cm.

This task assumes that dredging extends up to thirty-five (35) weeks with a maximum of thirty-five (35) weekly during-construction sedimentation surveys.

The 13 50-m permanent monitoring stations within the turbidity mixing zone (Figure 14 of the MMM Plan) will be surveyed for Queen Conch in conjunction with the sediment



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monitoring during weekly during-construction surveys. Data to be collected during the weekly surveys include:

- Divers will conduct belt transects, surveying a maximum distance of 2 m (7 ft) left and right of the belt transect.
- Number of conch present along each belt transect will be counted.
- Morphometric data including siphonal (shell) length (cm) and lip thickness (cm) will be collected, and the life stage each conch will be categorized as a juvenile, sub-adult or mature adult (presence of flaring lip).
- General benthic landscape features and behaviors will be noted.
- Presence of egg masses will be noted.
- Presence of dead conch (empty shells) will be noted.

**Deliverable.** Deliverables are the submittal of weekly raw sedimentation monitoring data and Queen Conch observation data to County, FDEP, AND USACE in electronic format within seven (7) days of completion of each weekly survey. Data shall be submitted in Microsoft Excel format via email or an FTP site. The final during-construction monitoring dataset shall be provided within seven (7) days of completion of sand trap excavation end with a digital copy of the scanned field datasheets (PDF file) to be submitted on a portable hard drive or via an FTP site.

**41. CONTINGENCY – TWENTY (20) WEEK DURING-CONSTRUCTION MONITORING IF SAND TRAP EXCAVATION EXTENDS UP TO FIFTY-FIVE (55) WEEKS (AUTHORIZATION WITHHELD)**

This task provides up to an additional twenty (20) weeks of during-construction sedimentation and Queen Conch monitoring surveys if dredging extends beyond the initial thirty-five (35) weeks. Surveys under this task shall be billed at a weekly rate up to the maximum of twenty (20) weeks.

**Deliverable.** Deliverables for this task are submittal of weekly raw sedimentation monitoring data and Queen Conch observation data to County, FDEP, and USACE in electronic format within seven (7) days of completion of each weekly survey. Data shall be submitted in Microsoft Excel format via email or an FTP site.

**42. CONTINGENCY – DURING-CONSTRUCTION MONITORING BASED ON SEDIMENTATION TRIGGERS (AUTHORIZATION WITHHELD)**

If during-construction weekly sediment depth measurements document sedimentation impacts, Consultant shall perform additional monitoring where the impact was documented (location/type of monitoring station where impact was documented). The FDEP Plan defines sedimentation impact as an increase in mean sediment depth of 1-cm

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or more above mean baseline sediment depth. Consultant shall notify County, FDEP, and USACE as soon as possible as to which trigger was tripped pursuant to the requirements of the FDEP Plan.

**42.1 During-Construction Sedimentation Triggered Monitoring at 50-m Transects**

If during-construction weekly sediment depth measurements at any of the 50-m transects at the permanent stations indicate sedimentation impacts, Consultant shall add qualitative video transects to the weekly during-construction monitoring of the affected transect(s). The additional video transect survey shall be implemented during the next weekly during-construction survey after sedimentation impacts are documented. Sediment triggered protocol shall remain in effect until 1) the immediate post-construction survey is conducted; or 2) weekly sediment depth data at whichever station(s) have been affected have returned to or are lower than the mean sediment depth recorded during the baseline survey.

This task assumes that qualitative video surveys at five (5) or more of the 13 50-m transects during dredging of the sand trap. The cost is based upon an increase in cost per weekly event to conduct the additional video transects for a maximum of twenty (20) weekly during-construction surveys. If four (4) or fewer stations trigger qualitative video surveys, there is no additional cost to the field surveys since it is assumed that the additional video surveys can be completed within the same two-day weekly survey period.

**42.2 During-Construction Sedimentation Triggered Monitoring at 150-m Transects**

If during-construction weekly sediment depth measurements at stations 1 and/or 38 indicate sedimentation impacts along the 0- to 50-m segment of the transect, Consultant shall add the entire 150-m of each transect to the weekly sedimentation survey protocol. Interval sediment depth measurements and qualitative video surveys shall be collected along the full 150-m of the transect(s) during the next weekly during-construction survey after sedimentation impacts are documented. Sediment triggered protocol changes shall remain in effect until either the immediate post-construction survey is conducted or weekly sediment depth data at whichever station(s) are affected document a return of mean sediment depth along the full 150-m length of the transect to that or below the mean depth recorded along the first 50-m of the transect during the baseline survey.

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This task is based upon an additional weekly cost to conduct the additional monitoring at the two (2) 150-m transects for a maximum of twenty (20) weekly during-construction surveys.

**42.3 During-Construction Sedimentation Triggered Monitoring at Stations Adjacent to the Turbidity Mixing Zone (Stations 23, 24 and *A. cervicornis* station)**

Consultant shall add the permanent transects at Stations 23, 24, and the *A. cervicornis* station to the weekly during-construction monitoring surveys if sedimentation impacts are recorded during weekly construction monitoring surveys of the distal portion of the transects (50- to 150-m) at stations 1 and/or 38. Weekly during-construction monitoring shall include interval sediment depth measurements and qualitative video surveys along the full lengths of all three (3) transects and shall commence during the survey immediately following detection of sedimentation impacts. Weekly during-construction monitoring for all three (3) stations (23, 24, and the *A. cervicornis* monitoring station) shall remain in effect if during-construction mean sediment depth along any transect indicates sedimentation impacts.

Weekly during-construction monitoring of all transects at three (3) stations shall be terminated if no sedimentation impacts are documented along any of the six (6) transects and weekly during-construction sediment depth data collected along the distal portions (50- to 150-m) of both transects at stations 1 and 38 indicate that mean sediment depth has returned to levels at or below the baseline survey. If weekly monitoring is terminated at the three (3) stations due to abatement of sedimentation impacts, but subsequent weekly monitoring documents new impacts along the 50- to 150-m segments of transects at stations 1 and/or 38, weekly during-construction monitoring at all three (3) stations (23, 24, and the *A. cervicornis* station) shall be reinitiated.

If no sedimentation impacts are detected at station 1 and/or 38 during the weekly construction sedimentation survey, these three (3) stations shall not be monitored during or after construction, and the pre-construction data and still images from these stations shall not be analyzed.

This task is based upon an additional weekly cost to conduct the additional monitoring at the three (3) stations for a maximum of twenty (20) weekly during-construction surveys.

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**42.4 During-Construction Sedimentation Triggered Monitoring from Additional Turbidity Samples Collected over Hardbottom Habitats in the Turbidity Mixing Zone**

The MMM Plan requires a Turbidity Monitoring GIS database for the project and additional turbidity samples are required on consolidated pavement and ridge habitats in the turbidity mixing zone during sand trap excavation (See **Task 4**). If the densest portion of the plume extends within a 10-m radius of the same location on consolidated hardbottom for three (3) consecutive days and the turbidity level at the location exceeds 10 NTUs at each reading, Consultant shall inspect the benthic community at the location of the elevated turbidity reading on the following day or as soon as conditions allow for safe dive operations. If the location of elevated turbidity is within 50-m of a permanent monitoring site, that site shall be inspected at the time of the next weekly monitoring event at the permanent site. If weekly monitoring has already occurred that week at the permanent site, the next weekly during-construction monitoring event shall be advanced such that it occurs within twenty-four (24) to forty-eight (48) hours of the turbidity exceedance.

If the turbidity exceedance is located at a discrete location away from existing permanent monitoring sites, a temporary 20-m long by 1-m wide belt transect shall be surveyed at the location of elevated turbidity levels. A permanent transect shall be installed at this location if sediment deposition resulting in the partial or total burial of hardbottom biota is observed. Permanent markers shall be installed at the start, end, and middle [10- m mark] of the transect.

Following installation of a permanent transect due to excessive turbidity, the area of impact shall be mapped and quantified. Digital, still images shall be taken to document the current condition of benthos. Impacted sites shall be added to the list of permanent monitoring sites that are monitored weekly during the remainder of construction.

This task is based upon an additional per event cost to conduct the additional monitoring at the temporary transect, install a permanent transect, and quantify the sedimentation impact area. A maximum of twelve (12) events/exceedances with permanent transect installation are included in the cost for this task.



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**42.5 During-Construction Turbidity and Sedimentation Triggered Monitoring in Seagrass Beds**

The MMM Plan requires collection of weekly turbidity samples within seagrass beds located on the north side of Port Everglades Inlet channel within the turbidity mixing zone. If a turbidity reading at the seagrass beds exceeds 6 NTUs above background, Consultant shall visually inspect the seagrass beds within forty-eight (48) hours of the elevated reading or as soon as conditions allow for safe dive operations.

Seagrass beds shall be assessed by divers swimming along an east-west transect through the extent of each bed. Seagrasses shall be inspected for signs of obvious sediment accumulation on above-ground biomass and partial/complete burial of patches due to sediment deposition. Seagrass bed edge mapping shall also be conducted following the mapping methods followed during the pre-construction survey (**Task 39**).

If no adverse effects to seagrasses are discovered after three (3) separate during-construction surveys (visual inspections and mapping efforts) following the occurrence of an exceedance of six (6) NTU above background, then during-construction seagrass monitoring will be discontinued. Future during-construction seagrass monitoring shall only be required if weekly turbidity monitoring values at the seagrass beds indicate turbidity levels exceed state water quality standards of twenty-nine (29) NTUs above background.

This task is based upon six (6) during-construction seagrass bed inspections following exceedances of six (6) NTUs above background with no adverse effects to seagrasses discovered during the inspections.

**42.6 During-Construction Sedimentation Impacts Discovered in Seagrass Beds**

If during-construction impacts are discovered in seagrass beds under **Task 42.5** above, Consultant shall identify and map the extent of sedimentation impact at the location and add the location to the list of permanent sites that are monitored weekly for sedimentation during construction. The site shall be visited weekly during construction to determine the permanence of the impact (i.e., success or failure of impacts to recede). Once triggered, the requirement for weekly during-construction (and immediate post-construction) monitoring of an impact site shall remain in effect until the immediate post-construction survey or weekly during-construction monitoring indicates impacts are no longer present.

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This task is based on six (6) documented sedimentation impact events in seagrass beds, which include mapping and quantifying the extent of the impact.

**Deliverable.** If any of the triggers listed under this task are exceeded, the additional data shall be included in the weekly sedimentation monitoring data submittals described under **Task 40** above, and the data will be presented and evaluated in the immediate post-construction report.

- E. INDIRECT IMPACT AREA - IMMEDIATE POST-CONSTRUCTION TURBIDITY MIXING ZONE MONITORING** (*FDEP Permit Condition No. 27; MMM Section 3.1; NMFS BO Appendix B and C*) All monitoring, reporting and notification tasks will be performed in accordance with the FDEP Permit, including the MMM Plan, and NMFS BO.

**43. IMMEDIATE POST-CONSTRUCTION MONITORING OF NEARSHORE HARDBOTTOM AND QUEEN CONCH WITHIN/ADJACENT TO THE TURBIDITY MIXING ZONE**

Consultant shall conduct the immediate post-construction biological monitoring survey of the thirteen (13) permanent stations within or adjacent to the turbidity mixing zone within one (1) week following sand trap excavation. All monitoring shall be conducted in accordance with the FDEP Plan. The immediate post-construction survey at the permanent transects shall consist of interval sediment depth measurements at 1-m intervals; quantitative photo surveys, and scleractinian coral and octocoral belt transect surveys. All three (3) metrics shall be evaluated following the requirements of the pre-construction survey described under **Task 36**.

This task assumes that qualitative video transect surveys were triggered by sedimentation impacts at four (4) or fewer stations during weekly construction surveys. Therefore, qualitative video transects shall be conducted at a maximum of four (4) stations according to the protocol of the pre-construction video transect survey (see **Task 36**). This task also assumes that monitoring of the distal portion of transects at stations 1 and 3 (two (2) 150-m transects) was not triggered during construction so that only the first 50-m of stations 1 and 38 shall be surveyed during immediate post-construction.

Quantitative image analysis of the still photographs at the thirteen (13) permanent stations during the immediate post-construction survey shall be conducted using the point count method described for the pre-construction survey under **Task 36**. A unique set of twenty-five (25) random points shall be applied to each image. Functional group cover shall be assessed at each of the twenty-five (25) points on every image to quantitatively assess benthic functional group cover.

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The 13 50-m permanent monitoring stations within the turbidity mixing zone (Figure 14 of the MMM Plan) will be surveyed for Queen Conch in conjunction with the hardbottom benthic and sediment monitoring during the Immediate post-construction survey. Data to be collected during the Immediate post-construction survey include:

- Divers will conduct belt transects, surveying a maximum distance of 2m (7 ft) left and right of the belt transect.
- Number of conch present along each belt transect will be counted.
- Morphometric data including siphonal (shell) length (cm) and lip thickness (cm) will be collected, and the life stage each conch will be categorized as a juvenile, sub-adult or mature adult (presence of flaring lip).
- General benthic landscape features and behaviors will be noted.
- Presence of egg masses will be noted.
- Presence of dead conch (empty shells) will be noted.

**Deliverable.** Immediate post-construction data shall be entered into a Microsoft Access database for data management and QA/QC review, and individual datasets shall be exported to Microsoft Excel workbooks for submittal to County and FDEP. All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable.

The data deliverables for this task will be provided on the Immediate post-construction data deliverable to be submitted on a portable hard drive to FDEP, USACE, NMFS, and County within sixty (60) days of completion of the Immediate post-construction survey. The monitoring data shall be evaluated in the final immediate post-construction report (see **Task 46**).

**44. IMMEDIATE POST-CONSTRUCTION SURVEY OF SEAGRASS HABITATS WITHIN THE TURBIDITY MIXING ZONE**

Consultant shall conduct an immediate post-construction survey of the seagrass beds mapped during the pre-construction survey along the north side of Port Everglades Inlet within the turbidity mixing zone. The edge of each seagrass bed shall be mapped within thirty (30) days following completion of dredging activities. During the edge mapping survey, divers shall swim around the full extent of each seagrass bed while towing a buoy equipped with a GNSS receiver which wirelessly transmits corrected positions to a radio on the survey vessel. The receiving radio must be interfaced with ArcPad or HYPACK navigation software on the survey vessel.

If during-construction impacts were discovered in seagrass beds as described under **Task 42.6**, Consultant shall conduct a final post-construction inspection to determine the

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permanence of the impact (i.e., success or failure of impacts to recede) and identify and quantify the extent of the permanent sediment impact.

**Deliverable.** A site map showing seagrass beds during the pre-construction and immediate post-construction surveys and a GIS shape file of seagrass bed locations during the immediate post-construction survey shall be prepared and submitted to County, FDEP, and USACE with the post-construction data deliverable described in **Task 43** above. The monitoring data shall be evaluated in the final immediate post-construction report (see **Task 46**).

**45. CONTINGENCY – IMMEDIATE POST-CONSTRUCTION MONITORING AND DATA ANALYSES BASED ON SEDIMENTATION IMPACTS (AUTHORIZATION WITHHELD)**

**45.1 Sedimentation triggered monitoring at 50-m and 150-m transects.**

At the stations where sedimentation levels triggered the need for qualitative video transects during weekly construction surveys (minimum of five (5) of the 50-m permanent stations) and these stations have not recovered to baseline conditions by the end of the sand trap dredging, or sedimentation was recorded along the entire 150-m length of the transects at stations 1 and/or 38, Consultant shall conduct additional qualitative video transects at the affected transects and/or conduct a sediment depth interval survey along the entire length of the two (2) 150-m transects. This work shall be performed during the immediate post-construction survey. The immediate post-construction video transect and sediment depth interval surveys shall be conducted according to the pre-construction survey protocol described in **Task 36**.

**45.2 Sedimentation triggered monitoring at stations adjacent to the turbidity mixing zone (Stations 23, 24 and *A. cervicornis* station).**

If no sedimentation impacts are detected at station 1 and/or 38 during the weekly construction sedimentation surveys (**Task 40**), Stations 23 and 24 and the *A. cervicornis* monitoring station will not be monitored during the immediate-post-construction survey, and the pre-construction data and still images from these stations will not be analyzed.

If during-construction sedimentation monitoring triggers extension of either station 1 or 38 during weekly surveys, and during-construction mean sediment depth measurements indicate sedimentation impacts along the distal, 100-m segment of the transect (from meter 50 to meter 150), Consultant shall conduct



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immediate post-construction monitoring at the transects at Stations 23 and 24 and the *A. cervicornis* monitoring station. The immediate post-construction survey shall consist of sediment depth interval measurements, quantitative still images, and qualitative video transects as conducted during the pre-construction survey under **Task 36**.

- 45.3 Sedimentation triggered monitoring from additional turbidity samples collected over consolidated hardbottom habitats in the turbidity mixing zone.

If additional 20-m permanent transects were installed during the weekly during-construction surveys in areas of new sedimentation impact away from the permanent monitoring stations, and sedimentation impacts did not abate/recede during weekly sedimentation surveys, Consultant shall conduct an immediate post-construction assessment at these transects. The area(s) of impact shall be mapped, and the final impact(s) shall be quantified and presented in the final immediate post-construction report (see **Task 46**).

**Deliverable.** Field data and point count data files/still images collected as part of this task shall be added to the immediate post-construction data submittal described under **Task 3** above and the data shall be presented and evaluated in the final immediate post-construction report (see **Task 46**).

- 45.4 Sedimentation triggered video transect point count analyses.

The qualitative video transect surveys serve as archival data for further resolution if quadrat and sediment data at specific permanent stations suggest project-related sedimentation impacts. If mandated by the FDEP Plan, Consultant shall conduct quantitative image analysis of the qualitative video transects at the stations of concern. Quantitative image analysis of frame-grabbed still images of the video transect shall be conducted using the point count method described for the pre-construction survey under **Task 36**. A unique set of twenty-five (25) random points shall be applied to each image. Functional group cover shall be assessed at each of the twenty-five (25) points on every still image to quantitatively assess benthic functional group and sediment cover. This task assumes that quantitative image analysis is required for a maximum of three (3) permanent stations during pre/post construction surveys.

**Deliverable.** Frame-grabbed still images from all video transects subject to quantitative image analysis shall be submitted to County and FDEP with the

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associated Point Count files and data summaries/output in Excel spreadsheets within sixty (60) days after survey completion.

**46. IMMEDIATE POST-CONSTRUCTION BIOLOGICAL MONITORING REPORT-NEARSHORE HARDBOTTOM AND QUEEN CONCH**

Consultant shall prepare the final immediate post-construction Biological Monitoring report which clearly describes field methods and data analyses and presents all permit-required data in tables, figures, and graphics. This report will include a summary of the Queen Conch monitoring data. The report shall compare the Pre-construction and Immediate Post-construction survey results and describe, compare, and contrast conditions observed during weekly during-construction surveys in the evaluation of unanticipated project impacts. If project-related impacts are suggested by the monitoring data, the report shall evaluate these effects and determine the severity of impacts.

**Deliverable.** A draft Immediate Post-construction report shall be submitted to County within sixty (60) days following survey completion. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Immediate Post-construction survey.

**47. IMMEDIATE POST-CONSTRUCTION SURVEYS OF LISTED CORAL SITES WITHIN THE TURBIDITY MIXING ZONE**

**47.1 LISTED CORAL MONITORING**

Consultant shall conduct immediate post-construction monitoring of the tagged *A. cervicornis* colonies at Sites 2, 33, and 34 (approximately twenty (20) colonies based on May 2021 data) within the turbidity mixing zone. The survey shall be conducted in accordance with the NMFS BO within thirty (30) days of completion of dredging activities. The following information shall be recorded for all tagged colonies during the post-construction survey: species, dimensions (diameter or longer dimension in units), percentage live tissue and recent percent mortality in (ten percent (10%) increments, still photographs, sediment cover, and GPS coordinates (or similar means of accurately locating) each tagged colony.

**47.2 SEDIMENTATION MONITORING AT LISTED CORAL SITES**

Consultant shall conduct immediate post-construction sediment monitoring at Sites 1, 2, 4, 33, and 34 within the turbidity mixing zone. Sediment data shall be collected within sixty (60) days of completion of sand trap dredging activities in accordance with the conditions of the NMFS BO. The immediate post-construction survey shall follow the same protocol as the pre-construction survey at the permanent transects described under **Task 38**. Sediment depth, sediment

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characterization, and habitat characterization shall be recorded at 1-m intervals along the 50-m permanent transects according to the sediment monitoring requirements of the NMFS BO. Sediment depth measurements shall be recorded to the nearest millimeter using a ruler that is at least 30-cm in length. Measurements greater than 30-cm shall be recorded as "> 30-cm." At each point along the transects where sediment depth is taken, the habitat shall be recorded as: 1) coral hardbottom; 2) sand patch; or 3) sand channel. Characterization of sediments shall also be recorded at each interval sediment depth location. Characterization categories shall include sand (S), sand with fines (SF), fines with sand (FS), and fines (F).

**Deliverable.** Post-construction coral and sediment data shall be entered into Microsoft Excel for data management and QA/QC review. Consultant shall prepare an immediate post-construction report that compares the post-construction coral and sediment surveys to the results of the pre-construction survey to describe, compare, and contrast the conditions observed and determine if unanticipated project impacts have occurred. Consultant and County will meet to discuss results of the draft final report prior to submittal. If impacts were documented, the report shall describe all project-related impacts and the severity of impacts, including quantifying the total loss or damage to ESA-listed corals.

All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable and immediate post-construction report to County, FDEP, and USACE within sixty (60) days of survey completion.

**F. MITIGATION ARTIFICIAL REEF SURVEYS** (*FDEP Permit Condition No. 27; MMM Plan Section 4.2*)

The MMM Plan requires construction of 0.5 net acres of artificial reef to serve as coral nursery habitat as mitigation for direct impacts to rubble-dominated coral communities during sand trap construction. Two (2) limestone boulder artificial reefs are required to provide transplantation receiver sites: a 0.30-acre reef located approximately one (1) mile offshore of R-65 in Fort Lauderdale and a 0.20-acre nearshore artificial reef. The permitted 0.20-acre reef site is being relocated to the north of the sand bypass project area through a minor modification to project permits. Permitting and site surveys for the new 0.20-acre nearshore reef have been authorized under a separate task order with County. All monitoring, reporting and notification tasks will be performed in accordance with the FDEP Permit, including the MMM Plan, and NMFS BO.



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#### 48. 0.3-ACRE OFFSHORE ARTIFICIAL REEF MITIGATION SITE SURVEYS

Consultant shall conduct a survey of the permitted offshore artificial reef site to identify the 0.30-acre footprint required for boulder placement within the larger permitted site (Figure 3 below). Divers shall visually inspect the sea floor within the reef placement area and verify that there is no exposed hardbottom within fifty (50) feet of the artificial reef footprint. Any exposed hardbottom within the permitted offshore site shall be identified and its location(s) shall be recorded by divers. The locations of reef edges in closest proximity to the 0.3-acre placement area shall be delineated with DPGS, and the coordinates of the four (4) corners of the 0.3-acre placement area shall be recorded. All mapping and positioning shall be conducted by divers towing a buoy equipped with a SP60 GNSS receiver.

**Deliverable.** Consultant shall provide ArcGIS shape files of any hardbottom features located within/adjacent to the permitted offshore artificial reef placement area and the final artificial reef footprint within the permitted artificial reef placement site. A map of the final 0.3-acre boulder placement area shall be provided in PDF and GIS shapefile format within thirty (30) days of survey completion.





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**Figure 3.** Permitted offshore artificial reef site showing the smaller 0.3-acre coral nursery area.

**49. MITIGATION ARTIFICIAL REEF CONSTRUCTION SUPERVISION (Authorization Withheld)**

Consultant shall conduct a single immediate pre-construction inspection of each mitigation reef placement area immediately following selection of mooring locations at each site by the Contractor, up to six (6) weekly inspections during construction of both mitigation artificial reefs, and a single immediate post-construction inspection prior to Contractor demobilization (total of eight (8) inspections) to ensure that both mitigation artificial reefs are constructed in compliance with FDEP and USACE permit conditions and construction plans and specifications. To ensure that the mitigation reefs will meet the net acreage success requirements of the project permits and MMM Plan, divers shall survey two (2) 10-m long temporary random transects for line-intercept sand/boulder cover within the newly constructed reef during each weekly inspection. Line-intercept data for sand and boulder cover shall be collected along the temporary transects to determine the percent cover of boulders within each reef section. Consultant shall report the data will be reported to County, summarize diver observations, and provide the line-intercept transect data for percent boulder/sand cover and representative photographs of the constructed reefs. These reports shall note any potential issues with permit compliance and provide recommendations as needed to ensure that net mitigation acreages shall be met.

**Deliverable.** Consultant shall submit weekly line-intercept transect reports to County within twenty-four (24) hours of completion of each inspection. This task shall be billed based on the number of weekly inspections conducted during construction and the immediate pre- and post-construction inspections.

**50. AS-BUILT IMMEDIATE POST-CONSTRUCTION SURVEYS OF THE 0.3-ACRE AND 0.2-ACRE ARTIFICIAL REEF CORAL NURSERIES**

Consultant shall delineate the boundaries of the 0.30-acre offshore and 0.20-acre nearshore limestone boulder artificial reefs within six (6) months following completion of reef construction as required by the MMM Plan. Mapping methods shall be consistent with the requirements of the MMM Plan. Divers shall swim the full extent of the boulder reef edge at each site while towing a buoy equipped with a SP60 GNSS receiver. The SP60 GNSS receiver transmits corrected positions to an XDL Rover 2 on the survey vessel. These positions are then transmitted to an Algiz 8X handheld tablet running ArcMap via Bluetooth technology.

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Consultant shall establish and survey seven (7) 10-m long temporary, random transects on the offshore boulder reef and five (5) 10-m long temporary transects on the nearshore boulder reef during the as-built survey. The locations and headings of the transect endpoints shall be randomly generated in ArcGIS prior to survey commencement. Line-intercept data for boulder cover shall be collected along all temporary transects. These data will be used to calculate the overall percentage of bottom occupied by boulders at each reef site to verify that the required net acreages of 0.3 and 0.2 acres of boulder have been constructed.

**Deliverable.** Consultant shall provide ArcGIS shape files of the diver transect locations and Excel files with the raw and summary data from the line intercept transects and overall percent cover/area covered by boulders at each site. Consultant shall submit final shape files of the 0.3-acre and 0.2-acre artificial reefs within thirty (30) days of survey completion with a map showing their locations net acreages.

**G. RE-EXPOSURE OF RUBBLE/CONSOLIDATED HARDBOTTOM MITIGATION (FDEP Permit Condition No. 27; MMM Plan Section 4.1)**

**51. DURING-CONSTRUCTION MITIGATION SURFACE RUBBLE INSPECTIONS**

Consultant shall conduct a verification survey of the 7.3-acre rubble removal area when Contractor believes that rubble removal work is roughly fifty percent (50%) complete. Scientific divers will sample three hundred (300) randomly placed, one-meter square quadrats over the 7.3-acre excavation area for mean areal percent cover of unconsolidated rubble and unconsolidated sediment depth over underlying consolidated hardbottom substrate. Consultant shall conduct a final verification survey according to the methods of the fifty percent (50%) completion survey when the Contractor believes that the rubble removal work is one hundred percent (100%) complete. This task also includes one (1) contingency verification survey to be performed if the work is not deemed complete following the completion of the second verification dive.

**Deliverable.** Consultant shall prepare and submit an Excel spreadsheet with the quadrat data and field datasheets as a PDF within three (3) day of survey completion.

**52. MITIGATION SUCCESS MONITORING- CREATION OF RUBBLE/COLONIZED PAVEMENT FROM CLEARING/RUBBLE REMOVAL- YEAR 1 POST-CONSTRUCTION BENTHIC HABITAT MAP**

Removal of approximately 16.2 acres of unconsolidated rubble during project dredging is expected to re-expose approximately 7.3 acres of consolidated substrate that County believes is suitable for subsequent coral colonization. The re-exposed hardbottom habitat

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is expected to function as rubble/consolidated pavement habitat following trap excavation since it will not be possible to remove all unconsolidated rubble. The MMM Plan requires annual post-construction monitoring at Years 1, 2, 3, and 5 (if necessary) to document the success of this mitigation measure and verify overall acreage and ecological functions of the re-exposed substrate.

Consultant shall update the extent of rubble/consolidated pavement in the 7.3-acre mitigation area (cleared rubble area) in the 2015 pre-construction benthic habitat map (NSU, 2015) to the Year 1 post-construction condition using ArcGIS desk-top analysis and diver mapping/ reconnaissance surveys of habitat borders.

Consultant shall obtain high-resolution, geo-rectified aerial photography, and/or satellite imagery that captures the Year 1 post-construction condition from archival sources. If there are no adequate archival remote sensing datasets available at the time of the Year 1 post-construction survey, Consultant shall obtain aerial photography as described under **Task 56** below. Consultant shall compare the 2015 pre-construction benthic habitat polygons in ArcGIS to the Year 1 post-construction imagery and draw new polygon edges in GIS as necessary to update the map. Habitats that appear distinct from the 2015 pre-construction benthic habitat map shall be modified in ArcGIS and then refined based on qualitative field reconnaissance surveys and field mapping of habitat borders. Analysis shall focus on the borders between habitat types in the study area (shoal crest, rubble/sand, colonized pavement, rubble/consolidated pavement, and unconsolidated sediments).

Consultant shall conduct field reconnaissance surveys to qualitatively validate the distinct habitats drawn in ArcGIS and aid in determining habitat boundaries for map refinement. Divers shall note obvious habitat transitions while swimming predetermined courses spanning multiple habitats. Habitat borders shall be mapped by divers towing a buoy equipped with a GNSS receiver which wirelessly transmits corrected positions to a radio on the survey vessel. The receiving radio must be interfaced with ArcPad software on the survey vessel.

**Deliverable.** Consultant shall provide County with an updated habitat map in ArcGIS and calculate acreage of re-exposed rubble/colonized pavement habitat within the 7.3-acre mitigation area. Consultant shall prepare a summary report to accompany the Year 1 post-construction habitat map. Consultant and County will hold a meeting to discuss results of the Draft final report prior to submittal. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days completion of the Year 1 post-construction survey.

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**53. MITIGATION SUCCESS MONITORING- CREATION OF RUBBLE/COLONIZED PAVEMENT FROM CLEARING/RUBBLE REMOVAL- YEAR 2 POST-CONSTRUCTION BENTHIC HABITAT MAP**

Consultant shall update the extent of rubble/consolidated pavement in the 7.3-acre mitigation area (cleared rubble area) in the Year 1 post-construction habitat map to the Year 2 post-construction condition using ArcGIS desk-top analysis and diver mapping/reconnaissance surveys of habitat borders.

Consultant shall obtain high-resolution, geo-rectified aerial photography, and/or satellite imagery that captures the Year 2 post-construction condition from archival sources. If there are no adequate archival remote sensing datasets available at the time of the Year 2 post-construction survey, aerial photography shall be obtained as described under **Task 56** below. The 2015 pre-construction and Year 1 post-construction benthic habitat polygons shall be compared in ArcGIS to the Year 2 post-construction imagery and new polygon edges shall be drawn in GIS as necessary to update the map. Habitats that appear distinct from the Year 1 post-construction benthic habitat map shall first be modified in ArcGIS and then refined based on qualitative field reconnaissance surveys and field mapping of habitat borders. Analysis shall focus on the borders between habitat types in the study area (shoal crest, rubble/sand, colonized pavement, rubble/ consolidated pavement, and unconsolidated sediments).

Field reconnaissance surveys shall be performed to qualitatively validate the distinct habitats drawn during in ArcGIS and to aid in determining habitat boundaries for map refinement. Divers shall note obvious habitat transitions while swimming predetermined courses spanning multiple habitats. Habitat borders shall be mapped by divers towing a buoy equipped with a GNSS receiver which wirelessly transmits corrected positions to a radio on the survey vessel. The receiving radio must be interfaced with ArcPad software on the survey vessel.

**Deliverable.** Consultant shall provide an updated habitat map in ArcGIS and calculate acreage of re-exposed rubble/colonized pavement habitat within the project area. A summary report shall be prepared to accompany the Year 2 post-construction habitat map. Consultant and County will meet to discuss the draft final report prior to submittal. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Year 2 post-construction survey.



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**54. MITIGATION SUCCESS MONITORING- CREATION OF RUBBLE/COLONIZED PAVEMENT FROM CLEARING/RUBBLE REMOVAL- YEAR 3 POST-CONSTRUCTION BENTHIC HABITAT MAP**

Consultant shall update the entire 2015 pre-construction benthic habitat map (NSU, 2015) to the Year 3 post-construction condition using ArcGIS desk-top analysis, diver mapping/reconnaissance surveys of habitat borders, and permanent transect data.

Consultant shall obtain high-resolution, geo-rectified aerial photography, and/or satellite imagery that captures the Year 3 post-construction condition from archival sources. If there are no adequate archival remote sensing datasets available at the time of the Year 3 post-construction survey, aerial photography shall be obtained as described under **Task 56** below. The 2015 Pre-construction, Year 1, and Year 2 post-construction benthic habitat polygons shall be compared in ArcGIS to the Year 3 post-construction imagery and new polygon edges shall be drawn in GIS as necessary to update the map. Habitats that appear distinct from previous benthic habitat maps shall be modified in ArcGIS and then refined based on qualitative field reconnaissance surveys and field mapping of habitat borders. Analysis shall focus on the borders between habitat types in the study area (shoal crest, rubble/sand, colonized pavement, rubble/ consolidated pavement, and unconsolidated sediments).

Consultant shall perform field reconnaissance surveys to qualitatively validate the distinct habitats drawn during in ArcGIS and aid in determining habitat boundaries for map refinement. Divers shall note obvious habitat transitions while swimming predetermined courses spanning multiple habitats. Habitat borders shall be mapped by divers towing a buoy equipped with a GNSS receiver which wirelessly transmits corrected positions to a radio on the survey vessel. The receiving radio must be interfaced with ArcPad software on the survey vessel.

Sixteen (16) permanent monitoring sites shall be installed on re-exposed rubble/colonized pavement habitat and reference rubble/colonized pavement habitat during the Year 3 post-construction survey. Comparison of survey results between these two (2) areas (re- exposed habitat vs. reference rubble/consolidated pavement habitat) shall be used to determine whether the re-exposed rubble/consolidated pavement habitat is providing functions similar to the existing reference habitat. Eight (8) of the sites shall be established within the re-exposed rubble/colonized pavement habitat. Another eight (8) sites shall be established within rubble/colonized pavement habitat as serve as the reference community habitat. Due to the limited acreage of reference community habitat, the eight (8) rubble/colonized pavement habitat sites may be located in the turbidity mixing zone permitted for sand trap excavation and/or sand trap maintenance

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dredging events. The site locations shall be determined in consultation with FDEP staff prior to the Year 3 post-construction monitoring event. Locations shall be based on post-project habitat conditions and FDEP staff assessment.

Consultant shall establish three (3) parallel 20-m long transects spaced 10-m apart at each monitoring site during the Year 3 post-construction survey. Permanent markers (pins, iron rods, etc.) shall be installed at the start, middle (10-m mark), and end of each transect line at each site. GPS coordinates for each permanent transect shall be recorded.

Transect monitoring shall consist of quantitative photo surveys with functional group cover analysis and quadrat/belt transect surveys. High-definition digital still photographs of a quality sufficient to allow for post-collection analysis shall be taken along each of the three (3) 20-m transects at each site. A diver shall photograph the full length of one (1) side of each transect; the side on which photographs are taken shall be recorded so that the survey may be repeated during Year 5 post-construction if necessary. All photographs shall be taken from a constant distance of 40-cm above the bottom.

A quadrat/belt transect survey shall be conducted to document scleractinian coral species richness, colony size, density, and condition (presence of disease, bleaching, and *Cliona* spp.), and octocoral density and colony size at each site. For each monitoring event, 0.75-m<sup>2</sup> quadrats (0.75-m wide by 1-m long) shall be sampled along both sides of the middle 20-m transect at each site (N=20 quadrats per side). Sampling shall result in a total survey area of 30-m<sup>2</sup> (0.75-m + 0.75-m wide X 20-m long) per site. Every scleractinian coral colony within each quadrat shall be identified to species and size (maximum colony dimension) shall be measured to the nearest centimeter. Each octocoral within each quadrat shall be identified to genus, and its height shall be measured and assigned to one of the following four size classes: <5-cm, 5-25-cm, 25-50-cm, and >50-cm.

**Deliverable.** Consultant shall update the entire 2015 Pre-construction benthic habitat map (NSU, 2015) to the Year 3 post-construction condition using ArcGIS desk-top analysis, diver mapping/reconnaissance surveys, and permanent transect data. An updated habitat map in ArcGIS shall be prepared and the acreage of re-exposed rubble/colonized pavement habitat within the project area shall be calculated and reported.

The MMM Plan shall be updated to include the coordinates of the sixteen (16) permanent monitoring sites. A map of the sites shall be prepared and submitted to County, FDEP and USACE. The raw data and still photo libraries from the Year 3 post-construction survey shall be submitted in digital format to FDEP and County within forty-five (45) days of completion of the Year 3 post-construction survey. Consultant shall prepare a summary

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report to accompany the Year 3 post-construction habitat map. The Year 3 report shall provide a mitigation success analysis to determine if the acreage of rubble/consolidated pavement in the cleared impact area is at least 6.6 acres [ninety (90%) of the predicted 7.3 acres of exposure] and major functional groups in the exposed rubble/colonized pavement area are at least seventy-five (75%) similar to the rubble/colonized pavement reference sites. If mitigation success is achieved, no monitoring shall be required at Year 5 post-construction.

Consultant and County will meet to discuss the draft final report prior to submittal. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Year 3 post-construction survey.

**55. MITIGATION SUCCESS MONITORING- CREATION OF RUBBLE/COLONIZED PAVEMENT FROM CLEARING/RUBBLE REMOVAL- YEAR 5 POST-CONSTRUCTION BENTHIC HABITAT MAP (AUTHORIZATION WITHHELD)**

If mitigation success is not achieved at Year 3 post-construction (**Task 0**), Consultant shall update the entire 2015 pre-construction benthic habitat map (NSU, 2015) to the Year 5 post-construction condition using ArcGIS desk-top analysis, diver mapping/reconnaissance surveys of habitat borders, and permanent transect data.

Consultant shall obtain high-resolution, geo-rectified aerial photography, and/or satellite imagery which captures the Year 3 post-construction condition shall be obtained from archival sources. If there are no adequate archival remote sensing datasets available at the time of the Year 5 post-construction survey, aerial photography shall be obtained as described under **Task 56** below. The 2015 Pre-construction and Year 3 post-construction benthic habitat polygons shall be compared in ArcGIS to the Year 5 post-construction imagery, and new polygon edges shall be drawn in GIS as necessary to update the map. Habitats which appear distinct from the previously mapped benthic habitats shall be modified in ArcGIS and then refined based on qualitative field reconnaissance surveys and field mapping of habitat borders. Analysis shall focus on the borders between habitat types in the study area (shoal crest, rubble/sand, colonized pavement, rubble/consolidated pavement, and unconsolidated sediments).

Field reconnaissance surveys shall be performed to qualitatively validate the distinct habitats drawn during in ArcGIS and to aid in determining habitat boundaries for map refinement. Divers shall note obvious habitat transitions while swimming predetermined courses spanning multiple habitats. Habitat borders shall be mapped by divers towing a buoy equipped with a GNSS receiver which wirelessly transmits corrected positions to a

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radio on the survey vessel. The receiving radio is interfaced with ArcPad software on the survey vessel.

The sixteen (16) monitoring sites installed during the Year 3 post-construction survey shall be surveyed during the Year 5 post-construction survey. Comparison of survey results between these reference and re-exposed habitats shall be used to determine whether the re-exposed rubble/consolidated pavement habitat is providing functions similar to the existing reference habitat.

Transect monitoring shall consist of quantitative photo surveys with functional group cover analysis and quadrat/belt transect surveys. High-definition digital still photographs of a quality sufficient to allow for post-collection analysis shall be taken along each of the three (3) 20-m transects at each site. A diver shall photograph the full length of one (1) side of each transect; the side on which photographs are taken shall be recorded so that the survey may be repeated during the Year 5 post-construction if necessary. All photographs shall be taken from a constant distance of 40-cm above the bottom.

A quadrat/belt transect survey shall be conducted to document scleractinian coral species richness, colony size, density, and condition (presence of disease, bleaching, and *Cliona* spp.), and octocoral density and colony size at each site. For each monitoring event, 0.75-m<sup>2</sup> quadrats (0.75-m wide by 1-m long) shall be sampled along both sides of the middle 20-m transect at each site (N=20 quadrats per side). Sampling shall result in a total survey area of 30-m<sup>2</sup> (0.75-m + 0.75-m wide X 20-m long) per site. Every scleractinian coral colony within each quadrat shall be identified to species, and its size (maximum colony dimension) shall be measured to the nearest centimeter. Each octocoral within each quadrat shall be identified to genus, and its height shall be measured and assigned to one (1) of the following four (4) size classes: <5-cm, 5-25-cm, 25-50-cm, and >50-cm.

**Deliverable.** Consultant shall update the 2015 Pre-construction benthic habitat map (NSU, 2015) to the Year 5 post-construction condition using ArcGIS desk-top analysis, diver mapping/reconnaissance surveys, and permanent transect data and prepare an updated habitat map in ArcGIS. Consultant shall calculate and report the acreage of re-exposed rubble/colonized pavement habitat within the project area.

The raw data and still photo libraries from the Year 5 post-construction survey shall be submitted in digital format to FDEP and County within forty-five (45) days of completion of the Year 5 post-construction survey. A summary report shall be prepared to accompany the Year 5 post-construction habitat map. The Year 5 report shall provide a mitigation success analysis to determine if the acreage of rubble/consolidated pavement in the



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cleared impact area is at least 6.6 acres (ninety (90%) of the predicted 7.3 acres of exposure) and major functional groups in the exposed rubble/colonized pavement area are at least seventy-five (75%) similar to the rubble/colonized pavement reference sites.

Consultant and County will meet to discuss the draft final report prior to submittal. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completing the Year 5 post-construction survey.

**56. CONTINGENCY – AERIAL PHOTOGRAPHY FOR MITIGATION SUCCESS MONITORING (AUTHORIZATION WITHHELD) – YEARS 1, 2, 3, and 5**

Consultant shall acquire updated, controlled digital color aerial photography at negative scales of 1"=500'. The photography shall be used to update annual project area habitat maps at Years 1 through 3 (and Year 5 if mitigation success is not achieved at Year 3) if there is no existing archival imagery for these years. The coverage area is the shorelines north of the inlet, the sand trap location, and the rubble pile. Consultant shall attempt to meet clear water, low tide, and low wave conditions during the flights. Since the proposed flight lines are in the Ft. Lauderdale Airport air space, some compromises in project specifications may be necessary. The work products shall be rectified and digital. The photo base shall be utilized in development of annual benthic habitat maps.

**Deliverable.** Consultant shall provide georeferenced, tiff format, digital aerial photography products with the projected coordinate system and datum used to geo-reference each image and standard compliant metadata.

**H. CORAL NURSERY MITIGATION – RELOCATING CORALS OF OPPORTUNITY AND MANAGING CORAL NURSERY REEFS (FDEP Permit Condition No .32; MMM Plan Section 4.3)**

Annual collection and relocation of corals of opportunity to the mitigation boulder reefs is required as a component of the coral nursery mitigation program. The FDEP Plan requires relocation of at least three thousand (3,000) corals of opportunity within ten (10) years of construction of the coral nursery artificial reefs. A-8 Scope covers the first four (4) years of coral collection and transplantation to the coral nursery artificial reefs and is based on relocating one thousand (1,000) colonies [average of two hundred fifty (250) colonies/year] over this four-year period. Survival, health, and reproductive status of a subset of coral colonies in each cohort transplanted to each coral nursery boulder reef shall be tracked over time (Time zero, Year 1, and Year 3 post-transplantation).

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**57. BASELINE CORAL HARVEST/RELOCATION, MONITORING AND NURSERY MAINTANENCE**

**57.1 Baseline Coral Harvest/Relocation- Cohort 1**

Consultant shall plan for and harvest approximately two hundred fifty (250) corals of opportunity and relocate these colonies to the coral nursery artificial reefs (Cohort 1). Coral transplantation protocol shall follow the specifications in the MMM Plan. Corals of opportunity shall be transplanted to boulders at their respective mitigation reef nursery sites. Each boulder to which colonies are transplanted will be tagged so that cohorts of transplants (colonies collected during the same year) can be identified. All corals on an individual boulder shall be of the same cohort.

**57.2 Monitoring the Survival and Health of Relocated Corals of Opportunity- Baseline Survey Cohort 1 (Time Zero)**

Consultant shall conduct the baseline (Time Zero) survey of Cohort 1 on the coral nursery boulder reefs. For monitoring the survival and health of colonies, the number of tagged boulders for each cohort will represent a minimum of twenty-five (25%) of colonies within the cohort. During the Time Zero survey of Cohort 1, divers shall identify colonies to species, measure live tissue (maximum diameter), and record colony condition according to the Plan requirements.

**57.3 Monitoring the Reproductive Status of Relocated Corals of Opportunity- Baseline Survey Cohort 1 (Time Zero)**

Consultant shall document the reproductive status of ten percent (10%) of Cohort 1 colonies (different from the subset monitored for health and survival under **Task 57.2**) through histological analysis at the time of collection (baseline) according to the protocol outlined in the FDEP Plan.

**Deliverables.** Within sixty (60) days of completing collection of the Cohort 1 colonies and the Time Zero monitoring event, Consultant will submit all raw data on coral condition, size, species, survival, and health directly and concurrently (simultaneously) to FDEP, USACE, and County in electronic format. Data shall be submitted either on a portable hard drive or via an FTP site.

**58. YEAR 1 CORAL HARVEST/RELOCATION, MONITORING AND NURSERY MAINTANENCE**

**58.1 Coral Harvest/Relocation- Cohort 2**

Consultant, through a qualified employee or subconsultant, shall plan for, harvest, and relocate approximately two hundred fifty (250) corals of opportunity

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(Cohort 2) to the coral nursery artificial reefs. Coral transplantation protocol shall follow the specifications in the MMM Plan. Corals of opportunity shall be transplanted to boulders at their respective mitigation reef nursery sites. Each boulder to which colonies are transplanted will be tagged so that cohorts of transplants (colonies collected during the same year) can be identified. All corals on an individual boulder shall be of the same cohort.

**58.2 Monitoring the Survival and Health of Relocated Corals of Opportunity- Baseline Survey (Time Zero) for Cohort 2**

Consultant shall conduct the baseline (Time Zero) survey of Cohort 2 of transplanted corals. For monitoring the survival and health of colonies, the number of tagged boulders for each cohort will represent a minimum of twenty-five (25%) of colonies within the cohort. Divers shall identify colonies to species, measure live tissue (maximum diameter), and record colony condition according to the Plan requirements.

**58.3 Monitoring the Reproductive Status of Relocated Corals of Opportunity- Baseline Survey Cohort 2 (Time Zero)**

Consultant shall document the reproductive status of ten (10%) of the Cohort 2 colonies (different from the subset monitored for health and survival under **Task 58.2**) through histological analysis at the time of collection (baseline) according to the protocol in the MMM Plan.

**58.4 Monitoring the Survival and Health of Relocated Corals of Opportunity- Year 1 Post-Transplantation Survey for Cohort 1**

Consultant shall conduct the Year 1 post-transplantation survey of Cohort 1. Monitoring methods shall follow the protocol in the FDEP Plan.

**58.5 Tracking the Recruitment of Scleractinian Corals to the Nursery Boulder Reefs- Year 1 Post-Transplantation Survey for Cohort 1**

Recruitment (sexual) of scleractinian corals to the mitigation reef shall be assessed during the Year 1 post-transplantation survey of Cohort 1. The area within 25-cm of all relocated colonies on tagged boulders shall be searched and all coral recruits (non-transplanted colonies greater than 2-cm in maximum dimension) shall be recorded and identified to the lowest taxonomic level possible (to species, if possible).

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**58.6 Cleaning the Surfaces of Nursery Boulder Reefs**

Consultant shall conduct annual cleaning of the nursery boulder reefs to reduce the overgrowth of turf and macroalgae on reef boulders. The cleaning event shall be conducted two (2) weeks prior to the August/September spawning event during the Year 1 post-transplantation survey of Cohort 1. Divers shall use wire brushes to remove turf and macroalgae from 25-cm diameter areas around each transplanted coral colony at each boulder reef.

**58.7 Active Management of Coral Nursery Boulder Reefs**

Consultant shall conduct an annual collection and relocation of long-spined sea urchins (*Diadema antillarum*) during the Year 1 post-transplantation survey of Cohort 1. Urchins shall be collected from the rubble habitats at the spoil shoal during collection of corals of opportunity. Relocation shall occur in summer months prior to annual coral spawning events.

**Deliverables.** Within sixty (60) days of completing collection of the Cohort 2 colonies, the Time Zero monitoring event of Cohort 2, and the Year 1 post-transplantation survey of Cohort 1, Consultant will submit all raw data on coral condition, size, species, survival and health to FDEP, USACE, and County in electronic format. Data shall be submitted on a portable hard drive or via an FTP site. Consultant shall prepare a final report. Consultant and County will meet to discuss results of a draft of the final report prior to submittal. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within sixty (60) days of completion of the Year 1 post-transplantation survey of Cohort 1 and Time Zero survey of Cohort 2.

**59. YEAR 2 CORAL HARVEST/RELOCATION, MONITORING AND NURSERY MAINTENANCE**

**59.1 Coral Harvest/Relocation- Cohort 3**

Consultant shall plan for, harvest, and relocate approximately two hundred fifty (250) corals of opportunity (Cohort 3) to the coral nursery artificial reefs. Coral transplantation protocol shall follow the specifications in the MMM Plan. Corals of opportunity shall be transplanted to boulders at their respective mitigation reef nursery sites. Each boulder to which colonies are transplanted will be tagged so that cohorts of transplants (colonies collected during the same year) can be identified. All corals on an individual boulder shall be of the same cohort.



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**59.2 Monitoring the Survival and Health of Relocated Corals of Opportunity- Baseline Survey (Time Zero) for Cohort 3**

Consultant shall conduct the baseline (Time Zero) survey of Cohort 3 on the coral nursery boulder reefs. the number of tagged boulders for each cohort will represent a minimum of twenty-five (25%) of colonies within the cohort. During the survey, divers shall identify colonies to species, measure live tissue (maximum diameter), and record colony condition according to the Plan requirements.

**59.3 Monitoring the Reproductive Status of Relocated Corals of Opportunity- Baseline Survey Cohort 3 (Time Zero)**

Consultant shall document the reproductive status of ten (10%) of the Cohort 3 colonies (different from the subset monitored for health and survival under **Task 59.2**) through histological analysis at the time of collection (baseline) according to the protocol in the FDEP Plan.

**59.4 Monitoring the Survival and Health of Relocated Corals of Opportunity- Year 1 Post-Transplantation Survey for Cohort 2**

Consultant shall conduct the Year 1 post-transplantation survey of Cohort 2 on the coral nursery boulder reefs. Monitoring methods shall follow the protocol in the FDEP Plan.

**59.5 Tracking the Recruitment of Scleractinian Corals to the Nursery Boulder Reefs- Year 1 Post-Transplantation Survey for Cohort 2**

Recruitment (sexual) of scleractinian corals to the mitigation reef shall be assessed during the Year 1 post-transplantation survey of Cohort 2. The area within 25-cm of all relocated colonies on tagged boulders shall be searched and all coral recruits (non-transplanted colonies greater than 2-cm in maximum dimension) shall be recorded and identified to the lowest taxonomic level possible (to species, if possible).

**59.6 Cleaning the Surfaces of Nursery Boulder Reefs**

Consultant shall conduct annual cleaning of the nursery boulder reefs to reduce the overgrowth of turf and macroalgae on reef boulders. The cleaning event shall be conducted two (2) weeks prior to the August/September spawning event during the Time Zero survey of Cohort 3/Year 1 post-transplantation survey of Cohort 2. Divers shall use wire brushes to remove turf and macroalgae from 25-cm diameter areas around each transplanted coral colony at each boulder reef.

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**59.7 Active Management of Coral Nursery Boulder Reefs**

Consultant shall conduct an annual collection and relocation of long-spined sea urchins (*D. antillarum*) during the Year 1 post-transplantation survey of Cohort 2. Urchins shall be collected from the rubble habitats at the spoil shoal during collection of corals of opportunity. Relocation shall occur in summer months prior to annual coral spawning events.

**Deliverables.** Within sixty (60) days of the Cohort 3 completing collection and the Time Zero monitoring event and the Cohort 2 Year 1 post-transplantation survey, Consultant will submit all raw data on coral condition, size, species, survival and health to FDEP, USACE, and County in electronic format. Data shall be submitted on a portable hard drive or via an FTP site. Consultant shall prepare a report. Consultant and County will meet to discuss a draft of the final report prior to submittal. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Cohort 2 Year 1 cohort transplantation and Cohort 3 time zero surveys.

**60. YEAR 3 CORAL HARVEST/RELOCATION, MONITORING AND NURSERY MAINTANENCE**

**60.1 Coral Harvest/Relocation- Cohort 4**

Consultant shall plan for, harvest, and relocate approximately two hundred fifty (250) corals of opportunity (Cohort 4) and to the coral nursery artificial reefs. Coral transplantation protocol shall follow the specifications in the MMM Plan. Corals of opportunity shall be transplanted to boulders at their respective mitigation reef nursery sites. Each boulder to which colonies are transplanted will be tagged so that cohorts of transplants (colonies collected during the same year) can be identified. All corals on an individual boulder shall be of the same cohort.

**60.2 Monitoring the Survival and Health of Relocated Corals of Opportunity- Baseline Survey Cohort 4 (Time Zero)**

Consultant shall conduct the baseline (Time Zero) survey of Cohort 4 on the coral nursery boulder reefs. The number of tagged boulders for each cohort will represent a minimum of twenty-five (25%) of colonies within the cohort. During the Time Zero survey, divers shall identify colonies to species, measure live tissue (maximum diameter), and record colony condition according to the Plan requirements.

**60.3 Monitoring the Reproductive Status of Relocated Corals of Opportunity- Baseline Survey Cohort 4 (Time Zero) and Year 3 Post-Transplantation Survey of**

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**Cohort 1**

Consultant shall document the reproductive status of ten percent (10%) of the Cohort 4 colonies (different from the subset monitored for health and survival under **Task 58.2**) and ten (10%) of the Cohort 1 colonies (Year 3 post-transplantation) through histological analysis at the time of collection (baseline) according to the protocol outlined in the Plan.

**60.4 Monitoring the Survival and Health of Relocated Corals of Opportunity- Year 3 Post-Transplantation Survey of Cohort 1 and Year 1 Post-Transplantation Survey of Cohort 3**

Consultant shall conduct the Year 1 post-transplantation survey of Cohort 3 and Year 3 post-transplantation survey of Cohort 1 on the coral nursery boulder reefs. Monitoring methods shall follow the protocol in the MMM Plan.

**60.5 Tracking the Recruitment of Scleractinian Corals to the Nursery Boulder Reefs- Year 3 Post-Transplantation Survey of Cohort 1/Year 1 Post-Transplantation Survey of Cohort 3.**

Recruitment (sexual) of scleractinian corals to the mitigation reef shall be assessed during the Year 1 post-transplantation survey of Cohort 3. The area within 25-cm of all relocated colonies on tagged boulders shall be searched and all coral recruits (nontransplanted colonies greater than 2-cm in maximum dimension) shall be recorded and identified to the lowest taxonomic level possible (to species, if possible).

**60.6 Cleaning the Surfaces of Nursery Boulder Reefs**

Consultant shall conduct annual cleaning of the nursery boulder reefs to reduce the overgrowth of turf and macroalgae on reef boulders. The cleaning event shall be conducted two (2) weeks prior to the August/September spawning event during the Year 1 post-transplantation survey of Cohort 3/Year 3 post-transplantation survey of Cohort 1. Divers shall use wire brushes to remove turf and macroalgae from 25-cm diameter areas around each transplanted coral colony at each boulder reef.

**60.7 Active Management of Coral Nursery Boulder Reefs.**

Consultant shall conduct an annual collection and relocation of long-spined sea urchins (*D. antillarum*) during the Year 1 post-transplantation survey of Cohort 3/Year 3 post-transplantation survey of Cohort 1. Urchins shall be collected from the rubble habitats at the spoil shoal during collection of corals of

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opportunity. Relocation shall occur in summer months prior to annual coral spawning events.

**Deliverables.** Within sixty (60) days of completing the Cohort 4 collection and Time Zero monitoring event, Year 1 post-transplantation survey of the Cohort 3, and Year 3 post-transplantation survey of Cohort 1, Consultant will submit all raw data on coral condition, size, species, survival and health to FDEP, USACE, and County in electronic format. Data shall be submitted on a portable hard drive or via an FTP site. Consultant shall write a final report. Consultant and County will meet to discuss a draft of the final report prior to submittal. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Year 1 cohort transplantation and time zero survey.

**PART III: COASTAL ENGINEERING SERVICES – FIRST SAND BYPASS EVENT**

**61. PLANNING, ENGINEERING, DESIGN, and PERMIT MANAGEMENT (AUTHORIZATION WITHHELD)**

**61.1 Engineering-Level Design.** Consultant shall utilize the most recent physical monitoring surveys to prepare an engineering-level design. Consultant will estimate the volume of material available in the sand trap and develop the planned location(s) and volume(s) of beach fill placement.

**Deliverable.** Consultant shall provide a summary memo of findings.

**61.2 Pre-construction Submittals.** Consultant shall prepare and submit pre-construction submittals as required by the FDEP and USACE permits.

**Deliverable.** Deliverables will include an electronic copy of the submittals to the FDEP and USACE.

**62. GEOTECHNICAL INVESTIGATION (AUTHORIZATION WITHHELD)**

**62.1 Data Collection.** Consultant shall collect ten (10) Vibracores within the sand trap to characterize the sediment. The Vibracores will be collected in a manner that the expected sand deposit and anticipated dredge horizon for the first sand bypass event will be represented.

**62.2 Laboratory Testing and Analysis.** Consultant shall photograph the vibracores and classify the sediment layers. Representative sediment samples will be analyzed for



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Munsell color, carbonate content, and grain size.

**Deliverable.** Deliverables are photographs of the vibracores, core logs, a field data collection report, laboratory results, and a summary memo of the findings.

**63. FINAL DESIGN and PLANS and SPECIFICATIONS (AUTHORIZATION WITHHELD)**

63.1 **Construction Plans.** Consultant shall prepare construction plans for the first maintenance dredging of the sand trap. Construction plans shall include project aerials, bathymetric charts, applicable geotechnical data, survey monumentation, and other relevant information.

63.2 Consultant shall prepare elements of the Project Manual that include the Bid Schedule, the Technical Specifications, and the Environmental Protection Requirements.

**Deliverables.** Consultant shall provide County with reproducible electronic (PDF) files of the final plans and project manual. Consultant shall provide up to three (3) revisions of the plans and specifications as may be required by County, state, and federal reviews.

**64. BID SUPPORT (AUTHORIZATION WITHHELD)**

64.1 Consultant shall assist County in conducting one (1) pre-bid conference, at which Consultant shall be available to answer technical and engineering questions.

64.2 Consultant shall provide timely responses to prospective bidders by using written addenda. Consultant shall prepare and distribute as necessary addenda approved by County.

64.3 Within seven (7) days of bid opening, Consultant shall provide County an evaluation of the bids for technical completeness and a written recommendation to County with respect to award of the contract. The non-technical portion of the bid submittals shall be evaluated by County.

**Deliverables.** Deliverables include a PDF pre-bid presentation, electronic written responses to bidders, and a recommendation memo to County.

**65. CONSTRUCTION SERVICES (AUTHORIZATION WITHHELD)**

**65.1 CONSTRUCTION CONTRACT ADMINISTRATION (Twelve (12) Weeks)**

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65.1.1 **Pre-construction Conference.** Consultant and Contract administrator shall review the Project Permits with the Contractor prior to commencement of the activity authorized by the Permits. Consultant shall coordinate, prepare for, and attend a pre-construction conference to review the construction methodology, and the specific conditions and monitoring requirements of the Permits with the Contractor, the Contractor's subcontractors, FDEP and FWC staff, County's marine turtle permit holder, and other involved parties and stakeholders. Consultant shall conduct a brief overview of the project and shall reiterate communications and reporting protocols for the duration of Contractor mobilization, construction, and demobilization activities. The conference shall be held at least seven (7) days prior to the commencement date of construction. Consultant shall coordinate with the agencies at least twenty-one (21) days prior to the intended commencement date. A minimum seven (7) days advance written notification shall be provided to the parties advising of the date, time, location, and teleconference number of the pre-construction conference. Consultant shall subsequently seek a notice-to-proceed from FDEP which has been withheld pending completion of the pre-construction conference.

**Deliverable:** Deliverables include written notification of planned pre-construction meeting details, and meeting minutes.

65.1.2 **Notice of Commencement.** At least forty-eight (48) hours prior to commencement of beach and groin activity authorized by the state and federal permits, Consultant shall submit to County, FDEP Beaches, Inlets and Ports Program, the USACE, and the appropriate District office of FDEP, a written notice (via email) of commencement of construction indicating the actual start date and the expected completion date and an affirmative statement that County and the Contractor, if one is to be used, have read the general and specific conditions of the permit and understand them.

**Deliverable.** Deliverables include one (1) electronic written notice.

65.1.3 **Notice of Deviations.** Consultant shall notify County and FDEP Beaches, Inlets and Ports Program in writing (via email) of any anticipated deviation from FDEP permit prior to implementation so that FDEP can determine whether a modification of the permit is required pursuant to Rule 62B-49.008, F.A.C.

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**Deliverable.** Deliverables are one (1) electronic written notice.

- 65.1.4 **Notice of Noncompliance.** Consultant shall notify immediately (via email) County of any noncompliance with any condition or limitation specified in the permits. The written report shall contain a description of and cause of noncompliance; and the period of noncompliance, including dates and times; or, 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. All notices of noncompliance from Consultant will be reported to County, who will report to the State and Federal agencies, as appropriate.

**Deliverable.** Deliverables include the written notice.

- 65.1.5 **Certification of Completion.** Within sixty (60) days after completion of construction authorized by the Permit, Consultant shall submit to County for submission to the FDEP Beaches, Inlets and Ports Program and the USACE a written statement of completion and certification by a registered professional engineer. This certification shall state that the activities authorized by the permits have been performed in compliance with the plans and specifications approved as a part of the permits, and all conditions of the permits; or shall describe any deviations from the plans and specifications, and all conditions of the permits. When the completed activity differs substantially from the permitted plans, any substantial deviations shall be noted and explained on two (2) copies of as-built drawings.

**Deliverable.** Deliverables include the one (1) hard copy and one (1) electronic copy of Consultant's certification and five (5) original copies of the as-built drawings, if necessary.

- 65.1.6 **Review of Contractor's Pre-Construction Submittals.** Consultant shall comment on and coordinate the acceptance and distribution of the following submittals required by the CONTRACTOR:
- Daily Report
  - Operations Plan
  - Quality Control Plan
  - Structure Inspection and Vibration Monitoring and Control Plan

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- Environmental Protection Plan
- Storm Contingency Plan
- Vessel Certification
- Accident Prevention Plan

**Deliverables.** Deliverables shall include email correspondence that documents were reviewed and accepted.

- 65.1.7 **Review of Contractor's Requests for Payment.** Consultant shall review Contractor progress and pay surveys, weigh tickets, volume calculations, and pay requests for all work elements. Consultant shall review for accuracy of computation and completeness, the Contractor's periodic payment invoices and will make recommendations to County. Consultant shall assist County in evaluating the periodic and final payments to the Contractor. Consultant will review pay requests and make a recommendation to County regarding payment within five (5) days of receipt of the pay request. Consultant shall assist County in assembling the documentation needed for State reimbursement or cost sharing.

**Deliverable.** The deliverables include letters of recommendation from Consultant to County regarding payment to the Contractor.

- 65.1.8 **Records Management.** Consultant shall ensure that a copy of the permit, complete with all conditions, attachments, modifications, and time extensions, and the approved plans and specifications shall be kept at the work site of the permitted activity. Consultant shall maintain detailed field logbooks and construction files (notebooks and file folders with copies of all documentation).

**Deliverable.** Upon completion of construction activities, Consultant shall conduct final file management and transfer to County one (1) copy of the files for archival of records.

- 65.1.9 **Project Closeout.** Following notification by the Contractor that construction activities are complete and all payment sections have been approved and accepted by County, Consultant shall conduct a final visual inspection of the work and staging areas and prepare a punch list of remaining equipment and material to be removed from the project sites and the activities required for restoration of access and staging areas. This



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list shall be furnished to County and Contractor to ensure control of final clean up.

- 65.1.10 Following notice from the Contractor that final clean-up has been completed, Consultant shall conduct a final inspection of the beach and staging areas. If the Contractor's equipment, construction fencing, supplies, and debris are completely removed, and access and staging areas restored, then Consultant shall forward a recommendation to County that final payment be made to the Contractor.

**Deliverable.** Deliverables include a punch list and recommendation for final payment.

**65.2 CONSTRUCTION OBSERVATIONS (12 Weeks)**

- 65.2.1 **Daily On-site Inspection.** Consultant shall designate Site Representatives to be present at the beach fill sites, access corridors or staging areas up to ten (10) hours per day for the duration of construction activities. Observations will be conducted to ensure that construction complies with the construction plans, contract documents, and permit authorizations granted for the work. The Site Representative will monitor daily progress of the work and track Contractor delays through the duration of the project, from mobilization through demobilization from the Project site.
- 65.2.2 **On-Call & Periodic On-Site Representation.** Consultant shall be 'on-call' basis throughout the period of construction to monitor construction activities and address questions and required administrative matters.
- 65.2.3 Through the Site Representatives, Consultant shall monitor daily progress of the work, track the Contractor activities, and notify County as appropriate.
- 65.2.4 Consultant shall obtain and review the Contractor's quality control reports (daily reports) through the duration of the project, from mobilization through demobilization from the project site.
- 65.2.5 Consultant shall designate Project Engineer(s), who shall visit the site on weekly throughout the period of construction. The Project Engineer(s) shall serve as liaison between the Contractor and County during all phases

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of construction. The Project Engineer(s) shall be available to address questions concerning the plans and specifications and address other issues requiring coordination or liaison.

65.2.6 The Project Engineer(s) and Site Representative(s) shall attend periodic progress meetings with the Contractor as appropriate during construction. It is expected that progress meetings will be held by the Contractor no less frequently than one (1) weekly during the period of construction.

65.2.7 Consultant shall email a weekly report to County that summarizes the progress of construction and compliance with the permits and Contract, including workforce, amount of work performed and by whom, equipment, problems encountered, method to correct problems, errors, omissions, deviations from Contract Documents, and weather conditions.

**Deliverable.** Deliverables include on-site presence during construction, daily reports, documentation of construction operations (including photographs), and a weekly summary report of construction progress.

**66. CONTINGENCY – CONSTRUCTION SERVICES (Authorization Withheld)**

**66.1 CONSTRUCTION CONTRACT ADMINISTRATION (Four (4) Weeks)**

This task provides beach fill services in addition to those outlined in **Task 65.1**. Consultant shall provide four (4) additional weeks (7-day weeks) of construction contract administration services, if needed.

**66.2 CONSTRUCTION OBSERVATION (Four (4) Weeks)**

This task shall provide beach fill services in addition to those outlined in **Task 65.2**. Consultant shall provide four (4) additional weeks (7-day weeks) of construction observation services, if needed.

**67. WATER QUALITY MONITORING (TWELVE (12) Weeks) (AUTHORIZATION WITHHELD)**

67.1 **Pre-Construction Submittals.** Consultant shall prepare and submit the turbidity monitoring scope of work and turbidity monitor qualifications consistent with the FDEP Permit.

67.2 **Daily Monitoring.** Consultant will conduct daily water quality monitoring as required by FDEP Permit while dredging is occurring for the project. When

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dredging activities occurring, Consultant shall be prepared to provide this service seven (7) days a week. This task provides for eight (8) weeks of water quality monitoring services.

- 67.3 **Weekly Report Submittals to FDEP.** Consultant shall submit weekly summary reports of water quality data and any water quality violations as required by the FDEP Permit.

**Deliverables:** Deliverables include electronic submittals to FDEP, including the turbidity monitor qualifications, the turbidity monitoring scope of work, daily reports, and weekly summary reports.

**68. SEDIMENT QA/QC MONITORING and COMPLIANCE (AUTHORIZATION WITHHELD)**

For sand placed along the beach, Consultant shall collect representative sand samples approximately 500-ft alongshore intervals within the fill area. A grain-size distribution curve will be formulated for each sample using the applicable ASTM standards. Consultant shall evaluate the samples for compliance with the Sediment QA/QC Plan and prepare a report for submittal to FDEP.

**Deliverables.** Deliverables are an engineering memo summarizing findings from the sampling and laboratory work. A statistical report and distribution curve for each sample tested will also be prepared and included with the engineering memo.

**69. POST-CONSTRUCTION REPORT (AUTHORIZATION WITHHELD)**

Consultant shall prepare a post-construction report which addresses all aspects of the sand bypass project, as constructed. Items of interest include documentation of Contractor productivity, construction and placement techniques, weather conditions during execution of the work, and factors affecting the Contractor's productivity. Additionally, the report will summarize the bid results, elements of the total cost to construct, public interest issues occurring during the period of construction, and other factors potentially affecting future operation and performance of the sand bypass project. Consultant shall assess, analyze, and summarize Contractor related data obtained from daily reports, project specific reporting submittals, internal reports, surveys, etc. If appropriate, such databases will be formulated in a graphic format for visual interpretation by the layman. Documentation of the as-built conditions of project features based upon both Contractor and Consultant surveys will be included.

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**Deliverable.** Deliverables to County and FDEP are one (1) PDF copy of the report with appendices. The PDF copy of the report will be provided on electronic media (CD, thumb drive, ftp site, etc.) suitable for distribution.

**PART IV: ENVIRONMENTAL SERVICES – FIRST SAND BYPASS EVENT**

*(FDEP Permit Condition No. 27b; MMM Plan Section 3.2)*

**70. PERMANENT MONITORING STATION ESTABLISHMENT AND BASELINE HARDBOTTOM MONITORING- SAND TRAP MAINTENANCE DREDGING MIXING ZONE (AUTHORIZATION WITHHELD)**

Consultant shall install six (6) permanent monitoring stations in the colonized pavement and rubble/colonized payment habitats within the 150-m turbidity mixing zone around the sand trap. The locations of the six (6) permanent stations will be determined in consultation with FDEP (Section 3.2.1).

Consultant shall establish a single 50-m long transect at each monitoring station and install permanent markers (pins, iron rods, etc.) at the start, end, and middle (25-m mark) of each transect. The pre-construction baseline survey of the six (6) stations shall consist of interval sediment depth measurements, quantitative still photography with functional group analysis using a point count method, belt transects for stony coral and octocoral density by species, and digital video transects. All field survey activities shall be performed in accordance with the MMMPlan.

**Deliverable.** Pre-construction data shall be entered into a Microsoft Access database for data management and QA/QC review. Individual datasets shall be exported to Microsoft Excel workbooks. All field datasheets shall be reviewed and scanned to PDF format for submittal with the raw data deliverable. At least thirty (30) days prior the commencement of sand trap excavation and within sixty (60) days of completion of the pre-construction monitoring, Consultant shall submit all raw pre-construction (baseline) data, including the still photo transect images and digital video transects, point count raw and summary data, GIS shape files of the six (6) permanent monitoring stations, and a map which shows the locations of the six (6) monitoring stations and benthic habitats. The data shall be submitted to County and FDEP in electronic format on a single portable hard drive or via an FTP site.

**71. WEEKLY DURING-CONSTRUCTION SEDIMENT SURVEYS DURING THE FIRST SAND TRAP MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall conduct weekly surveys at the six (6) permanent stations during maintenance dredging operations. All field monitoring tasks shall be conducted in



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accordance with the MMM Plan. County expects that weekly surveys will require one (1) day/week to complete.

The weekly during-construction surveys shall consist of interval sediment depth measurements at 1-m intervals along each transect inclusive of sand patches. Three (3) sediment depth measurements shall be taken at each 1-m interval: one (1) measurement on the center of the line, one (1) 0.5-m to the left of the line, and another 0.5-m to the right of the line. Depth measurements will be recorded to the nearest half centimeter (e.g., 0-cm, 0.5-cm, 1-cm, 1.5-cm, etc.), and measurements greater than 30-cm shall be recorded as greater than 30-cm.

This task assumes that maintenance dredging extends up a maximum of ten (10) weeks; therefore, a maximum of ten (10) field days during construction is required.

**Deliverable.** Consultant shall submit the weekly raw sedimentation monitoring data directly and concurrently to County and FDEP in electronic format within five (5) days of completion of each weekly survey. Data shall be submitted in Microsoft Excel format via email or uploaded to an FTP site. The final during-construction sediment monitoring dataset shall be provided within five (5) days of completion of the first maintenance dredging event with a digital copy of the scanned field datasheets (PDF file) on a portable hard drive or via an FTP site.

**72. CONTINGENCY DURING-CONSTRUCTION SEDIMENTATION TRIGGERED MONITORING DURING THE FIRST SAND TRAP MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

If during-construction weekly sediment depth measurements at any of the six (6) permanent stations indicate sedimentation impacts, Consultant shall include digital video transect monitoring. The MMM Plan defines sedimentation impact as an increase in mean sediment depth of 1-cm or more above mean baseline sediment depth. Qualitative video surveys shall be implemented during the next weekly during-construction survey at the affected transect(s). The digital video transect protocol changes shall remain in effect until either the post-construction survey is conducted, or weekly sediment depth data at the affected transect(s) indicate that impacts have receded (defined as the return of mean sediment depth to or below the mean sediment depth recorded during the pre-construction baseline survey).

This task assumes that qualitative video transect surveys have been added at three (3) or more permanent stations. The cost is based upon an increase in cost per weekly event to conduct the additional video transects for a maximum of nine (9) weekly

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during-construction surveys. If qualitative video transects surveys are triggered at only one (1) or two (2) permanent stations, there is no additional cost to the field surveys since it is assumed that the additional video surveys can be completed within the same day.

**Deliverable.** Consultant shall notify County, FDEP, and the USACE as soon as possible if the video transect monitoring requirement is triggered and provide summaries in the weekly sedimentation monitoring data submittals of the affected station(s). The digital video transects shall be submitted to County and FDEP in electronic format (USB flash drive or uploaded to an FTP site) within five (5) days of completion of each weekly survey.

**73. IMMEDIATE POST-CONSTRUCTION HARDBOTTOM MONITORING IN THE TURBIDITY MIXING ZONE- FIRST SAND TRAP MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall conduct the immediate post-construction biological monitoring survey of the six (6) permanent stations within the 150-m turbidity mixing zone following the first maintenance dredging event as required by permit. All monitoring shall be conducted in accordance with the FDEP Plan and follow the same metrics as the pre-construction baseline survey (**Task 70**). The immediate post-construction survey at the permanent stations shall consist of interval sediment depth measurements at 1-m intervals, quantitative photo surveys, scleractinian and octocoral belt transect surveys, and digital video transects.

**Deliverable.** The immediate post-construction monitoring data shall be entered into a Microsoft Access database for data management and QA/QC review, and individual datasets shall be exported to Microsoft Excel workbooks. All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable.

Within sixty (60) days of completion of the immediate post-construction monitoring event for the first maintenance dredging of the sand trap, Consultant shall submit all monitoring data, including the still photo transect images and digital video transects and point count raw and summary data, to County and FDEP in electronic format (a single portable hard drive or via a FTP site).

**FIRST MAINTENANCE DREDGING-OF SAND TRAP - BEACH FILL PLACEMENT MONITORING- R-86 TO R-92 (AUTHORIZATION WITHHELD) (FDEP Permit Condition No. 29; MMM Plan Section 5.0)**

Sand dredged from maintenance dredging of the sand trap will be placed in the template for the Broward County Segment III Beach Nourishment Project at Dr. Von D. Mizell- Eula Johnson State Park ("Park") between R-86 and R-92. The permitted Equilibrium Toe of Fill

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("ETOF") for the Port Everglades Sand Bypassing project is the same as the ETOF permitted for the Broward County Segment III Beach Nourishment Project (FDEP Permit No. 0163435-015-JC, expiration November 9, 2035). The Biological Monitoring Plan ("BMP") for the Segment III Project in the Park is intended to be identical to the FDEP Plan for the Sand Bypass Project.

Thirteen (13) permanent, 150-m shore-perpendicular transects were installed between R-86 and R-93 in the Park in September 2020. Seven (7) of the transects (BT1-BT7) are full biological transects while six (6) transects (ST1 – ST6) are sediment-only transects (Figure 4). Transect BT7 is located approximately 1,000-ft. downdrift of the beach fill area, just north of R-93. The pre-construction (baseline) survey of the Park transects was conducted in September 2020. This survey shall serve as the pre-construction baseline survey for the Sand Bypass Project; a separate pre-construction survey for the Sand Bypass Project is not required. Post-construction nearshore hardbottom monitoring in the Park shall be conducted under either the Segment III BMP requirements or the Sand Bypass Project Plan requirements; monitoring shall not be duplicated. A-8 Scope includes the initial post-construction survey required within six (6) months of the initial fill placement in the Park and three (3) years of annual post-construction hardbottom monitoring surveys of the beach fill placement area (Years 1 through 3 post-construction) in event that these surveys are not already being conducted for compliance with the Segment III Beach Nourishment Project BMP.



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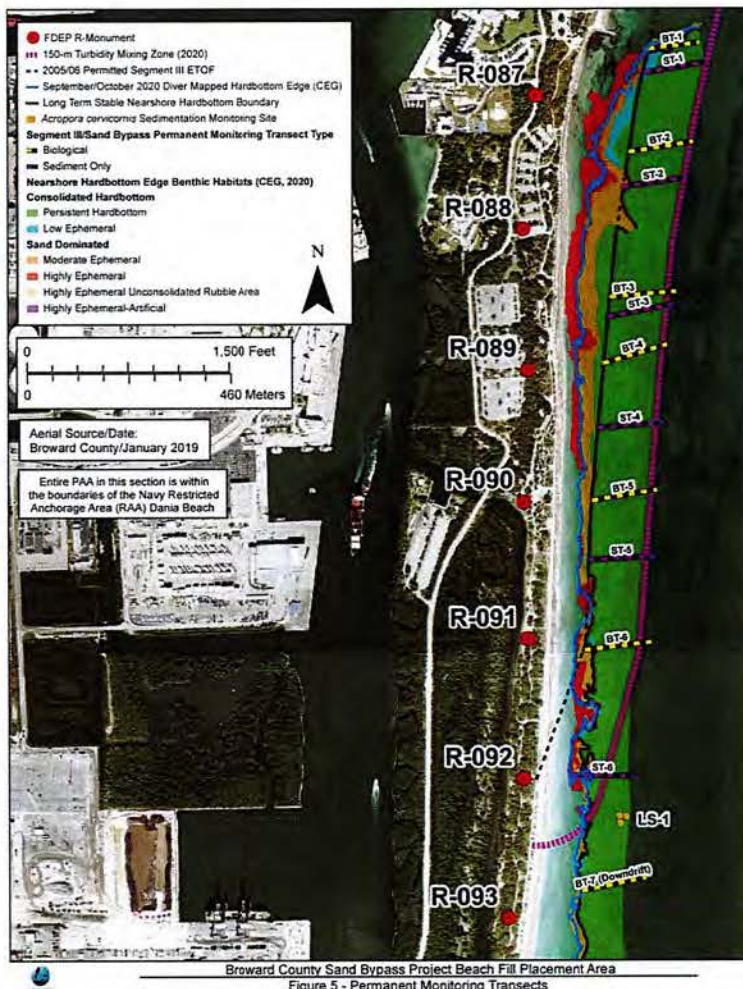


Figure 4. Permanent monitoring transects for beach fill placement within the Park.

74. IMMEDIATE POST-CONSTRUCTION HARDBOTTOM MONITORING – BEACH FILL PLACEMENT FOLLOWING THE FIRST MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)

Consultant shall conduct the immediate post-construction hardbottom monitoring at the beach fill placement area at the Park according to the requirements of the MMM Plan. The immediate post-construction hardbottom monitoring survey shall include diver mapping of the nearshore hardbottom edge between R-86 and R-92 following FDEP standards, benthic monitoring of the permanent quadrats at the six (6) biological monitoring transects, digital video transects and sediment depth/line intercept monitoring at all thirteen (13) permanent transects, and monitoring of the permanent



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A. *cervicornis* station located downdrift of the fill area. All data collection shall be consistent with the baseline survey conducted in September/October 2020.

**Deliverable.** The immediate post-construction data shall be entered into a Microsoft Access database for data management and QA/QC review, and individual datasets shall be exported to Microsoft Excel workbooks. All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable within forty-five (45) days of completion of the immediate post-construction monitoring event. Consultant shall submit all monitoring data, including GIS shape files of the transects and diver-mapped hardbottom edge, still photo images, and digital video transects to County and FDEP in electronic format (a single portable hard drive or an FTP site).

**75. IMMEDIATE POST-CONSTRUCTION BIOLOGICAL MONITORING REPORT - FIRST SAND TRAP MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall prepare the immediate post-construction report for submittal to County, FDEP, and USACE, describing the field monitoring methods and data analyses and presenting all permit-required data in tables, figures, and maps. The report shall compare the pre-construction and immediate post-construction survey results at the sand trap and describe, compare, and contrast conditions observed during the weekly during-construction sedimentation surveys at the sand trap with the baseline and immediate post-construction surveys. The report shall also compare the pre-construction and immediate post-construction surveys at the beach fill placement area in the evaluation of unanticipated project impacts if potential impacts are not being evaluated in the post-construction monitoring reports for the Segment III project for the same monitoring period. If project-related impacts are suggested in the monitoring data, the report shall evaluate these effects and determine the severity of impacts.

**Deliverable.** A draft report shall be provided to County for review within sixty (60) days of completion of the immediate post-construction survey. The final report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the immediate post-construction survey.

**76. YEAR 1 POST-CONSTRUCTION HARDBOTTOM MONITORING – BEACH FILL PLACEMENT FOLLOWING THE FIRST MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall conduct the Year 1 post-construction hardbottom monitoring at the beach fill placement area at the Park according to the requirements of the MMM Plan. The Year 1 post-construction hardbottom monitoring survey shall include diver mapping of the nearshore hardbottom edge between R-86 and R-92 following FDEP standards, benthic monitoring of the permanent quadrats at the six (6) biological monitoring

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transects, digital video transects and sediment depth/line intercept monitoring at all twelve (12) permanent transects, and monitoring of the permanent *A. cervicornis* station located downdrift of the fill area. All data collection shall be consistent with the baseline survey conducted in September/October 2020.

**Deliverable.** The Year 1 post-construction data shall be entered into the Microsoft Access project database for data management and QA/QC review. Individual datasets shall be exported to Microsoft Excel workbooks. All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable within forty-five (45) days of completion of the Year 1 post-construction monitoring event. Consultant shall submit all monitoring data, including GIS shape files of the transects and diver-mapped hardbottom edge, still photo images and digital video transects, to County and FDEP in electronic format (a single portable hard drive or a FTP site).

**77. YEAR 1 POST-CONSTRUCTION BIOLOGICAL MONITORING REPORT - FIRST SAND TRAP MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall prepare the Year 1 post-construction report for submittal to County, FDEP, and USACE. The report will clearly describe the methods used in field monitoring and data analyses and present all permit-required data in tables, figures, and maps. The report shall compare the pre-construction baseline and Year 1 post-construction survey results at the beach fill placement area in the evaluation of unanticipated project impacts. The report will evaluate any project-related impacts suggested in the monitoring data and determine their severity.

**Deliverable.** Consultant shall provide a draft report to County for review within sixty (60) days of completion of the immediate post-construction survey. The report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Year 1 post-construction survey.

**78. YEAR 2 POST-CONSTRUCTION HARDBOTTOM MONITORING – BEACH FILL PLACEMENT FOLLOWING THE FIRST MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall conduct the Year 2 post-construction hardbottom monitoring at the Park's beach fill placement area in accordance with the FDEP Plan. The Year 2 post-construction hardbottom monitoring survey shall include diver mapping of the nearshore hardbottom edge between R-86 and R-92 following FDEP standards, benthic monitoring of the permanent quadrats at the six (6) biological monitoring transects, digital video transects and sediment depth/line intercept monitoring at the twelve (12) permanent transects, and monitoring of the permanent *A. cervicornis* station located

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downdrift of the fill area. All data collection shall be consistent with the baseline survey conducted in September/October 2020.

**Deliverable.** Consultant shall enter the Year 2 post-construction data into the Microsoft Access project database for data management and QA/QC review. Individual datasets shall be exported to Microsoft Excel workbooks. All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable within forty-five (45) days of completion of the Year 2 post-construction monitoring event. Consultant shall submit all monitoring data, including GIS shape files of the transects and diver-mapped hardbottom edge, still photo images and digital video transects, to County and FDEP in electronic format (a single portable hard drive or via a FTP site).

**79. YEAR 2 POST-CONSTRUCTION BIOLOGICAL MONITORING REPORT – FIRST SAND TRAP MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall prepare the Year 2 post-construction report for submittal to County, FDEP, and USACE. The report must clearly describe the field monitoring methods and data analyses and present all permit-required data into tables, figures, and maps. The report shall compare the pre-construction baseline and Year 2 post-construction survey results at the beach fill placement area in the evaluation of unanticipated project impacts. The report will evaluate any project-related impacts are suggested in the monitoring data and determine their severity.

**Deliverable.** Consultant shall provide a draft report to County for review within sixty (60) days of completion of the immediate post-construction survey. The report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Year 2 post-construction survey.

**80. YEAR 3 POST-CONSTRUCTION HARDBOTTOM MONITORING – BEACH FILL PLACEMENT FOLLOWING THE FIRST MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall conduct the Year 3 post-construction hardbottom monitoring at the Park's beach fill placement area in accordance with the MMM Plan. The Year 3 post-construction hardbottom monitoring survey shall include diver mapping of the nearshore hardbottom edge between R-86 and R-92 following FDEP standards, benthic monitoring of the permanent quadrats at the six (6) biological monitoring transects, digital video transects and sediment depth/line intercept monitoring at the twelve (12) permanent transects, and monitoring of the permanent *A. cervicornis* station located downdrift of the fill area. All data collection shall be consistent with the baseline survey conducted in September/October 2020.

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**Deliverable.** Consultant shall enter the Year 3 post-construction data into the Microsoft Access project database. Individual datasets shall be exported to Microsoft Excel workbooks. All field datasheets shall be reviewed and scanned to digital format for submittal with the raw data deliverable within forty-five (45) days of completion of the Year 3 post-construction monitoring event. Consultant shall submit all monitoring data, including GIS shape files of the transects and diver-mapped hardbottom edge, still photo images and digital video transects, to County and FDEP in electronic format (a single portable hard drive or via a FTP site).

**81. YEAR 3 POST-CONSTRUCTION BIOLOGICAL MONITORING REPORT – FIRST SAND TRAP MAINTENANCE DREDGING EVENT (AUTHORIZATION WITHHELD)**

Consultant shall prepare the Year 3 post-construction report for submittal to County, FDEP, and USACE. The Year 3 post-construction report is the final monitoring report for the first maintenance dredging event. The report must clearly describe the field monitoring methods and data analyses and include all permit-required data in tables, figures, and maps. The report shall compare the pre-construction baseline and Year 3 post-construction survey results at the beach fill placement area in the evaluation of unanticipated project impacts. The report will evaluate any short-term or longer-term project-related impacts that are suggested in the cumulative monitoring data and determine their severity.

**Deliverable.** Consultant shall provide a draft report to County for review within sixty (60) days of completion of the immediate post-construction survey. The report shall be provided in digital (PDF) format to County, FDEP, and USACE within ninety (90) days of completion of the Year 3 post-construction survey.

**PART V: ADDITIONAL QUEEN CONCH WORK**

**82. POST-RELOCATION QUEEN CONCH RECEIVER SITE SURVEYS – Initial Construction**

Receiver site(s) within the overall receiver area (s) will be surveyed biweekly after Queen Conch relocation for a total of six (6) surveys. Three (3) random 100 m x 100 m sites within the overall receiver site(s) will also be surveyed in conjunction with the sites which received Queen Conch. Data to be collected include:

- Overall count of live Queen Conch by life stage.
- Document all tagged individuals with tag number, life stage, behavior, and substrate where found. Digital still photographs of each tagged queen conch will be taken.
- Note presence of egg masses.



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- Enumerate all dead Queen Conch (empty shell). If a tagged conch is found dead, the individual will be identified and photographed.
- Collect morphometric data on all tagged individuals present during the final monitoring event at week 12.

**Deliverables.** Consultant shall submit six (6) summary emails, one per post-relocation survey, within seven (7) calendar days of each survey to the County, NMFS, and USACE. Raw monitoring data will be submitted to the County, NMFS, and USACE within sixty (60) days of completing the final (12-week) survey. A final monitoring report summarizing the Queen Conch relocation and receiver site monitoring data will be submitted to the County, NMFS, and USACE within ninety (90) days of completing the 12-week monitoring period and will include the status of all relocation Queen Conch.

**83. WEEKLY 50-M BUFFER AREA SURVEYS – Initial Construction**

Divers will conduct weekly during-construction monitoring of the 50-m buffer area around the direct impact area (sand trap and rubble shoal removal) and relocate any queen conch that re-entered the buffer area following the methods described in Task 20. All Queen Conch that are collected during these surveys will be tagged and added to the receiver site monitoring schedule.

**Deliverables.** Consultant shall submit summary emails as needed if Queen Conch are relocated from the buffer area. Raw monitoring data will be submitted to the County, NMFS, and USACE within sixty (60) days of construction completion. An Immediate Post-Construction monitoring report will be submitted to the County, NMFS, and USACE within ninety (90) days of immediate post-construction monitoring and will include the results of Queen Conch and Hardbottom Sediment Monitoring.