

SECTION V

TECHNICAL SPECIFICATIONS

1.0 CONTRACTOR WORK PLAN

The Contractor shall prepare and submit a Construction Work Plan within ten (10) calendar days after the contract award. The Work Plan is subject to approval by the Engineer and City.

The Work Plan shall include at a minimum:

- Letter appointing the project superintendent
- List of Equipment (including size and production rates)
- List of Sub-Contractors
- Critical Path Schedule
- Written description of construction means and methods for each major work component
- Site Access and Staging Plan
- Construction Sequencing and Sediment Management Plan
- Dewatering and Turbidity Control Plan
- All manufacturer's shop drawings, product literature, and specifications for material(s) utilized to construct the habitat island. Shop drawings shall give complete information necessary for fabrication of component parts of the system including the complete dimensioned layout of the system
- Material and equipment delivery schedules
- Contractor's Quality Control Plan (details and methods including surveys, dredge position control, testing and tolerance control)
- Pipeline plan (if dredging by hydraulic means)
- Environmental Protection Plan
- Dive Plan (if applicable)

1.1 Site Access and Staging Plan. The Site Access and Staging Plan shall include at a minimum:

- Identification of all proposed site access routes and staging areas
- Areas to be disturbed by site access and staging (i.e., vegetation, sidewalks, barriers, fences, utilities, etc.)
- Itemized list of restoration efforts of disturbed site features
- Anticipated permit and approvals required for requested site access and staging areas

1.2 Construction Sequencing and Sediment Management Plan. The Contractor shall submit a construction sequencing plan describing the sequence of each major work component as it relates to the Critical Path Schedule. As described in Appendix C, the results of prior geotechnical investigations indicate the presence of three major classifications of sediment. Approximately 14% of the sediment to be dredged is composed of fine sand with less than 20% fines (Class I Sediment), 53% is composed of sediment with a fines content between 20-60% (Class II Sediment) and the remaining 32% is composed of sediment with a fines content exceeding 60% (Class III Sediment). The fines content is defined as the percent passing the #230 sieve. The habitat island itself shall be comprised of a mixture of Sediment Classes II and III and will be capped with sand (Class I) or with a cap layer thickness of 12 to 18 inches. The Contractor's sequencing plan shall provide a clear, detailed description of the dredge sequence and sediment management utilized to manage the sediment resources available for the habitat island construction. The Contractor is solely responsible for investigating the sediment resources prior to submitting his bid and managing said resources during construction to ensure a sand cap meeting the required specifications is constructed.

1.3 Dewatering and Turbidity Control Plan. The Contractor shall prepare and submit a Dewatering and Turbidity Control Plan for review and approval by Engineer and City. The Construction Drawings provide for the use of interior containment baffles constructed using geotextile containers to control dewatering and formation of the island. The City and

Engineer do not guarantee the Contractor that the use of these interior containment baffles will result in satisfactory completion of the Work as described in these Contract Documents. The Contractor shall devise a dewatering plan based on his investigations of the site and proposed construction means, methods and sequencing. The Contractor must also provide for Turbidity Control to meet the permit and Contract Document requirements.

1.4 Materials. The Contractor shall submit a notarized certification from the manufacturer(s) indicating that the material(s) utilized meet the project specifications for review and approval by the Engineer. Materials shall be ordered only after the required submittals and shop drawings have been received and approved. All materials proposed by the Contractor are subject to approval by the Engineer. Approval by the Engineer shall not relieve the Contractor from the responsibility of procuring the appropriate materials to meet these design and performance intent of these Contract Documents. Any error or omission on the material specifications, even though approved by Engineer, shall not relieve the Contractor from the responsibility of performing the work in accordance with the specifications.

1.5 Shop Drawings. The Contractor shall submit the shop drawings to Engineer for approval. The Engineer shall be allowed ten (10) working days for review and approval.

1.5.1 Approval by the Engineer covers general design of details only, and if any change is made, which would cause members not to fit, or would not give sufficient strength, the Contractor shall call the Engineer's attention to the fact at once, in writing, so that corrections may be made. If the Contractor fails to do this, the sole responsibility shall rest upon the Contractor.

1.5.2 Any details not sufficiently shown on the Construction Drawings will be furnished to the Contractor by the Engineer upon request.

1.6 QA/QC Plan. The Contractor shall prepare and submit a Quality Assurance and Quality Control (QA/QC) Plan including the site layout, excavation positioning control, progress

survey schedule and required testing. Records of verification, testing, inspections and the survey data shall be provided as scheduled and specified. Inspection of the work to ensure conformance with the contract documents shall at a minimum include:

- excavation procedures, quantities, staking and surveys
- correct alignment, location and elevation of excavation plant
- construction to required elevations and dimensions
- performance and submittal of required quality control testing
- removal of all stakes, alignment ropes and equipment employed during the work

1.7 Pipeline Plan. If hydraulic dredging is proposed, the contractor will be required to submit a temporary pipeline plan to show the intended routes and avoidance of impacts to sub-surface biological features. The pipeline plan shall also include proposed measures for anchoring and marking the pipeline.

1.8 Environmental Protection Plan. The Contractor shall submit a written Environmental Protection Plan to the Engineer. The Environmental Protection Plan shall include but not be limited to the following:

- Oil Spill Contingency Plan
- Environmental monitoring procedures for the protection water, land and air resources
- Procedures to be implemented in order to provide environmental protection and to comply with applicable laws and regulations.

The Contractor shall provide written assurance that immediate action will be taken to correct pollution of the environment due to accident, natural causes or failure to follow the procedures set out in the Environmental Protection Plan.

The Contractor shall identify the person responsible for implementing the Environmental Protection Plan. The Contractor's responsible person shall have the responsibility and

authority to act for the Contractor in all environmental protection matters and shall report directly to the Contractor's top management.

1.9 Dive Plan. All diving performed under this contract shall be in strict accordance with the rules and regulations prescribed by the U.S. Navy Diving Manual: 0910-LP-708-8000; 29 CFR Part 1910, Subpart T; 29 CFR Part 1915; the EM 385-1-1, Section 30; and ER 385-1-86. The Contractor shall submit a Dive Plan if underwater divers are to be utilized in the execution of the Work. The Dive Plan shall include, at a minimum, the equipment, work methods and safety procedures to be used.

2.0 AS-BUILT DATA AND DRAWINGS

2.1 Red-line as-built drawings must be maintained onsite at all times denoting the project components installed to-date.

2.2 The Contractor shall be required to submit a certified as-built drawing upon Project completion showing the post-excavation bathymetry and topography and positions of all habitat island components installed. In addition, a full topographic and bathymetric survey at a grid spacing not to exceed 100 ft shall be conducted following construction. The as-built drawing shall be submitted on 24x36 inch sheets to a scale approved by the Engineer unless otherwise approved. The Contractor shall be required to submit four certified hard-copies of the as-built drawings in addition to the electronic CAD file in *.dwg format.

2.3 Final payment shall not be made to the Contractor until these drawings and record data are turned over to the Engineer and City.

3.0 ORDER OF WORK

As described in TS-1, the contractor shall propose a construction sequencing plan to meet the Project's design intent and specifications. The Contractor's sequencing plan is subject to approval by the Engineer.

4.0 SURVEY

4.1 Layout of Work. As described in GS-9, the Contractor shall use a professional surveyor to establish horizontal and vertical control from the Engineer's baseline prior to the commencement of excavation.

4.2 Progress Surveys.

4.2.1 During canal excavation operations, the Contractor shall conduct progress surveys not less than once daily to ensure compliance with the regulatory permits and Contract Documents. The results of the surveys shall be reported on the Daily QC report.

4.2.2 During the construction of the habitat island, the Contractor shall conduct progress surveys not less than twice per week to ensure compliance with the regulatory permits and Contract Documents. The results of the surveys shall be reported on the Daily QC report.

4.3 Acceptance or "Pay" Surveys.

4.3.1 Acceptance or "pay" surveys shall be conducted by a professional surveyor licensed in the State of Florida, in the presence of the Engineer. The Engineer shall be notified a minimum of forty-eight (48) hours in advance of each acceptance survey to allow for observation by a representative of the Engineer, unless waived in writing by the Engineer.

4.3.2 The Contractor shall conduct canal acceptance surveys, at a spacing of 100 feet along the established centerline and at the canal dredge terminuses and shall include

transects at all points of intersection for both the centerline and canal toes. Soundings shall be taken at a maximum interval of ten (10) feet in the transverse or cross-section direction. In addition, a single longitudinal profile survey along the canal baseline is required for each canal with soundings at a maximum interval of ten (10) ft. Acceptance surveys shall extend a minimum of twenty (20) ft beyond the excavation areas.

4.3.3 All bathymetric data for the canals shall be collected utilizing Hypack Hydrographic Data Collection Software interfaced with RTK GPS and digital fathometer unless otherwise approved by the Engineer.

4.3.4 All habitat island acceptance surveys shall include cross-sections spaced at 100 ft intervals, and at the north and south habitat island terminuses, with topographic data collected at a minimum spacing of twenty (20) ft and capture all major breaks in slope. In addition, a longitudinal profile survey along the baseline will be required with topographic data collected at a minimum spacing of twenty (20) ft and capture all major breaks in slope. The Contractor shall be permitted to call for a maximum of two acceptance surveys for the habitat island. The Contractor's survey notes and as-built drawings shall notate all topographic components of the island. All acceptance surveys for the habitat island shall extend a minimum of fifty (50) ft beyond the habitat island boundaries.

4.3.5 All data shall be tied to the Florida State Plane Coordinate System, NAD 83/07 horizontal datum and NAVD88 vertical datum.

4.3.6 All topographic and hydrographic data shall meet or exceed FDEP and USACE standards and requirements.

5.0 CANAL EXCAVATION

5.1 Scope. The Work to be performed under this section includes furnishing all labor and equipment and performing all operations in connection with the excavation of approximately 16,435 CY (to design depth) with an overdredge pay allowance of 3,575 CY from six distinct areas within the Port Royal Residential Canal system to the design elevation specified in the Construction Drawings.

5.2 General. All excavation of the channel shall be performed in accordance with the approved Work Plan and requirements specified herein and as shown on the Construction Drawings. Excavation of the channel may be conducted using either hydraulic (cutterhead or dustpan) dredge equipment or mechanical (i.e. barge mounted clamshell) means as approved by the Engineer.

5.3 Sediment Characteristics. As described in Appendix C, based upon prior geotechnical investigations, the dredged material can be generally classified into one of three sediment categories: (i) Class I Sediment - sediment with less than or equal to 20% fines, (2) Class II Sediment -sediment with 20%-60% fines and (3) Class III Sediment – sediment with greater than 60%. General sediment characteristics are provided as grain size distribution curves in Appendix C. Appendix C also contains the results of the jet probe and vibratory core boring investigation of the canal dredge areas. The sediment descriptions provided therein are based on the site investigations performed by the Engineer and describe only those materials obtained from those investigations. The Contractor is solely responsible for any interpretations or conclusions drawn there from.

5.4 Inclusive in the dredge quantity estimates is approximately 65 CY of oyster shell located at the entrance to Galleon Cove as shown on the Construction Drawings. All oyster shell excavated may be used by the Contractor to construct the oyster reef component of the habitat island.

5.5 As described in General Specification 7.4, a box cut will be allowed on the 1V:5H side slopes (1V:3H for Cutlass Cove) within the canal dredge areas.

5.6 Dredge Elevation Control. The Contractor is required to have positioning equipment and report the location of dredge plant twice daily when operating. The Contractor is required to calibrate the equipment as required by the manufacturers' recommendations. Proof of calibrations may be requested by the Engineer on a weekly basis. The horizontal location of the dredge is to be reported with a probable range of error not to exceed 10 feet and furnished daily with the Daily QC Report. A drawing indicating the track of the dredge in relation to the canal boundaries shall be included with the daily reports.

5.6.1 The Contractor shall have, maintain, and use a depth recorder capable of determining the excavation depth (i.e., vertical position of the cutterhead, bucket, etc.) at all times for each piece of dredging equipment. Vertical accuracy for dredge depth monitoring shall be +/- 1.0 ft, and referenced to NAVD88.

5.6.2 The Contractor shall have, maintain, and use a recording-type tide gauge or tide board/staff in a nearby, quiescent location throughout the construction in order to observe the varying water elevations and make real time corrections to the dredging depths. The use of predicted tides is not acceptable. This gauge/board shall be placed in a location that represents the water surface elevation at the borrow site away from features or obstructions that would give an unrepresentative reading. Details of the tidal measurement method shall be submitted to the Engineer for review, amendment, and approval prior to commencement of excavation.

5.6.3 Details of the positioning and depth measurement system shall be submitted as part of the QA/QC Plan (TS-1.6).

5.6.4 **Excavation Limits.** The lower excavation limits of the borrow area are defined by an elevation as shown on the Drawings. In order to achieve these excavation limits, the

sediment material may be removed and disturbed to a depth of one (1) ft below the stated design excavation limit. This one (1) ft buffer zone ("overdredge allowance") is established to allow for unintentional disturbance of sediment below the excavation limit. The Contractor will be eligible for payment for the removal of a maximum of up to four inches of the one foot overdredge allowance.

5.6.5 No dredging shall occur within fifteen (15) ft of shoreline, revetment, seawalls, docks, boat lifts, mooring pile or other such features. For sloping shorelines and revetments, this distance shall be measured from the MLLW depth contour.

5.6.6 **Encountering Rock, Rubble or Debris in the Excavation Areas.** If rock, rubble, debris or other undesirable material is encountered in the canal excavation areas, the Contractor shall immediately notify the Engineer verbally. The Contractor is responsible for obtaining any additional geotechnical information that he may require to make a sound estimate before constructing the project. Such undesirable material may be incorporated into the habitat island or disposed of upland in consultation with and as approved by the Engineer and City.

5.6.7 **Lighting.** Lighting of all water-based equipment shall meet all USCG requirements. The Contractor shall display lights on floating dredge pipelines and display day signals on vessels of more than 65 feet in length moored or anchored in a fairway or channel.

6.0 CONVEYANCE OF EXCAVATED SEDIMENT

6.1 **General.** The Contractor shall convey excavated material from the canals to the habitat island site. The proposed method and equipment (hydraulic conveyance via a pipeline or barge transport) proposed to convey the must be specified in the Work Plan and approved by the Engineer. Should hydraulic conveyance via a pipeline occur, the Contractor shall make daily inspections of the pipeline to ensure that no leaks are present and that buoyancy has not loosened any submerged pipeline anchors. All pipeline must be either

floating on the surface or resting on the bottom (submerged). In no case will the Contractor's pipeline be allowed to fluctuate between the surface and the bottom or lie partly submerged. Where the pipeline crosses a navigation channel, the pipeline must be submerged and any anchoring devices must not project above the project depth of the navigation channel. The entire length of floating and submerged pipeline shall be marked with appropriate signs, buoys, lights and flags conforming to USCG regulations.

6.2 Leaks and Spillage. The Contractor is required to maintain a tight discharge pipeline at all times. All pipelines for hydraulic transport of material must be kept in good condition at all times and any leaks or breaks along the length must be promptly and properly repaired. Failure to repair leaks satisfactorily which results in an unacceptable spillage (as determined by the Engineer) will result in suspension of excavation operations without additional compensation. The Contractor will transport the Engineer to any leak repair sites for visual inspection if so requested by the Engineer.

6.3 Misplaced Equipment or Excavated Material. Should the Contractor, during the progress of the work, lose, dump, throw overboard, sink, or misplace any material, plant machinery, or appliance which in the opinion of the Engineer may be dangerous to or obstruct navigation or is in violation of any law, the Contractor shall recover and remove the same with the utmost dispatch. The Contractor shall give immediate notice, with description and location of such obstructions, to the Engineer, and when required shall mark or buoy such obstructions until the same are removed. Should he refuse, neglect, or delay compliance with the above requirements, such obstructions may be removed by the Engineer, and the cost of such removal may be deducted from any money due or to become due to the Contractor, or may be recovered under bond.

6.4 The direct placement of excavated sediment to the habitat island by hydraulic discharge shall employ such controls as are necessary to prevent scour and erosion of the bay bottom, control turbidity so that it is within the ranges allowable by the regulatory permits and

retain the sediment within the habitat island limits as specified on the Construction Drawings. These controls may include, but are not limited to, the use of temporary geotextile containers, dual discharges using a "Y"-valve and other flow control devices. The Engineer may direct the Contractor to modify his sediment containment and flow control devices, if necessary, to control turbidity and improve sediment accumulation within the island.

7.0 DEWATERING AND TURBIDITY CONTROL

7.1 General. The Contractor shall conduct excavation and dewatering operations in a manner to minimize turbidity and shall conform to all water quality standards required by the permits and those prescribed by Federal, State, and Local agencies.

7.2 Turbidity Levels. The Contractor shall ensure that turbidity levels do not exceed 29 nephelometric turbidity units (NTUs) above background during the execution of the Work.

7.3 Turbidity Curtains. The Contractor is required to install and maintain turbidity barriers as shown on the Construction Drawings and as otherwise may be required to control turbidity during construction in compliance with State Water Quality Standards and the regulatory permits. The turbidity curtains shall extend to within one (1) ft of the bottom. The Contractor shall be responsible for ensuring that the turbidity curtains are inspected daily and maintained in good working order.

7.4 Turbidity Monitoring. The Contractor shall conduct turbidity monitoring at four hour intervals at the excavation site(s) and habitat island site during construction activities. Background samples shall be collected at 1,200 feet up-current from the work area and outside any visible turbidity plume to provide baseline turbidity values. Compliance samples shall be collected within 5 feet outside and down-current of the work area and within the densest visible plume.

7.4.1 In situ turbidity measurements will be taken by a trained individual familiar with the proper calibration and operation of turbidimeters. The situ turbidity will be measured in NTUs. Samples shall be collected using a Kemmerer, Van Dorn or similar sampler that is designed to collect in situ water samples. All sampling shall be conducted in accordance with FDEP's Standard Operating Procedure for field turbidity measurements which can be accessed at www.dep.state.fl.us/labs/qa/sops.htm.

7.4.2 Compliance and background samples shall be collected at the surface, at mid-depth in the water column and one foot above the bottom at each location, except where shallow water depths at the habitat island site permit only one sample within the water column.

7.4.3 A log shall be kept by the Contractor that includes the following:

- FDEP Permit Number
- Date, time, and location of sampling
- A statement describing the methods used in collection, handling, storage and analysis of the samples
- A scaled schematic map with the sample site shown
- Water depth
- Sample depth
- Weather, wind, and current conditions
- Approximate tide
- Turbidity data for each sample collected

The log format is subject to approval by the Engineer.

7.4.4 Samples are to be taken at a minimum of two (2) hours after continuous excavation or dewatering activity, a minimum of two (2) hours before sunrise and a minimum of

- two (2) hours before sunset. Samples shall be analyzed within 60 minutes of collection.
- 7.4.5 If the turbidity at the compliance station described above exceeds 29 NTUs above the corresponding background levels, construction activities shall cease and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. If a turbidity problem persists, additional measures shall be implemented to reduce turbidity.
- 7.4.6 As part of the Dewatering and Turbidity Control Plan, the Contractor shall submit the details of the methodology, personnel, equipment and schedule for turbidity monitoring to the Engineer for review and approval.
- 7.4.7 The Contractor shall submit the turbidity monitoring form to the Engineer on a daily basis with the Contractors Quality Control Form. The Contractor shall also maintain the turbidity monitoring records onsite at all times for inspection by the regulatory agencies.
- 7.4.8 The Contractor shall comply with all other provisions and monitoring requirements for turbidity monitoring as specified in the regulatory permits.

7.5 Dewatering at the Habitat Island Site.

- 7.5.1 As described under TS-6.4, the Contractor shall control turbidity through the use of temporary geotextile containers, dual discharges using a "Y"-valve and other flow control devices. The Engineer may direct the Contractor to modify his sediment containment and flow control devices, if necessary, to control turbidity and improve sediment accumulation within the island.

7.5.2 All dewatering activities at the habitat island site are to be in accordance with Section IV and Appendix II of the *State of Florida Erosion and Sediment Control Designer and Reviewer Manual* (June 2007), the Environmental Specifications, and the Construction Drawings.

7.5.3 The return discharge from the island to the surrounding surface waters shall be limited to 1,500 gpm (max) to minimize turbidity.

7.5.4 The Contractor is to inspect the effluent outfall at the habitat island site for scour on an hourly basis during active discharge. Should scour occur at the outfall, Contractor shall notify Engineer immediately and determine the remedies required to prevent scour.

7.6 Polymer. A polymer/flocculent may be required to aid in dewatering and settlement of the large fraction of fines found in the sediment to be excavated. The polymer type and dosing is subject to approval by the Florida Department of Environmental Protection (FDEP). The Contractor shall select a polymer mix and dosing which is custom tailored to the soil type and chemistry associated with the project in consultation with a qualified a polymer supplier and FDEP.

7.6.1 The following information will be provided to the Engineer and FDEP at least 60 days prior to the commencement of dredging:

- Name and Material Safety Data Sheet (MSDS) for the polymer / flocculant that will be used
- Description / schematic of treatment system, including maximum dosage rates
- Description of control measures in place to ensure residual polymer is not being discharged; this should include descriptions of any testing methods in place to measure residual polymer and the frequency that these measurements will be conducted

- A detailed explanation of the methodology and rationale for choosing the proposed polymer, considering the nature of the suspended solids, the volume of material to be treated, dosing rates and volumes, discharge rates and volumes, mixing (stirring) methodology, water conditions (fresh vs. saline) and location of treatment vs. discharge
- A detailed discussion of the treatment process, including equipment, intakes, discharges, stirring processes, volumes to be treated and nature of the material to be treated
- Full literature on the polymer that is proposed for use, including chemical composition of the polymer, molecular weight, residual (unreacted) monomer content and percentage of active ingredient
- Anticipated concentrations of polymer to be discharged from the treatment area
- Possible effects of product decomposition on dissolved oxygen and biochemical oxygen demand
- The degradation rate (half-life) of the proposed polymer under expected field conditions
- Toxicity bioassay data for an invertebrate and fish species and
- A Polymer Testing and Monitoring Plan including protocol and requirements for acute elutriate toxicity testing, chronic elutriate effluent toxicity testing, and on-going construction monitoring requirements

7.6.2 The Department's "Sampling and Analysis for Polymers and Other Flocculating Agents" Guide dated March 30, 2012 shall be followed during the selection, testing and protocol development.

7.6.3 The following suppliers have received site specific data and have performed site specific sampling and analysis of the excavated sediment and surface waters. The use of a polymer mix from these suppliers is not guaranteed to provide sufficient

flocculation nor are they guaranteed approval from FDEP. The final polymer mix and approval by FDEP is the responsibility of the Contractor. The Contractor is not limited to the procurement of polymer from either of these two suppliers:

- BASF Corporation (Contact Dewey Hunter)
4612 River Overlook Drive, Valrico, FL 33596
- SNF Holding Company (Contact Mike Chancey)
Chemical Plant Road, Riceboro, GA 31323

8.0 HABITAT ISLAND CONSTRUCTION

8.1 General. The Contractor shall arrange for fabrication, purchase, delivery and installation of all components required to construct the habitat island under this Contract as shown on the Construction Drawings.

8.2 Work Plan. The Contractor's Work Plan (TS-1.0) shall include specific material and installation procedures for each of the component parts of the habitat island including, but not limited to, the sequence, equipment (including pumps and other filling equipment), materials and methods, and a listing of personnel experienced in the installation and geotextile containers. The Plan shall also include a brief written discussion and shop drawings describing the geometry, orientation, methods for transport and placement of material, fabric specification details, fabrication, installation methods and sequence, anchoring and filling procedures including the dewatering plan and shore/bracing shop drawings for approval by Engineer. Drawings shall show complete dimensioned layout of all components of the habitat island. Furthermore, the Work Plan shall include details of the Contractor's Quality Control Plan for furnishing and installation of the habitat island components including surveys, testing of geotextiles, and elevation control of installed components.

8.3 Order of Work. The Contractor shall complete all work associated with the construction of the habitat island to the satisfaction of the Engineer. The Contractor shall stakeout the

perimeter of the island for approval by the Engineer prior to the placement of any materials. The geotextile container perimeter and dewatering containment baffles must be in place prior to direct discharge of sediment into the island's interior.

8.4 Estimated Quantities. The theoretical size of the habitat island, as shown on the Construction Drawings, is approximately 1.7 acres. The size of the island was estimated by the Engineer based on the following parameters:

- The total gross excavation for the project will be between the four (4) inch pay overdredge depth and the maximum one (1) ft permitted overdredge allowance
- Based on the three difference sediment classes (by fines fraction), the Contractor will experience sediment gains due to sloughing at the excavation site on the order of 10-15% and will experience sediment losses due to dewatering and compaction at the habitat island site on the order of 30-70%
- The net cut to fill ratio (excavation to island in-place) for the project as a whole is assumed to be approximately 2:1

The Contractor shall be responsible for independently estimating and verifying the anticipated size of the island based upon the site specific sediment characteristics and his construction means and methods. The Contractor shall immediately contact the Engineer if any discrepancies are discovered in any of the information presented concerning the anticipated size of the island. If the Contractor does not contact the Engineer, it is understood that the Contractor agrees with all information presented in the specifications and Construction Drawings related to the sizing of the habitat island.

8.5 Materials.

8.5.1 **General.** Excess and/or non-compliant materials delivered to the project site will not be paid for and shall be removed at the Contractor's expense.

8.5.2 **Standards.** The following American Society for Testing and Materials (ASTM) Publications are hereby included as reference:

D2487-93 Classification of Soils for Engineering Purposes
(Unified Soils Classification System)

D3786-87 Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics –
Diaphragm Bursting Strength Test Method

D3884-92 Abrasion Resistance of Textile Fabrics
(Rotary Platform, Double-Head Method)

D4354-96 Sampling of Geosynthetics for Testing

D4355-92 Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water
(Xenon-Arc Type Apparatus)

D4491-96 Water Permeability of Geotextiles by Permittivity

D4533-91 Trapezoid Tearing Strength of Geotextiles (R 1996)

D4595-86 Tensile Properties of Geotextiles by the Wide-Width Strip Method
(R 1994)

D4632 Grab Breaking Load and Elongation of Geotextiles (R 1996)

D4751-95 Determining Apparent Opening Size of a Geotextile

D4759-88 Determining the Specification Performance of Geosynthetics
(R 1996)

D4833-88 Index Puncture Resistance of Geotextiles, Geomembranes, and Related
(R 1996)

D4873-95 Identification, Storage, and Handling of Geotextiles.

D4884-96 Strength of Sewn or Thermally Bonded Seams of Geotextiles.

8.5.3 Scour Apron.

A double scour apron (i.e. with anchor tubes on each longitudinal side) shall be used beneath the perimeter geotextile containers as shown on the Construction Drawings and in accordance with the manufacture’s recommendations. The anchor tubes shall be a minimum four (4) ft circumference or as otherwise approved by the Engineer. The scour apron shall conform to the minimum physical properties shown in Table 1 below. The properties specified in Table 1 represent the absolute minimum properties permissible for the scour apron under this Contract. In the case of the anchor tubes, these properties may be met with woven fabric alone or through the use of a woven fabric in combination with an internal nonwoven filter layer. The Contractor shall consult with the geotextile manufacturer(s) to ensure that the product(s) selected for use on this Project will have properties sufficient to fulfill the project’s design intent and support the perimeter geotextile containers.

Table 1. Polypropylene Material for Scour Apron

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			Machine Direction	Cross Direction
Wide Width Tensile Strength (at ultimate)	ASTM D4595	kN/m (lbs/in)	70 (400)	52 (300)
Wide Width Tensile Elongation	ASTM D4595	%	20 (max)	20 (max)
Factory Seam Strength	ASTM D4884	kN/m (lbs/in)	26 (150)	
Apparent Opening Size (AOS)	ASTM D4571	Mm (US Sieve #)	0.300 (50) 0.425 (40) apron	
Water Flow Rate	ASTM D4491	l/m/m ² (gmp/ft ²)	570 (14)	
UV Resistance (% Strength Retained after 500 hrs)	ASTM D4355	%	80	

8.5.4 Geotextile Containers for Island Perimeter.

The geotextile containers used to construct the island’s perimeter shall be manufactured to meet or exceed the criteria specified in the table below or as otherwise approved by the Engineer. The geotextile containers used must be capable of containing and dewatering the fine sediments to be excavated from the canals. The geotextile containers shall be manufactured using high tenacity

polypropylene multifilament and monofilament yarns, which are woven into a stable network such that the yarns retain their relative position. The geotextile container material shall be inert to biological degradation and resistant to naturally encountered chemicals, alkalis and acids. The circumferential tolerance for the containers shall be +2 ft (e.g. a container specified as 45 ft nominal circumference shall be between 45 to 47 ft circumference). The geotextile containers shall conform to the minimum physical properties shown in Table 2 below. These properties may be met with woven fabric alone or through the use of woven fabric in combination with an internal nonwoven filter layer.

Table 2. Polypropylene Material for Perimeter Geotextile Containers

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			Circumferential Direction (360 deg)	Axial Direction (at nose and top)
Wide Width Tensile Strength (at ultimate), after seaming	ASTM D4595	kN/m (lbs/in)	87.6 (500)	87.6 (500)
Wide Width Tensile Elongation	ASTM D4595	%	20 (max)	20 (max)
Apparent Opening Size (AOS)	ASTM D4571	mm (US Sieve #)	0.300 (50)	
Water Flow Rate	ASTM D4491	l/m/m ² (gmp/ft ²)	570 (14)	
UV Resistance (% Strength Retained after 500 hrs)	ASTM D4355	%	85	
Color	NA	NA	Tan	

Injection ports for filling shall be located at intervals of no more than forty (40) ft, or as recommended by the manufacturer. Inlet sleeves shall be as recommended by the manufacturer. Pressure relief ports shall be located no more than fifteen (15) ft from each end of the container, or as recommended by the manufacturer.

The properties specified in Table 2 above represent the absolute minimum properties permissible for geotextile containers under this Contract. The Contractor shall consult with the geotextile container manufacturer(s) to ensure that the product(s) selected for use on this

Project will have properties sufficient to dewater and contain the sediments excavated from the canals.

8.5.5 **Rip Rap.** All the stone shall be limestone with a minimum unit weight of 150 pounds per cubic feet and be rough and angular in shape. The least dimension of any stone shall not be less than one-third (1/3) of the greatest dimension of that stone. Square or flat stone shall not be accepted. The stone shall be hard, durable, close grained, free of cracks, and free of seams or other imperfections which might affect the durability of the stone. The stone shall not disintegrate under the elements or break under handling. The inclusion of dirt, sand, clay, and rock fines shall not be permitted and if any is found in a shipment of stone, it shall be excluded and removed from the project site at the Contractor's expense.

The Contractor shall submit samples of the rip rap stone to the Engineer for approval prior to delivery to the project area. The Contractor shall include the source, supplier and information and gradient of the material proposed. The Engineer shall be provided access to all supplier facilities to conduct inspection of the material. The Contractor shall provide the Engineer with testing results that demonstrate that the material meets the specifications outlined in these Contract Documents. The Contractor shall submit copies of all stone material delivery tickets to the Engineer on a weekly basis.

The rip rap overlay for the east and west sides of the island shall have a rock size with a nominal diameter ranging between 12 to 16 inches. The rip rap overlay for the north and south sides of the island shall have a rock size with a nominal diameter ranging between 24 to 36 inches. Larger material or different rock type may be considered under approval by the Engineer.

8.5.6 **Geotextile Containers for Internal Containment Baffles.** The Construction Drawings provide for the use of interior containment baffles constructed using geotextile containers to control dewatering and formation of the island. The City and Engineer do not guarantee the Contractor that the use of these interior containment baffles will result in satisfactory completion of the Work as described in these Contract Documents. The Contractor shall devise a dewatering plan based on his investigations of the site and proposed construction means, methods and sequencing. Should geotextile containers be proposed for dewatering, they shall meet the minimum properties described in Table 3 below.

Table 3. Polypropylene Material for Perimeter Geotextile Containers

Mechanical Properties	Test Method	Unit	Minimum Average Roll Value	
			Circumferential Direction (360 deg)	Axial Direction (at nose and top)
Wide Width Tensile Strength (at ultimate), after seaming	ASTM D4595	kN/m (lbs/in)	87.6 (400)	52 (300)
Wide Width Tensile Elongation	ASTM D4595	%	20 (max)	20 (max)
Apparent Opening Size (AOS)	ASTM D4571	mm (US Sieve #)	0.425 (40)	
Water Flow Rate	ASTM D4491	l/m/m ² (gmp/ft ²)	813 (20)	
UV Resistance (% Strength Retained after 500 hrs)	ASTM D4355	%	80	
Color	NA	NA	Tan	

The properties specified in Table 3 above represent the absolute minimum properties permissible for geotextile containers used in the island’s interior under this Contract. The Contractor shall consult with the geotextile manufacturer(s) to ensure that the product(s) selected for use on this Project will have properties sufficient to dewater and contain the sediments excavated from the canals.

8.5.7 **Geoweb with Shell Infill.** The eight (8) inch geoweb layer shall be constructed of GW20V8 by Presto or equivalent product as approved by the Engineer. The geoweb

shall be infilled with medium (1/4 to 1/2 inch) washed shell or #57 crushed limestone. The geoweb shall be placed on top of a non-woven geotextile fabric (Mirafi 160N or equivalent). The purpose of the geoweb layer is to protect the island during overwash events. The Contractor shall submit manufacturer's shop drawings in accordance with TS-1.5 including, product data, section layout, anchor stake locations, tendon locations, ATRA clip locations and anchorage requirements. The geotextile under layer shall be installed and secured per the Manufacturer's instructions.

- 8.5.8 **Sand Cap.** The Class I sediment excavated from the canals shall be used to cap the habitat island with a 12 to 18 inch cap thickness. If additional sand is required, it shall be obtained from an upland source approved by the Engineer and in accordance with Table 4 below. Imported sand shall be clean, washed, non-organic, cohesion-less, free of deleterious substances, debris/rock free and free of elongated or flat particles which are susceptible to degradation. The term "mean" in these specifications refers to the measure of the individual grains in each and every sample or load used to create the sand cap, rather than to a comparison of distinct samples or loads. The Contractor shall understand that by agreeing to provide a specified grain size, he is agreeing to provide material whose various individual grains average the specified grain size, as measured in individual random samples and quantified by the method of calculation (moment) as described in these specifications. The Contractor shall understand that this requirement applies to ALL of the material provided, and that the material shall be considered unacceptable if some of the material features a mean grain size (as calculated by the moment method) which is lower or higher than the specified average grain size range. Acceptable imported sand is oftentimes described by local sand mines as "250 Sand," "Concrete Sand" or "Beach Sand."

Table 4: Imported Sand Criteria

Sediment Parameter	Compliance Value
Max Silt Content (% passing #230 sieve)	5%
Mean Grain Size Range	0.25 to 0.50 mm
Max Fine Gravel Content (% retained on #4 sieve)	5%
Munsell Color	10YR 6/1 or lighter

8.5.9 **Oyster Reef.** The oyster reef shall be constructed of materials that will provide appropriate attachment surfaces for oysters and other sessile mollusks. Aquaculture grade mesh (<1 inch mesh size) shall be filled with washed shell. The aquaculture grade mesh bags shall be 2 feet long and closed on each end. The Contractor shall provide large (2 to 5 inch with at least 50 percent greater than 3 inches), screened, washed shell to meet this requirement unless otherwise approved by the Engineer. The source of shell material shall be proposed by the Contractor and approved by the Engineer to ensure compliance with these specifications.

8.6 Product Delivery, Handling, and Storage.

8.6.1 **General.** Materials shall be delivered only after the required submittals and shop drawings have been received and approved. The Contractor shall provide two (2) samples of each of the materials proposed prior to shipment to the Project site.

8.6.2 **Product Delivery.** Materials shall be delivered to site in Manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and Manufacturer. Geotextile materials and fabrics shall be delivered to the project site in a protective wrap or cover which shall not be removed until installation. The geotextile materials shall be clearly labeled with the manufacturer's name, geotextile type, lot number, roll number, and roll dimensions (length, width, or gross weight) for easy identification. Geotextile materials greater than 1,000 pounds gross weight or installed in the wet shall be rolled on a steel pipe and the ends fitted with PVC protective caps. Geotextile materials damaged as a result of delivery, storage,

or handling shall be repaired or replaced, as directed, at no additional cost to the City.

8.6.3 **Project Handling.** All materials shall be delivered and handled in a manner to prevent damage. No hooks, tongs, or other sharp instruments shall be used for handling geotextile containers and containers shall not be dragged on the ground under any circumstances. The geotextile containers shall be unrolled into position, as recommend by the manufacturer.

8.6.4 **Product Storage.** All materials shall be stored in accordance with Manufacturer's instructions. The geotextile containers shall be stored in areas where water cannot accumulate, elevated off the ground, and protected from conditions that will affect the proper ties or performance of the container. The geotextile containers should not be exposed to temperatures in excess of 180°F. The duration of storage time shall not exceed the manufacturer's recommendation. Prior to installation, the geotextile shall not be exposed to direct sunlight for more than 14 days.

8.7 Installation. Prior to the installation of the habitat island, the Contractor shall submit a Work Plan in accordance with TS-1 describing the construction methods and sequencing for the creation of the habitat island. The Work Plan shall address site preparation, deployment, chemical/polymer selection, mixing and injection, anchoring and filling geotextile containers and so forth. The equipment to be used for these operations shall also be specified. No work may commence on the habitat island until the Engineer has approved the Contractor's Work Plan.

8.7.1 **Site Preparation.** Prior to the commencement of installation of the habitat island, the Contractor shall verify the existing sub-grade conditions at the habitat island site and report any discrepancies or obstructions that may interfere with the Work to the Engineer. The Contractor shall stakeout the perimeter of the island and location

of the various work components in accordance with his approved Work Plan for inspection by the Engineer immediately prior to the commencement of installation.

8.7.2 **Scour Apron.** The scour apron shall be placed in accordance with the lines, grades and dimensions as shown on the Construction Drawings and as specified in the Contractor's approved Work Plan. The ends of each apron shall be overlapped a minimum of five (5) feet.

8.7.3 **Geotextile Containers for Island Perimeter.** The perimeter geotextile containers shall be placed in accordance with the lines, grades and dimensions as shown on the Construction Drawings and as specified in the Contractor's approved Work Plan.

8.7.3.1 **Placement and Anchoring.** No portion of a geotextile container segment may be filled until it has been fully anchored along the correct alignment. Means of assuring the container is properly aligned and anchored may include the use of any successful combination of tie-down straps, piling/poles, and/or other physical buttressing. Methods for aligning and anchoring the containers shall be specified in the Contractor's approved Work Plan. Before filling, adjacent geotextile containers shall be overlapped at the end joints or butted together so that there are no gaps between the containers and the cross-section fit is tight and meets the full dimensions of the containers. Overlapping and butting of the end joints shall be as recommended by the Manufacturer. Beneath the geotextile container, the ends of each scour apron shall be overlapped a minimum of five (5) feet.

8.7.3.2 **Filling.** The discharge line shall be fitted with a "Y" valve to control the rate of filling. The "Y" valve system shall be fitted with an internal mechanism such as a gate, butterfly valve, ball valve or pinch valve, to allow the Contractor to regulate the discharge into the container. The discharge line shall be limited to 6 to 10 inches in diameter or as recommended by the geotextile container manufacturer.

The discharge pipe shall be free of protrusions that could tear the fill port. The discharge pipe shall be supported above the fill port to reduce stress on the fill port seams. The geotextile container manufacturer shall be consulted as to the best method to affix the discharge pipe to the fill port. The geotextile container shall be completely filled to its design height, with the height generally no more than 50% of the container width as specified in the Construction Drawings. At no time should the containers be over-pressurized or overfilled. Once container filling is initiated, it cannot be suspended until the container segment is fully installed to the required dimensions and elevations. The Contractor is responsible for scheduling work and crews to ensure that a container is never left partially filled overnight or a period exceeding two hours. Upon completion of filling the geotextile container, the fill port sleeves shall be closed in accordance with the manufacturer's recommendation and in a manner sufficient to prevent movement of the sleeve by subsequent wave action or other disturbances.

8.7.3.3 **Voids.** Tolerance in filling the containers is equal to or less than 2 inch pockets, for a maximum length of 2 ft along the container, to prevent voids in the fill.

8.7.3.4 **Tolerances.** Tolerances are given for the effective height of the structure defined as the height from the tube foundation to the average top of the filled tube measured every fifteen (15) ft along the length of the tube including fill ports and butt joints. The vertical tolerance shall be ± 4 inches for each container and four (4) inches maximum overall at adjacent containers. The horizontal tolerance shall be ± 2 ft overall along the cross sectional dimension.

8.7.4 **Rip Rap.** The in-place stone shall be well-graded and represent the range of sizes for each classification of stone specified. The Contractor shall stockpile each different classification of stone in separate stockpiles and not mix the various stones before

placement. If the stone becomes segregated prior to placement, the Contractor shall thoroughly mix the stone to the specified gradations before initiating placement.

Rip rap shall be placed in accordance with the lines, grades and dimensions as shown on the Construction Drawings and as specified in the Contractor's approved Work Plan. All rip rap shall be placed with a minimum of two (2) layers as described on the Construction Drawings. The under layer shall be level and stable before the placement of stone. The elevation of the top of the stone must meet or exceed the elevations shown on the Drawings. The stone shall be placed within +1 ft of the elevations shown on the Construction Drawings.

Stones shall be placed in such a manner that they will be properly interlocked with the adjacent stones to resist displacement by wave action and form a uniform and compact section. Each stone shall be set firmly and well-supported by underlying material and adjacent stone. All stone shall be lowered to rest before releasing. No small stones shall be free on the surface. All stone shall be placed in such a manner as to prevent rolling or sliding. Placement of stone during periods of increased wave or current energy sufficient to cause displacement of the stone shall be at the Contractor's risk.

8.7.5 **Geotextile Containers for Internal Containment Baffles.** The geotextile containers used as internal dewatering containment baffles shall be placed in accordance with the lines, grades and dimensions as shown on the Construction Drawings and as specified in the Contractor's approved Work Plan. These containers shall be installed in accordance with TS-9.2.3.

8.7.6 **Geoweb with Shell Infill.** The geoweb layer shall be placed in accordance with the lines, grades and dimensions as shown on the Construction Drawings and as

specified in the Contractor's approved Work Plan. The installation shall meet or exceed all Manufacturer's recommendations for installation.

8.7.6.1 Subgrade Preparation.

- a. Fill foundation soils so that top of installed Geoweb section is flush with or slightly lower than final grade as indicated on the drawings or as directed by the Engineer.
- b. Install the geotextile underlayer on the prepared surface ensuring overlaps of 2 feet (minimum) are maintained and outer edges of geotextile are buried in accordance with the Manufacturer's recommendations.

8.7.6.2 Geoweb Section Anchorage.

- a. Position collapsed Geoweb sections flush with adjacent geotextile containers or at the crest of the slope based on Geoweb position, as shown on the Construction Drawings.
- b. Drive ATRA Anchors flush with the adjacent geotextile container or at the crest of the slope based on Geoweb position, as shown on the Construction Drawings. The Contractor shall ensure the geotextile containers are not damaged as a result of anchoring the geoweb layer.
- c. After the Geoweb sections are expanded as desired, drive ATRA Anchors so the arm of the ATRA Clip is through the internal slots in the Geoweb cell wall and do not protrude over the top of the cell wall.
- d. Anchorage pattern and stake length shall be as recommended by the Manufacturer.

8.7.6.3 Geoweb Section Placement and Connection.

- a. Place unexpanded Geoweb sections flush with adjacent geotextile containers or at the crest of the slope based on Geoweb position, as shown on the Construction Drawings, and expand Geoweb sections outward or downslope, as

appropriate. Verify each Geoweb section is expanded uniformly to required dimensions and outer cells of each layer are correctly aligned. Interleaf or overlap edges of adjacent sections in each layer. Ensure upper surfaces of adjoining Geoweb sections are flush at joint and adjoining cells are fully connected.

- b. Connect Geoweb sections with ATRA keys at each interleaf and end to end connection. Insert the ATRA key through the slot in the cell wall before inserting through the adjacent cell. Turn the ATRA key 90 degrees to lock the panels together.

8.7.6.4 **Aggregate Infill.**

- a. Place specified infill in expanded cells with suitable material handling equipment, such as a backhoe, front-end loader, conveyor, or crane-mounted skip.
- b. Limit drop height to a maximum of three (3) feet to avoid damage or displacement of the cell walls.
- c. If on sloped section, fill Geoweb from the crest of the slope to toe or in accordance with Engineer's direction.
- d. Compact infill material to a minimum 95 percent Standard Proctor.
- e. Ensure the infill will be flush with the Geoweb cell walls after completion.

8.7.7 **Sand Cap.** The Contractor shall not be permitted to place the sand cap until the under layers inclusive of the geoweb layer are inspected by the Engineer. All sand shall be deposited within the lines, grades and cross-sections shown in the Construction Drawings and as specified in the Contractor's approved Work Plan. The Contractor shall place the sand cap in such a manner as to establish a uniform grade between survey profiles. The sand cap shall be a minimum of twelve inches thick in all locations.

8.7.8 **Oyster Reef.** The oyster reef shall be placed in accordance with the lines, grades and dimensions as shown on the Construction Drawings and as specified in the Contractor's approved Work Plan. The aquaculture grade mesh bags shall be stacked four bags high and two bags thick and encompass the perimeter of the oyster reef habitat to form the footprint or as otherwise proposed and approved in the Contractor's Work Plan. Loose shell, or additional shell filled mesh bags, shall be use in the interior of the oyster reef portion up to a thickness of 2-1/2 ft. Shell placement shall occur so as to avoid fracturing of the shell during placement.

8.7.9 **Tolerances.** The maximum vertical tolerance above the template is +1 ft to allow for initial island settlement with no lower vertical tolerance. Any material placed above this tolerance may be left in place at the discretion of the Engineer.

9.0 VEGETATION (BID OPTION A)

9.1 **Materials.** Only use nursery grown plant materials purchased from Florida based Nurseryman Stock that comply with all required inspection, grading standards, and plant regulations in accordance with the latest edition of the Florida Department of Agriculture's "Grades and standards for Nursery Plants." Minimum grade for all plants is Florida No. 1 or better. All plants must be the specified size and grade at the time of delivery to the site. Plants will not be accepted if stressed from dehydration, disease, insects, freeze or windburn. All plant material shall be free of invasive non-native plant species. Unhealthy or undersize plants shall be subject to replacement (and, as appropriate, installation) by the Contractor at no additional cost to the City.

9.2 **Quantities.** As described in TS-8.4, the theoretical size of the habitat island, as show on the Construction Drawings, is approximately 1.7 acres. The required plant spacing and relative proportion of plant materials, along with the estimated quantities based on a habitat island approximately 1.7 acres in size, are shown in Table 5. The Contractor shall be responsible for independently estimating and verifying the anticipated size of the island based upon the

site specific sediment characteristics and his construction means and methods and accordingly estimate the quantity of plants required based on the spacing requirements.

Table 5: Planting Details

Plant Name	Size	Spacing (ft O.C.)	Area (sf)	Quantity
Red & Black Mangrove (<i>Rhizophora mangle</i> / <i>Avicennia germinans</i>)	1 gallon	3	14,650	2,500
	3 gallon	3	14,650	700
Smooth Cordgrass (<i>Spartina alterniflora</i>)	4" liner	1.5	24,390	7,500
	1 gallon	1.5	24,390	2,800
Black needlerush (<i>Juncus roemerianus</i>)	4" liner	1.5	24,390	7,500
	1 gallon	1.5	24,390	2,800

9.3 Installation.

9.3.1 Plant installation shall not begin until planting areas are staked out by the Contractor and accepted by the Engineer.

9.3.2 Native trees and gallon size plants shall be planted within the selected areas by hand using a shovel, spade, dibble or other acceptable method. The planting tool shall be used to create a hole that is two to three inches wider than the plant pot and of sufficient depth and width to allow the entire root mass to be inserted without breakage or damage. Plants shall be planted upright and plumb so the junction between the root crown and the stem is at the ground surface. The installed plants should be checked at the end of each day for "floaters" or plants that have dislodged from the soil and floated to the surface. Floaters should be replanted each day.

9.3.3 Only as necessary, staking and guying of plants will be performed by the Contractor to insure stability and plumb condition of the plants. Staking and guying of the plants shall be at the discretion of the Contractor unless otherwise directed by the City.

9.3.4 The Contractor shall guarantee the survival of at least eighty five (85) percent of all plant materials per species for a period of one year from date of installation. Plants per species that die in excess of the 15% allowance shall be replaced and maintained by the Contractor at no additional cost to the City.

10.0 ENVIRONMENTAL PROTECTION

10.1 General. The Contractor shall provide all equipment, materials, and labor and perform all work required to prevent environmental pollution and damage as a result of construction operations under this Contract. For the purpose of this specification, environmental pollution and damage are defined as the presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to man; or degrade the utility of the environment for aesthetic, cultural and/or historical purposes. The control of environmental pollution requires consideration of air, water, and land resources. Management of visual aesthetics, solid waste, and noise are associated issues within environmental protection steps. It is the Contractor's responsibility to investigate and comply with all applicable Federal, State, and Local laws, regulations, and permits governing environmental protection.

10.2 Permits. The Contractor shall comply with all conditions stipulated in the project permits. The Project permits include:

- FDEP Environmental Resource Permit No. 11-0312776-001 (pending)
- FDEP Submerged Lands Lease No. 110236845 (pending)
- USACE Permit No. SAJ-2012-01027 (pending)
- City Resolution No. 11-13008

Copies of the Project permits obtained by the City are provided in Appendix B of the Contract Documents. A copy of the Draft FDEP Environmental Resource Permit is included in Appendix

B. Copies of outstanding regulatory permits will be issued as Addendums to the Bid Documents upon permit issuance.

10.3 Noncompliance Action. The Engineer shall notify the Contractor and applicable regulatory agencies in writing of any observed noncompliance with the aforementioned Federal, State, or Local laws, regulations, permits, and any elements of this section of these specifications. Upon notification, the Contractor shall be required to take immediate corrective action. If the Contractor fails or refuses to comply promptly, the Engineer may issue an order stopping all or part of the Work until satisfactory corrective action has been taken.

10.4 Protection of Historical or Archeological Resources. If historical or archaeological artifacts are discovered at any time within the Project site, the Contractor shall immediately notify the Engineer.

10.5 Protection of Land Resources. The Contractor shall not remove, cut, deface, injure, or destroy vegetation and other land resources within the preservation areas. Trees, shrubs, grasses, land forms, and other landscape features to be preserved shall be identified by the Contractor by protective marking, fencing, or other protective and noticeable means. No ropes, cables, or guy wires shall be fastened to or attached to any trees for anchorage unless specifically authorized. The Contractor shall be responsible for the replacement of any damaged or destroyed vegetation to the satisfaction of the Engineer and regulatory agencies. Failure to replace damaged or destroyed vegetation by the Contractor will result in replacement by the City and the cost of replacement shall be deducted from monies due to the Contractor.

10.6 Solid Waste. Solid wastes shall be handled in environmentally sound manners, placed in containers, and discarded on regular schedules. It shall be the Contractor's responsibility to maintain all work areas to acceptable standards and to transport all

solid waste off the properties and dispose of according to federal, state, and local requirements for solid waste. All debris and solid waste material shall be removed and legally disposed of at an upland site.

10.7 Chemical Waste. Chemical waste shall be stored in corrosion-resistant containers, removed from the Work area, and disposed of in accordance with federal, state, and local regulations.

10.8 Other Waste. Discarded materials, other than those which can be included in the solid waste category, shall be handled as directed by the Engineer.

10.9 Protection of Water Resources. The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. Monitoring of all water resource areas affected by construction activities shall be the responsibility of the Contractor. The Contractor shall not discharge or permit discharge into canals, waterways, ditches, etc., fuels, oils, bitumens, garbage, sewage, or other materials which may be harmful to fish, wildlife, or vegetation, or that may be detrimental to outdoor recreation. The Contractor shall be responsible for investigating and complying with all applicable federal, state, and local laws and regulations governing pollution of waters. All Work under this Contract shall be performed in such a manner that objectionable conditions will not be created in waters through or adjacent to the Project areas.

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

10.11 Fish and Wildlife Resource Protection. The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife.

10.11.1 **Marine Mammal Monitoring.** All personnel involved with the project shall be instructed about the potential presence of sea turtles and manatee. The Contractor shall take all measures to ensure the safety of these marine mammals that are in the vicinity of the Contractor's equipment. These measures shall include at a minimum:

- The Contractor shall instruct all personnel associated with the project of the potential presence of manatees and sea turtles and the need to avoid collisions with these mammals. All construction personnel are responsible for observing water-related activities for the presence of marine mammals.
- The Contractor shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the Florida Manatee Sanctuary Act.
- Turbidity curtains and barriers shall be made of material in which marine mammals cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entrapment. Barriers must not block manatee entry to or exit from essential habitat.
- All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area.
- If manatee(s) or sea turtle(s) are seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure protection of these marine mammals. These precautions shall include the operation of all moving equipment no closer than fifty (50) feet of a manatee or sea turtle. Operation of any equipment closer than fifty (50) feet from a manatee or sea turtle shall

necessitate immediate shutdown of that equipment. Activities will not resume until the manatee(s) or sea turtle(s) has departed the project area (50 foot radius around the equipment) of its own volition.

- Any collision with and/or injury to a manatee or sea turtle shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Vero Beach (1-772-562-3909).
- Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) must be used. One sign measuring at least 3 ft. by 4 ft. which reads *Caution: Manatee Area* must be posted. A second sign measuring at least 8 1/2" by 11" explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. Please see the Florida Fish and Wildlife Conservation Commission website for information on how to obtain appropriate signs:

http://www.myfwc.com/docs/WildlifeHabitats/Manatee_EducationalSign.pdf

- 10.11.2 **Seagrass and Oyster Reef Resources.** The Contractor shall protect all seagrass, oyster reef and other environmentally sensitive resources during all phases of the work. At no time shall the Contractor be permitted to anchor, dredge, lay cables or pipe on any seagrass or other submerged resource. Dredging shall not be permitted to occur within fifty (50) ft of seagrass beds or other restriction imposed by the regulatory permits. The Contractor shall use all means necessary to prevent impacts to the submerged resources. The Contractor shall note that the regulatory agencies may levy heavy fines on those who damage seagrass or other submerged resources. Locations of seagrass resources and oyster reefs, mapped in August

2012, within the project area are provided on the Construction Drawings. The mapping of these resources by the Engineer was limited to the immediate project vicinity. The Contractor is responsible for identification and avoidance impacts to all seagrass and other marine resources within the limits of Contractor's operations.

10.11.3 **Mangrove.** No mangrove trimming is authorized under this Contract.

10.12 Dust and Noise Control. The Contractor shall be required to maintain all access roads, ingress routes, egress routes, and all other work areas within or without the Project boundaries free from dust which would cause a hazard or nuisance to others. All equipment used on this Work shall be equipped with satisfactory mufflers or other noise abatement devices. The Contractor shall conduct his operations so as to comply with all Federal, State, and Local laws pertaining to noise. The use of horns, whistles, and back-up alarms shall be held to the minimum necessary in order to ensure as quiet an operation as possible while maintaining safety on the job site.

11.0 SITE RESTORATION

The Contractor shall remove all temporary construction facilities such as stockpiles of excess or waste materials, temporary equipment, staking and markers, and construction debris and return the site to the condition equal to or better than pre-construction activities. The Contractor shall repair any and all damage to the site at the Contractor's expense.