

**PUNTA RASSA BOAT RAMP
CONCRETE MAT SCOUR PROTECTION REPLACEMENT
TECHNICAL SPECIFICATIONS**

Definitions - The following terms and abbreviations used in these Technical Specifications shall be defined as:

PROJECT	Punta Rasa Armor Mat remove/Replace
AGENT	West Coast Inland Navigation District
CONTRACTOR	Those parties selected and duly authorized by the AGENT to conduct the Work contained herein.
Contract Drawings	Construction Plans prepared by Coastal Engineering Consultants
DEP	State of Florida Department of Environmental Protection.
OWNER	Lee County Board of County Commissioners
USACE	United States Army Corps of Engineers.
USCG	United States Coast Guard.
WORK	The project scope of work generally described as removal and replacement of existing armor mat at the Punta Rasa Boat Ramp as described in detail on the Construction Plans and these Specifications.

TS-1.0 SCOPE OF WORK

The WORK to be performed under the CONTRACT consists of furnishing all labor, equipment, supplies, materials, transportation, fuel, power and water, providing environmental protection, and performing all operations in connection with the Punta Rasa Boat Ramp Scour Protection Replacement Project. The County desires to maintain use of two of the four launch lanes open to the public throughout construction. Consideration for partial day closures for safety during crane operations may be considered.

The property is located at 15001 Punta Rassa Road, Fort Myers, Florida in San Carlos Bay, Class II Waters, Section 9, Township 46 South, Range 23 East, Lee County. Stringent turbidity avoidance and control requirements shall be met.

This WORK must be completed according to the CONTRACT documents within the time specified in the CONTRACT and within compliance with the conditions of the Federal, State and local permits. The CONTRACTOR is solely responsible for all construction means, methods, techniques, procedures, lay out, and the sequence of the WORK except as set forth in section "Order of Work".

TS-2.0 BASIS OF AWARD

The basis of award will be the overall lowest most responsive responsible bidder meeting all specifications. The DISTRICT unconditionally reserves the right to award to the vendors whose prices, in its sole judgment, are the most realistic in terms of provision of the best services. Additionally, the DISTRICT reserves the right to reject any and all bids at any time, unconditionally and without cause.

All items listed on the Bid Schedule at the units shown, values of which shall be inclusive of all plant, labor, equipment, supplies, and shall also include all other items of overhead, profit, labor, material and any other costs incident to perform and complete all WORK specified herein.

TS-3.0 SUBMITTALS

TS-3.1 Work Plan

Prior to commencement of WORK the CONTRACTOR shall submit to the DISTRICT and ENGINEER for approval, a WORK plan to cover all specified operations. The WORK plan shall include, but not be limited to, the means and methods to be employed to accomplish: construction access, staging, and restoration; concrete mat scour protection demolition and reconstruction; site restoration; turbidity controls; best management practices; storm emergency plan; health and safety plan; endangered species protection plans and; environmental protection plan; pollution control plan; required shop drawings; and required manufacturers' specifications and certifications. The Work Plan shall also include the Progress Schedule, Schedule of Values, Construction Sequence, and Order of Work. Details on how the contractor proposes keeping two launch lanes open to the public during construction shall be included. The DISTRICT and ENGINEER shall review the WORK Plan and the CONTRACTOR shall make necessary revisions prior to acceptance of the WORK Plan.

TS-3.2 Administrative Records

TS-3.2.1 Relocation of Navigation Aids

Temporary removal of any navigation aids located within or near the WORK areas shall be coordinated by CONTRACTOR with the U.S. Coast Guard prior to removal. The CONTRACTOR shall not otherwise remove, change the location of, obstruct, willfully damage, make fast to, or interfere with any aid to navigation. The CONTRACTOR shall notify the Commander, Seventh Coast Guard District, Miami, Florida, in writing, with a copy to the DISTRICT and ENGINEER, seven days in advance of the time he plans to WORK adjacent to any aids which require relocation to facilitate the WORK. The CONTRACTOR shall contact the U.S. Coast Guard and DISTRICT for information concerning the position to which the aids will be relocated.

TS-3.2.2 Notification of Discovery of Historical Sites

The CONTRACTOR shall immediately notify the DISTRICT and ENGINEER if any shipwreck, artifact, treasure trove, or other objects of antiquity that have scientific or historical value, or are of interest to the public, are discovered, located, and/or recovered.

TS-4.0 CONSTRUCTION SEQUENCE

TS-4.1 Order of Work

In general, the Order of WORK shall be as follows. Any changes in the Order of WORK must be submitted in writing and approved by the DISTRICT and ENGINEER prior to initiation of the specific WORK activity.

- (1) Pre-construction submittals and notifications
- (2) Mobilize
- (3) Prepare construction access and staging areas
- (4) Close one boat ramp, adjacent dock, and center dock for repairs
- (5) Install turbidity controls and best management practices
- (6) Stabilize existing structures
- (7) Remove existing concrete mat scour protection and sediment for one ramp
- (8) Grade channel bottom for one ramp
- (9) Install new concrete mat scour protection for one ramp
- (10) Open the repaired boat ramp for public use
- (11) Close other boat ramp and repeat steps (4) through (10)
- (12) Remove turbidity controls and related construction materials
- (13) Complete site restoration
- (14) Demobilize

TS-4.2 Time of Operations

The CONTRACTOR is allowed to conduct work activities during daylight hours Monday through Friday, excluding weekends and Holidays, at the CONTRACTOR's discretion, provided that the CONTRACTOR complies with all applicable labor laws. The CONTRACTOR may request in writing with minimum five (5) day notice to the DISTRICT to conduct work on weekends. The DISTRICT will review each request individually.

TS-5.0 PAYMENT

TS-5.1 Mobilization and Demobilization

Payment for the cost of mobilization and demobilization including construction access and restoration of construction access and staging area is included in this CONTRACT. Payment for all appropriate costs in connection therewith or incidental thereto; which shall also include all other items of cost required by the CONTRACT for which a separate payment is not provided for herein. This WORK shall be included in the applicable CONTRACT lump sum price for Bid Item "Mobilization and Demobilization." Fifty percent (50%) of the lump sum price will be paid after commencement of removal of the existing concrete mat scour protection. The remaining fifty percent (50%) will be included in the final payment for WORK under this CONTRACT.

In the event the DISTRICT or ENGINEER considers that the amount in this item (50%), which represents mobilization, does not bear a reasonable relation to the cost of the WORK in this CONTRACT, the DISTRICT may require the CONTRACTOR to produce cost data to justify this portion of the bid. Failure to justify such price to the satisfaction of the DISTRICT will result in

payment of actual mobilization costs, as determined by the DISTRICT and ENGINEER at the completion of mobilization, and payment of the remainder of this item in the final payment under this CONTRACT. The determination of the DISTRICT and ENGINEER is not subject to appeal.

TS-5.2 Concrete Mat Scour Protection

Payment shall be made for materials and WORK specified in connection with the grading, leveling, and preparation of the channel bottom; installation of concrete mat scour protection; and all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT unit pricing for Bid Item "Concrete mat Scour Protection."

TS-5.3 Environmental Protection Measures

Payment shall be made for materials and WORK specified in connection with installation and maintenance of turbidity controls; best management practices; turbidity monitoring; implementing state and federal endangered and threatened species protection conditions; implementing habitat and resource protection measures; environmental permit compliance; and all other appropriate costs in connection therewith or incidental thereto. This WORK shall be included in the applicable CONTRACT lump sum price for Bid Item "Environmental Protection Measures."

TS-6.0 WORK AREA

TS-6.1 Limits of Construction

Areas in the vicinity of the Project area contain sensitive environmental habitats such as seagrass beds, mangroves, and oyster beds. The CONTRACTOR shall avoid these habitats and is responsible for environmental protection. All WORK must be confined to the CONTRACTOR's WORK area. No plant or equipment may operate or transit outside those areas. All construction areas shall be restored to pre-construction conditions, or better as part of demobilization.

TS-6.2 Security

The CONTRACTOR is permitted to exclude the public from his immediate WORK area as necessary to perform the WORK and to operate in accordance with the General Conditions of the CONTRACT. The park shall remain open during construction and provide access to two launch lanes. Enforcement shall be the CONTRACTOR's responsibility at no additional cost to the DISTRICT. The enforcement shall be coordinated with local enforcement agencies and will be subject to approval of the DISTRICT.

TS-6.3 Construction Access

The temporary construction access and staging areas for the WORK shall be provided on site. Procurement of any additional access routes for ingress and egress to the construction area shall be obtained by and at the expense of the CONTRACTOR. The CONTRACTOR shall confine his plant, equipment, materials, and operations of personnel to areas permitted by law, ordinances, permits and the requirements of the CONTRACT Documents, and shall not unreasonably encumber the premises with plant, equipment, and materials. The CONTRACTOR must control noise and must control wind-blown sand, silt and dust while using the accesses. The CONTRACTOR is responsible for preparation and restoration of the access areas. The

CONTRACTOR is required to submit a construction access and staging plan including restoration measures prior to their usage. The costs for, but not limited to, earthwork, grading, signage, fencing, walls, guardrails, curbing, paving, stairways, and vegetation removal and reinstallation, along with removal and installation of any other facilities are included in the lump sum price for Bid Item "Mobilization and Demobilization". Disposal of any cleared vegetation, debris and rubbish shall be in a manner acceptable to the DISTRICT and ENGINEER.

TS-6.4 Protection of Existing Facilities

During all phases of the WORK including but not limited to staging, access, construction, and site restoration, the CONTRACTOR shall implement best management practices to protect and stabilize the existing facilities within and adjacent to the WORK Area and to prevent damage thereto by the CONTRACTOR's operations. Where existing facilities are damaged, they shall be immediately repaired in conformance with the best construction standards of practice.

TS-6.5 Noise

The CONTRACTOR shall conduct their operations so as to comply with all Federal, State, and local laws pertaining to noise. The CONTRACTOR shall use a decibel meter and keep records as necessary to verify the WORK is being conducted accordingly.

TS-6.6 Existing Utilities

It shall be the responsibility of the CONTRACTOR to acquaint themselves with the exact location of existing underground structures and utilities and to avoid conflict with all existing facilities. The CONTRACTOR shall be responsible for notifying, in writing and in advance of construction activities, the DISTRICT and ENGINEER and all government and private agencies and entities that may have an area of responsibility, jurisdiction or involvement for any items of WORK being constructed, or who shall assume responsibility for the items after construction. This list of agencies and entities shall include, but is not limited to:

- a. Florida Power and Light
- b. Sprint
- c. Comcast
- d. Lee County Utilities

These agencies require a minimum of 48 hour written notice of activities within their jurisdiction. The CONTRACTOR shall also call Sunshine 811 before beginning any WORK in the WORK area.

Protection of all utilities shall be the responsibility of the CONTRACTOR who shall provide adequate protection to maintain proper service. The CONTRACTOR is to include within its line item bid prices, the costs to protect, and/or support, all underground utilities which may be in conflict with the construction of this Project. Attention is called to the Florida Underground Facility Damage Prevention and Safety Act, Chapter 556, Florida Statutes. This act provides for a one-call center charged with helping prevent damages to underground utilities.

Any expense of utility repair or other damage caused by the CONTRACTOR's operations shall be borne by the CONTRACTOR. Where existing utilities are damaged, they shall be immediately repaired by the CONTRACTOR in accordance with the requirements of the government, private agencies, and entities that may have an area of responsibility, jurisdiction or

involvement for the utilities. If the owner of the utility elects to make such repairs with his own forces, the CONTRACTOR shall make sure that specific arrangements are made to protect the DISTRICT from all damages. Where such conflicts are unavoidable, every effort shall be made to construct the WORK so as to cause as little interference as possible with the services rendered by the structure disturbed.

TS-7.0 CONTRACTOR'S PLANT AND EQUIPMENT

The CONTRACTOR agrees to keep on the job sufficient plant and equipment to meet the requirements of the WORK. The plant and equipment shall be in satisfactory operating condition and capable of safely and efficiently performing the WORK as set forth in the specifications and the plant shall be subject to access by the DISTRICT and ENGINEER at all times. The Plant and Equipment to be utilized by the CONTRACTOR shall be submitted by the CONTRACTOR with their Bid. The Plant listed on the Plant and Equipment Schedule is the minimum which the CONTRACTOR agrees to place on the job unless otherwise determined by the DISTRICT and its listing thereon is not to be construed as an agreement on the part of the DISTRICT that it is adequate for the performance of the WORK. No reduction in the capacity of the Plant employed on the WORK shall be made except by written permission of the DISTRICT. The measure of the "Capacity of the Plant" shall be its actual performance on the WORK to which these Specifications apply.

TS-8.0 TRANSPORTATION FACILITIES

The CONTRACTOR shall make his own investigation of available roads or other means of conveyance for transportation, load limits for bridges, barges and roads, and other road or waterside conditions affecting the transportation of all equipment to the site.

TS-9.0 WATER, SEWER, AND ELECTRIC

The responsibility shall be upon the CONTRACTOR to provide and maintain, at his own expense, an adequate supply of water for his use for construction, and to install and maintain necessary supply connections and piping for same, and necessary portable sanitary facilities but only at such locations and in such manner as may be approved by the DISTRICT and ENGINEER. In the event water is made available by the DISTRICT, the CONTRACTOR shall, at his own expense, install a meter to determine the amount of water used by him and such water will be paid for by, or charged to, the CONTRACTOR at prevailing rates. All electric current required by the CONTRACTOR shall be furnished at his own expense. All temporary lines will be furnished, installed, connected, and maintained by the CONTRACTOR in a workmanlike manner satisfactory to the DISTRICT and ENGINEER and shall be removed by the CONTRACTOR in like manner at his expense prior to completion of the construction and final acceptance.

TS-10.0 MISPLACED MATERIAL

Should the CONTRACTOR, during the progress of the WORK, loose, dump, throw overboard, sink, or misplace any material, plant, or equipment, which in the opinion of the DISTRICT and ENGINEER may be dangerous to, or obstruct navigation, 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 U.S. Coast Guard,

DISTRICT and ENGINEER and when required, shall mark or buoy such obstructions until the same are removed. In the event of refusal, neglect, or delay in compliance with the above requirements, such obstructions may be removed by the DISTRICT, 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 CONTRACTOR's bond.

TS-11.0 CONCRETE

TS-11.1 Description

Construct concrete structures and other concrete members, with the exception of incidental concrete construction (which are specified in other Sections). Refer to FDOT Section 450 for prestressed construction requirements additional to the requirements of this Section.

TS-11.2 Materials

Meet the following FDOT requirements:

Concrete	Sections 346 and 347
Reinforcing Steel	Section 415
Curing Materials	*Section 925
Epoxy Bonding Compounds	Section 926
Joint Materials	Section 932

* The ENGINEER will allow clean sand and sawdust for certain curing, when and as specified.

Meet the following ASTM requirements:

Reinforcing Steel	ASTM A123 and A153
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TS-11.3 Submittals

Furnish the following:

1. Complete data on the concrete mix in accordance with ASTM C94, Alternate 3.
2. Ready mix delivery tickets for each truck with the following information:
 - a. Name of concrete firm.
 - b. Serial number of ticket.
 - c. Date.
 - d. Truck number.
 - e. Specific class of concrete.
 - f. Amount of concrete.
 - g. Time loaded.
 - h. Water added.
 - i. Time unloaded.

TS-11.4 Concrete

- A. Ready-mixed meeting ASTM C-94 and these Specifications.
- B. Portland Cement: Type II with fly ash. Minimum cement content shall be 550 pounds with a maximum water-cement ration of 0.60.
- C. Mix Design:

1. Minimum Allowable 28-Day Compressive Field Strength: 3,000 psi when cured and tested in accordance with ASTM C-31 and C-39.
 2. Coarse Aggregate Size: #89. Other aggregate gradations must be submitted for review and approved in writing before use on the project.
 3. Slump Range: 6 inches \pm 1 inch.
 4. Air Entrainment: 3 percent \pm 1.5 percent by volume.
- D. Mixing: Minimum 70 and maximum 270 revolutions of mixing drum. Nonagitating equipment is not allowed. Concrete shall be placed within 1½ hours after the cement has been added to the mix.
- E. CONTRACTOR shall coordinate and schedule concrete sampling and testing with an independent testing laboratory in accordance standard FDOT test methods for each batch of concrete.

TS-11.4.1 Inspections before Placing Concrete

Do not place concrete until the depth and character of the foundation and the adequacy of the forms and falsework have been approved by the ENGINEER. Do not deposit any concrete until all reinforcement is in place and has been inspected and approved by the ENGINEER. The CONTRACTOR shall notify the DISTRICT and ENGINEER a minimum of 48 hours prior to placing the concrete so that the ENGINEER may inspect the steel.

TS-11.4.2 General Requirements for Placing Concrete

Deposit concrete as nearly as possible in its final position. Do not deposit large quantities at one point and then run or work it along the forms. Take special care to fill each part of the forms, to work coarse aggregate back from the face, and to force concrete under and around reinforcing bars without displacing them.

Use a method and manner of placing concrete that avoids the possibility of segregation or separation of aggregates. If the ENGINEER determines that the quality of concrete as it reaches its final position is unsatisfactory, remove it and discontinue or adjust the method of placing until the ENGINEER determines that the quality of the concrete as placed is satisfactory.

Use metal or metal-lined open troughs or chutes. Where steep slopes are required, use chutes that are equipped with baffles or are in short lengths that reverse the direction of movement. Where placing operations would involve dripping the concrete freely more than 3 feet, deposit it through pipes, troughs, or chutes of sheet metal or other approved material. Keep all troughs, chutes, and pipes clean and free from coatings of hardened concrete by thoroughly flushing them with water after each run or more often if necessary.

TS-11.4.3 Placing Concrete by Pumping

In general, use concrete pumping equipment that is suitable in kind and adequate in capacity for the work proposed. Use a pump discharge line that has a minimum diameter of 2.5 inches. Use a pump and discharge lines that are constructed so that no aluminum surfaces are in contact with the concrete being pumped. Operate the pump to produce a continuous stream of concrete, without air pockets. When using cement slurry or similar material to lubricate the discharge line when pumping begins, collect such material at the point of discharge. The CONTRACTOR shall dispose of the collected slurry in areas provided by the CONTRACTOR.

Control the pump discharge locations so that the placement locations of the various lots of concrete represented by strength test cylinders can be identified in the event the test cylinders indicate deficient strength. When concrete is placed by pumping, take all test samples of concrete at the end of the discharge line, except in accordance with the provisions of the FDOT Standard Operating Procedures for Quality Control Concrete.

TS-11.4.4 Method of Placing

Carefully place concrete deposited underwater in the space in which it is to remain by means of a tremie or other approved method. Do not disturb the concrete after depositing it. Deposit all seal concrete in one continuous placement. Do not place any concrete in running water and ensure that all formwork designed to retain concrete underwater is watertight.

TS-11.4.5 Use of Tremie

Use a tremie consisting of a tube having a minimum inside diameter of 6 inches, constructed in sections having watertight joints. Do not allow any aluminum parts to have contact with the concrete. Ensure that the discharge end is entirely seated at all times and keep the tremie tube full to the bottom of the hopper. When dumping a batch into the hopper, keep the tremie slightly raised (but not out of the concrete at the bottom) until the batch discharges to the bottom of the hopper. Stop the flow by lowering the tremie. Support the tremie such as to permit the free movement of the discharge end over the entire top surface of the work and to permit its being lowered rapidly when necessary to choke off or retard the flow. Provide a continuous, uninterrupted flow until completing the work. Exercise special care to maintain still water at the point of deposit.

TS-12.0 GEOTEXTILE

TS-12.1 General

The geotextile shall be a woven monofilament or multifilament pervious sheet of polymeric yarn, Mirafi FW500, or approved equivalent. Fibers used in the manufacture of the geotextile fabric shall consist of long-chain synthetic polymers composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. Stabilizers and/or inhibitors shall be added to the base polymer if necessary to make the filaments resistant to deterioration by ultraviolet light, oxidation, and heat exposure. Reclaimed or recycled fibers (post-consumer) or polymer shall not be added to the formulation. Geotextiles shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other (including the filaments or yarns at the edges of the fabric).

The geotextile shall be finished so that the filaments will retain their relative position with respect to each other. The edges of woven fabric shall be finished to prevent the outer material from pulling away from the fabric. The CONTRACTOR shall provide the manufacturer's certificate of compliance attesting that the geotextile meets the requirements of these specifications and the mill certificates stating the length and width of fabric contained on each roll to the DISTRICT and ENGINEER prior to construction.

TS-12.2 Placing Geotextile

The CONTRACTOR shall prevent exposure of the geotextile to light until needed for construction. The geotextile laying and subsequent covering with succeeding courses shall proceed in such a manner as to limit exposure to light to a maximum period of 24 hours.

The surface to receive the geotextile shall be smooth, free from obstructions, depressions, and sharp objects. The CONTRACTOR shall notify the DISTRICT and ENGINEER 48 hours prior to placing the geotextile so that the ENGINEER may observe the surface to receive the geotextile. The CONTRACTOR shall lay the geotextile so as to minimize the number of joints and seams, lay the geotextile loosely, but without creases, and provide at least three feet overlap at joints.

The CONTRACTOR shall not operate machinery directly on the geotextile. When placing material over joints, the CONTRACTOR shall place the material in the direction from the overlying geotextile to the underlying geotextile. The CONTRACTOR shall prevent puncture, tear, or displacement of the geotextile and protect it from damage; and replace torn areas and holes by placing an overlay of geotextile having dimensions at least three feet greater than the tear or hole.

TS-13.0 CONCRETE MAT SCOUR PROTECTION

TS-13.1 General

The CONTRACTOR shall prepare the channel bottom and install the concrete mat in accordance with the CONTRACT Plans and these Specifications.

TS-13.2 Cellular Concrete Blocks

TS-13.2.1 References

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 33 (1993) Concrete Aggregates

ASTM C 140 (1996) Sampling and Testing Concrete Masonry Unit

ASTM C 150 (1995; Rev. A) Portland Cement

ASTM C 207 (1991) Hydrated Lime for Masonry Purposes

ASTM C 595 (1994; Rev. A) Blended Hydraulic Cements

ASTM C 618 (1996) Coal Fly Ash and Raw or Calcined Natural Pozzolan for use as a Mineral Admixture in Portland Cement Concrete

ASTM C 4419(1995) Clear Permeability of Geotextiles by Permittivity

ASTM C 4632(1991) Grab Breaking Load and Elongation of Geotextiles

ASTM C 4651(1993) Isobutane Thermophysical Property Tables

ASTM C 4833(1996) Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

ASTM C 5101(1996) Measuring the Soil-Geotextile System Clogging Potential by the Gradient Ratio

TS-13.2.2 Submittals

The CONTRACTOR shall submit the following information to the DISTRICT and ENGINEER.

TS-13.2.2.1 Manufacturer's Catalog Data

Submit all manufacturer's performance research results and calculations in support of the cellular concrete mat system and geotextile proposed for use.

TS-13.2.2.2 Drawings

Submit all manufacturer's specifications, shop drawings for the fabrication of the mats, literature and any recommendations, if applicable, 14 days prior to assembly of the cellular mats.

TS-13.2.2.3 Certificates

Submit manufacturer's certificates of compliance for cellular concrete blocks/mats, revetment cable, and any revetment cable fittings and connectors prior to the start date of mat fabrication.

TS-13.2.3 Products

All cellular concrete mats shall be pre-manufactured as an assembly of concrete blocks, with specific hydraulic capacities, bound into mats by the use of revetment cables. Individual blocks in the cellular mats shall be staggered and interlocked for enhanced stability. Mats shall be constructed of closed cell blocks. Parallel strands of cable shall extend through ducts in each block in a manner which provides for longitudinal binding of the blocks within the mats. Each row of blocks shall be laterally offset by one-half block width from the adjacent row so that any given block is cabled to four other blocks (two in the row above and two in the row below).

The gross area of each individual block in direct contact with the protected subgrade shall be no less than one square foot. Each block shall incorporate interlocking surfaces that prevent lateral displacement of the blocks within the mats when they are lifted by the longitudinal revetment cables. The interlocking surfaces shall not protrude beyond the perimeter of the blocks to such an extent that they reduce the flexibility or articulation capability of the cellular mats or become damaged or broken when the mats are lifted during shipment or placement. Once the mats are in place, the interlocking surfaces shall prevent the lateral displacement of the blocks even if the cables become damaged or removed. The mats must be able to flex a minimum of 45° in the downward direction.

The cables shall be inserted into the mats in such a manner to form lifting loops at one end of the mat and the corresponding cable ends shall be spliced together to form a lifting loop at the other end of the mat. The cellular concrete mats shall be placed on a filter fabric.

TS-13.2.4 Concrete Blocks

TS-13.2.4.1 Materials

Cementitious materials shall conform to the following ASTM specifications:

ASTM C 150, for Portland Cement

ASTM C 595, for Blended Hydraulic Cements

ASTM C 207, for Hydrated Lime Types

ASTM C 618, for Pozzolans

ASTM C 33, for Concrete Aggregates, except for grading requirements

TS-16.2.4.2 Physical Requirements

At the time of delivery to the WORK area, the units shall have a minimum compressive strength of 4,000 pounds per square inch and maximum water absorption of 12 pounds per cubic foot.

TS-13.2.4.3 Durability

The CONTRACTOR shall provide the manufacturer certification of proven field performance that the concrete units have adequate durability even if they are subjected to a freeze-thaw environment.

TS-13.2.4.4 Testing

The CONTRACTOR shall sample and test units in accordance with ASTM C 140.

TS-13.2.4.5 Visual Inspection

All units shall be sound and free of defects that would interfere with the proper placing of the unit or impair the strength or performance of the construction. Surface cracks incidental to the usual methods of handling in shipment and delivery shall not be deemed grounds for rejection.

Cracks exceeding 0.25 inch in width and or 1.0 inch in depth shall be deemed grounds for rejection.

Chipping resulting in a weight loss exceeding 10% of the average weight of the blocks shall be deemed grounds for rejection.

Blocks rejected shall be replaced or repaired with structural grout with the DISTRICT and ENGINEER'S approval at the expense of the CONTRACTOR.

TS-13.2.4.6 Sampling and Testing

The DISTRICT and ENGINEER shall be accorded access to facilities to inspect and sample the units at the place of manufacturer from lots ready for delivery.

TS-13.2.5 Revetment Cable and Fittings

TS-13.2.5.1 Polyester Revetment Cable and Fittings

The revetment cable shall be constructed of high tenacity, low elongating, continuous filament polyester fibers. The cable shall consist of a core construction comprised of parallel fibers contained within an outer jacket or cover. The weight of the parallel core shall be between 65% to 70% of the total weight of the cable. The revetment cable shall have the following physical characteristics.

Nominal Cable Dia. – Circum.	Approx. Avg. Strength Lbs.	Weight / 100 Feet	
		Min Lbs.	Max Lbs.
5/16" – 27mm	7,000	3.99	4.42
3/8" – 30mm	10,000	4.75	5.25
1/2" – 40mm	15,000	8.93	9.90

Elongated requirements specified below are based upon stabilized, new, dry cable. Stabilization refers to a process in which the cable is cycled fifty (50) times between a load corresponding to $200D^2$ and a load equal to 10%, 20% or 30% of the cable's approximate average breasting strength. Relevant tolerance on these values is $\pm 5\%$.

	% Breaking Strength		
	10%	20%	30%
Permanent Elongation (while working)	0.7	1.8	2.6
Elastic Elongation	0.6	1.4	2.2
Total Strength	1.3	3.2	4.8

The revetment cable shall exhibit good to excellent resistance to most concentrated acids, alkalis and solvents. The cable shall be impervious to rot, mildew and degradation associated with marine organisms. The materials used in the construction of the cable shall not be affected by continuous immersion in fresh or salt water.

Selection of cable and fittings shall be made by the CONTRACTOR in a manner that insures a safe design factor for mats being lifted from both ends, thereby forming a catenary. Consideration shall be taken for the bending of the cables around hooks or pins during lifting. Revetment cable splicing fittings shall be selected so that the resultant splice shall provide a minimum of 60 percent of the minimum rated cable strength. Fittings such as sleeves and stops shall be aluminum and washers shall be galvanized steel unless otherwise shown on the Contract plans.

TS-13.2.5.2 Size of Cellular Concrete Mats

The cellular concrete blocks, cables and fittings shall be fabricated into mats with a width of up to eight (8) feet and a length which is approved by the DISTRICT and ENGINEER. Minimum mat size shall be 100 square feet.

TS-13.2.6 Execution

TS-13.2.6.1 Foundation Preparation

TS-13.2.6.2 General

Areas on which filter fabric and cellular concrete blocks are to be placed shall be constructed to the lines and grades shown on the Contract Plans and to tolerances specified in the Contract Documents and approved by the DISTRICT and ENGINEER.

TS-13.2.6.3 Grading

The final grade shall be graded to a smooth plane surface to ensure that intimate contact is achieved between grade and the geotextile (filter fabric), and between the geotextile and the entire bottom surface of the cellular concrete blocks. All slope deformities, roots, grade stakes, and stones which project normal to the local slope face must be regraded or removed. No holes, "pockmarks", slope board teeth marked, footprints, or other voids greater than 4.0 inches in depth normal to the local slope face shall be permitted. No grooves or depressions greater than 4 inches in depth normal to the local slope face with a dimension exceeding 2.0 feet in any direction shall be permitted. Where such areas are evident, they shall be brought to grade by placing homogeneous material.

TS-13.2.6.4 Inspection

Immediately prior to placing the filter fabric and cellular concrete blocks, the prepared area shall be inspected by the DISTRICT and ENGINEER. No fabric or blocks shall be placed thereon until that area has been approved.

TS-13.2.7 Placement of Cellular Concrete Blocks/Mats

TS-13.2.7.1 General

Cellular concrete block/mats shall be constructed within the specified lines and grades shown on the Contract Plans.

TS-13.2.7.2 Placement

The cellular concrete blocks shall be placed on the filter fabric in such a manner as to produce a smooth plane surface in intimate contact with the filter fabric. No individual block within the plane of placed cellular concrete blocks shall protrude more than 2.0 inches or as otherwise specified.

If assembled and placed as large mattresses, the cellular concrete mats shall be attached to a spreader bar or other approved device to aid in the lifting and placing of the mats in their proper position by the use of a crane or other approved equipment. The equipment used should have adequate capacity to place the mats without bumping, dragging, tearing or otherwise damaging the underlying fabric. The mats shall be placed side by side and/or end to end, so that the mats abut each other. Mat seams or openings between mats greater than six (6) inches shall be filled with grout. They may be placed either by hand or in large mattresses. Distinct changes in grade that result in a discontinuous revetment surface in the direction of flow shall require a grout seam at the grade change location so as to produce a continuous surface.

TS-14.0 POLLUTION CONTROL

The CONTRACTOR shall control and conduct such operations and institute maintenance procedures to eliminate pollution of adjacent surface waters caused by either material runoff or discharges of any kind from the construction area (roof drains discharge excepted). No off-site discharge is allowed. The CONTRACTOR shall comply with the provisions of Chapters 253 and 403, Florida Statutes, regarding control of air and water pollution and with all rules and regulations of the Department of Environmental Protection. If non-compliance with the aforementioned Federal, State or Local laws or regulations occurs, the CONTRACTOR shall immediately inform the DISTRICT and ENGINEER of proposed corrective action and take such action as may be approved. If the CONTRACTOR fails or refuses to comply promptly, the DISTRICT, through the ENGINEER, may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of a claim for extension of time or for excess costs or damages by the CONTRACTOR.

TS-15.0 ENVIRONMENTAL PROTECTION

TS-15.1 General

For the purpose of this specification, environmental protection is defined as the retention of the environment in its natural state to the greatest possible extent during project construction and to enhance the natural appearance in its final condition. Environmental protection requires consideration of air, water, and land, and involves noise, solid waste-management as well as other pollutants. In order to prevent any environmental pollution arising from the construction activities in the performance of this CONTRACT, the CONTRACTOR and his SUBCONTRACTORS shall comply with all applicable Federal, State and local laws and regulations concerning environmental pollution control and abatement.

TS-15.1.1 Subcontractors

Compliance with the provisions of this section by SUBCONTRACTORS will be the responsibility of the CONTRACTOR.

TS-15.1.2 Landscape Protection

The environmental resources within the project boundaries and those affected outside the limits of permanent WORK under this CONTRACT shall be protected during the entire period of

this CONTRACT. The CONTRACTOR shall confine his activities to areas agreed to by the CONTRACTOR and County park staff.

Prior to the beginning of any construction, the CONTRACTOR shall identify all land resources to be preserved within the CONTRACTOR's WORK area. The CONTRACTOR shall not remove, cut, deface, injure, or destroy land resources, including trees, shrubs, vines, grasses, topsoil, and landforms without special permission from the DISTRICT and ENGINEER. Trees damaged beyond restoration shall be removed and disposed of by the CONTRACTOR in a manner approved by the DISTRICT and ENGINEER. Trees that are to be removed because of damage shall be replaced at the CONTRACTOR's expense by nursery-grown trees of the same species or a species approved by the DISTRICT and ENGINEER. The size and quality of nursery-grown trees shall also be approved by the DISTRICT and ENGINEER. No ropes, cables, or guys shall be fastened to or attached to any trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the CONTRACTOR shall provide effective protection for land and vegetation resources at all times.

Prior to any construction the CONTRACTOR shall mark the areas that are not required to accomplish all WORK to be performed under this CONTRACT. Isolated areas within the general WORK area which are to be saved and protected shall also be marked or fenced. The CONTRACTOR shall protect from damage all existing trees designated to remain and protect tree roots from noxious materials in solution caused by run-off or spillage. No materials, trailers, or equipment shall be stored within the drip line of any protected tree. Monuments and markers shall be protected before construction operations commence. Where construction operations are to be conducted during darkness, the markers shall be visible. The CONTRACTOR shall convey to his personnel the purpose of marking and/or protection of all necessary objects.

Trees and their roots, shrubs, vines, grasses, landforms, and other landscape features are to be preserved, clearly identified, and protected by fencing or any other approved techniques as necessary. The CONTRACTOR shall place tree protection fencing before excavation or grading is begun and maintain in place until construction is complete; remove branches of protected trees, if required, to clear for construction and extend pruning operation to restore the natural shape of the entire tree; cut branches or roots, if required, with sharp pruning instruments, (do not break or chop); and repair any damage to tree crowns or roots promptly after damage occurs.

TS-15.1.3 Location of Storage Facilities

The CONTRACTOR's storage areas required in the performance of the WORK shall be located upon existing cleared portions of the job site or areas to be cleared, and shall require written approval of the DISTRICT and ENGINEER. The CONTRACTOR shall not store oil or fuel on-site, or equipment that is not required for the daily construction activities. A metal pan with sides a minimum of four (4) inches high shall be placed under the equipment or adjacent area during refueling. The pan shall have a capacity equal to the capacity of the gas cans used and catch any spills or leaks during the refueling activity. Fuel caught in the pan shall be contained and either transported off-site or used in the equipment. Under no condition shall the material be discharged on-site or into adjacent waters.

TS-15.1.4 Post-Construction Cleanup or Obliteration

The CONTRACTOR shall obliterate all signs of construction WORK areas, waste materials, or any other vestiges of construction as directed by DISTRICT and ENGINEER. The area will be restored to near natural conditions.

TS-15.1.5 Spillage

Special measures shall be taken to prevent bilge pumpage or effluent, chemicals, fuels, oils, greases, bituminous materials, waste washing, herbicides and insecticides, and concrete drainage from entering public waters.

TS-15.1.6 Disposal

Disposal of any materials, wastes, effluent, trash, garbage, oil, grease, chemicals, etc., in areas adjacent to streams or other waters of the State shall not be permitted. If any waste material is dumped in unauthorized areas, the CONTRACTOR shall remove the material and restore the area to its original condition before being disturbed. If necessary, contaminated ground shall be excavated, disposed of as directed by the DISTRICT, and replaced with suitable fill material, compacted and finished with topsoil and planted as required to re-establish vegetation.

TS-15.2 Manatees

In order to ensure that Manatees are not adversely affected by the construction activities, the CONTRACTOR shall abide by the STANDARD MANATEE CONSTRUCTION CONDITIONS contained within the Permits.

TS-15.3 In-Water Sea Turtle and Smalltooth Sawfish

In order to ensure that In-Water Sea Turtles and Smalltooth Sawfish are not adversely affected by the construction activities, the CONTRACTOR shall abide by the SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS contained within the Permits.

TS-15.4 Turbidity Controls

The WORK shall be conducted in a manner that does not cause violations of state water quality standards. The CONTRACTOR shall implement best management practices for erosion and pollution control to prevent violations of state water quality standards, including but not limited to, the use of floating turbidity barriers, staked silt screens and staked hay bales. Turbidity barriers shall remain in place at all locations until any generated turbidity subsides. All practices shall be in accordance with these specifications and Permits. The CONTRACTOR shall correct any erosion or shoaling that causes adverse impacts to the water resources.

The CONTRACTOR shall take measures to ensure that turbidity levels within waters of the State surrounding the project site do not exceed allowable levels. Such measures include, but are not limited to, working during a slack tide, working at a time when the tidal ranges are minimal/less frequent, and working when currents within the Project area are at minimal intensity.

As required by the Permits, prior to the commencement of any in-water WORK, floating turbidity screens with weighted skirts that extend to within 1 foot of the bottom shall be placed

around the active construction area. The screens shall be maintained and shall remain in place for the duration of the WORK to ensure that turbidity levels outside the WORK area do not exceed the State's water quality standards for turbidity.

The CONTRACTOR shall conduct his WORK in a manner to prevent damage to the submerged bottom (rutting, prop-scouring, and equipment sitting on the bottom) outside of the construction areas. WORK in the shallow water areas shall occur during high tides to prevent damage to the submerged bottom.