

**SECTION 227 NATIONAL SHORELINE EROSION
CONTROL**

DEVELOPMENT AND DEMONSTRATION PROGRAM

DRAFT

SPECIFICATIONS

FOR THE

63RD STREET "HOTSPOT", MIAMI BEACH, FLORIDA

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SECTION 1 SUPPLIES OR SERVICES AND PRICES/COSTS

1.1 GENERAL

1.1.1 Bidding Schedule

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Item No.	Description	Qty	Unit	Cost per Unit	Cost
A	Mobilization		L.S.	\$ _____	\$ _____
B	ABM Fabrication		S.F	\$ _____	\$ _____
C	Reefball Fabrication		EA	\$ _____	\$ _____
D	RBAM Installation		EA	\$ _____	\$ _____
E	Indiv. RB Installation		EA	\$ _____	\$ _____
F	Anchor Installation			\$ _____	\$ _____
G	Demobilization		L.S.	\$ _____	\$ _____
				Subtotal	\$ _____
				Contingencies	\$ _____
				TOTAL	\$ _____

1.2 PRODUCTS (NOT APPLICABLE)

1.3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 2 GUIDANCE TO CONTRACTORS

2.1 GENERAL

2.1.1 Project Information

2.1.1.1 Project Location

The project is located at 63rd Street in Miami Beach, Florida.

2.1.1.2 Project Description

The project includes all construction necessary to construct the Submerged Artificial Reef Training Structure (SMART Structure) for the City of Miami Beach, Florida as shown on the drawings and as described herein, including purchase, handling, transportation and placing of materials. The project also includes all relocation, temporary construction and restoration necessary to produce a complete a useable facility.

NOTE: The work site is accessible by water and air only. The Contractor shall transport equipment, materials, and labor to the work site by water only.

2.1.2 Summary of Contract Work

The contract work consists of, but is not limited to, the following items of work:

- A. Mobilize to include transportation of barges, equipment and materials to the site and establishing work platforms offshore.
- B. Fabricating the reefballs and ABMs
- C. Assembling the RBAM Units.
- D. Installing the RBAM Units.
- E. Installing individual reefball units.

2.1.3 Special Conditions:

- A. The Contractor shall engage registered architects and professional engineers, as required by the State of Florida, to oversee the design, quality control and construction work.
- B. The Contractor shall possess the experience, ability, personnel, equipment and facilities to fully perform the indicated scope of work. The Contractor shall have demonstrated such qualifications by satisfactorily completing the construction of at least three (3) similar projects within the last (8) years, with at least one of those projects completed in the last three (3) years. Satisfactory

completion shall mean completion by the Contractor of the terms and conditions of the contract for construction and unqualified acceptance of the completed project by the owner.

- C. The contractor will provide a staging area for the fabrication and storage of the RBAM units and individual reefballs.
- D. Construction shall be water based. A crane mounted on a jackup barge or other suitable floating device will be necessary for construction.
- E. The contractor shall assume he will be required load larger items onto barges and deliver them to the construction site by barge or similar floating device. The contractor shall select his own method of delivery to the project site.
- F. The Contractor shall take all necessary actions to maintain the safety of boaters, swimmers, and persons on or near the beach or construction site during construction.

2.1.4 Construction Scheduling

- A. Offerors shall submit a Construction Schedule as part of their response to this Request for Proposal. The following requirements are to be addressed in the proposed Construction Schedules:
 - 1. Staging and Construction operations.
 - 2. Anticipated adverse weather days.
- B. The Contractor shall develop and maintain up-to-date construction progress schedules. The schedule shall be presented to show order, length and interdependence of activities and the sequence in which the work is to be accomplished.
- C. The anticipated monthly adverse weather days shall be based on NOAA data for the Miami Beach, Florida area. Condition definitions are as follows:

Hurricane Conditions of Readiness

Miami Beach, Florida is subject to hurricane storms at various times during the year. The Contractor shall comply with the following requirements for hurricane readiness unless specifically directed otherwise:

Condition FOUR:

(Sustained winds of 50 knots or greater expected with 72 hours): Normal daily job site cleanup and good housekeeping practices. Collect and store in piles or containers all scrap lumber, waste material, and rubbish for removal and disposal at the close of each workday. Maintain the construction site at the close of each workday. Maintain the construction site including storage areas,

free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all debris, trash, or objects that could become missile hazards. Contact the Project Manager for Condition of Readiness (COR) updates and completion of required action.

Condition THREE:

(Sustained winds of 50 knots or greater expected within 48 hours): Maintain “Condition FOUR” requirements and commence securing operations as necessary for “Condition ONE” which cannot be completed within 18 hours. Cease all routine activities that might interfere with securing operations. Commence securing and stow all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to “Condition TWO” and continue action as necessary to attain “Condition THREE” readiness. Contact the Project Manager for weather and COR updates and completion of required action.

Condition TWO:

(Sustained winds of 50 knots or greater expected within 24 hours): Curtail or cease routine activities until securing operation is complete. Reinforce or remove formwork and scaffolding. Secure machinery, tools, equipment, materials, or remove from the job site.

Condition ONE:

(Sustained winds of 50 knots or greater expected within 18 hours): Expend every effort to clear all missile hazards and loose equipment from project site. Secure the job site and leave the premises.

2.1.5 Permits

The Contractor shall obtain and pay for all permits required by authorities having jurisdiction. The Architect/Engineer of record shall certify completion of construction for all permits prior to final acceptance.

2.1.6 Damages

Fences, roads, ditches, private or public grounds, and other structures or improvements damaged as a result of the Contractor's operations herein specified shall be repaired or rebuilt by the Contractor at its expense.

2.1.7 Correlation and Intent

- A. Omissions in this Specification of such words and phrases as “the Offeror shall,” “shall be,” “shall consist of,” “as indicated on the drawings,” “in accordance with,” “shall,” “and,” “the,” etc., are intentional. Such words and phrases shall be supplied by implication.
- B. Whenever the words “necessary,” “proper,” or words of like effect are used with respect to the extent, conduct, or character of work required, they shall mean that the said work shall be carried to the extent, must be conducted in a

manner, or be of a character which is “necessary” or “proper” under the circumstances in the opinion of the Project Manager, and the Project Manager's judgment in such matters shall be considered final.

2.1.8 Site Condition Verification

Offerors shall examine the site and determine for themselves the existing conditions and general character of the site. Claims for additional costs due to conditions that could have been verified by site investigation will not be permitted.

2.2 PRODUCTS (NOT APPLICABLE)

2.3 EXECUTION (NOT APPLICABLE)

END OF SECTION

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SECTION 3 CODES AND STANDARDS

3.1 GENERAL

The project shall be designed and constructed in accordance with the applicable codes, standards, design parameters or regulations noted in this section or other sections. In case of conflict between codes, standards, or regulations, the most stringent requirement shall apply.

Reference to standard specifications of any technical society, organization, or association, or to codes, manuals or regulations of Federal, State, or local authorities shall mean the latest standard, code, manual, regulation, specification, or tentative specification adopted and published at least 30 days prior to submittal of proposals, unless specifically states otherwise.

Final construction drawings must bear the seal of an Architect or Professional Engineer registered in the State of Florida.

3.2 PRODUCTS (NOT APPLICABLE)

3.3 EXECUTION (NOT APPLICABLE)

END OF SECTION

SECTION 4 SUBMITTAL PROCEDURES

4.1 GENERAL

4.1.1 Submittals

The submittals described below are those required and further described in other Sections of the specifications. Submittals required by other non-technical parts of the contract are not included in this Section.

- A. Data. Submittals that provide calculations, descriptions, or documentation regarding the work.
- B. Drawings. Submittals that graphically show relationship of various components of the work, schematic diagrams of systems, details of fabrication, layouts of particular elements, connections, and other relational aspects of the work.
- C. Schedules. Tabular lists showing location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.
- D. Reports. Reports of inspections or tests, including analysis and interpretation of test results. Each report shall be properly identified. Test methods used shall be identified and test results shall be recorded.
- E. Certificates. Statement signed by an official authorized to certify on behalf of the manufacturer of a product, system or material, attesting that the product, system or material meets specified requirements. The statement shall be dated after the award of this contract, shall state the Contractor's name and address, shall name the project and location, and shall list the specific requirements that are being certified.

4.1.2 Approved Submittals

The approval of submittals by the Project Manager shall not be construed as a complete check, but will indicate only that the general method of construction, materials, detailing and other information are satisfactory. Approval will not relieve the Contractor of the responsibility for any error, which may exist, as the Contractor under the Contractor Quality Control requirements of this contract is responsible for dimensions, the design of adequate connections and details, and satisfactory construction of all work. After submittals have been approved by the Contracting Officer, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

4.1.3 Disapproved Submittals

The Contractor shall make all corrections required by the Project Manager and promptly furnish a corrected submittal in the form and number of copies specified

for the initial submittal. If the Contractor considers a correction indicated on the submittals to constitute a change to the contract, a notice in accordance with the CONTRACT CLAUSE entitled CHANGES shall be given promptly to the Contracting Officer.

4.1.4 Withholding of Payment

Payment for materials incorporated in the work will not be made if required approvals have not been obtained.

4.2 PRODUCTS (NOT APPLICABLE)

4.3 EXECUTION

4.3.5 General

The Contractor shall make submittals as required by the specifications. The Contracting Officer may request submittals in addition to those listed when deemed necessary to adequately describe the work covered in the respective Sections. Units of weights and measures used on submittals shall be the same used on the contract drawings. Each submittal shall be complete and in sufficient detail to allow ready determination of compliance with contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor's Quality Control System Manager and each item shall be stamped, signed, and dated by the Contractor's Quality Control System Manager indicating the action taken. Proposed deviations from the contract requirements shall be clearly identified. Submittals shall include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including, but not limited to, catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; Operation and Maintenance manuals including parts list; certifications; warranties; and other such required submittals. Samples remaining upon completion of the work shall be picked up and disposed in accordance with manufacturer's Material Safety Data Sheets (MSDS) and in compliance with existing laws and regulations.

4.3.6 Scheduling

Submittals covering component items forming a system or items that are interrelated shall be scheduled to be coordinated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time, usually a minimum of 15 calendar days exclusive of mailing time, shall be allowed and shown on the register for review and approval. No delays damages or time extensions will be allowed for time lost in late submittals.

4.3.7 Control of Submittals

The Contractor shall carefully control its procurement operations to ensure that each individual submittal is made on or before the Contractor-scheduled submittal date shown on the approved “Submittal Register”.

END OF SECTION

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SECTION 5 Diving Services

5.1 GENERAL

5.1.1 General Requirements

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, except as modified below. A Contracting Officer's Representative, will be designated by the Contracting Officer at the Post Award Conference, to act for the Contracting Officer for all submissions, directions and/or acceptance(s) required under these specifications. The Government will designate an individual as the District Dive Coordinator.

5.1.2 REFERENCES

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

CORPS OF ENGINEERS (COE)

EM 385-1-1	(Sep 1996) Safety and Health Requirements Manual
ER 385-1-86	(July 1994) Engineer Regulation, Government Personnel Diving Operations

CODE OF FEDERAL REGULATIONS (CFR)

29 CFR Part 1910	(1999) Occupational Safety and Health Standards
29 CFR Part 1915	(1999) Safety and Health Standards Applicable to Shipyard Employment

NAVAL SEA SYSTEMS COMMAND (NSSC)

0910-LP-708-8000	(Jan 1999) U.S. Navy Diving Manual, Revision 4
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5.1.3 SUBMITTALS

5.1.3.1 Diving Plan.

Submit, for review, at least 10 days prior to any diving operations, three (3) copies of a Project/Task Specific Dive Plan prior to performing any actual dive

task or assignment. Each separate Dive Plan will require review and acceptance by the Contracting Officer's Representative prior to commencing any diving required under this contract. A typical Dive Plan (the Contractor may prepare a form with the appropriate subject/item already listed with blank spaces to be filled in as required for each Dive Plan submitted) shall include the following information as a minimum:

- a. Dive Plan for: (project and specific tasks).
- b. Name of Contractor (and diving subcontractor if required).
- c. Contract Number.
- d. Date of Dive Plan submission.
- e. Name of diving supervisor preparing the Dive Plan.
- f. Description of proposed work and diving mission.
- g. Approximate time and date dive mission will start.
- h. Listing of diving equipment to be used.
- i. Name or type of diving platform to be used.
- j. Planned depth of dive and maximum depth to bottom.
- k. Maximum single dive bottom time for the planned depth of dive for each diver.
- l. Surface and underwater conditions, to include visibility, temperature, thermal protection, and currents.
- m. Lockout/Tagout procedures, including procedures for dealing with differential pressures.
- n. Listing of special tools or equipment to be used.
- o. Materials to be handled or installed.
- p. Listing by name each member of the diving team. The first time each diver is employed on the job, the Contractor shall attach to the dive plan a qualification statement and copy of the diver's current medical record, giving the physician's written report and opinion of the diver's fitness for exposure to hyperbaric conditions, including any limitations to such exposure. The required qualifications statement and current medical report shall be in accordance with EM 385-1-1. Diver's qualification statement and medical record need not be attached to subsequent Dive Plans unless a

diver's medical report has expired and a new medical report has been submitted.

- q. Listing by name each person directly involved in topside assistance/support to the dive team.
- r. Listing of information and equipment required at the dive site. The following information and work materials shall be available at the dive site, either referenced in the Diving Operations Manual or work materials furnished by the Contractor: U. S. Navy Standard Air Decompression Table; Diving Log Sheets; Repetitive Dive Worksheets; Table of No-Decompression Air Dives; means of direct emergency communications between the dive site and the Contractor's project office, the Dive Coordinator/Dive Inspector; stop watch or equivalent, as required to monitor times for each diver; standard first aid supplies; litter or tilt board and a manual resuscitator capable of administering oxygen; portable VHF marine band radio as required to communicate with vessel traffic.
- s. Listing of information required at the dive site and the project office; local emergency medical assistance names, locations, and telephone numbers for ambulance service, hospital, and doctor, emergency medical evacuation assistance for ground and/or air transportation facilities with point of contact names, locations and telephone numbers; nearest emergency medical facility with hyperbaric chamber capable of recompression equivalent to 165 feet of water, with point of contact names, location and telephone numbers.
- t. The Dive Plan shall contain the following statement: "If for any reason the diving plan, as accepted, is altered in scope of mission, depth, personnel, or equipment, the Philadelphia District Diving Coordinator shall be contacted in order to review the proposed diving plan revision prior to the actual diving operation." (24 Hrs).

5.1.3.2 Diving Operations Manual

Submit, for review, at least 15 days prior to any diving operations, two (2) copies of a Diving Operations Manual, which shall depict the Contractor's general plan for accomplishing the diving operations required under this contract. The Diving Operations Manual shall be reviewed by the Contracting Officer's Representative prior to commencing of any diving operations under this contract. The Diving Operations Manual shall include the following information as a minimum:

- a. A complete copy of 29 CFR Part 1910, Subpart T, and the Contractor's proposed method of complying with each of its pertinent parts.
- b. U. S. Navy Standard Air Decompression Table.

- c. A sample of the Diving Log sheets to be used under this contract.
- d. A sample of the Repetitive Dive Worksheets or equivalent (dive profile method) to be used under this contract.
- e. U. S. Navy Table of No-Decompression Limits and Repetitive Group Designation for No-Decompression Air Dives.
- f. U. S. Navy Residual Nitrogen Timetable for Repetitive Air Dives.
- g. An outline of emergency communications between the dive site and the Contractor's project office (located at the job site); Contractor-furnished portable radios, hardware, telephone hookup, etc.
- h. An outline of proposed treatment and emergency evacuation for drowning, gas embolism, decompression sickness, or traumatic injury.
- i. Emergency assistance information, including location, telephone numbers, and names of nearest doctor, hospital, emergency ground and air transportation, recompression facilities, and other appropriate medical assistance.
- j. An Activity Hazard Analysis Plan, setting forth potential hazards, means of prevention, and actions to be taken should an accident involving the potential hazard occur. Minimum coverage in the Activity Hazard Analysis Plan shall include; means of prevention and procedures for dealing with fire, equipment failure, and adverse environmental conditions, prevention and procedures for dealing with fire, equipment failure, and adverse environmental conditions, drowning, air embolism, decompression sickness, hypoxia, carbon dioxide excess, carbon monoxide excess, strangulation, various type of squeezing, fouling or entanglement, mechanical injury, overexertion/exhaustion, hypothermia, hyperthermia, currents caused by hydraulic differential through the structure, and electrocution and blowup if dry suits are used. Also to be included shall be means of prevention and procedures for dealing with fire, equipment failure, and adverse environmental conditions.
- k. An outline of pre-dive briefings and equipment checkout procedures for daily diving activities under this contract.
- l. An outline of qualifications and experience requirements for the dive team members, required under this contract. As a minimum, each team member shall have at least one (1) year of commercial experience in the applicable position; divers shall have completed at least four (4) working dives to the depths required by this contract, using the particular diving techniques and equipment to be used under this contract. Divers shall demonstrate that at

least one (1) of the four (4) qualification dives was performed in the last six (6) months prior to the contract award date.

- m. An outline of the medical qualifications required for divers to be employed under this contract. As a minimum, each diver shall meet the certification requirements specified in 29 CFR Part 1910, Subpart T, and EM-385-1-1, Section 30.
- n. An outline of diving equipment, maintenance procedures and certification of analysis of air output for diving air supply compressors to be used under this contract. As a minimum, the equipment maintenance procedures shall indicate method of testing, frequency, and repair methods used. Diving air supply compressors' output air shall be in conformance with the following limits: oxygen - 20 to 22 percent by volume, carbon dioxide - 1,000 ppm maximum, carbon monoxide - 20 ppm maximum, total hydrocarbons - 25 ppm maximum, particulates - 5 mg/cubic meter maximum, and have no objectionable odor.
- o. An outline of administrative and record-keeping procedures. As a minimum, the outline shall contain (by title of position) job responsibilities, the chain of command, daily briefing and diving safety orientation procedures, log and diving-related record-keeping responsibilities,
- p. equipment maintenance and pre-dive equipment checklist, etc.

5.1.3.3 Daily Logs

Submit each day, to the Contracting Officer/District Dive Coordinator fully completed copies of the previous day's Diving Log Sheets and any other work sheets prepared in conjunction with the Diving Log Sheets.

5.2 PART 2 PRODUCTS (NOT APPLICABLE)

5.3 PART 3 EXECUTION

5.3.4 Restrictions

Only air-supplied diving within the No-Decompression Limits, using the previously cited U. S. Navy Diving Tables, will be permitted under this contract, unless otherwise accepted by the Contracting Officer. Any deviation from or modification to the U. S. Navy Diving Tables, proposed by the Contractor, shall be submitted at the time the Diving Operations Manual is submitted, with any such deviation or modification clearly identified for review purposes.

5.3.5 Documents Availability

One (1) copy of the accepted Diving Operations Manual (to be kept in D.O.) and one (1) copy of the appropriate accepted Diving Plan shall be available at the dive site while diving operations are underway.

5.3.6 Coordination

All Diving activities shall be conducted with full knowledge and close coordination with the Contracting Officer and Dive Coordinator. Divers shall not enter the water or move from prescribed location without the acceptance of the Dive Inspector or Dive Coordinator.

5.3.7 Pre-Dive Check

Prior to the dive and at the scene of the dive, the Contractor will meet with the USACE diving inspector and shall insure, as a minimum, the following pre-dive checks are performed:

- a. Breathing air tanks contain sufficient air supply to perform the required work, i.e., standby air tanks are on site and full to the capacity (3,000 psi). A pressure reading shall be taken to insure that approximately 3,000 psi of breathing air is contained.
- b. All diving equipment shall be checked for proper function prior to diver entry.
- c. All necessary safety equipment specified hereinbefore are on site and functioning properly.
- d. Lockout/tagout procedures are followed and the diving supervisor is in possession of the key or keys.
- e. Crane signals are reviewed and radio communications with the crane operator is functioning properly, when applicable.
- f. Welding or cutting procedures are clearly reviewed, the proper welder polarity is set and precautions have been taken to insure that electrocution will not occur.
- g. A pre-dive briefing shall be given which includes but is not limited to, the accident management plan, activity hazards analysis, equipment check list, diving logs, diving conditions, and diving procedures.

5.3.8 Dive Team Crew Requirements

The following dive team members are required as the minimum crew manning levels:

Comply with EM 385-1-1, Appendix N, Table III.

5.3.8.1 Surface-Supplied Air Mode

All working dives requiring communications between the Divers and topside to direct crane load movements, etc., shall be performed in surface-supplied air mode. The minimum crew manning level consists of the In-water Diver, Stand-by Diver, Diver Tender, and Dive Supervisor. A member of the crew shall be responsible for radio communications and timekeeping. Surface-supplied air gear shall include hardwire communications and a diver carried air reserve.

5.3.9 Measurement and Payment

The work specified in this section will not be measured for payment and all costs in connection therewith shall be included in the costs of all the associated bid items.

END OF SECTION

SECTION 6 ENVIRONMENTAL PROTECTION

6.1 GENERAL

6.1.1 Scope of Work

This Section covers prevention of environmental pollution and damage as the result of construction operations under this contract and for those measures set forth in other Sections of these specifications. For the purpose of this specification, environmental pollution and damage is 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 historical purposes. The control of environmental pollution and damage requires consideration of air, water, and land, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

6.1.2 Quality Control

The Contractor shall establish and maintain Quality Control for environmental protection of the items set forth herein. The Contractor shall record on daily reports, problems in complying with laws, regulations, and ordinances, and the corrective action taken.

6.1.3 Submittals

The Contractor shall submit an Environmental Protection Plan in accordance with provisions as herein specified.

6.1.3.1 Environmental Protection Plan

Environmental Protection Plan shall include but not be limited to the following:

A. A list of governmental laws, regulations, and permits concerning environmental protection, pollution control and abatement that are applicable to the Contractor's proposed operations and the requirements imposed by those laws, regulations and permits.

B. Methods for Protection of Features to be preserved within authorized work areas. The Contractor shall prepare a listing of methods to protect resources needing protection, including landscape features, air and water quality, fish and wildlife, soil, historical, archeological, and cultural resources.

C. Procedures to be implemented to provide the required environmental protection and to comply with the applicable laws and regulations. The Contractor shall set out the procedures to be followed to correct pollution of the environment due to accidental or natural causes.

6.1.4 Implementation

Within 15 days after receipt of Notice to Proceed, the Contractor shall submit in writing an Environmental Protection Plan. Approval of the Contractor's plan will not relieve the Contractor of its responsibility for adequate and continuing control of pollutants and other environmental protection measures.

6.1.5 Subcontractor

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

6.1.6 Notification of Non-compliance

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

6.1.7 Payment

No separate payment or direct payment will be made for the cost of the work covered under this Section and the work will be considered a subsidiary obligation of the Contractor.

6.2 PRODUCTS (NOT APPLICABLE)

6.3 EXECUTION

6.3.1 Protection of Environmental Resources

The environmental resources within the project boundaries and those affected outside the limits of permanent work under this contract shall be protected during the entire period of this contract. The Contractor shall confine its activities to areas defined by the drawings and specifications. Environmental protection shall be as stated in the following subparagraphs.

6.3.1.1 Protection of Land Resources

Prior to the beginning of construction, the Contractor shall identify the land resources to be preserved within the Contractor's work area. The Contractor shall not remove, cut, deface, injure, or destroy land resources without special permission from the Contracting Officer. Ropes, cables, or guys shall not be fastened to or attached to trees for anchorage unless specifically authorized. Where such special emergency use is permitted, the Contractor shall provide

effective protection for land and vegetation resources as defined in the following subparagraphs.

6.3.1.2 Protection of Landscape

Landscape features identified by the Contracting Officer to be preserved for removal by others shall be clearly identified by marking, fencing, or wrapping with boards, or other approved techniques.

6.3.1.3 Location of Field Offices, Storage, and Other Contractor Facilities

The Contractor's field offices, staging areas, stockpile storage, and temporary buildings shall be placed in approved areas. Temporary movement or relocation of Contractor facilities shall be made only on approval.

6.3.1.1 Temporary Excavations and Embankments

Temporary Excavations and Embankments for plant or work areas shall be controlled to protect adjacent areas from despoilment.

6.3.1.4 Placement of Solid Wastes

Solid wastes, excluding clearing debris, shall be placed in containers, which are emptied on a regular schedule. Handling and disposal shall be conducted to prevent contamination.

6.3.1.5 Placement of Discarded Materials

Discarded materials, other than those, which can be included in the solid waste category, will be handled as directed.

6.3.1.6 Sanitation Facilities

The Contractor shall provide and operate sanitation facilities that will adequately treat or dispose sanitary wastes in conformance with local health regulations.

6.3.2 Protection of Water Resources

The Contractor shall keep construction activities under surveillance, management, and control to avoid pollution of surface and ground waters. The contractor shall investigate and comply with all applicable Federal, State, and local laws concerning pollution of surface and groundwater. Special management techniques, as set out below, shall be implemented to control water pollution by the listed construction activities, which are included in this contract.

6.3.3 Protection of Fish and Wildlife Resources

The Contractor shall keep construction activities under surveillance, management, and control to minimize interference with, disturbance to, and damage of fish and wildlife. Species that require specific attention along with measures for their protection will be listed by the Contractor prior to beginning of construction operations.

6.3.4 Protection of Air Resources

The Contractor shall keep construction activities under surveillance, management, and control to minimize pollution of air resources. Activities, equipment, processes, and work operated or performed by the Contractor in accomplishing the specified construction shall be in strict accordance with emission and performance laws and standards. Ambient Air Quality Standards set by the Environmental Protection Agency shall be maintained for the construction operations and activities specified herein. Special management techniques as set out below shall be implemented to control air pollution by the construction activities included in the contract.

END OF SECTION

DRAFT

SECTION 7 SMART Structure

7.1 GENERAL

7.1.1 Scope

The work covered by this section consists of furnishing all labor, materials, and equipment, and performing all operations required for construction of the SMART Structure as specified herein and shown on the drawings, including purchase, handling, transportation and placing of materials.

7.1.2 References

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ACI 211.191	Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
ACI 304	Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
ACI 305R 91	Hot Weather Concreting
ACI 306R 88	Cold Weather Concreting
ACI 308	Standard Practice for Curing Concrete
ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM A 416/A 416M	(1996) Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
ASTM A 615/A 615M	(1996a) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
ASTM C 33	(1999ae1) Concrete Aggregates
ASTM C 39	Standard Specifications for Compressive Testing
ASTM C 94	Ready Mix Concrete
ASTM C 127	(1988) Test Method for Specific Gravity and Adsorption of Coarse Aggregate

ASTM C 131	(1989) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion in the Los Angeles Machine
ASTM C 150	(1999)Portland Cement
ASTM C 260	Standard Specifications for Air-Entraining Admixtures for Concrete
ASTM C 295	Recommended Practice for Petrographic Examination of Aggregates for Concrete
ASTM C 494-92	Standard Specifications for Chemical Admixtures for Concrete
ASTM C 535	(1996) Resistance to Degradation of Large-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C 618	Fly Ash For Use As A Mineral Admixture in Portland Cement Concrete
ASTM C 1116	Standard Specifications for Fiber Reinforced Concrete or Shotcrete
ASTM C 1201-91	Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
ASTM C 1240-93	Standard Specifications for Silica Fume Concrete
CRD-C-144	(1992) Standard Test Method for Resistance of Rock to Freezing and Thawing
	CORPS OF ENGINEERS (COE)
EM 385-1-1	(Sep 1996) Safety and Health Requirements

7.1.3 Site Conditions

The work area is subject to tidal action and wave forces and is therefore dynamic in nature. Consequently, the site conditions may have changed since the date of the surveys used for preparation of the contract drawings. The Contractor shall field verify existing conditions at the work site. The conditions at the work site require that a lifesaving skiff be manned and immediately available when working

on water. All safety equipment shall be in accordance with the requirements of EM 385-1-1.

7.1.4 Access by Water

The RBAM units and individual reefballs shall be placed from the water only. There shall be no utilization of the beach area except for support services, i.e. surveys.

7.1.5 Submittals

The following documents shall be submitted:

7.1.5.1 Work Plan

The Contractor shall submit to the Contracting Officer for approval at least 14 days prior to the start of work his plan for purchasing, fabricating, handling, transportation, and storage of all materials. The Contractor shall include in this plan the details of the work methods, the personnel, and the equipment to be utilized in placing the RBAM units and individual reefballs in the approximate locations indicated in the contract drawings. Also, the Contractor shall include plans for diving to confirm the proper placement of the RBAMs and individual reefballs.

7.1.5.2 Diving Report

The Contractor shall submit a diving report indicating the proper or improper placement of the RBAM units and individual reefballs. The report shall also describe distances between each of the RBAM units. Distances between each adjacent RBAM Unit shall be measured at three locations: western edge, midway, and eastern edge. The report shall refer to each RBAM units and individual reefball by its assigned number.

7.1.5.3 Surveyor Qualifications

The Contractor shall submit qualifications of the licensed surveyor for land and hydrographic surveying.

7.1.5.4 Pre-Construction Condition Surveys

The Contractor shall provide onshore-offshore survey cross-sections within 30 days after the Notice to Proceed.

7.1.5.5 Surveys of the SMART Structure

The Contractor shall provide post-construction, as-built, plans of the Smart Structure, indicating the RBAM units and individual reefballs by number, their location, and their elevation.

7.1.5.6 Record Drawings

The Contractor shall keep a careful record during the progress of the work of all changes and corrections from the layout shown on the contract drawings. The Contractor shall document such information on one set of record drawings promptly, but in no case less than on a weekly basis. The record drawings shall be submitted to the Project Manager at the conclusion of the contract period.

7.1.6 Testing

All testing of material from a source which has no test and service records shall be performed by an approved, industry-recognized testing laboratory. Tests to which stone shall be subjected to are petrographic analysis (ASTM C 295), specific gravity (ASTM C 127), abrasion (ASTM C 535), absorption, wetting and drying, freezing and thawing (CRD C 144), and such other tests as may be considered necessary by the Project Manager to demonstrate the suitability of the material for use in the work. All testing shall be performed at no additional cost to URS and the test results shall be submitted for approval by the Project Manager no less than 7 days in advance of delivery of material to the work site.

7.2 PRODUCTS

7.2.1 RBAM Units and Individual Reefball Units

The RBAM Units shall be fabricated from reefballs and Articulating Block Mats (ABMs) as shown in the contract drawings. The concrete used in both the reefballs and the ABMs are shall have the following properties:

7.2.1.1 Concrete Strength Requirements

Compressive strengths for reefballs shall be tested in accordance with ASTM C 39. Compressive strengths shall reach a minimum of the following table at the time of use of at least:

	Super/Ultra/Reefball (psi)	Pallet Ball (psi)
Floating Deployment	8,500+	7,000+
Barge Deployment	7,000+	5,500+
To remove from mold	750+	750+
To lift from base	1,500+	1,200+

The blocks for the ABMs will be manufactured at a local block plant. The minimum 28-day compressive strength will be 4,000 psi.

7.2.1.2 Concrete Mix Design

A typical baseline specification for triil mixture proportions is as follows:

- A. Portland Cement: Shall be Type II and conform to ASTM C-150
- B. Fly Ash: Shall meet requirements of ASTM C-618, Type F. And must be proven to be non-toxic as defined by the Army Corps of Engineers General Artificial Reef Permits. Fly Ash is not permitted in the State of Georgia and in most Atlantic States. (In October, 1991, The Atlantic States Marine Fisheries Commission adopted a resolution that opposes the use of fly ash in artificial reefs other than for experimental applications until the Army Corps of Engineers develop and adopt guidelines and standards for use.)
- C. Water: Shall be potable and free from deleterious substances and shall not contain more that 1000 parts per million of chlorides or sulfates and shall not contain more than 5 parts per million of lead, copper or zinc salts and shall not contain more than 10 parts per million of phosphates.
- D. Fine Aggregate: Shall be in compliance with ASTM C-33.
- E. Coarse Aggregate: Shall be in compliance with ASTM C-33 #8 (pea gravel). (Up to 1 inch aggregate can be substituted with permission from the mold user.) Limestone aggregate is preferred if the finished modules are to be used in tropical waters.
- F. Concrete Admixtures: Shall be in compliance with ASTM C-494.
- G. Required Additives: The following additives shall be used in all concrete mix designs when producing the Reef Ball Development Group's product line:
 - 1) High Range Water Reducer: Shall be ADVA Flow 120 or 140.
 - 2) Silica Fume: Shall be Force 10,000 Densified in Concrete Ready Bags as manufactured by W.R. Grace. (ASTM C-1240-93)
 - 3) Air-Entrainer: ONLY IF ADVA is not used: Shall be W.R. Grace Darex II (ASTM C-260)
 - 4) Optional Additives: The following additives may be used in concrete mix designs when producing Reef Ball Development's product line:
 - a. Fibers. Shall be either Microfibers as manf. by W.R. Grace, or Fibermesh Fibers (1 1/2 inches or longer)

- b. Accelerators: Any Non- Calcium Chloride or W.R. Grace Daracell (ASTM C-494 Type C or E)
- c. Retarders: Shall be in compliance with ASTM-C-494-Type D as in W.R. Grace Daratard
- d. Prohibited Admixtures: All other admixtures are prohibited.

7.2.1.3 Trial Mix Design

Sample concrete mix design for the reefballs and ABMs:

	One Cubic Yard	One Cubic Meter
Cement:	600 lbs. (Min.)	356 kg
Aggregate:	1800 lbs.	1068 kg
Sand:	1160 lbs	688 kg
Water:	240 lbs. (Max.)	142 kg
Force 10K:	50 lbs	30 kg
Grace Microfibers	.25 bag	.3 bag
Adva Flow 120 or Adva Flow 140	3.5-5 ounces per 100 lbs cement or 6-10 ounces per 100 lbs cement	1

7.2.1.4 Casting guidelines

For successful casting of dolosse units, the following guidelines are recommended:

1. Concrete is usually placed in formworks in lifts no more than 24 in.
2. Each lift should be vibrated to remove voids.
3. Armor Units with cold joints are to be rejected.
4. In general, forms should be stripped no sooner than 48 hours.
5. A curing agent should be applied as soon as the forms are stripped.
6. Steam curing is not acceptable.
7. The heat of hydration should never be allowed to exceed 75° C.

7.2.2 Geosynthetic Fabric

The RBAM units will require a geosynthetic filter fabric to prevent scour and the migration of sand through the openings the ABM. The fabric shall be attached to the ABM so that it is smooth and free of tension, stress, folds, wrinkles, or creases. Adjacent edges shall be joined with a seam.

The geosynthetic shall be a woven or non-woven pervious textile as defined by ASTM D 123. The geosynthetic fiber shall consist of a long-chain synthetic polymer composed of at least 85 percent by weight of propylene, ethylene, ester, amide, or vinylidenechloride, and shall contain stabilizers and/or inhibitors added to the base plastic if necessary to make the filaments resistant to deterioration due

to ultraviolet and heat exposure. The geosynthetic shall be fixed so that the fibers will retain a stable matrix and their relative position with respect to each other. This stable matrix shall prevent movement of the fibers and the formation of any openings in the geosynthetic during handling and/or placement. The edges of the geosynthetic shall be finished to prevent the outer fibers from pulling away from the geosynthetic.

All numerical values represent MARV (minimum average roll value) with the exception of the AOS value, which is based on the average value. The geotextile properties represent the test result from as received material, which means unaged material.

The machine direction (MD) of the geotextile should be placed along the principle direction of the slope, which is the inshore/outshore direction of the breakwater. The geosynthetic shall be manufactured in a width not less than 12 feet and shall meet the physical requirements in the following table.

PHYSICAL REQUIREMENTS

Physical Property	Test Procedure	Acceptable Test Results
Tensile Strength (Unaged Geotextile)	ASTM D 4595	1800 pounds per inch minimum in the machine direction (MD) and 600 pounds per inch minimum in the cross-machine direction (XD).
Breaking Elongation (Unaged Geotextile)	ASTM D 4595	10 percent minimum in any principal direction
Bursting Strength (Unaged Geotextile)	ASTM D 3786	1200 pounds per square inch minimum
Puncture Strength (Unaged Geotextile)	ASTM D 4833	200 pounds minimum
Apparent Opening Size (AOS)	ASTM D 4751	U.S. Standard Sieve Nos. 40-70
Trapezoidal Tear Strength	ASTM D 4533	150 pounds minimum in any principal direction
Permittivity	ASTM D 4491	0.07 per sec minimum
UV Stability	ASTM D 4355	50% after 500 hours of exposure

The seams of the high strength geotextile shall be sewn with thread. Seams may be temporarily tack-bonded, prior to sewing, by approved thermal methods (e.g., wedge welding, hot air, hot plate, hot knife, ultrasonic devices, etc.). The thread type shall be polymeric with chemical and ultraviolet light resistant properties

equal or greater than that of the geotextile itself. The color of the sewing thread shall contrast that of the color of the geotextile for ease in visual inspection. Seamed geotextile shall be joined with a folded seam using a single lock-type stitch seam or a double chain type stitch seam. The minimum distance from the geotextile edge to the stitch line nearest to that edge shall be 3 inches, unless otherwise recommended by the manufacturer. Patch seams shall have multiple stitch rows in accordance with the manufacturer's recommendations. Sewing may be done on-site or by the manufacturer. The thread at the end of each seam run shall be tied off to prevent unraveling. Seams shall be on the top of the geotextile to allow inspection. Seams shall be tested in accordance with method ASTM D 1683 4884., using 1-inch square jaws and 12 inches per minute constant rate of traverse. The strengths shall be not less than 300 pounds per inch.50 percent of the required tensile strength of the unaged geotextile in the machine direction.

7.2.2.1 Protection of Fabric

The fabric shall be protected at all times during construction. Any damage to the fabric during its installation or during placement of RBAM Units shall be repaired or replaced by the Contractor.

7.2.2.2 Repair of Fabric

The Contractor shall perform the following procedure when repairing damaged sections of the fabric during or following its installation:

- a. The damaged section of the fabric shall be cut in a rectangular or square section and removed.
- b. An undamaged piece of fabric shall be seamed over the original fabric so that its edges over-lap the cut area a minimum of 2 feet in all directions.

7.3 EXECUTION

7.3.1 Access to Land

The Contractor shall utilize berthing areas as directed by the Project, determined at “start-of-construction”, for off-loading equipment, materials and labor. Other areas for off-loading require the prior approval of the Project Manager.

7.3.2 Construction Methods

Construction must be accomplished from the water. Equipment and/or materials may be staged on barges and/or on land. If equipment and/or materials are staged on land, they shall be staged in the areas specified by the Project.

7.3.3 Locating and Placing the RBAM Units

6.3.6.1 Determining the Alignment

6.3.6.1.1 Horizontal Alignment

The location for placement of the RBAM Units and individual reefballs, as shown on the contract drawings, is approximate and for bid purposes only. The exact alignment of the RBAM Units and individual reefballs will be determined and directed by the Project Manager after pre-construction surveys have been submitted and reviewed.

6.3.6.1.3 Vertical Alignment

The objective of the project is to place the RBAM units at the approximate elevation of -7.0 (mean low water) MLW. It may not be practical, however, to place the units along the -7.0 MLW contour. For bid purposes, the Contractor shall assume that the RBAM Units shall be placed at an elevation within plus or minus 1.0 feet of -7.0 MLW.

6.3.6.2 Placing the RBAM Units

RBAM Units must be handled carefully – excessive impact stresses can be generated from even moderate drop heights (<20 in.). If a unit is dropped it must be carefully inspected by the Project Manager or a qualified URS representative. If the unit is cracked it must be rejected. Once on site, if a unit is found to be cracked, it will not be placed. The RBAM Units shall be placed in a side-by-side pattern with a minimal space not to exceed 0.5 foot between adjacent units. The Contractor shall utilize divers to confirm the proper placement of each unit and to confirm that the units are properly placed within the required tolerances. All diving shall be in accordance with Section 5 DIVING SERVICES. The divers shall submit a report as specified in paragraph “SUBMITTALS,” herein. Upon placement of one-half of all of the units to be placed, and, after confirmation of proper placement of those units by the divers, the Contractor shall immediately survey the crest of each placed unit to determine each unit's location and elevation. The Contractor shall submit a listing of each unit, by its number, indicating each unit's location and elevation. After approval of that survey information by the Project Manager, the Contractor shall proceed and continue to place the remaining units. The Contractor shall survey the crest of ALL placed units and submit a listing of each unit, by its number, indicating each unit's location and elevation.

7.3.4 General Survey Requirements

All land surveys shall be performed under the direction and supervision of a Professional Licensed Surveyor. All hydrographic surveys shall be conducted under the direction and supervision of a Surveyor certified by the American Congress on surveying and Mapping (ACSM) as an In-Shore Hydrographer, or by a Professional Licensed Surveyor with a minimum of 5 years documented experience in a hydrographic surveying environment similar in nature to the surveys required under this Contract.

7.3.4.1 Control

Survey control will be established from the existing survey control description data provided in **Section 00840** of these specifications. The Contractor shall utilize NAVD 1988 as the vertical datum for elevation and depth references for all cross sections, and shall be responsible for obtaining necessary ocean tide height measurements during the survey periods to assure that accurate adjustments are made to the observed depths to account for tidal variations in water level. The Contractor shall utilize Florida State Plane Coordinate System NAD 1983 as the horizontal reference datum.

6.3.6.2 Tolerances

The landward portion of the profile lines shall be surveyed utilizing surveying procedures and methodology that meet or exceed accuracy tolerances of +/- 0.10 feet in the vertical and +/- 0.50 in the horizontal with a 95% confidence level. Hydrographic surveys will be conducted to meet requirements for Class 1, Contract Payment Surveys, as outlined in U.S. Army Corps of Engineers Hydrographic Surveying Manual (DRAFT) EM-1110-2-1003, dated 1 Jan 2001. Surveys will be performed by single transducer sounding techniques, multi-beam sweep type surveys or both. Bottom soundings will be obtained by the single beam survey fathometer operating at a frequency ranging from 194 to 206 Khz. When utilizing multi-beam technology, the operating frequency will range from 180 to 250 Khz. All fathometers will be calibrated following procedures outlined in the aforementioned EM and EC.

All surveying procedures, methods and equipment for landward beach surveys, hydrographic surveys and tidal monitoring (if applicable), shall be reviewed and approved by the Government Survey Point of Contact prior to the conduct of any type of surveying work. This review process shall also include the review and acceptance of the Surveyor's Qualifications.

END OF SECTION