



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard, Jr.
Secretary

CERTIFIED - RETURN RECEIPT REQUESTED

February 22, 2011

U.S. Air Force
45th Space Wing Patrick Air Force Base
1224 Jupiter St.
Patrick Air Force Base, FL 32925

c/o Kevin R. Bodge, P.E., PhD
Olsen Associates, Inc.
4438 Herschel St.
Jacksonville, FL 32210

NOTICE OF PERMIT ISSUANCE

Permit Number: **0294526-001-JC**
Applicant Name: **Patrick Air Force Base**
Project Name: **Patrick Air Force Base Beach Nourishment**

Dear Dr. Bodge:

Your request for a Joint Coastal Permit, issued pursuant to Chapters 161 and 373, Florida Statutes, and Title 62, Florida Administrative Code, has been approved by the Department. Negotiations since the issuance of the *Consolidated Notice of Intent to Issue* for this project have led to alterations in the conditions and drawings related to the Biological Monitoring Plan, the Physical Monitoring Plan and the establishment of a wetland buffer, among others. Therefore, please read the enclosed joint coastal permit and permit conditions closely before starting construction. Particularly note the permit conditions pertaining to a pre-construction conference and written reports which must be submitted to the Department at specified times. Note also that the easement for Canaveral Shoals I has not been executed. We will forward a copy of the permit and other materials to the Department's Division of State Lands for easement processing.

If you have any additional questions, please contact me by phone at (850) 414-7806, or by e-mail at Steven.MacLeod@dep.state.fl.us.

Sincerely,

Environmental Manager
Bureau of Beaches and Coastal Systems

Joint Coastal Permit
Permit No. 0294526-001-JC
Patrick Air Force Base Beach Nourishment
Page 2 of 2

Enclosure: Final Order with attachments

Copies furnished (via electronic mail) to:

Patrick Giniewski, Patrick AFB	Michael Barnett, DEP, BBCS-Chief
Carol Noble, Canaveral Port Authority	Dave Herbster, DEP, Central District
Mike McGarry, Brevard County	Paden Woodruff, BBCS-BECP
George Getsinger, NMFS, Jacksonville	William (Guy) Weeks, BBCS-BECP
Jay Herrington, USFWS, Jacksonville	Alex Reed, BBCS-BECP
Ann Marie Lauritson, USFWS, St. Pete	Roxane Dow, BBCS-BECP
Mary Ann Poole, FWC, OPSC	Martin Seeling, BBCS-JCP
Lisa Gregg, FWC, MFMS	Vladimir Kosmynin, BBCS-JCP
Robbin Trindell, FWC, ISMS	Stephanie Gudeman, BBCS-JCP
Maj. Jack Daugherty, FWC, NE Region	Molly Edson, BBCS-CCCL
Robert Brantly, BBCS-CE	John McDowell, BBCS-CCCL
El Kromhout, BBCS-CE	JCP Compliance Officer
Subarna Malakar, BBCS-CE	BBCS File



Florida Department of Environmental Protection

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Rick Scott
Governor

Jennifer Carroll
Lt. Governor

Herschel T. Vinyard, Jr.
Secretary

CONSOLIDATED JOINT COASTAL PERMIT AND SOVEREIGN SUBMERGED LANDS AUTHORIZATION

PERMITTEE:

45th Space Wing Patrick Air Force Base
c/o Patrick Giniewski
1224 Jupiter St.
Patrick Air Force Base, FL 32925

AGENT:

Kevin R. Bodge, P.E.
Olsen Associates, Inc.
4438 Herschel St.
Jacksonville, FL 32210

PERMIT INFORMATION:

Permit Number: 0294526-001-JC

Project Name: Patrick Air Force Base
Nourishment

County: Brevard

Issuance Date: **February 22, 2011**

Expiration Date of Construction Phase:
February 22, 2021

REGULATORY AUTHORIZATION:

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

ACTIVITY DESCRIPTION:

The project consists of nourishing the beach at Patrick Air Force Base (PAFB), one time only, with approximately 310,000 cubic yards of sand from previously-authorized offshore borrow areas and a new upland (beach) borrow area. The beach profile will include a dune and beach berm complex up to 130 feet wide, a dune elevation between +12.6 feet and +15 feet NAVD and a berm elevation varying between +9 feet and +10 feet NAVD. The dune will generally have a shore-facing slope of 1V:1.5H (vertical:horizontal), transitioning to a 1V:4H slope and intercepting the top of berm at elevation +10 NAVD. The beach berm will have a shore-facing slope of 1V:50H and a width of approximately 50 feet. The foreberm slope will be 1V:8H extending to the intercept with the existing profile.

The offshore borrow site(s) will be Canaveral Shoals I (with access channel) and/or II found in water depth of -10 to -46 feet NGVD. The Canaveral Shoals I access channel has a cut depth of -24.9 feet NGVD (-23 ft MLW, -26.3 ft NAVD) and the borrow area has a maximum dredge depth of -28.9 feet NGVD (-27 ft MLW, -30.3 ft NAVD). Non-beach compatible material found below the cut depth of -24.9 feet NGVD in the access channel will be disposed to the approved offshore disposal area (ODMDS) off Cocoa Beach. The Canaveral Shoals I borrow

**Joint Coastal Permit
Patrick Air Force Base Nourishment
Permit No. 0294526-001-JC
Page 2 of 27**

area is divided into five subsections. Section A has a cut depth of -27 feet MLW. Section B has a cut depth of -24 ft MLW. Section C has a cut depth of -25 feet MLW. Section D has a cut depth of -19 feet MLW. Section E has a cut depth of -22 feet MLW. The Canaveral Shoals II borrow area is divided into five subareas. The cut depth for area A is -48.1 ft MLLW. The cut depth for area B is -46.1 ft MLLW. The cut depth for area C is -44.1 ft MLLW. The cut depth for area D is -42.1 ft MLLW. The cut depth for area E is -28.1 ft MLLW. Sand from the offshore borrow area would be collected using a hopper dredge and then pumped to the beach (between R-53 and R-65) via pipeline from a nearshore pumpout station. If the offshore borrow areas are used, a temporary stockpile is authorized on the constructed berm (between R-61 and R-65), from which the sand will be distributed southward (through R-70) by truck. Sand placed in the stockpile will not exceed an elevation of +15.2 feet NAVD, with a 1V:2H beach face slope.

The new upland sand source will be approximately 3,600 linear feet of existing accretional beach berm, immediately north of the Canaveral Harbor Entrance Channel. Sand would be transported to the PAFB placement area by truck via public roads. Use of this area involves excavation of the upper portion of the beach face, the berm, and the landward face of the primary dune. At the seaward edge of the beach, material lying above the mean high water elevation (+2 feet NGVD, +3.4 feet NAVD) would be excavated. As the excavation continues in the landward direction, it would incline at a slope of approximately 1V:100H. The width of excavation would be variable up to a maximum of 340 feet landward of the pre-construction MHW elevation. If this upland borrow area is used landward of the existing primary dune vegetation line, a dune will be constructed, with a seaward toe located approximately 15 to 20 feet landward of the excavation area. The dune will have seaward and landward slopes of 1V:4H, a variable crest width between 3 feet and 15 feet, a crest elevation between +8 feet and +13 feet NGVD (+9.4 and +14.4 feet NAVD). This dune will be planted with sea oats immediately following construction.

Beach access locations for the sand placement area are within PAFB, just south of R-69, and at R-55.5, R-64.5 and R-72. Beach access locations for the upland borrow area are within the Cape Canaveral Air Force Station (CCAFS), at virtual monument V-164 and southeast of virtual monument V-167, along the north jetty. Staging area 1 is located near V-164 and staging areas 2 and 3 are located near V-167.

The activity includes consideration of an application for a 10-year sovereign submerged lands easement containing 889.1 acres, more or less. The existing borrow area easement is to Brevard County. This easement will authorize PAFB to also use the borrow area for the Patrick Air Force Base Beach Nourishment Project.

ACTIVITY LOCATION:

The nourishment site is located along the northern 3.1 miles of the Patrick Air Force Base shoreline, between R-53 and R-70, in Brevard County, Sections 2, 11 and 14, Township 26 South, Range 37 East, and Section 35, Township 25 South, Range 37 East, extending into the

**Joint Coastal Permit
Patrick Air Force Base Nourishment
Permit No. 0294526-001-JC
Page 3 of 27**

Atlantic Ocean, Class III Waters. The upland (beach) borrow area is located on Cape Canaveral Air Force Station property, immediately north of the Canaveral Harbor Entrance Channel's north jetty, between virtual monuments V-164 to V-167. Canaveral Shoals I Borrow Area is located east-northeast of Cape Canaveral, and is centered approximately 1.6 miles offshore of CCAFS, on sovereign submerged lands. Canaveral Shoals II Borrow Area is located east of Cape Canaveral, and is centered approximately 4.5 miles offshore of CCAFS, outside of State waters.

PROPRIETARY AUTHORIZATION:

This activity also requires a proprietary authorization, as the activity is located on sovereign submerged lands held in trust by the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees), pursuant to Article X, Section 11 of the Florida Constitution, and Sections 253.002 and 253.77, F.S. The activity is not exempt from the need to obtain a proprietary authorization. The Board of Trustees delegated the Department the responsibility to review and take final action on this request for proprietary authorization in accordance with Section 18-21.0051, F.A.C., and the Operating Agreements executed between the Department and the water management districts, as referenced in Chapter 62-113, F.A.C. In addition to the above, this proprietary authorization has been reviewed in accordance with Chapter 253, F.S., Chapter 18-21 and Section 62-343.075, F.A.C., and the policies of the Board of Trustees.

As staff to the Board of Trustees, the Department has reviewed the project described above, and has determined that the nourishment activity qualifies for a Letter of Consent to use sovereign, submerged lands, as long as the work performed is located within the boundaries as described herein and is consistent with the terms and conditions herein. Therefore, consent is hereby granted, pursuant to Chapter 253.77, F.S., to perform the activity on the specified sovereign submerged lands.

The Department has also determined that the offshore borrow area dredging requires an easement be issued to PAFB for the use of those lands, pursuant to Chapter 253.77, F.S. Brevard County is currently the only easement holder for that borrow area. The Department intends to issue the borrow area easement to PAFB subject to the conditions outlined in the previously issued *Consolidated Intent to Issue* and in the Recommended Proprietary Action (entitled *Delegation of Authority*).

The final documents required to execute the easement will now be sent to the Division of State Lands. The Department intends to issue the easement upon satisfactory execution of those documents. **You may not begin construction of this activity on state-owned, sovereign submerged lands until the easement has been executed to the satisfaction of the Department.**

COASTAL ZONE MANAGEMENT:

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

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

OTHER PERMITS:

Authorization from the Department does not relieve you from the responsibility of obtaining other permits (Federal, State, or local) that may be required for the project. When the Department received your permit application, a copy was sent to the U.S. Army Corps of Engineers (USACE) for review. The USACE will issue their authorization directly to you, or contact you if additional information is needed. If you have not heard from the USACE within 30 days from the date that your application was received by the Department, contact the nearest USACE regulatory office for status and further information. Failure to obtain USACE authorization prior to construction could subject you to federal enforcement action by that agency.

AGENCY ACTION:

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

GENERAL CONDITIONS:

1. All activities authorized by this permit shall be implemented as set forth in the plans and specifications approved as a part of this permit, and all conditions and requirements of this permit. The Permittee shall notify the Department in writing of any anticipated deviation from the permit prior to implementation so that the Department can determine whether a modification of the permit is required pursuant to section 62B-49.008, Florida Administrative Code.
2. If, for any reason, the Permittee does not comply with any condition or limitation specified in this permit, the Permittee shall immediately provide the Bureau of Beaches and Coastal Systems and the appropriate District office of the Department with a written report containing the following information: a description of and cause of noncompliance; and the period of noncompliance, including dates and times; or, if not

corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance.

3. This permit does not eliminate the necessity to obtain any other applicable licenses or permits that may be required by federal, state, local, special district laws and regulations. This permit is not a waiver or approval of any other Department permit or authorization that may be required for other aspects of the total project that are not addressed in this permit.
4. This permit conveys no title to land or water, does not constitute State recognition or acknowledgment of title, and does not constitute authority for the use of sovereignty land of Florida seaward of the mean high-water line, or, if established, the erosion control line, unless herein provided and the necessary title, lease, easement, or other form of consent authorizing the proposed use has been obtained from the State. The Permittee is responsible for obtaining any necessary authorizations from the Board of Trustees of the Internal Improvement Trust Fund prior to commencing activity on sovereign lands or other state-owned lands.
5. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered specifically approved unless a specific condition of this permit or a formal determination under section 373.421(2), F.S., provides otherwise.
6. This permit does not convey to the Permittee or create in the Permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the Permittee. The issuance of this permit does not convey any vested rights or any exclusive privileges.
7. This permit or a copy thereof, complete with all conditions, attachments, plans and specifications, modifications, and time extensions shall be kept at the work site of the permitted activity. The Permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.
8. The Permittee, by accepting this permit, specifically agrees to allow authorized Department personnel with proper identification and at reasonable times, access to the premises where the permitted activity is located or conducted for the purpose of ascertaining compliance with the terms of the permit and with the rules of the Department and to have access to an copy any records that must be kept under conditions of the permit; to inspect the facility, equipment, practices, or operations regulated or required under this permit; and to sample or monitor any substances or parameters at any location reasonably necessary to assure compliance with this permit or Department rules. Reasonable time may depend on the nature of the concern being investigated.

9. At least forty-eight (48) hours prior to commencement of activity authorized by this permit, the Permittee shall submit to the Bureau of Beaches and Coastal Systems (JCP Compliance Officer) and the appropriate District office of the Department a written notice of commencement of construction indicating the actual start date and the expected completion date and an affirmative statement that the Permittee and the contractor, if one is to be used, have read the general and specific conditions of the permit and understand them.
10. If historic or archaeological artifacts, such as, but not limited to, Indian canoes, arrow heads, pottery or physical remains, are discovered at any time on the project site, the Permittee shall immediately stop all activities in the immediate area that disturb the soil in the immediate locale and notify the State Historic Preservation Officer and the Bureau of Beaches and Coastal Systems (JCP Compliance Officer). In the event that unmarked human remains are encountered during permitted activities, all work shall stop in the immediate area and the proper authorities notified in accordance with Section 872.02, F.S.
11. Within 30 days after completion of construction or completion of a subsequent maintenance event authorized by this permit, the Permittee shall submit to the Bureau of Beaches and Coastal Systems (JCP Compliance Officer) and the appropriate District office of the Department a written statement of completion and certification by a registered professional engineer. This certification shall state that all locations and elevations specified by the permit have been verified; the activities authorized by the permit have been performed in compliance with the plans and specifications approved as a part of the permit, and all conditions of the permit; or shall describe any deviations from the plans and specifications, and all conditions of the permit. When the completed activity differs substantially from the permitted plans, any substantial deviations shall be noted and explained on two paper copies and one electronic copy of as-built drawings submitted to the Bureau of Beaches and Coastal Systems (JCP Compliance Officer)

SPECIFIC CONDITIONS:

1. All reports or notices relating to this permit shall be sent to the DEP, Bureau of Beaches and Coastal Systems, JCP Compliance Officer, 3900 Commonwealth Boulevard, Mail Station 300, Tallahassee, Florida 32399-3000 (e-mail address: JCPCCompliance@dep.state.fl.us).
2. The terms, conditions and provisions of the required easement modification shall be met. Construction of this activity shall not commence on sovereign submerged lands, title to which is held by the Board of Trustees, until all easement documents have been executed to the satisfaction of the Department.

3. No work shall be conducted under this permit until the Permittee has received a written notice to proceed (NTP) from the Department. At least 45 days prior to the desired date of issuance of the notice, the Permittee shall submit a written request to the Department for an NTP along with the following items:
 - a. **Final plans and specifications:** The Permittee shall submit the final plans and specifications for this project, which must be consistent with the activity description of this permit and the approved permit drawings. This plan shall specifically denote the location of the pipeline corridor and indicate the distance from the existing MHW line. The Permittee shall point out any deviations from the activity description or the approved permit drawings, and any significant changes would require a permit modification. Submittal shall include one (1) hardcopy (sized 11 inches by 17 inches or greater, with all text legible) and one (1) electronic copy of the final plans and specifications. The plans and specifications shall be accompanied by a letter indicating the project name, the permit number, the type of construction activity, the specific type of equipment to be used, the anticipated volume of material to be moved (if applicable) and the anticipated schedule. Further, the Permittee shall specify any anticipated sites that will be used (such as a disposal or re-use location for sand that is not beach compatible) and appropriate contact information for those facilities. The final plans and specifications submitted under this condition must comply with all conditions set forth in this permit;
 - b. **Turbidity monitoring qualifications:** The names and qualifications of those individuals performing turbidity monitoring, along with 24-hour contact information and an example of the turbidity monitoring form that includes a map with an approximate delineation of hardbottom resources at the placement site, shall be submitted for approval. Construction at the project site shall be monitored closely to assure that turbidity levels do not exceed the compliance standards established in this permit. This monitoring shall be conducted by an independent third party (not associated with the dredging contractor) to assure that turbidity levels do not exceed the compliance standards established in this permit. Also, an individual familiar with beach construction techniques and turbidity monitoring shall be present at all times when fill material is discharged on the beach. This individual shall have authority to alter construction techniques or shut down the dredging or beach construction operations if turbidity levels exceed the compliance standards established in this permit.;
 - c. **Biological monitoring qualifications:** The names and qualifications of those individuals performing the biological monitoring of hardbottom shall be submitted for Department approval. All in water biological monitoring required by this permit shall be conducted by individuals that have a good working knowledge of algae, coral, and sponge taxonomy; all wetland biological

monitoring required by this permit shall be conducted by individuals that have a good working knowledge of wetland delineation (under Rule 62-340, F.A.C.), Florida wetland plant identification and wetland ecology.

- d. **Easement:** The terms, conditions and provisions of the required easement modification shall be met. Construction of this activity shall not commence on sovereign submerged lands, title to which is held by the Board of Trustees, until all easement documents have been executed to the satisfaction of the Department.
4. If prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoe remains, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project area, the permitted project should cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The Permittee, or other designee, should contact the Florida Department of State, Division of Historical Resources, Review and Compliance Section at (850) 245-6333 or (800) 847-7278, and the JCP Compliance Officer. Project activities should not resume without verbal and/or written authorization from the Division of Historical Resources. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, Florida Statutes.
5. **Pre-Construction Conference.** The Permittee shall conduct a pre-construction conference to review the specific conditions and monitoring requirements of this permit with Permittee's contractors, the engineer of record and the JCP Compliance Officer (or designated alternate) prior to each construction event. In order to ensure that appropriate representatives are available, at least twenty-one (21) days prior to the intended commencement date for the permitted construction, the Permittee is advised to contact the Department, and the other agency representatives listed below:

DEP, Bureau of Beaches & Coastal Systems
JCP Compliance Officer
3900 Commonwealth Boulevard, M.S. 300
Tallahassee, Florida 32399-3000
phone: (850) 414-7716
e-mail: JCP.Compliance@dep.state.fl.us

DEP Central District Office
Submerged Lands & Environmental Resources Program
3319 Maguire Blvd, Suite 232
Orlando, Florida 32803-3767
Phone: (407) 894-7555
Fax: (407) 897-6499

Imperiled Species Management Section
Florida Fish & Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, Florida 32399-1600
phone: (850) 922-4330
fax: (850) 921-4369 or email: marine.turtle@myfwc.com

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

6. Sediment quality will be assessed as outlined in the Sediment QA/QC Plan approved on July 22, 2009 (attached). Any occurrences of unacceptable material will be handled according to the protocols set forth in the Sediment QA/QC Plan. The sediment testing result will be submitted to FDEP within 90 days following the completion of beach construction.
7. No impacts to hardbottom (including stony and soft corals, wormrock and sponges) are authorized under this permit. All pipelines shall be placed in areas devoid of hardbottom resources. No excavation may occur waterward of the mean high water line (MHWL), approximately +2.0 elevation (NGVD), in the upland borrow area.
8. Unanticipated project-related impacts to aquatic natural resources that are identified after construction will require in-kind mitigation, unless DEP subsequently determines them to be *de minimis*. In the event unanticipated project-related impacts to aquatic natural resources are identified and quantified through the required biological or physical monitoring and the Department's Uniform Mitigation Assessment Method (UMAM) (Rule 62-345, F.A.C.), the Permittee shall submit a mitigation plan to the Department for review and approval within 6 months after the impacts are identified. The Permittee shall install the required in-kind mitigation within 12 months following the approval of the mitigation plan. Any mitigation will be subject to biological monitoring and minimum success criteria, which will be stipulated in the approved mitigation plan.
9. The Permittee shall not allow the wetland at the upland borrow area, which is located in the overwash areas adjacent to the north jetty, to be adversely impacted by this project. No excavation shall be allowed within the buffer areas specified below. If the upland borrow area is used for this project, the Permittee shall take the following measures:
 - a. Prior to excavating the upland borrow site, the Permittee shall clearly mark a 150-foot buffer along the construction side of the wetland and install erosion control

devices to prevent upland sediment from washing into the wetland during excavation activities. Once the 150-foot buffer is marked and the erosion control devices are installed, excavation may proceed outside of the 150-foot buffer.

- b. If the Permittee wishes to excavate between 100 and 150 feet from the wetland, the Permittee shall first monitor the hydroperiod of the wetland for one year, as described in Specific Condition 9.d., below. After completion of the pre-construction hydroperiod monitoring of the wetland, and prior to excavating the upland borrow site between 100 and 150 feet from the wetland, the Permittee shall clearly mark a 100-foot buffer along the construction side of the wetland and install erosion control devices as appropriate. Once the wetland hydroperiod has been monitored for one year, the 100-foot buffer is marked and the control devices are installed, excavation may proceed outside of the 100-foot buffer. These erosion control devices, as well as best management practices (BMPs) to control erosion and turbidity at the all other work areas, shall generally adhere to the guidance in the Florida “Erosion and Sediment Control - Designer and Reviewer Manual,” available at the following website:

<http://stormwater.ucf.edu/publications/RevisedDesignerManual.pdf>

BMPs shall be maintained daily to ensure integrity and functionality until post-construction clean-up of each work area has been completed and the BMPs are removed. Note that hay bales shall be isolated from runoff water to avoid nutrient enrichment.

- c. Prior to excavation, a qualified environmental scientist proficient in wetland evaluation and delineation (per Rule 62-340, F.A.C) shall survey the vegetative community to determine species composition and percent coverage by species. Also prior to excavation, the Permittee shall submit a report on the wetland vegetation (species composition and percent coverage by species);
- d. If the Permittee plans to excavate the upland borrow area between 100 and 150 feet from the wetland, the wetland hydroperiod shall be monitored for at least one year prior to excavation. In order to document the normal, pre-excavation hydroperiod of the wetland, the Permittee shall install piezometers in the wetland and between 100 feet and 150 feet of the wetland. This shall be done without damaging the wetland vegetation. The piezometers shall be placed at a density of one per quarter acre, with at least one in the deepest part of the wetland and at least one at the edge of the wetland. Data shall be recorded (at least monthly) in order to summarize the normal hydroperiod (depth and duration of surface water and groundwater). After excavating the upland borrow area located between 100 feet and 150 feet from the wetland, the Permittee shall continue to monitor the hydroperiod for one year, to determine if the excavation has adversely affected the wetland hydroperiod. Within 30 days following the first year of post-

excavation monitoring, the Permittee shall submit a report to the Department documenting any statistically significant change in the wetland hydroperiod;

- e. One year after excavating the upland borrow area located between 100 feet and 150 feet from the wetland, a qualified environmental scientist proficient in wetland evaluation and delineation (per Rule 62-340, F.A.C) shall again survey the vegetative community to determine species composition and percent coverage by species. Within 30 days following this survey, the Permittee shall submit a report (prepared by the certified profession wetland scientist) to the Department documenting any statistically significant change in the wetland plant community;
 - f. Within 60 days following excavation landward of the existing primary dune vegetation line, any affected dune shall be replaced. The seaward toe of the replacement dune shall be located approximately 15 to 20 feet landward of the excavation area, and the landward toe of the dune shall remain at least 15 feet outside of the wetland. The dune shall have seaward and landward slopes of 1V:4H, a variable crest width between 3 feet and 15 feet, and a crest elevation between +8 feet and +13 feet NGVD (+9.4 and +14.4 feet NAVD); and
 - g. Prior to future excavation of the upland borrow site, the Permittee shall clearly mark a 10-foot buffer on the construction side of the newly constructed dune. The dune feature along the western borrow area boundary must be constructed and vegetated within 90 days following completion of the upland borrow area excavation. Dune planting is subject to the marine turtle and shorebird monitoring requirements and prohibitions outlined below.
10. Within 30 days of dune planting completion, an as-built report shall be submitted to the Department which details the number, size and location of all species planted and planting dates. Any variations from the approved plan design should be noted. Dune vegetation monitoring shall be conducted per the approved dune vegetation monitoring plan. At least one annual post-construction dune vegetation monitoring report will be required. Monitoring reports shall be submitted to the Department, to the attention of the JCP Compliance Officer, within 60 days after each monitoring event.
11. The Permittee shall not conduct project operations or store project-related equipment in, on or over dunes, or otherwise impact dune vegetation, outside the approved staging, beach access and dune restoration areas designated in the permit drawings.
12. The Permittee shall not store or stockpile tools, equipment, materials, etc., within littoral zones or elsewhere within surface waters of the state without prior written approval from the Department. Storage, stockpiling or access of equipment on, in, over or through seagrass (or other aquatic vegetation) beds, wetlands or vegetated dunes is prohibited

unless within a work area or ingress/egress corridor specifically approved by this permit. Anchoring of vessels within beds of aquatic vegetation is also prohibited.

Marine Turtles

13. Beach nourishment shall be started after October 31 and be completed before May 1. During the May 1 through October 31 period, no construction equipment or pipes shall be placed and/or stored on the beach.
14. If excavation of sand from the marine turtle nesting beach north of Canaveral Inlet or placement of sand at Patrick Air Force Base is conducted during the period from March 1 through May 1 or November 1 through November 30, early morning surveys for sea turtle nests must be conducted daily at both sites from March 1 through September 30 or until two weeks after the last documented crawl.
 - a. Nesting surveys and egg relocations will only be conducted by personnel with prior experience and training in nesting survey and egg relocation procedures. Surveyors must have a valid FWC permit issued pursuant to Florida Administrative Code Rule 68E-1. Nesting surveys must be conducted daily between sunrise and 9 a.m. The contractor must not initiate work until daily notice has been received from the sea turtle permit holder that the morning survey has been completed. Surveys must be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.
 - b. Only those nests that may be affected by sand excavation or sand placement activities will be relocated except as noted below. Nests requiring relocation must be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation; the nest relocation site must be approved by FWC Marine Turtle Management staff in the Tequesta Field office. Relocated nests must not be placed in organized groupings; relocated nests must be randomly staggered along the length and width of the beach in settings that are not expected to experience daily inundation by high tides or known to routinely experience severe erosion and egg loss, that are subject to artificial lighting, or that are historically impacted by predation. Nest relocations in association with construction activities must cease when sand placement activities no longer threaten nests.
 - c. Nests deposited within areas where construction activities have ceased or will not occur for 65 days must be marked and left *in situ* unless other factors threaten the success of the nest. The Marine Turtle Permit Holder must install an on-beach marker at the nest site and/or a secondary marker at a point landward as possible to assure that future location of the nest will be possible should the on-beach marker be lost. A series of stakes and highly visible survey ribbon or string must

be installed to establish a 10-foot radius around the nest. No activity will occur within this area or will any activities occur that could result in impacts to the nest. Nest sites must be inspected daily to assure nest markers remain in place and the nest has not been disturbed by the restoration activity.

- d. If beach excavation or nourishment occurs during the period from November 1 through November 30, then daily early morning surveys for late nesting sea turtles shall be conducted 65 days prior to project initiation and continue through September 30 or until two weeks after the last documented crawl, and eggs shall be relocated per the preceding requirements.
14. From March 1 through April 30, and November 1 through November 30, the contractor must not excavate the nesting beach or extend the beach fill more than 300 feet along the shoreline between dusk and the following day unless nighttime nesting surveys are conducted as outlined above. If nighttime surveys are not conducted, no construction activities, including vehicular traffic, may proceed outside the 300 feet of shoreline outlined above, until completion of the morning sea turtle surveys and the necessary nest relocations have been completed.
 15. For the excavation (borrow) site at Cape Canaveral Air Force Station, all nests found landward of the mean high water line that are in danger of inundation or erosion will be relocated to another area of beach that is unaffected by the sand excavation. Turtle nest relocation along the affected beach at Cape Canaveral Air Force Station shall continue for five years following the last nourishment event.
 16. Immediately after completion of the beach fill placement event and prior to March 1 for three (3) subsequent years if placed sand still remains on the beach, the beach shall be tilled as described below or the Permittee may follow the procedure outlined below to request a waiver of the tilling requirement. During tilling, at a minimum, the protocol provided below shall be followed:
 - a. The area shall be tilled to a depth of 36 inches. All tilling activity must be completed prior to March 1.
 - b. An annual summary of compaction surveys and the actions taken shall be submitted to the FWC.
 - c. If the project is completed just before the nesting season, tilling shall not occur in areas where nests have been left in place or relocated unless authorized by the U.S. Fish and Wildlife Service in an Incidental Take Statement.
 - d. This condition shall be evaluated annually and may be modified if necessary to address sand compaction problems identified during the previous year.

17. To request a waiver of the tilling requirement, the Permittee may measure sand compaction in the area of restoration in accordance with a protocol agreed to by the FWC, the Department, the U.S. Fish & Wildlife Service, and the Permittee to determine if tilling is necessary; the protocol shall include the following:
 - a. Compaction sampling stations shall be located at 500-foot intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area) and one station shall be midway between the dune line and the high water line (normal wrack line).
 - b. At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lie over less compact layers. Replicates shall be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments.
 - c. The three replicate compaction values for each depth shall be averaged to produce final values for each depth at each station. Reports shall include all 18 values for each transect line, and the final 6 averaged compaction values.
 - d. If the average value for any depth exceeds 500 psi for any two or more adjacent stations, then that area shall be tilled prior to March 1. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the FWC shall be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling shall not be required.

18. Visual surveys for escarpments along the beach fill area shall be made immediately after completion of sand placement and prior to March 1 of the following two years. In addition, weekly surveys of the project area shall be conducted during the two nesting seasons following completion of the beach nourishment. Surveys shall occur weekly during nesting season along the excavated beach for a minimum of five (5) years following completion of each construction event during which sand is removed from the marine turtle nesting beach.
 - a. The number of escarpments and their location relative to DNR-DEP reference monuments shall be recorded during each weekly survey and reported relative to the length of the beach surveyed. Notations on the height of these escarpments shall be included (0 to 18 inches, 18 inches to 4 feet, and 4 feet or higher) as well as the maximum height of all escarpments.

- b. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall be leveled to the natural beach contour by March 1. The Permittee shall provide documentation that authorization for incidental take during scarp removal has been obtained from the U.S. Fish and Wildlife Service prior to project initiation. Any escarpment removal shall be reported relative to R-monument.
 - c. If weekly surveys during the marine turtle nesting season document subsequent reformation of escarpments that exceed 18 inches in height for a distance of 100 feet, then the Department shall be contacted immediately to determine the appropriate action to be taken. Upon written notification, the Permittee shall level escarpments in accordance with mechanical methods prescribed by the Department.
19. From March 1 through April 30 and November 1 through November 30, staging areas for construction equipment shall be located off the beach to the maximum extent practicable and no construction equipment shall be parked on the beach where it can hinder marine turtle nesting or hatchling emergence. In addition, all construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes on the beach shall be in such a manner so as to impact the least amount of nesting habitat and shall likewise not compromise the integrity of the dune systems.
20. During the early (March 1- April 30) and latter (November 1 - November 30) portions of marine turtle nesting and hatching season, all on-beach lighting associated with the project shall be limited to the immediate area of active construction only and shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination. Lighting on offshore equipment shall be similarly minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements.
21. The Permittee shall arrange a meeting between representatives of the contractor, the Department, the FWC, and the permitted person responsible for marine turtle nest monitoring at least 30 days prior to the commencement of work on this project. At least 15 days advance notice shall be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.
22. Reports on all nesting activity on the fill placement site and the excavation site shall be provided for the initial nesting season and for a minimum of two (2) additional nesting seasons. Monitoring of nesting activity in the seasons following construction shall include daily surveys and any additional measures authorized by the FWC. Reports

submitted shall include daily report sheets noting all crawl activity, nesting success rates, hatching success of all relocated nests, hatching success of a representative sampling of nests left in place (if any), dates of construction and names of all personnel involved in nest surveys and relocation activities. Data should be reported separately for the sand placement area, the excavation area and for adjacent beaches that are not nourished in accordance with the attached Table. Summaries of nesting activity shall be submitted in electronic format (Excel spreadsheets). All reports should be submitted by January 15 of the following year.

23. In the event a sea turtle nest is excavated during construction activities, all work shall cease in that area immediately and the permitted person responsible for egg relocation for the project shall be notified so the eggs can be moved to a suitable relocation site.
24. Upon locating a dead or injured sea turtle adult, hatchling, or egg that may have been harmed or destroyed as a direct or indirect result of the project, the Corps, permittee, and/or local sponsor must be responsible for notifying FWC Wildlife Alert at 1-888-404-FWCC (3922) and the U.S. Fish & Wildlife Service Office. Care must be taken in handling injured or dead turtles or eggs to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.
25. In the event a hopper dredge is utilized, the following requirements shall be met in addition to the Terms and Conditions of the NMFS Biological Opinion for Hopper Dredging:
 - a. Handling of sea turtles captured during hopper dredging projects shall be conducted only by persons with prior experience and training in these activities and who is duly authorized to conduct such activities through a valid permit issued by the Florida Fish and Wildlife Conservation Commission (FWC), pursuant to Florida Administrative Code 68E-1.
 - b. *Dredging Pumps*: Standard operating procedure shall be that dredging pumps shall be disengaged by the operator when the dragheads are not firmly on the bottom, to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations.
 - c. *Sea Turtle Deflecting Draghead*: A state-of-the-art rigid deflector draghead must be used at all times of the year.
 - d. The Sea Turtle Stranding and Salvage Network (STSSN) Coordinator, Dr. Allen Foley, shall be notified at (904) 573-3930 of the start-up and completion of hopper dredging operations.

- e. Relocation trawling shall be undertaken at all projects where any of the following conditions are met:
 - i. Two or more turtles are taken in a 24-hour period in the project.
 - ii. Four or more turtles are taken in the project.

- f. The Permittee shall fax (850-921-6988) or e-mail (Meghan.Koperski@MyFWC.com) weekly reports to the FWC Imperiled Species Management (ISM) section on Friday each week that relocation trawling is conducted in Florida water. These faxes shall include: the species and number of turtles captured in Florida waters, general health, and release information. A summary of all turtles captured in Florida waters, including all measurements, the latitude and longitude (in decimal degrees) of captures and tow start-stop points, and times for the start-stop points of the tows, including those tows on which no turtles are captured shall be submitted to the ISM section by January 15 of the following year.

Shorebirds

- 27. *Shorebird Surveys.* Shorebird surveys shall be conducted by trained, dedicated individuals (Shorebird Monitor) with proven shorebird identification skills and avian survey experience. Credentials of the Shorebird Monitor shall be submitted to the FWC Regional Biologist for review and approval. Shorebird Monitors will use the following survey protocols on both the excavation and fill placement beach.

- 28. *Nesting Season Surveys.* Shorebird Monitors should review and become familiar with the general information and data collection protocols outlined on the FWC's Beach-Nesting Bird Website (<http://myfwc.com/shorebirds/>). An outline of what data should be collected, including downloadable field data sheets, is available on the website.
 - a. The nesting season is generally 1 April – 1 September, but some nesting may occur through September.

 - b. Nesting season surveys shall begin on April 1 or 10 days prior to project commencement (including surveying activities and other pre-construction presence on the beach), whichever is later, and be conducted daily throughout the construction period or through August, whichever is earlier. Weekly surveys of the project site shall continue through August or through fledgling or loss of identified nests or hatchlings, whichever is later.

 - c. Nesting season surveys shall be conducted in all potential beach-nesting bird habitats within the project boundaries that may be impacted by construction or pre-construction activities during the nesting season. Portions of the project in

which there is no potential for project-related activity during the nesting season may be excluded.

- d. Surveys for detecting new nesting activity will be completed on a daily basis prior to movement of equipment, operation of vehicles, or other activities that could potentially disrupt nesting behavior or cause harm to the birds or their eggs or young.
29. Once breeding is confirmed by the presence of a scrape, eggs, or young, the Bird Monitor will notify the Regional Nongame Biologist of the FWC at **(352) 732-1225** within 24 hours. All breeding activity will be reported to the Beach-Nesting Bird website within one week of data collection.
30. *Buffer Zones and Travel Corridors.* Within the project area, the Permittee shall establish a 300 ft-wide buffer zone around any location where shorebirds have been engaged in nesting behavior, including territory defense. Any and all construction activities, including movement of vehicles, should be prohibited in the buffer zone.
- a. The width of the buffer zone shall be increased if birds appear agitated or disturbed by construction or other activities in adjacent areas.
 - b. Site-specific buffers may be implemented upon approval by FWC as needed.
 - c. Reasonable and traditional pedestrian access should not be blocked where nesting birds will tolerate pedestrian traffic. This is generally the case with lateral movement of beach-goers walking parallel to the beach at or below the highest tide line. Pedestrian traffic may also be tolerated when nesting was initiated within 300 feet of an established beach access pathway. The Permittee shall work with FWC staff to determine if pedestrian access can be accommodated without compromising nesting success.
 - d. Designated buffer zones must be posted with clearly marked signs around the perimeter. If pedestrian pathways are approved within the 300-foot buffer zone, these should be clearly marked. These markings shall be maintained until nesting is completed or terminated. In the case of solitary nesters, nesting is not considered to be completed until all chicks have fledged.
 - e. No construction activities, movement of vehicles, or stockpiling of equipment shall be allowed within the buffer area.
31. FWC-approved travel corridors should be designated and marked outside the buffer areas. Heavy equipment, other vehicles, or pedestrians may transit past nesting areas in

these corridors. However, other activities such as stopping or turning shall be prohibited within the designated travel corridors adjacent to the nesting site.

- a. Where such a travel corridor must be established within the project area it should avoid critical areas for shorebirds (known nesting sites, wintering grounds, FWC-designated Critical Wildlife Areas, and USFWS-designated critical piping plover habitat) as much as possible, and be marked with signs clearly delineating the travel corridor from the shorebird buffer areas described above.
 - b. To the degree possible, the Permittee should maintain some activity within these corridors on a daily basis, without directly disturbing any shorebirds documented on site or interfering with sea turtle nesting, especially when those corridors are established prior to commencement of construction. Passive methods to modify nesting site suitability must be approved by FWC Regional Biologist for that region.
32. *Notification.* If shorebird nesting occurs within the project area, a bulletin board will be placed and maintained in the construction area with the location map of the construction site showing the bird nesting areas and a warning, clearly visible, stating that “BIRD NESTING AREAS ARE PROTECTED BY THE FLORIDA THREATENED AND ENDANGERED SPECIES ACT AND THE STATE AND FEDERAL MIGRATORY BIRD ACTS”.
33. *Beach Contours.* All tilling and scarp removal should be done outside the shorebird nesting season. It is the responsibility of the contractors to avoid tilling or scarp removal in areas where nesting birds are present.
- a. A relatively even surface, with no deep ruts or furrows, shall be created during tilling. To do this, chain-linked fencing or other material shall be dragged over those areas as necessary after tilling.
 - b. The slope between the mean high water line and the mean low water line must be maintained in such a manner as to approximate natural slopes.
34. *Placement of Equipment and Sand.* If it will be necessary to extend construction pipes past a known shorebird nesting site or over-wintering area for piping plovers, then whenever possible those pipes should be placed landward of the site before birds are active in that area. No pipe or sand shall be placed seaward of a known shorebird nesting site during the shorebird nesting season.

Manatees: The Permittee shall comply with the following standard conditions for in-water work (updated in 2009) intended to protect manatees from direct project effects:

35. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The Permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.
36. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.
37. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.
38. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.
39. Any collision with or injury to a manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida.
40. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the Permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) shall be used (see MyFWC.com). One sign which reads *Caution: Boaters* shall be posted. A second sign measuring at least 8 1/2" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

Right Whales:

41. In order to ensure that right whales are not adversely affected by the construction activities authorized by this permit, the Permittee shall adhere to the following conditions:
 - a. From December 1 to March 31 all vessels should post a dedicated observer to spot right whales in the southeastern critical habitat area. The southeastern critical

habitat area extends from 31°15'N to 30°15'N out 15 miles offshore and from 30°15'N to 28°00'N out 5 miles offshore. If a whale is seen, the vessel speed should be reduced (8 knots is suggested) and the vessel operator must stay 500 yards from the whale and take the necessary precautions to avoid the whale. Daily updates of whale sightings during this portion of the year are maintained by the St. Johns Bar Pilots Association available at (904) 246-6716 or on VHF marine channel 14; and,

- b. From December 15 through February 15, vessels shall proceed at reduced speeds (suggested 8 knots) in the southeastern right whale critical habitat area.

MONITORING REQUIRED:

42. Water Quality - Turbidity shall be monitored follows:

Units: Nephelometric Turbidity Units (NTUs).

Frequency: 3 times daily (daylight hours only) at least 4 hours apart during all dredging and hydraulic sand placement operations, and whenever a significant work-generated plume appears to extend beyond the limits of the approved mixing zone such that a water quality violation may exist. If a hopper dredge is used, then monitoring shall be performed approximately midway through each fill/empty cycle while the barge is actively dewatering or discharging overflow. Also, measurements shall be taken 3 times daily, at least 4 hours apart, during all mechanical (i.e., truck-hauled) sand placement operations, beginning only AFTER a work-generated plume is observed to extend beyond the limits of the approved mixing zone. Monitoring at the trucked sand placement sites shall continue until the plume is no longer visible beyond the mixing zone for at least 24 hours or the Department acknowledges in writing that the Permittee has provided sufficient monitoring evidence that the mechanical placement activities are not likely to cause or contribute to a water quality violation.

Location: Background: At mid-depth clearly outside the influence of any artificially generated turbidity plume.

Canaveral Shoals I Dredge Site: approximately 300 meters in the opposite direction of the prevailing current flow.

Beach Placement Site: approximately 500 meters upcurrent of the point where the return water from the dredged discharge reenters the Atlantic Ocean and the same distance offshore as the associated compliance sample. At mechanical (truck-hauled) sand placement

locations, the distance shall be measured from the location where sand was last placed below MHW.

Compliance: At mid-depth, within the densest portion of any visible turbidity plume generated by this project.

Canaveral Shoals Dredge Site: Samples shall be collected 150 meters downcurrent from the dredge head, in the densest portion of any visible turbidity plume.

Beach Placement Site: Samples shall be collected where the densest portion of the turbidity plume crosses the edge of the mixing zone, which measures 150 meters offshore and 150 meters downcurrent from the point where the return water from the dredged discharge reenters the Atlantic Ocean. At mechanical (truck-hauled) sand placement locations, the distance shall be measured from the location where sand was last placed below MHW.

Calibration: The instruments used to measure turbidity shall be fully calibrated within one month of commencement of the project, and at least once a month throughout the project. Calibration shall be verified each morning prior to use, and after each time the instrument is turned on, using a turbidity “standard” that is different from the one used during calibration.

There shall be no turbidity discharge related to excavation of the upland borrow area. Please see Specific Condition 9 for the required best management practices for this location.

Turbidity measurements shall be acquired in adherence to the Department’s Standard Operating Procedure (SOP) for field turbidity, available at the website: www.dep.state.fl.us/labs/qa/sops.htm. The monitoring requirements for the type of activity and location of the sampling site must be reflected on the monitoring report forms.

Any project-associated discharge other than dredging, disposing, or nourishing the beach (e.g., pipeline leakage or runoff from a staging area) should be monitored as close to the source as possible every hour until background turbidity levels return or until otherwise directed by the Department. The Permittee shall notify the Department by separate email or telephone to the Permit Processor, or the JCP Compliance Officer, of such an event within 24 hours of the time the Permittee first becomes aware of the discharge.

43. The **compliance** locations given above shall be considered the limits of the temporary mixing zone for turbidity allowed during construction.

- a. If monitoring reveals turbidity levels at the **compliance** sites that are greater than 29 NTUs above the corresponding background turbidity levels, construction activities shall **cease immediately** and not resume until corrective measures have been taken and turbidity has returned to acceptable levels. Any such occurrence shall also be immediately reported to the Department's Bureau of Beaches and Coastal Systems (BBCS) in Tallahassee at (850) 414-7716 (attn: JCP Compliance Officer) and the Department's Central District office in Orlando.
- b. For 24 hours following an exceedance of 29 NTUs over background, turbidity shall be measured according to the protocol above at least every 6 hours (i.e., at least 4 times daily) including nighttime operations.

TURBIDITY REPORTS

44. Turbidity monitoring reports shall be submitted to the Department on a weekly basis within seven (7) days of collection. Reports shall be submitted under a cover letter containing the following statement: "**This information is provided in partial fulfillment of the monitoring requirements in Permit No. 0294526-001-JC, Patrick Air Force Base Nourishment.**" The cover letter shall summarize any significant compliance issues and the dates or monitoring period of the reports. Also, please clearly reference the permit number on each page of the reports. In addition to analytical results for samples and quality control, each report should also include:
 - a. Specific monitoring requirements for the sampling location;
 - b. Time and date samples were taken;
 - c. Sampling results, the net difference between compliance and background results, and whether the turbidity level is in compliance.
 - b. Depth of water body and depth of samples;
 - c. Antecedent weather conditions, including wind direction and velocity;
 - d. Tidal stage and direction of flow;
 - e. A statement describing the methods used in collection, handling and analysis of the samples;
 - f. Turbidity meter calibration/verification documentation;

- g. A map indicating the location of the current construction activity, the sampling locations (background and compliance), the visible plume pattern of the applicable mixing zone; and
- h. A statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, limits of detection and accuracy of the data.

Nearshore Biological Monitoring

45. The Permittee shall adhere to the Biological Monitoring Plan for Nearshore Hardbottom dated and approved by the Department on December 10, 2010. The plan includes or shall be supplemented by the following conditions unless altered through a permit modification. Changes to other aspects of the plan may be made with written approval from the Department.
- a. Nearshore biological monitoring along the south shoreline of Patrick AFB, between DEP monuments R-64 and R-75.4 shall include surveys to document the following:
 - i. epibiota cover and taxonomic composition (macroalgae and sessile invertebrates, including worm rock); and,
 - ii. abundance, life-stage, distribution and activity of marine turtles the presence and abundance of macroalgae, mobile and sessile macroinvertebrates (e.g., reef-building sabellariid worms, tunicates, bryozoans), and marine turtles in this habitat.
 - b. The biological monitoring shall be conducted prior to the first nourishment event under this permit (i.e., baseline). The surveys shall be repeated after beach fill construction if the results of physical monitoring indicate that the project activity may have resulted in burial or related adverse impact to the rock habitat. Surveys shall be conducted within, or as close as possible to, summer months as conditions and schedules allow. Multiple-year surveys shall be conducted at the same time each year, as practicable, to minimize temporal (seasonal) differences.
 - c. Epibiota shall be monitored using sampling “units”, each approximately 40 feet by 75 feet in size. This sampling unit shall be divided into three cells of equal 40-foot by 25-foot area. Within each cell shall be three randomly located sub-samples that are collected (assessed) for the biological response variables. Each sampling unit thus consists of nine (9) sub-sample assessment points. Six (6) sampling units will be established along the study area: two each near the north, central, and south ends, with one unit at each location being near the inshore edge of the hardbottom and one being near the central-seaward edge of the hardbottom. This plan shall result in a total of 54 subsample assessment points.

- d. Epibiota sampling units shall be randomly positioned within the general plan locations described above. The final location of the randomly-placed units shall include exposed hardbottom. Once established, the coordinate locations of sampling units shall be recorded by DGPS accurate to 2 meters or better. For purposes of safety, the locations shall not be marked by permanent rods. Random target coordinates for subsample placement within cells will be generated prior to the field survey.
- e. At each sub-sample location, epibiota shall be surveyed using digital video or still cameras mounted to rigid, portable stainless steel frames. Photo-quadrats shall be obtained that represent the image size that would be provided through a camera positioned approximately 40 cm to 45 cm above the seafloor (e.g., 2400 square centimeters minimum). Because of the marginal visibility conditions in the area, the actual height of the camera above the seafloor may be less than 45 cm, in which case the Permittee shall compile a photomosaic of images suitable for providing quantitative data of the entire photo-quadrat.
- f. Data shall include a list of epibiota identified to the lowest practical taxon and ranked in order of percent cover. Epibiotical taxa may be aggregated into broader taxonomic groups such as macroalgae, sponges, hydrozoans, bryozoans, worm rock, and tunicates. Substrate types shall include sand, bare rock, dead wormrock and algal turf. Total percent cover shall be assessed by superimposing a random-dot overlay upon the photographic images (or mosaic image, if applicable) using image analysis software. The number of random points to be employed for point-count assessment on photograph and video images shall be established through sensitivity analysis of image evaluation.
- g. Marine turtles shall be surveyed by two (2) observers and a boat driver, trained in the identification of marine turtles. The survey shall be conducted using systematic visual transects from a shallow draft watercraft equipped with a sighting tower and travelling parallel to shore at approximately 7 mph. A survey day shall consist of at least two (2) transects along the nearshore hard bottom (R-64 to R-75.4) in water approximately 4 feet to 6 feet deep. Depending on inshore swell activity, sea turtle surveys shall be conducted approximately 100 to 300 feet from shore. Transects shall be alternated to begin at either the north or south ends of the study area shoreline.
- h. At least three (3) survey days or seven (7) transects shall be conducted for marine turtle distribution. Approximate water depth, temperature and clarity shall be noted during the surveys, in addition to the air temperature, wind speed and direction, sea state and swell conditions. These data shall be updated as conditions change.

- i. When a turtle is observed, the boat driver will enter a time-stamped GPS waypoint and record the following information:
 - i. turtle species;
 - ii. life-history stage (juvenile or adult);
 - iii. location in relation to the transect (inside, outside or on the transect line);
 - iv. location within the water column (top, middle, or bottom); and
 - v. behavior (swimming, breathing, resting, foraging, etc.).

- j. A report of the survey details and methodologies, collected data, and findings shall be submitted within 120 days after completion of the field surveys. Results for each sub-study (e.g., epibiota and turtles) may be submitted separately. At minimum, the report shall assess:
 - i. the total biotic cover, composition and cover of major taxa, and total number of taxa for epibiota including macroalgae, rock-building worms, and sessile invertebrates); and
 - ii. abundance, life-stage, distribution and activity of marine turtles.

PHYSICAL MONITORING REQUIRED:

46. Pursuant to 62B-41.005(16), F.A.C., physical monitoring of the project is required through acquisition of project-specific data to include, at a minimum, topographic and bathymetric surveys of the beach, offshore, and borrow site areas, and engineering analysis. The monitoring data is necessary in order for both the project sponsor and the Department to regularly observe and assess, with quantitative measurements, the performance of the project, any adverse effects which have occurred, and the need for any adjustments, modifications, or mitigative response to the project. The scientific monitoring process also provides the project sponsor and the Department information necessary to plan, design, and optimize subsequent follow-up projects, potentially reducing the need for and costs of unnecessary work, as well as potentially reducing any environmental impacts that may have occurred or be expected. The approved Physical Monitoring Plan (dated June 1, 2009) shall apply to this project.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT
OF ENVIRONMENTAL PROTECTION


Michael R. Barnett, P.E., Chief
Bureau of Beaches and Coastal Systems

Table 1
Marine Turtle Monitoring

The following monitoring is required for these projects. Reports summarizing the nesting should be submitted to the Tequesta office with a copy to the Tallahassee office by January 15 of the subsequent year. Data for nesting activity on the project beach and on 100 feet of beach immediately north and south of the project shall be reported separately, and should include numbers of nests lost to erosion or washed out. Summaries of nesting activity shall be submitted in electronic format (Excel spreadsheets).

Characteristic	Parameter	Measurement	Variable
Nesting Success	False crawls - number	Visual assessment of all false crawls	Number and location of false crawls in project and control areas with respect to the different types of fill sand: any interaction of the turtle with obstructions, such as groins, seawalls, or scarps, should be noted.
	False crawl - type	Categorization of the stage at which nesting was abandoned	Number in each of the following categories: emergence-no digging, preliminary body pit, abandoned egg chamber.
	Nests	Number	The number of marine turtle nests in the project and adjacent areas in project and control areas should be noted with respect to the different types of fill sand. Nest location along the profile, including the distance from the waterline and the landward structure, shall be recorded using sub-meter GPS. Any abnormal cavity morphologies should be reported as well as whether turtle touched groins, seawalls, or scarps during nest excavation
		Lost Nests	The number of nests lost to inundation, erosion depredated, vandalized, or the number with lost markers that could not be found.
	Lighting Impacts	Disoriented sea turtles	The number of disoriented hatchlings and adults shall be documented and reported in accordance with existing FWC protocol for disorientation events.
Reproductive Success	Emergence & hatching success	Standard survey protocol	Numbers of the following: unhatched eggs, depredated nests and eggs, live pipped eggs, dead pipped eggs, live hatchlings in nest, dead hatchlings in nest, hatchlings emerged, disoriented hatchlings, depredated hatchlings

CAUTION: MANATEE HABITAT

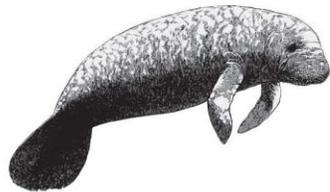
All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

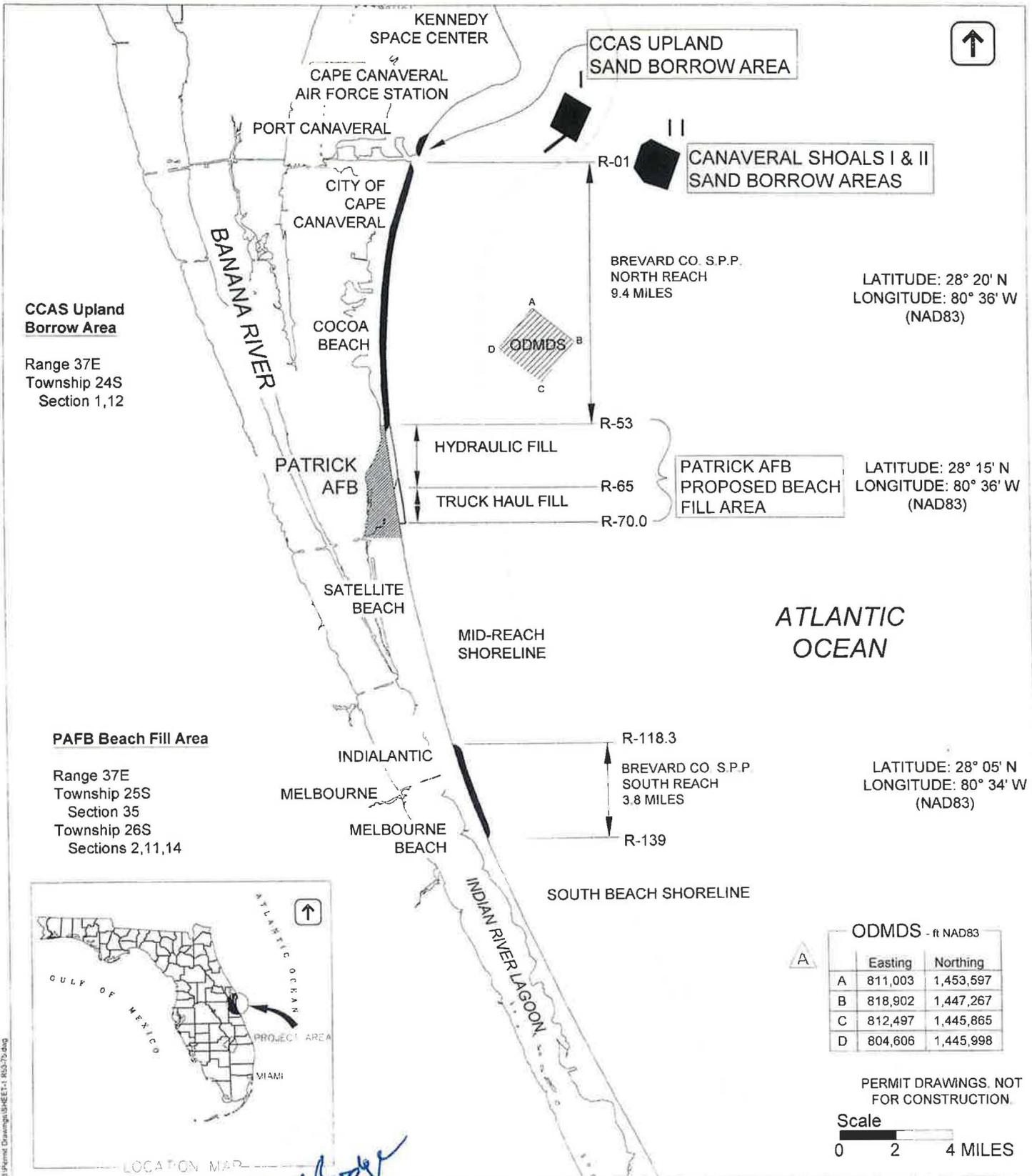
Report any collision with or injury to a manatee:



Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC



CCAS Upland Borrow Area

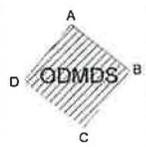
Range 37E
Township 24S
Section 1,12

CCAS UPLAND SAND BORROW AREA

CANAVERAL SHOALS I & II SAND BORROW AREAS

BREVARD CO. S.P.P. NORTH REACH
9.4 MILES

LATITUDE: 28° 20' N
LONGITUDE: 80° 36' W
(NAD83)



PATRICK AFB

HYDRAULIC FILL

TRUCK HAUL FILL

PATRICK AFB PROPOSED BEACH FILL AREA

LATITUDE: 28° 15' N
LONGITUDE: 80° 36' W
(NAD83)

ATLANTIC OCEAN

PAFB Beach Fill Area

Range 37E
Township 25S
Section 35
Township 26S
Sections 2,11,14

R-118.3

BREVARD CO. S.P.P. SOUTH REACH
3.8 MILES

LATITUDE: 28° 05' N
LONGITUDE: 80° 34' W
(NAD83)

R-139

SOUTH BEACH SHORELINE

ODMDS - ft NAD83

	Easting	Northing
A	811,003	1,453,597
B	818,902	1,447,267
C	812,497	1,445,865
D	804,606	1,445,998

PERMIT DRAWINGS. NOT FOR CONSTRUCTION.

Scale

0 2 4 MILES



olsen
associates, inc.
4458 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

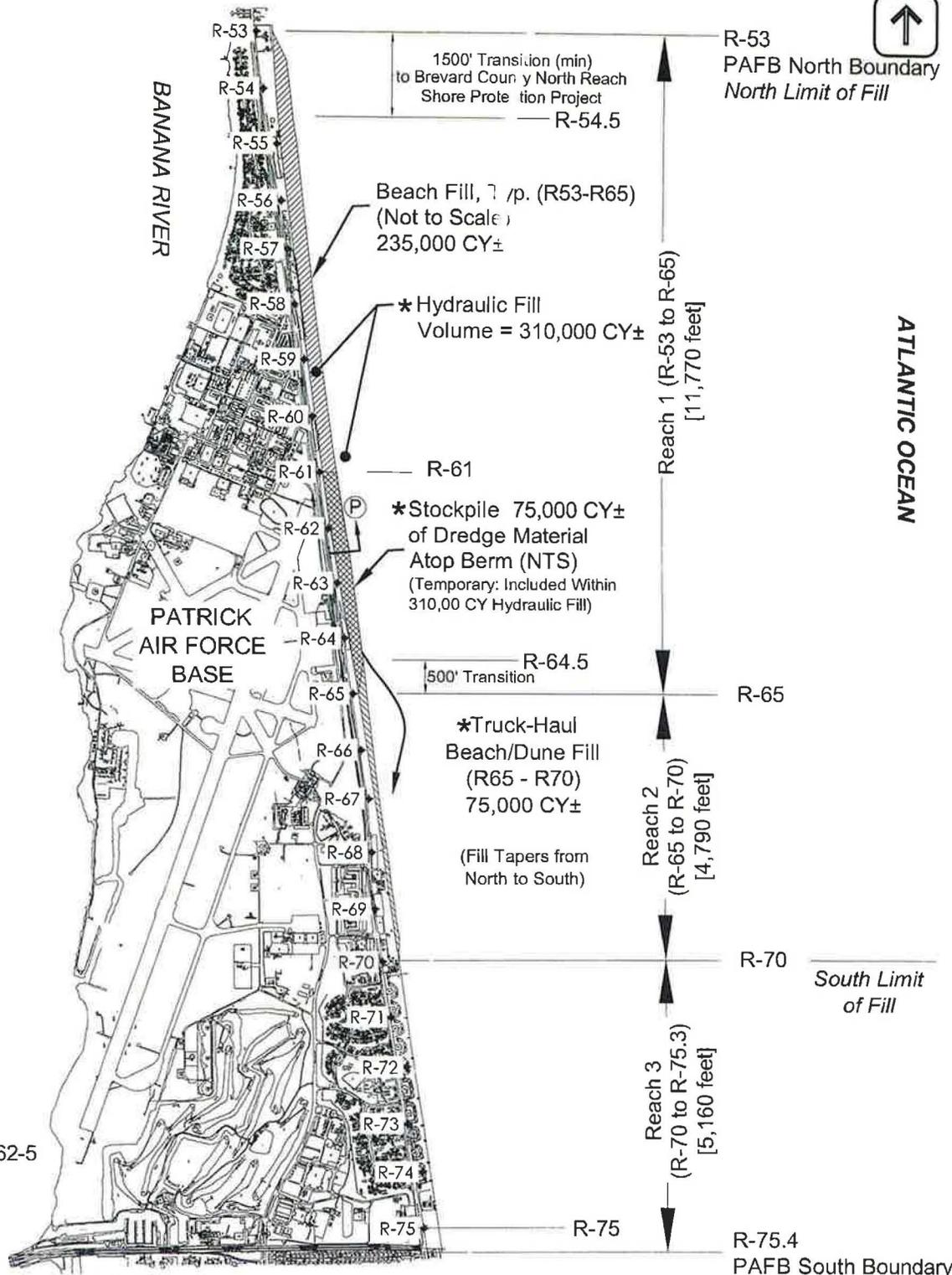
K.J. Boudry
4/2/2010

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
VICINITY MAP

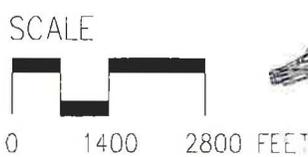
DATE	REVISION
4/1/10	ODMDS

01/15/09
DRAWN BY
ML
SHEET
1 OF 19

PERMIT # 294526-001



Ⓟ Dredge pipeline corridor north of R62-5



* Note: Temporary beach stockpile feature will not be used for construction from upland (non-hydraulic) sand sources.

PERMIT DRAWINGS. NOT FOR CONSTRUCTION.

Z:\Projects\Brevard\PAFB\Permit\Drawings\SHEET-2\103475.dwg



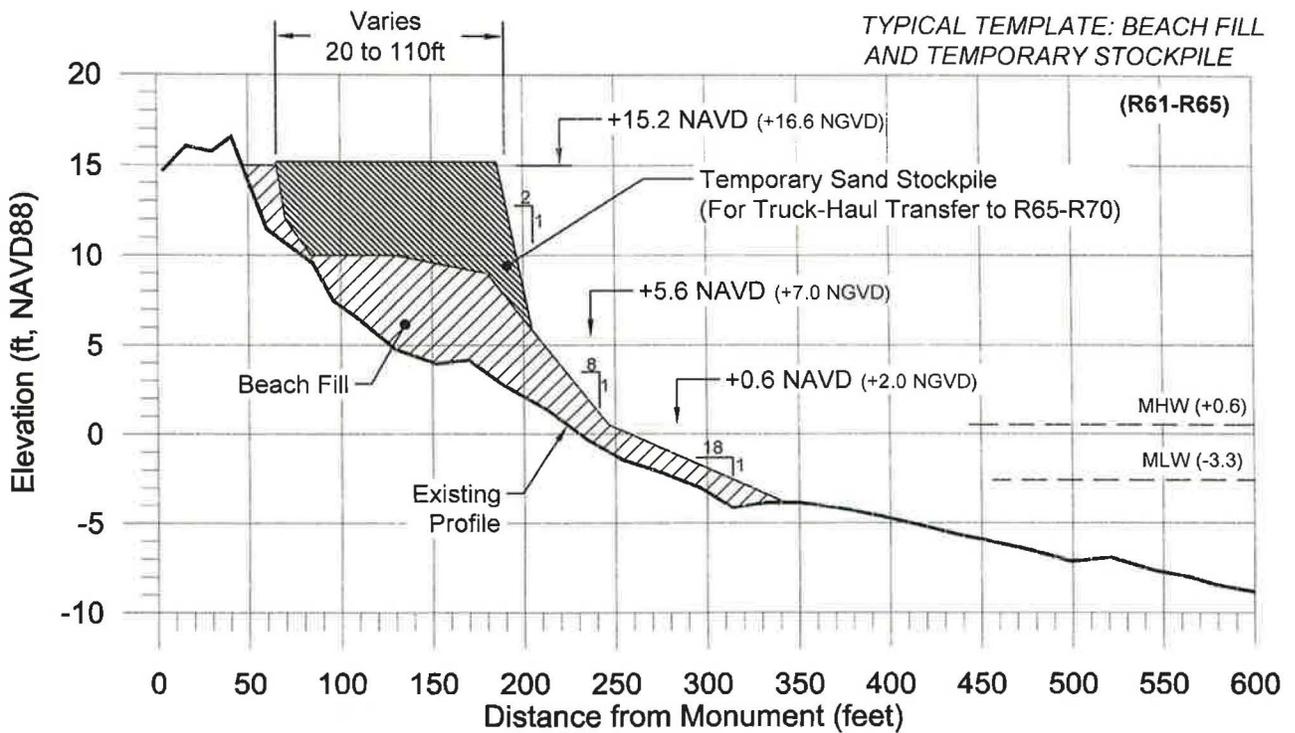
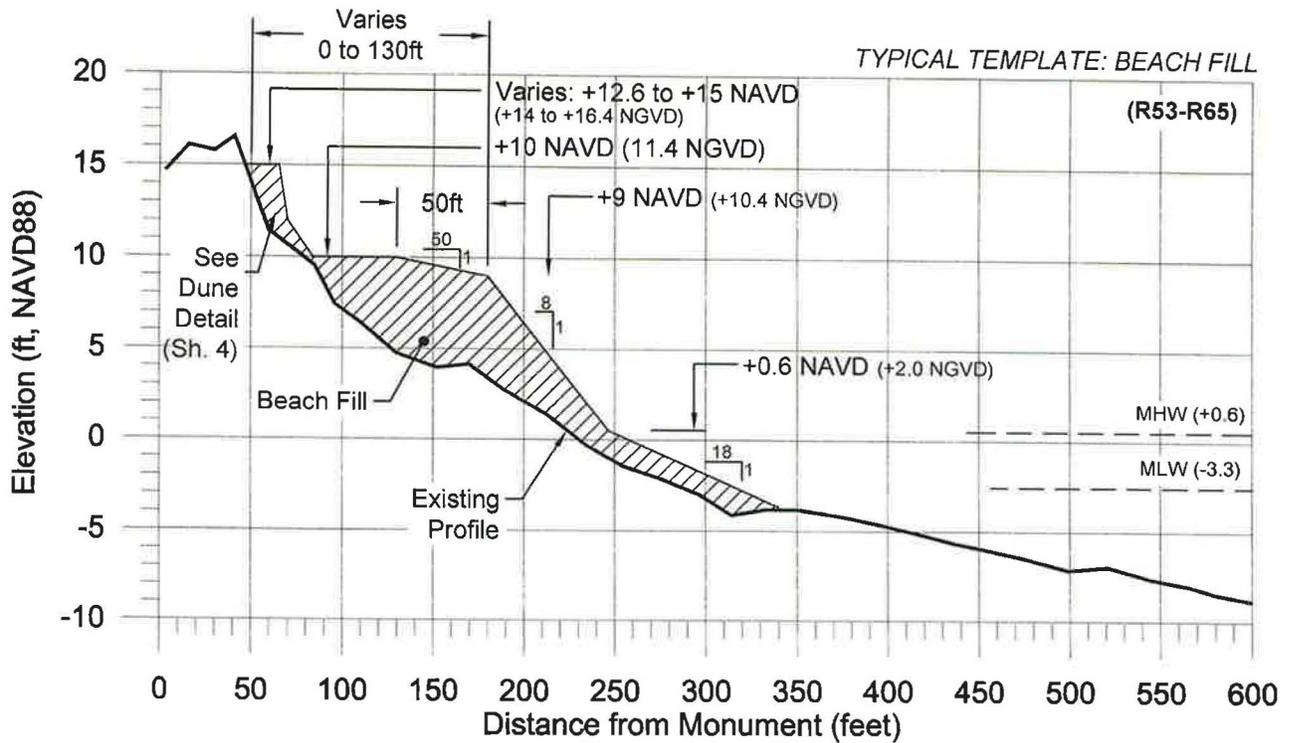
olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

Kry Godek
Nov. 21
2009

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
PLAN

DATE: 11/2/09	REVISION: PIPELINE CORRIDOR ADDED	DATE: 01/15/09
		DRAWN BY: ML
		SHEET 2 OF 19

PERMIT # 294526001



PERMIT DRAWINGS. NOT FOR CONSTRUCTION.

PERMIT # 294526001



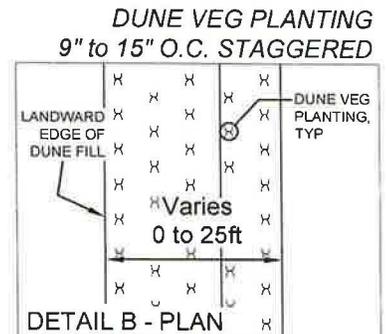
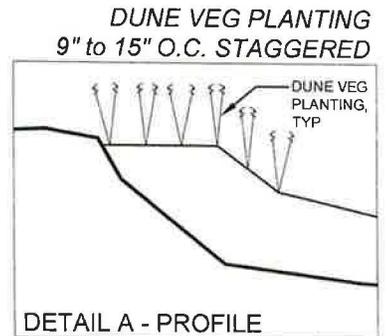
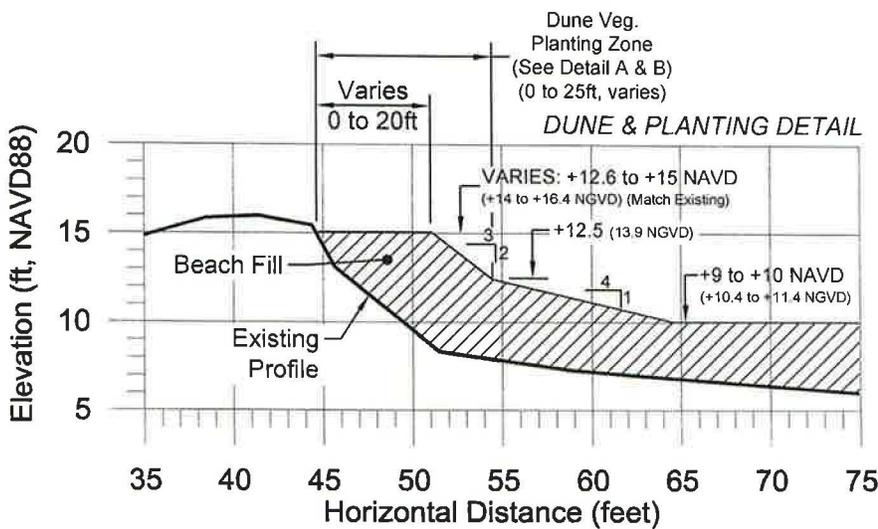
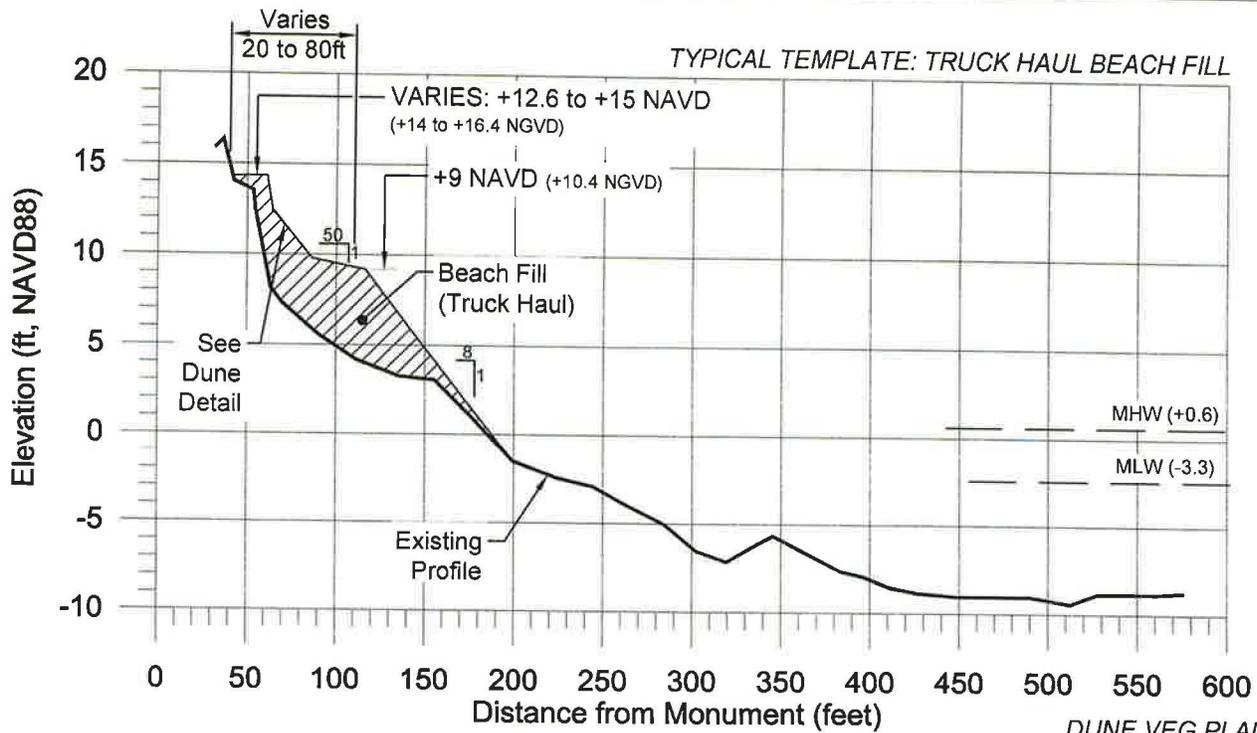
olsen associates, inc.
 4438 Herschel Street
 Jacksonville, FL 32210
 (904) 387-6114
 COA No. 3491

KFB
2/2/09

PATRICK AIR FORCE BASE
 SHORE PROTECTION PROJECT
 BREVARD COUNTY, FL
 TYP. BEACH FILL TEMPLATE
 (R53-R65)

DATE	REVISION	DATE
		01/15/09
		DRAWN BY
		ML
		SHEET
		3 OF 19

Project: Brevard County Shoreline Protection, 2008 Permit Drawings, Sheet - 3 R65.dwg



PERMIT # 294526001

R-Monument Control Reflected in these Drawings

U.S. Survey Feet; NAD27 / NGVD29 [Morgan & Eklund (November 2008 Survey)]

MON.	NORTHING	EASTING	ELEV.	AZIM	MON.	NORTHING	EASTING	ELEV.	AZIM
R-53-T	1,431,534.0	626,564.4	5.29	90	R-62-T	1,422,827.7	627,855.2	14.25	90
R-54	1,430,544.8	626,689.9	4.18	90	R-63-T	1,421,862.0	628,007.0	16.39	90
R-55-T	1,429,595.8	626,936.1	8.29	90	R-64-T	1,420,891.5	628,132.0	13.33	90
R-56-T	1,428,594.1	627,018.9	12.67	90	R-65-T	1,419,917.5	628,271.8	11.51	90
R-57-T	1,427,751.5	627,132.2	13.25	90	R-66	1,418,930.4	628,402.5	12.41	90
R-58-T	1,426,773.3	627,257.5	13.39	90	R-67-T	1,418,067.8	628,532.3	13.99	90
R-59-T	1,425,806.6	627,438.8	12.03	90	R-68-T	1,417,117.6	628,575.9	9.16	90
R-60-T	1,424,805.0	627,578.4	12.49	90	R-69	1,416,119.9	628,817.7	9.8	90
R-61-T	1,423,815.3	627,708.8	14.32	90	R-70	1,415,199.9	628,906.2	11.1	90

KR Bodey
4/17/09

PERMIT DRAWINGS. NOT FOR CONSTRUCTION.

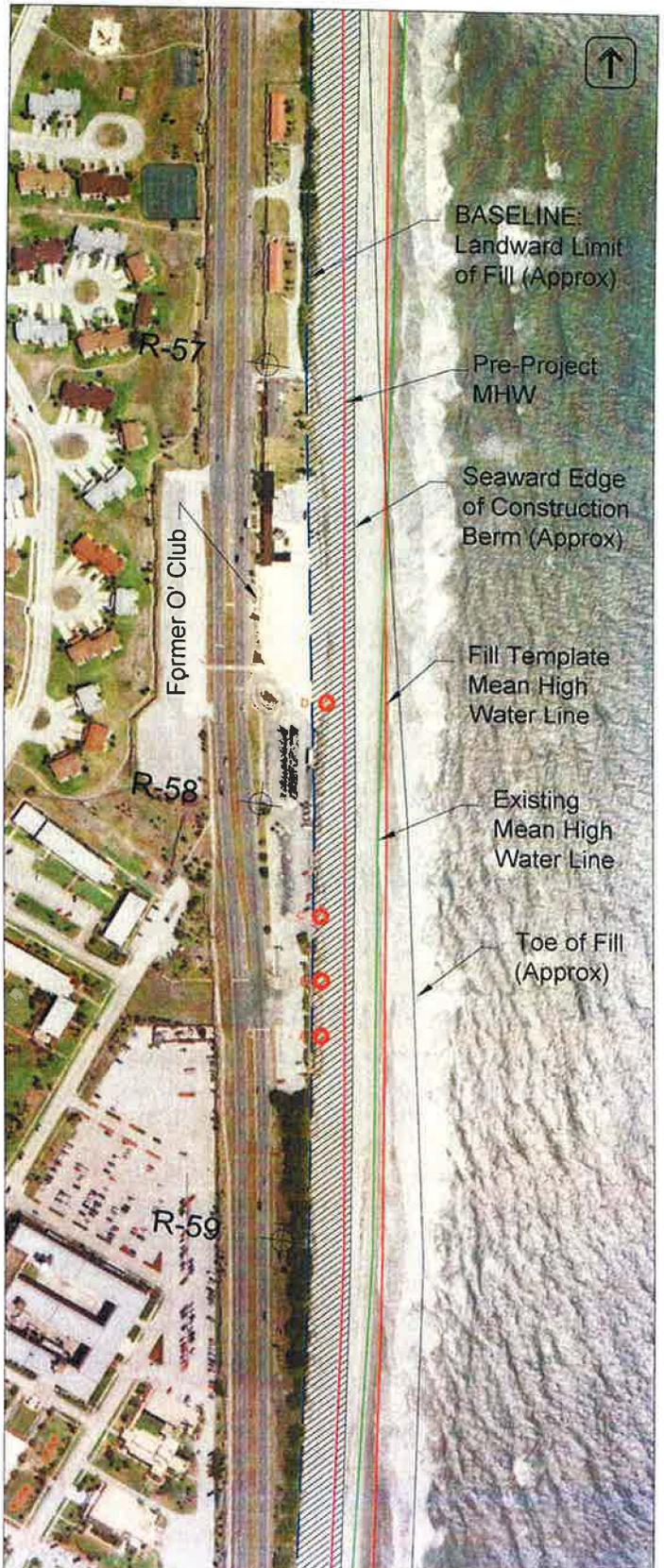


oisen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
TYP. BEACH FILL TEMPLATE
(R65-R70 & DUNE DETAIL)

DATE	REVISION	DATE
4/9/09	Veg Planting Detail added	01/15/09
		DRAWN BY ML
		SHEET 4 OF 19

○ EXISTING STORM-WATER OUTFALL LOCATIONS (BURIED)



2008A Permit Drawings Sheet 5-7 to.dwg



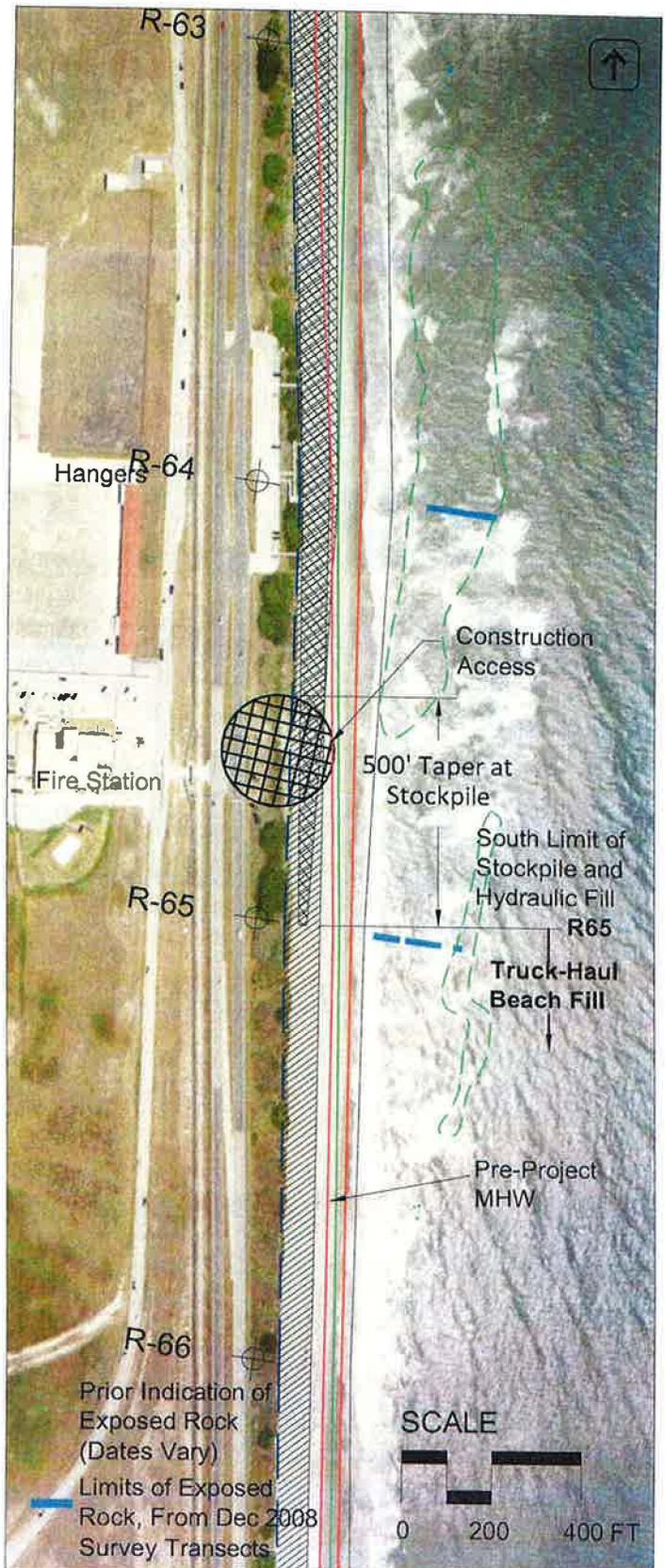
olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

KE/Sodgy
4/17/09

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
PLAN - DETAIL (1 of 3)

DATE	REVISION	DATE
4/17/09	OUTFALL LOCATIONS ADDED	01/15/09
DRAWN BY		ML
SHEET		5 OF 19

PERMIT # 294526001



PHOTOGRAPHY DATE: 4/6/06

Z:\Projects\Brevard\PAF\B-Permitting_2008\Permit_Drawing\Sheet-5-7_top.dwg



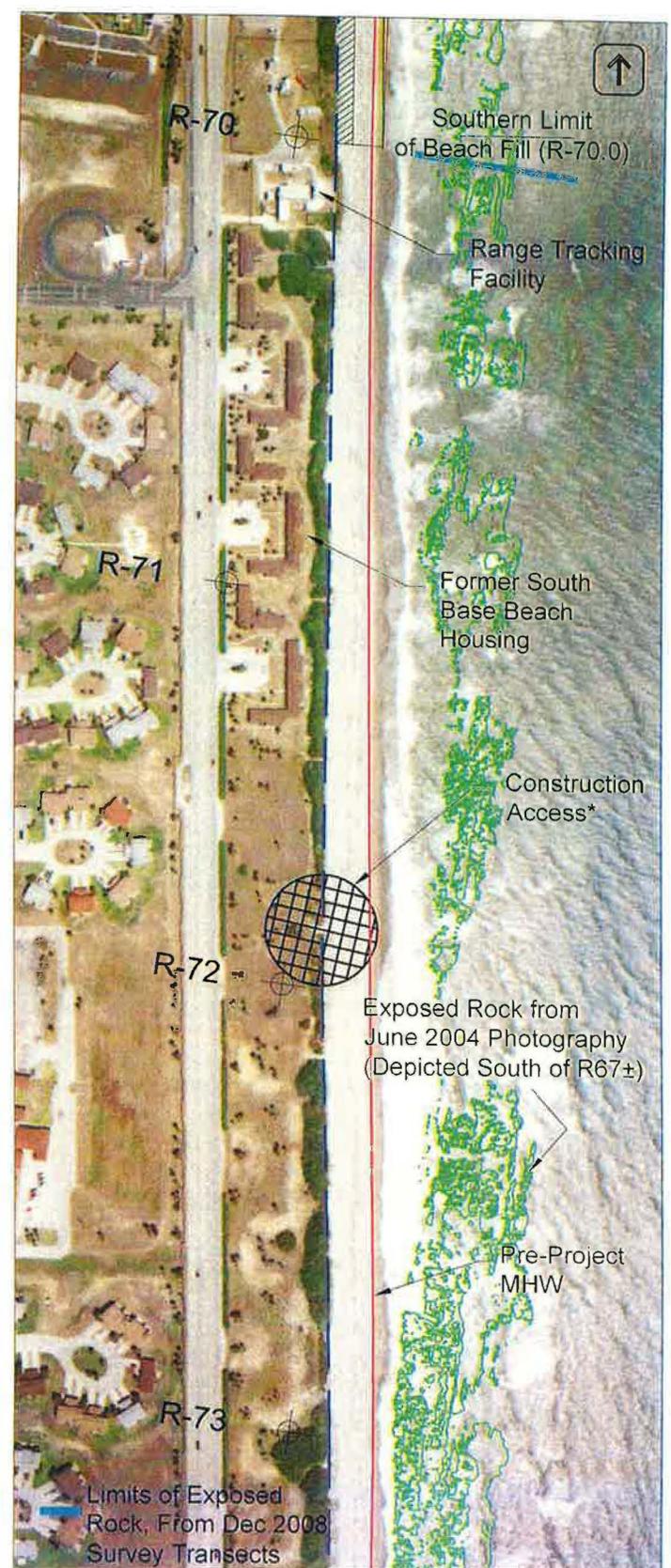
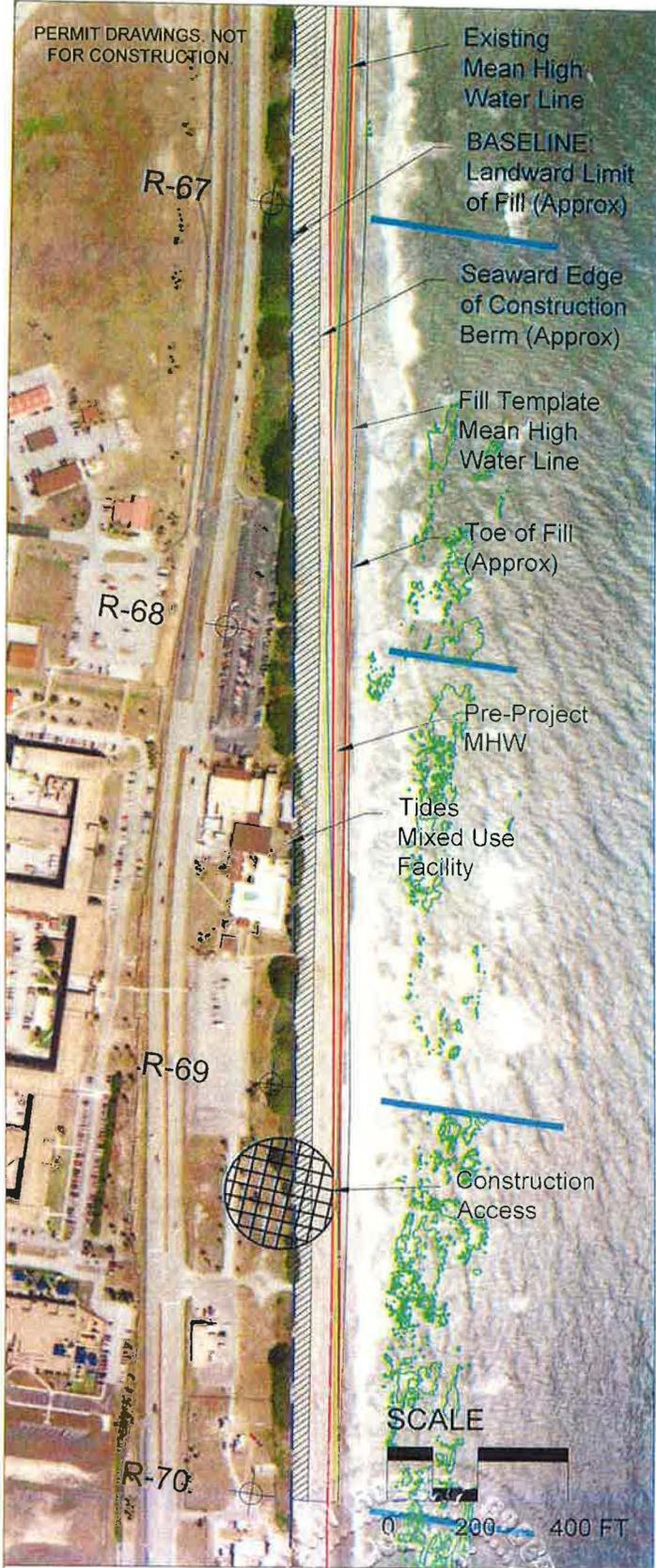
olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No 3491

Handwritten: K.R. Gandy
Nov. 21 2009

**PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
PLAN - DETAIL (2 of 3)**

DATE: 11/2/09	REVISION: PIPELINE CORRIDOR ADDED	DATE: 01/15/09
		DRAWN BY: ML
		SHEET 6 OF 19

PERMIT # 294526001



PERMIT DRAWINGS. NOT FOR CONSTRUCTION.

R-67

R-68

R-69

R-70

Existing Mean High Water Line

BASELINE Landward Limit of Fill (Approx)

Seaward Edge of Construction Berm (Approx)

Fill Template Mean High Water Line

Toe of Fill (Approx)

Pre-Project MHW

Tides Mixed Use Facility

Construction Access



R-70

R-71

R-72

R-73

Southern Limit of Beach Fill (R-70.0)

Range Tracking Facility

Former South Base Beach Housing

Construction Access*

Exposed Rock from June 2004 Photography (Depicted South of R67±)

Pre-Project MHW

Limits of Exposed Rock, From Dec 2008 Survey Transects



olsen associates, inc.
 4438 Herschel Street
 Jacksonville, FL 32210
 (904) 387-6114
 COA No. 3491

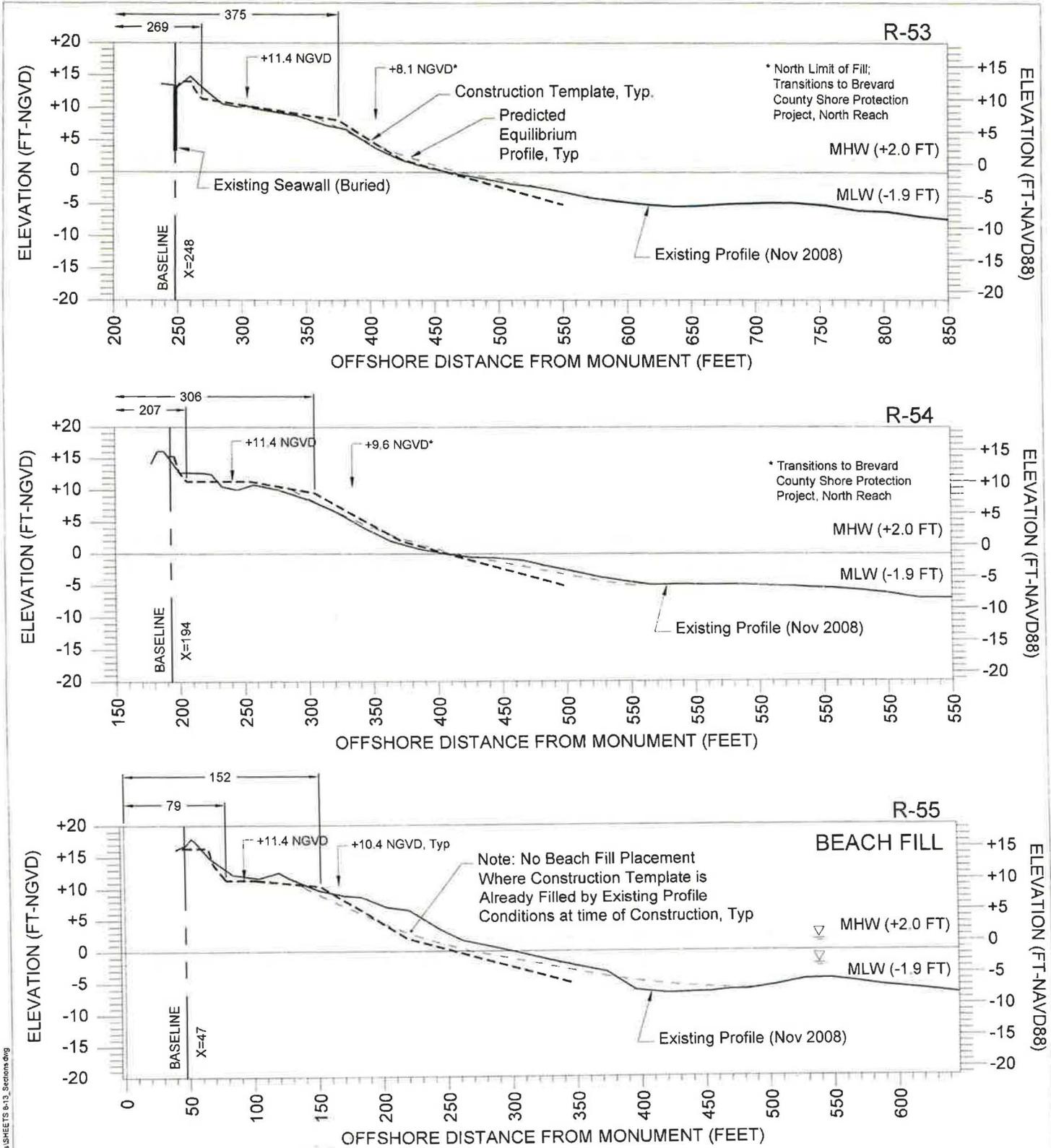
*Kalby
 2/2/09*

PATRICK AIR FORCE BASE
 SHORE PROTECTION PROJECT
 BREVARD COUNTY, FL
 PLAN - DETAIL (3 of 3)

DATE	REVISION	DATE
		01/15/09
DRAWN BY		ML
SHEET		7 OF 19

PERMIT # 294526001

PERMIT DRAWINGS. NOT FOR CONSTRUCTION.



See Sheets 3 & 4
 For Beach Fill Details

PERMIT # 294526001



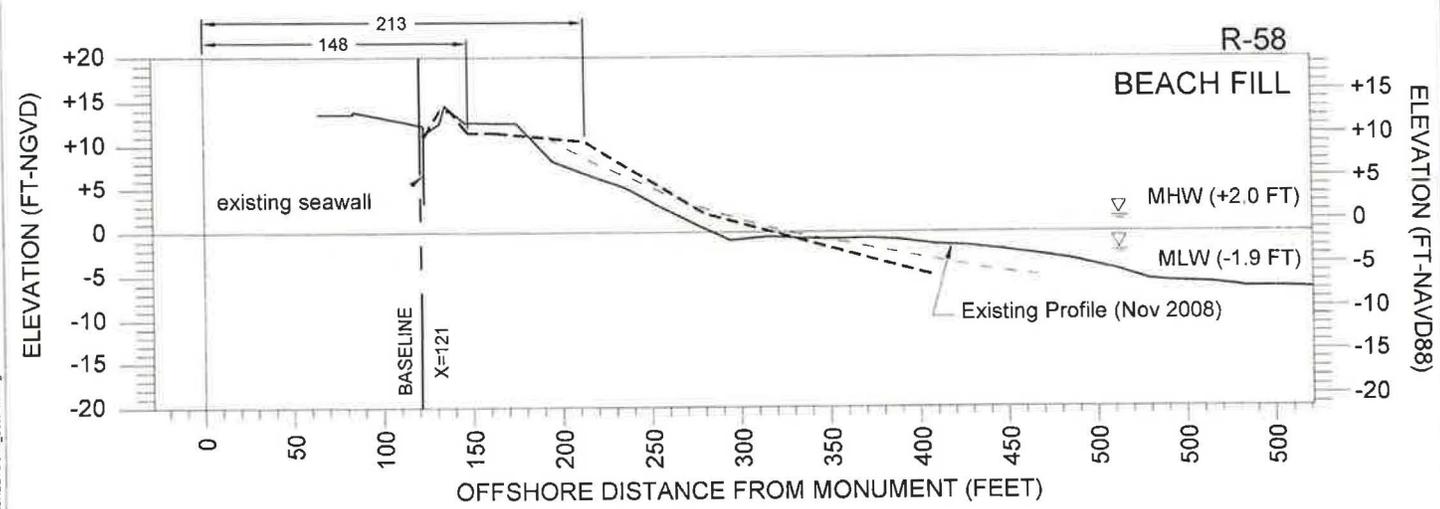
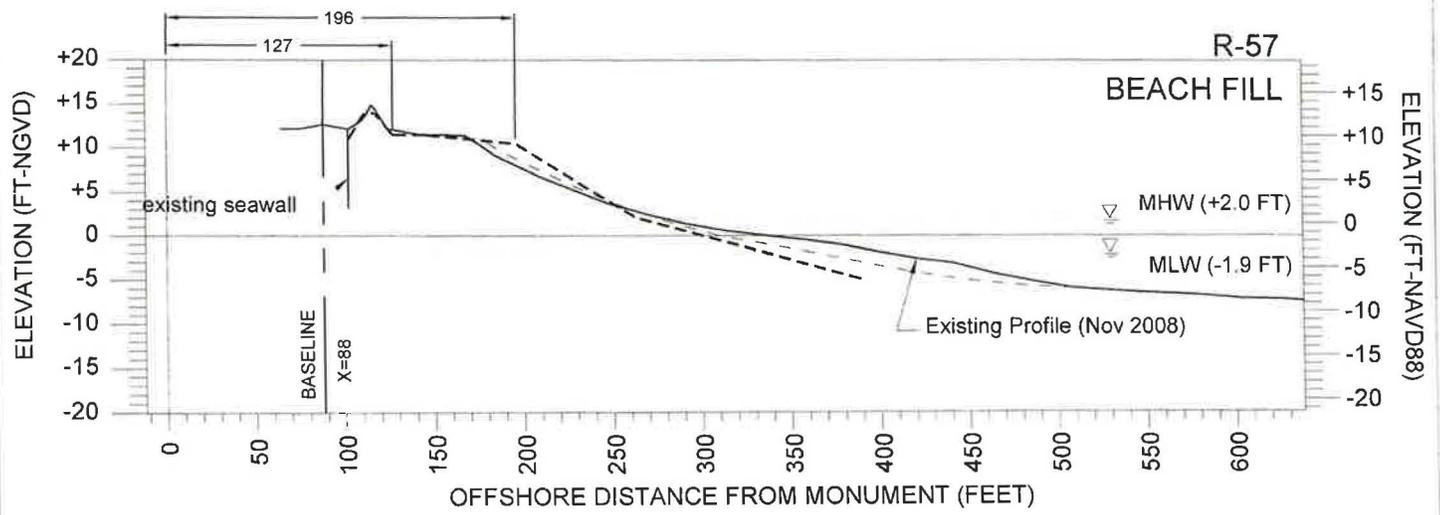
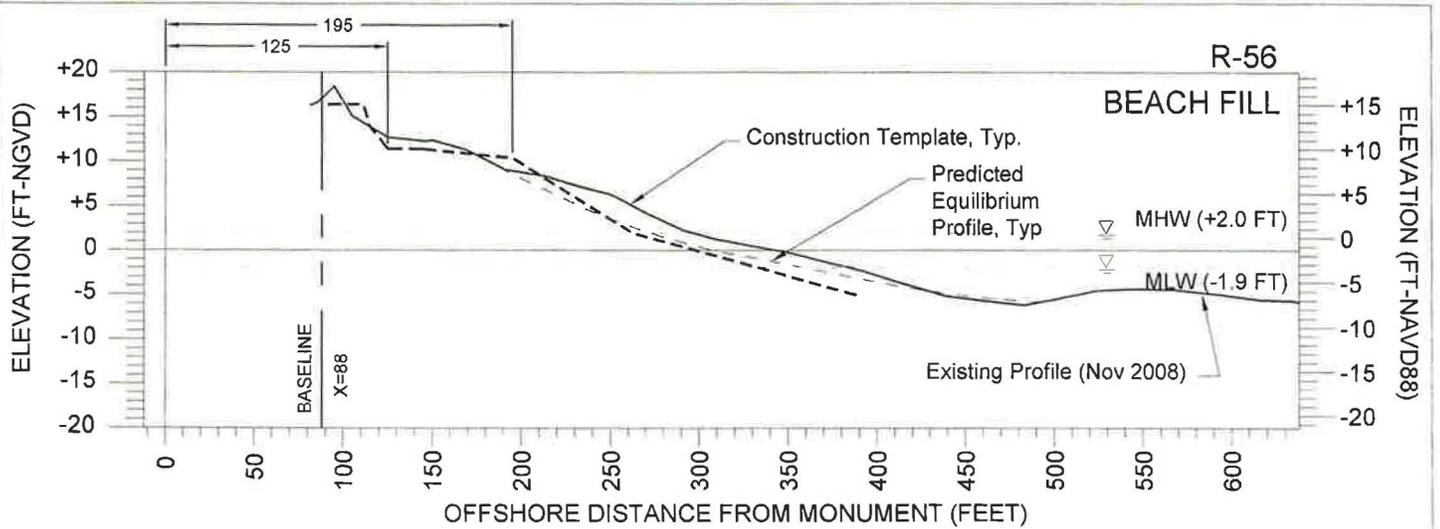
olsen associates, inc.
 4438 Herschel Street
 Jacksonville, FL 32210
 (904) 387-6114
 COA No. 3491

Handwritten signature and date:
 2/2/09

PATRICK AIR FORCE BASE
 STORM DAMAGE REPAIR BEACH FILL
 BREVARD COUNTY, FL
TYPICAL SECTIONS (1 of 6)

DATE	REVISION	DATE
		01/15/09
		DRAWN BY
		ML
		SHEET
		8 OF 19

Z:\Projects\Brevard\PAFB\Permitting\2008\Permit Drawings\SHEET 3 B-13_Section.dwg



See Sheets 3 & 4
 For Beach Fill Details

PERMIT # 294526001



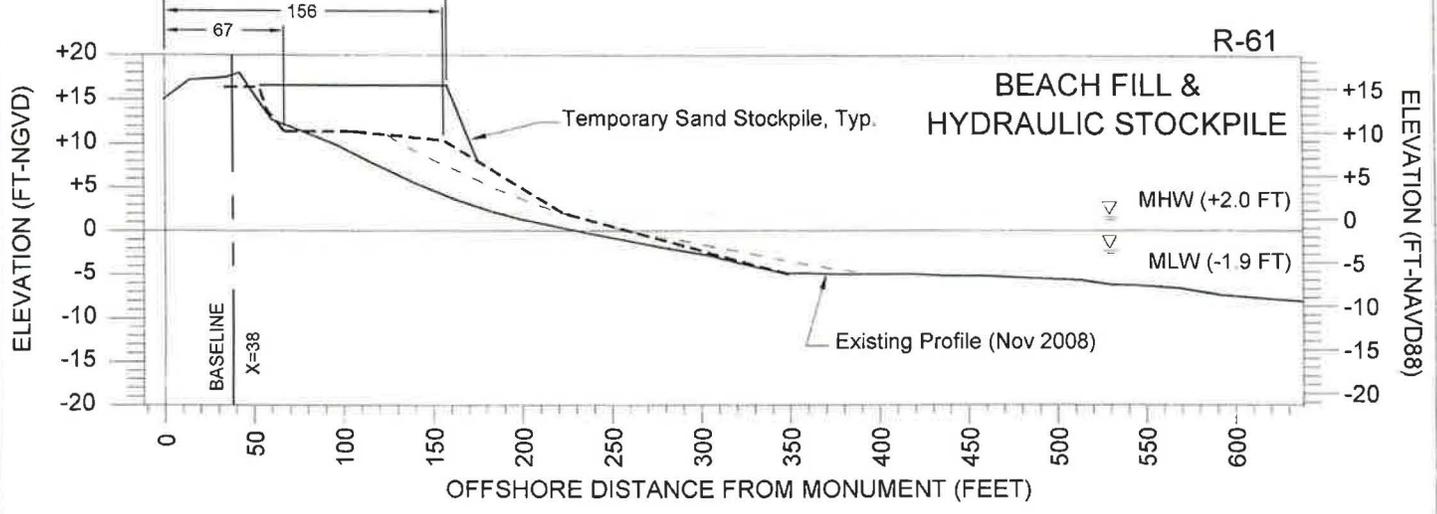
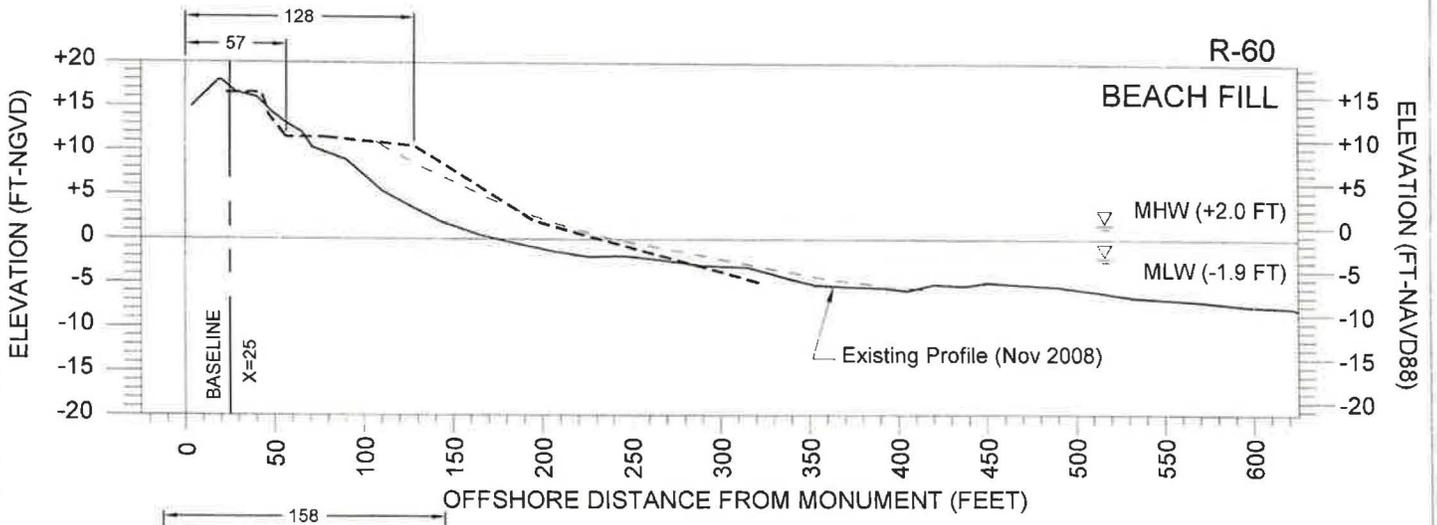
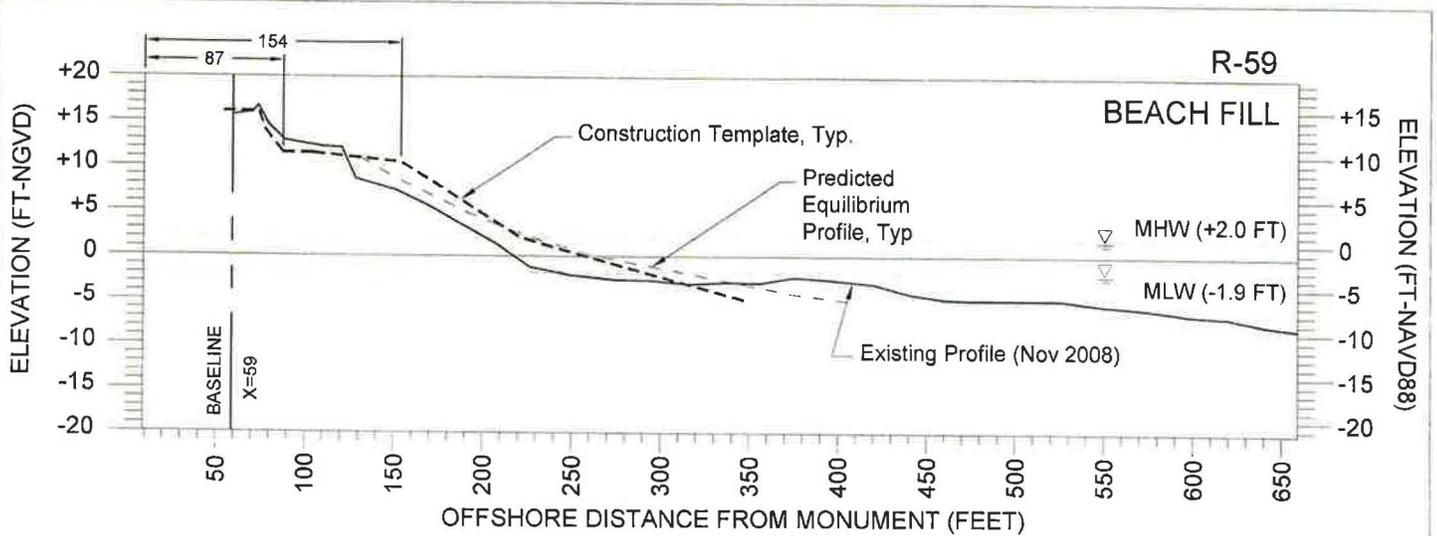
olsen associates, inc.
 4438 Hersche Street
 Jacksonville, FL 32210
 (904) 387-6114
 COA No. 3491

K. R. Budy
 2/3/09

PATRICK AIR FORCE BASE
 STORM DAMAGE REPAIR BEACH FILL
 BREVARD COUNTY, FL
TYPICAL SECTIONS (2 of 6)

DATE	REVISION	DATE
		01/15/09
		DRAWN BY
		ML
		SHEET
		9 OF 19

PERMIT DRAWINGS. NOT FOR CONSTRUCTION.



See Sheets 3 & 4 For Beach Fill Details

PERMIT # 294526001

Z:\Projects\Illustrations\PAF\Permitting\2008\Permit Drawings\SHEETS 6-12_Sections.dwg

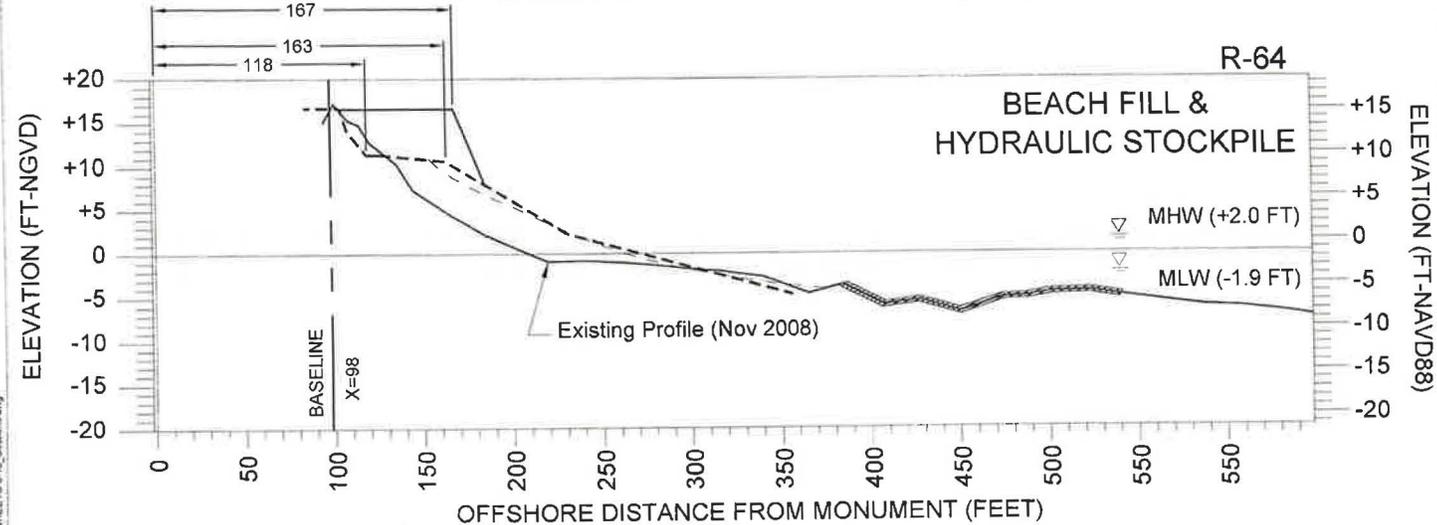
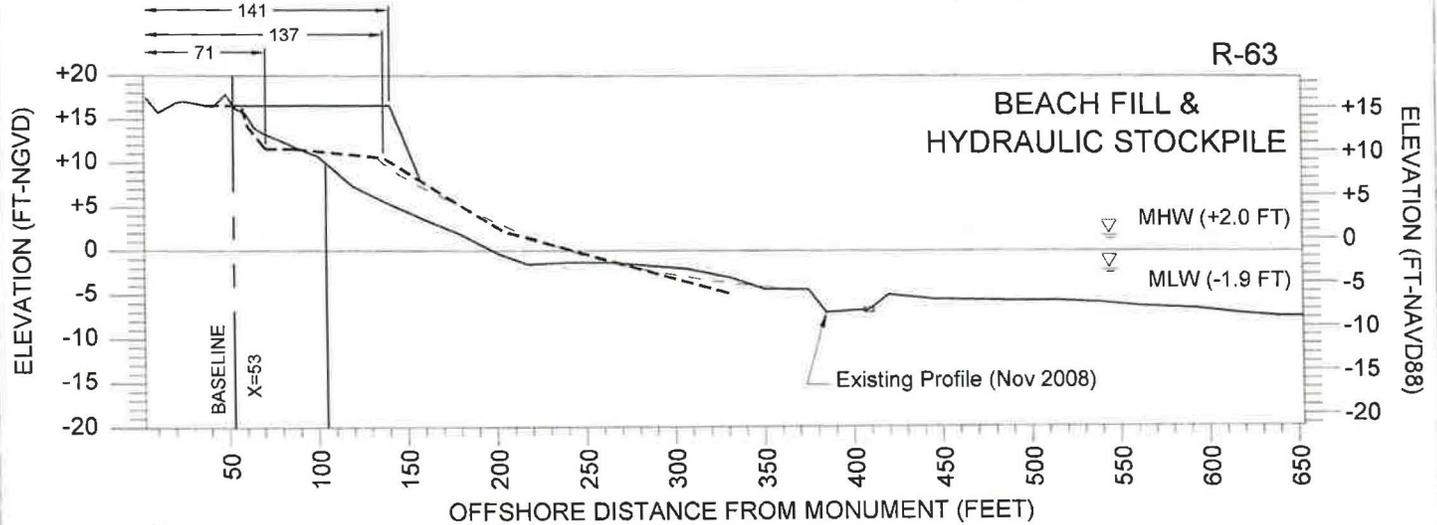
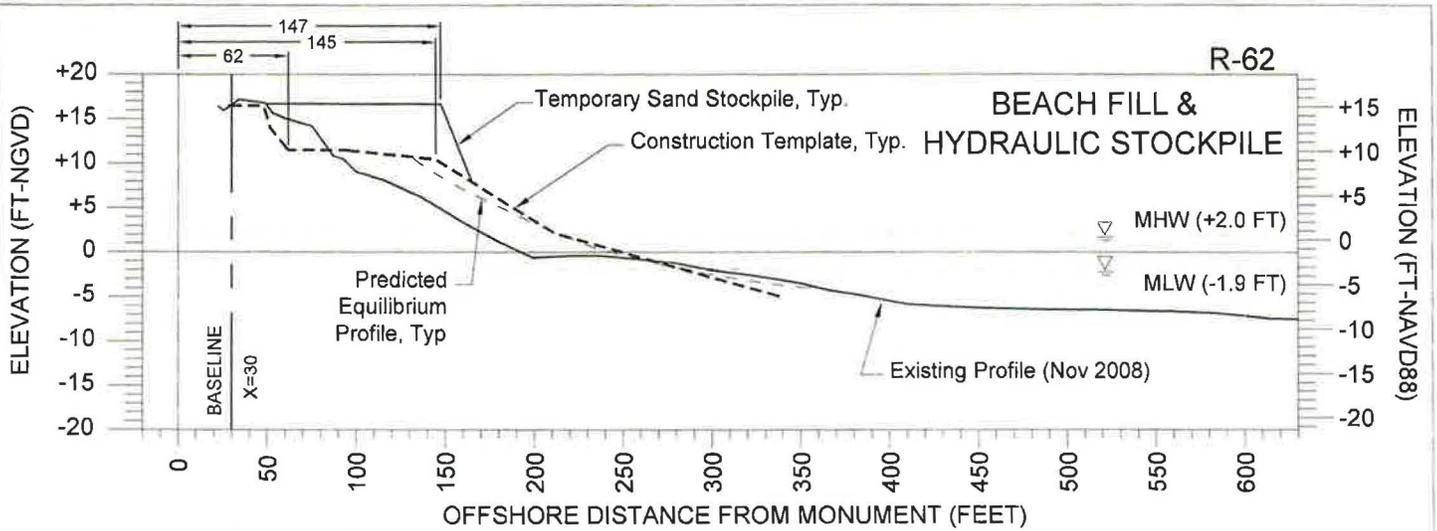


olsen associates, inc.
 4438 Herschel Street
 Jacksonville, FL 32210
 (904) 387-6114
 COA No. 3491

KF
12/29

PATRICK AIR FORCE BASE
 STORM DAMAGE REPAIR BEACH FILL
 BREVARD COUNTY, FL
TYPICAL SECTIONS (3 of 6)

DATE	REVISION	DATE
		01/15/09
		DRAWN BY ML
		SHEET 10 OF 19



See Sheets 3 & 4
 For Beach Fill Details

Exposed Rock
 (Nov. 2008)

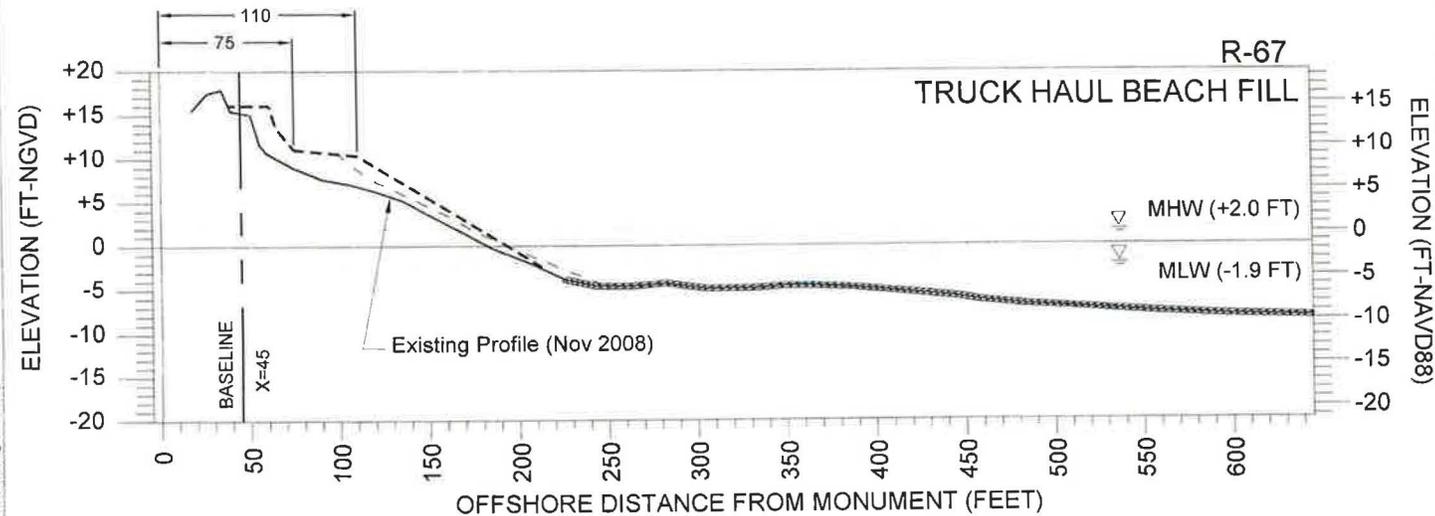
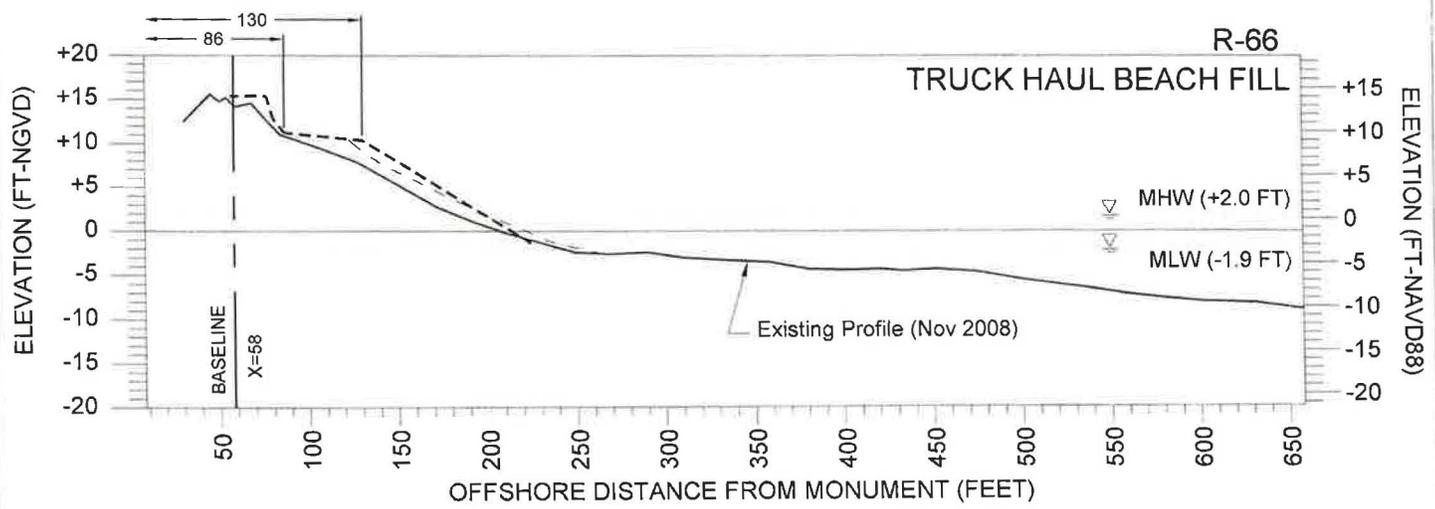
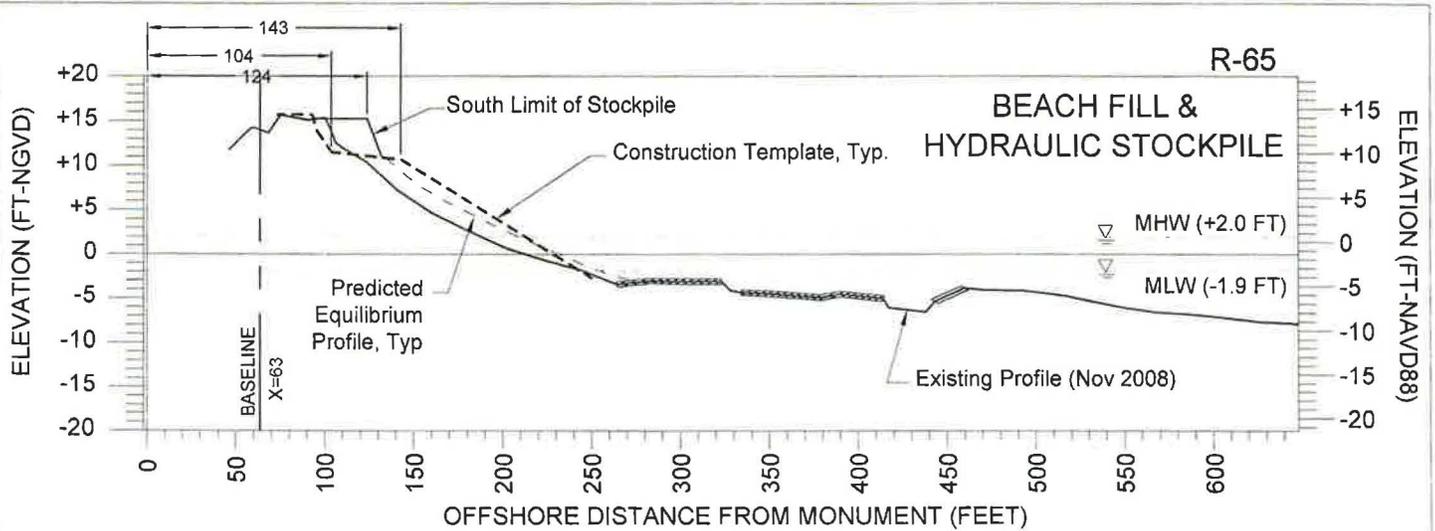


olsen
 associates, inc.
 4438 Herschel Street
 Jacksonville, FL 32210
 (904) 387-6114
 COA No. 3491

Handwritten: 5/22/09

PATRICK AIR FORCE BASE
 STORM DAMAGE REPAIR BEACH FILL
 BREVARD COUNTY, FL
TYPICAL SECTIONS (4 of 6)

DATE	REVISION	DATE
		01/15/09
		DRAWN BY ML
		SHEET 11 OF 19



See Sheets 3 & 4
 For Beach Fill Details

Exposed Rock
 (Nov. 2008)

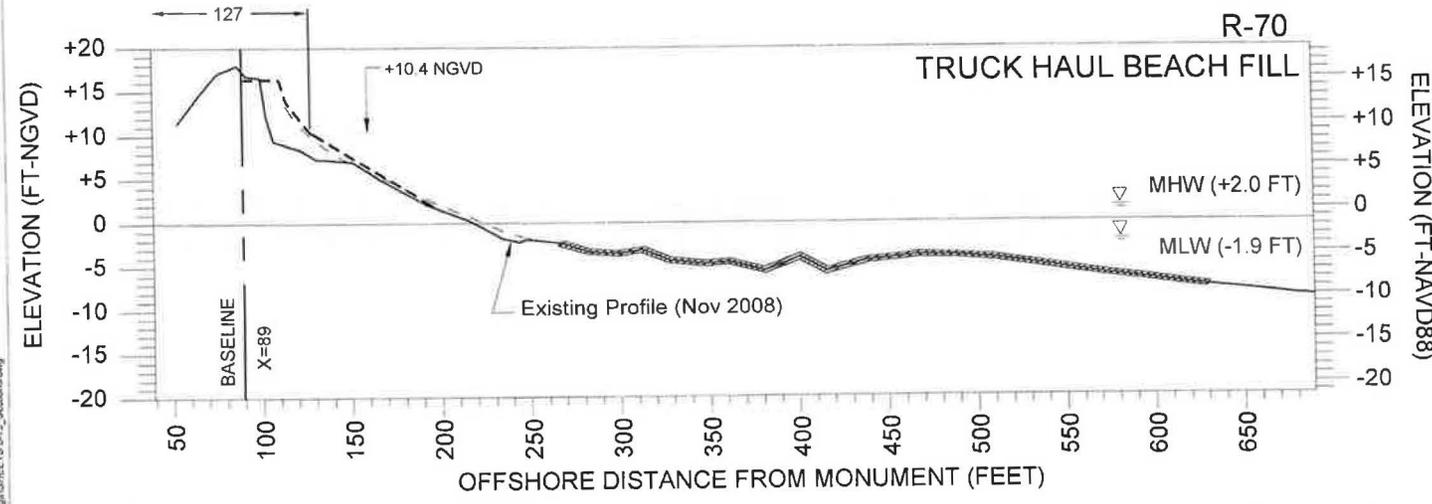
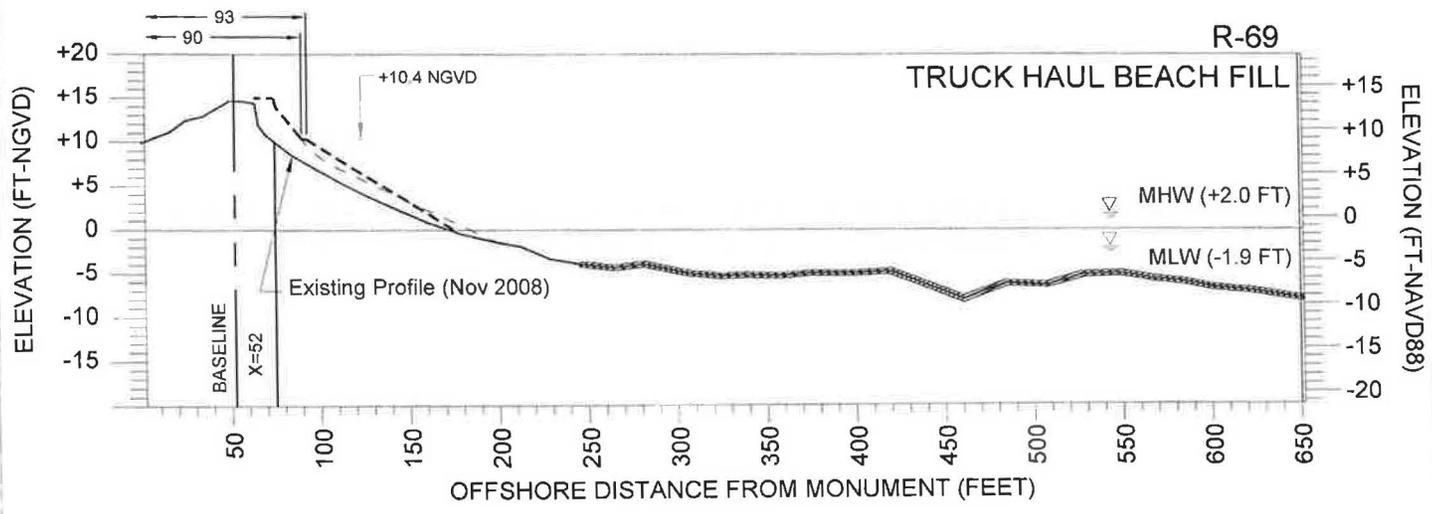
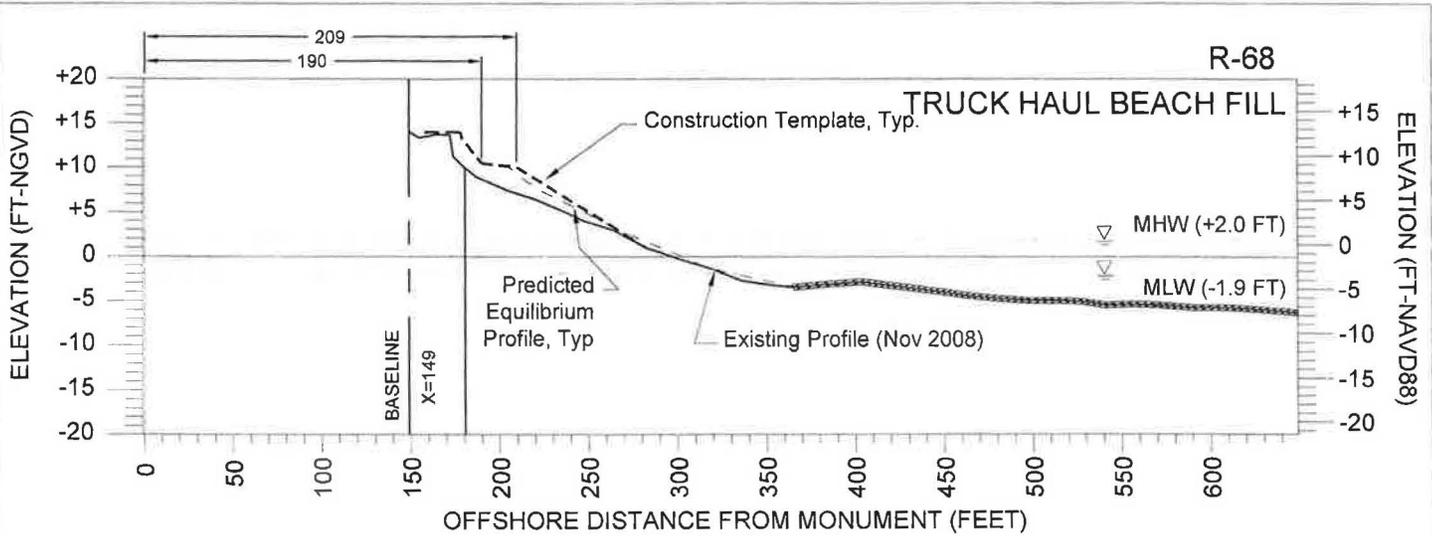


olsen
 associates, inc.
 4438 Herschel Street
 Jacksonville, FL 32210
 (904) 387-6114
 COA No. 3491

Handwritten: 5/2/09, 2/2/09

PATRICK AIR FORCE BASE
 STORM DAMAGE REPAIR BEACH FILL
 BREVARD COUNTY, FL
TYPICAL SECTIONS (5 of 6)

DATE	REVISION	DATE
		01/15/09
		DRAWN BY ML
		SHEET 12 OF 19



See Sheets 3 & 4
For Beach Fill Details

Exposed Rock
(Nov. 2008)



olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-8114
COA No. 3491

Handwritten signature and date:
2/2/09

PATRICK AIR FORCE BASE
STORM DAMAGE REPAIR BEACH FILL
BREVARD COUNTY, FL
TYPICAL SECTIONS (6 of 6)

DATE	REVISION	DATE
		01/15/09
		DRAWN BY
		ML
		SHEET
		13 OF 19

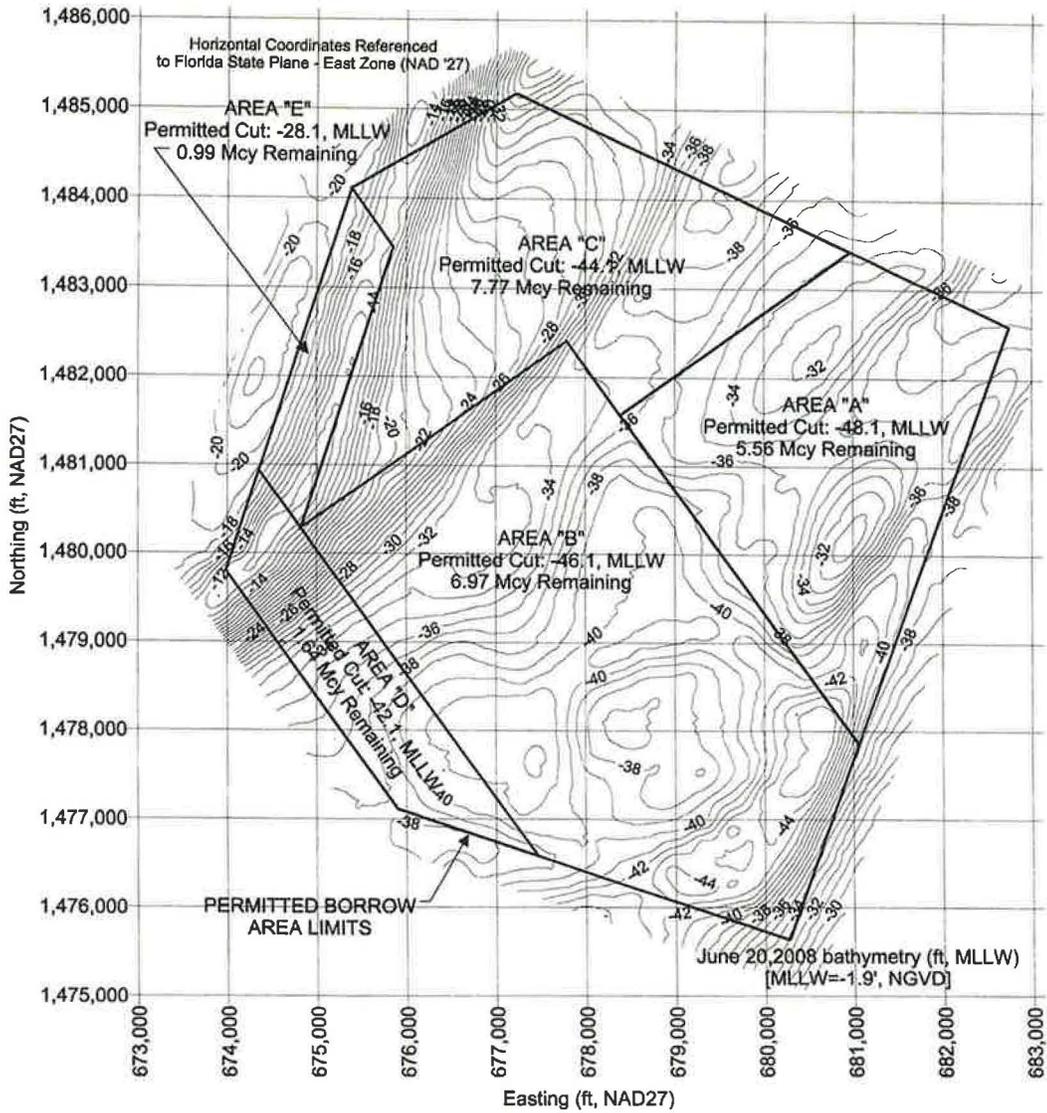


TABLE: Canaveral Shoals II Boundary Coordinates

PT	NAD27		NAD83		NAD83	
	Easting (FT)	Northing (FT)	Easting (FT)	Northing (FT)	Latitude	Longitude
A	677,218.0	1,485,178.6	833,454.9	1,485,342.9	28.418717	80.448451
B	682,740.0	1,482,600.0	838,976.9	1,482,764.3	28.411554	80.431310
C	680,267.4	1,475,638.1	836,504.3	1,475,802.4	28.392439	80.439102
D	675,899.5	1,477,115.5	832,136.4	1,477,279.8	28.396557	80.452666
E	673,977.0	1,479,797.3	830,213.8	1,479,961.6	28.403957	80.458609
F	675,381.2	1,484,113.1	831,618.0	1,484,277.4	28.415809	80.454180



olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

SR
2/2/09

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
CANAVERAL SHOALS II
BORROW AREA

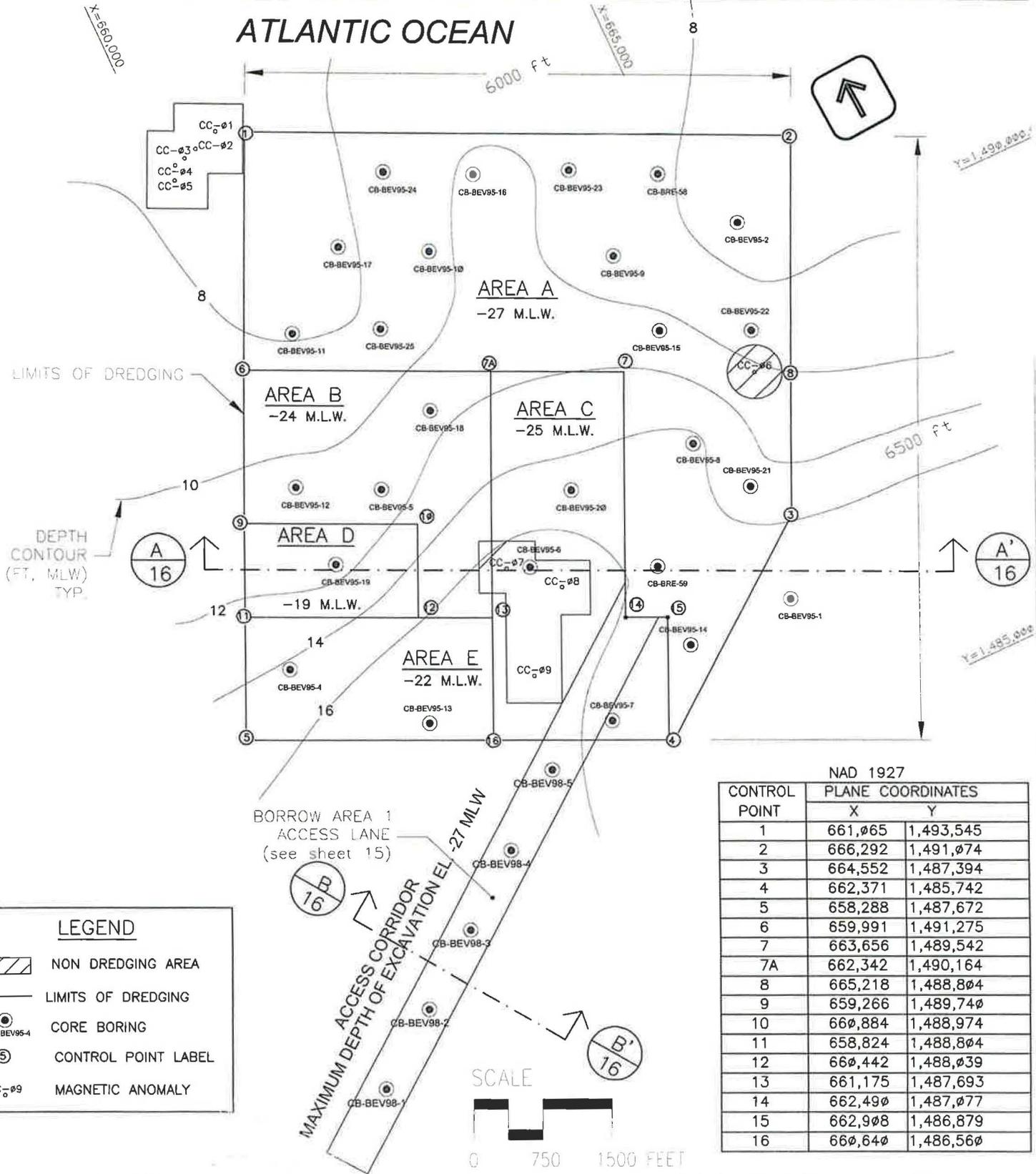
DATE	REVISION

DATE	01/15/09
DRAWN BY	ML
SHEET	14 OF 19

PERMIT # 294526001

PERMIT # 294526001

ATLANTIC OCEAN



CONTROL POINT	NAD 1927 PLANE COORDINATES	
	X	Y
1	661,065	1,493,545
2	666,292	1,491,074
3	664,552	1,487,394
4	662,371	1,485,742
5	658,288	1,487,672
6	659,991	1,491,275
7	663,656	1,489,542
7A	662,342	1,490,164
8	665,218	1,488,804
9	659,266	1,489,740
10	660,884	1,488,974
11	658,824	1,488,804
12	660,442	1,488,039
13	661,175	1,487,693
14	662,490	1,487,077
15	662,908	1,486,879
16	660,640	1,486,560

LEGEND

- NON DREDGING AREA
- LIMITS OF DREDGING
- CORE BORING
- CONTROL POINT LABEL
- MAGNETIC ANOMALY



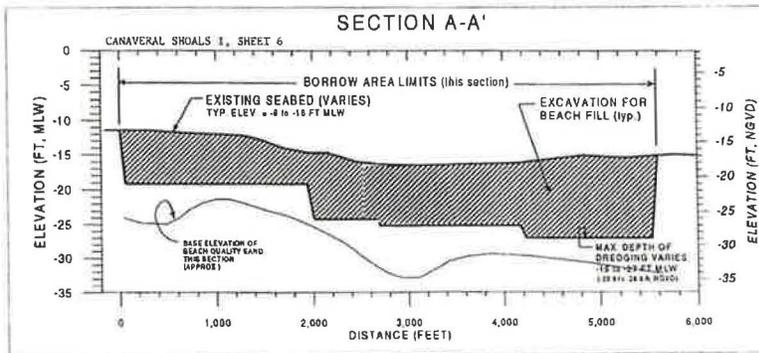
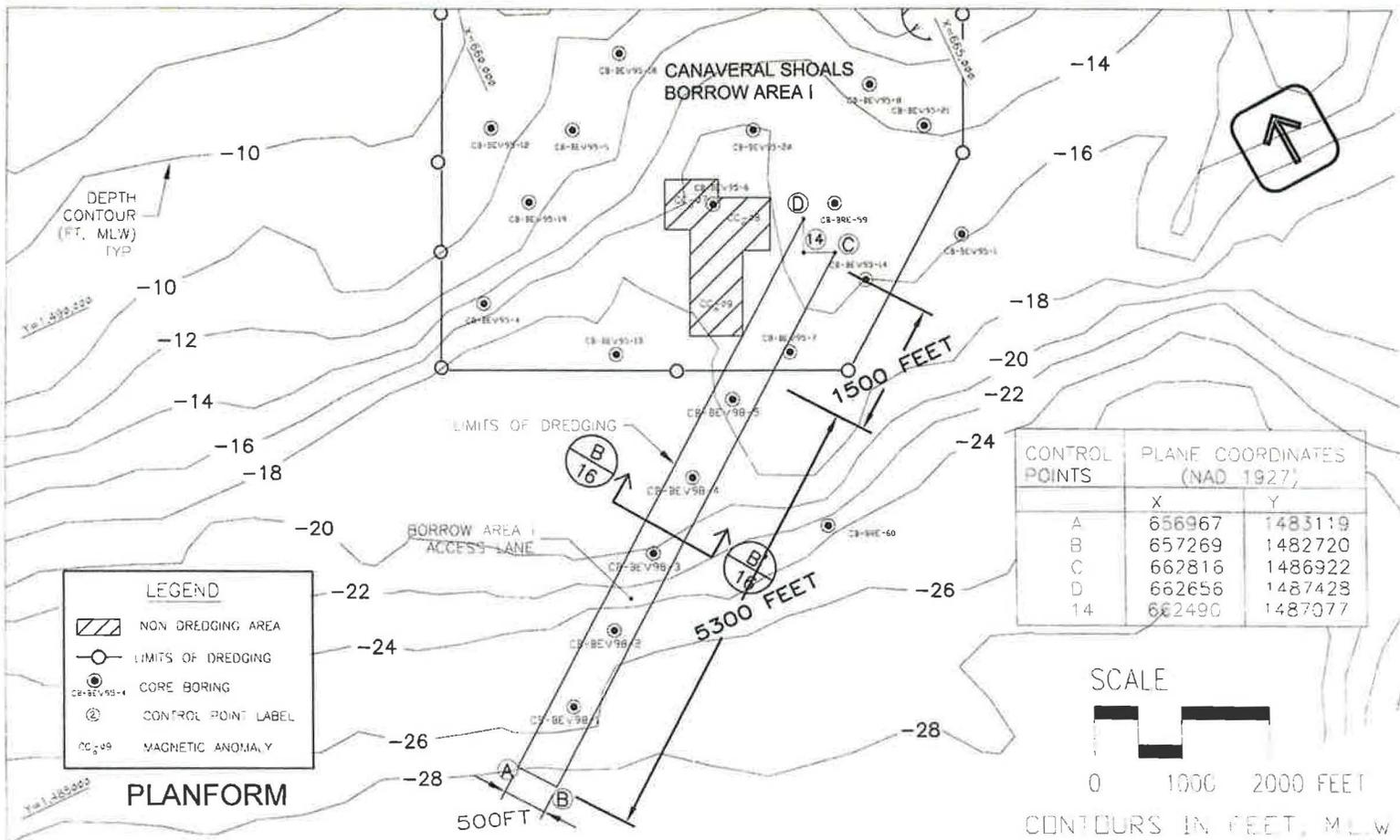
olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

*KRR/BJD
2/2/09*

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
CANAVERAL SHOALS I
BORROW AREA

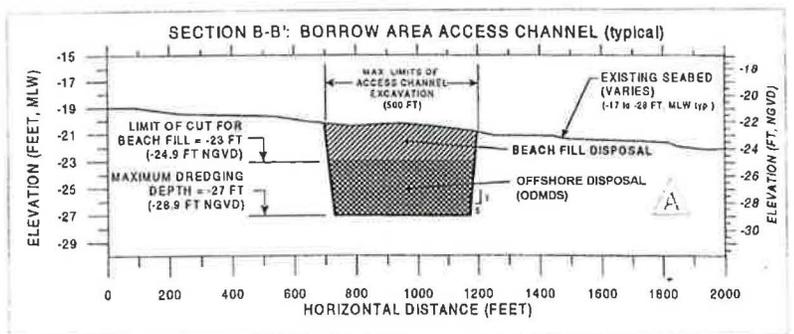
DATE:	REVISION:	DATE:
		01/15/09
		DRAWN BY:
		ML
		SHEET
		15 OF 19

PERMIT DRAWINGS. NOT FOR CONSTRUCTION.

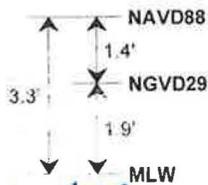


TYPICAL BORROW AREA SECTION A-A'

TYPICAL BORROW AREA ACCESS CHANNEL SECTION B-B



PERMIT DRAWINGS. NOT FOR CONSTRUCTION.



olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

K R Brody
4/2/2010

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
CANAVERAL SHOALS
BORROW AREA I SECTIONS

DATE: 4/1/10	REVISION: NOA reference changed	DATE: 01/15/09
DRAWN BY: ML		SHEET 16 of 19

PERMIT # 294526001

PERMIT DRAWINGS. NOT FOR CONSTRUCTION.

Staging area coordinates.

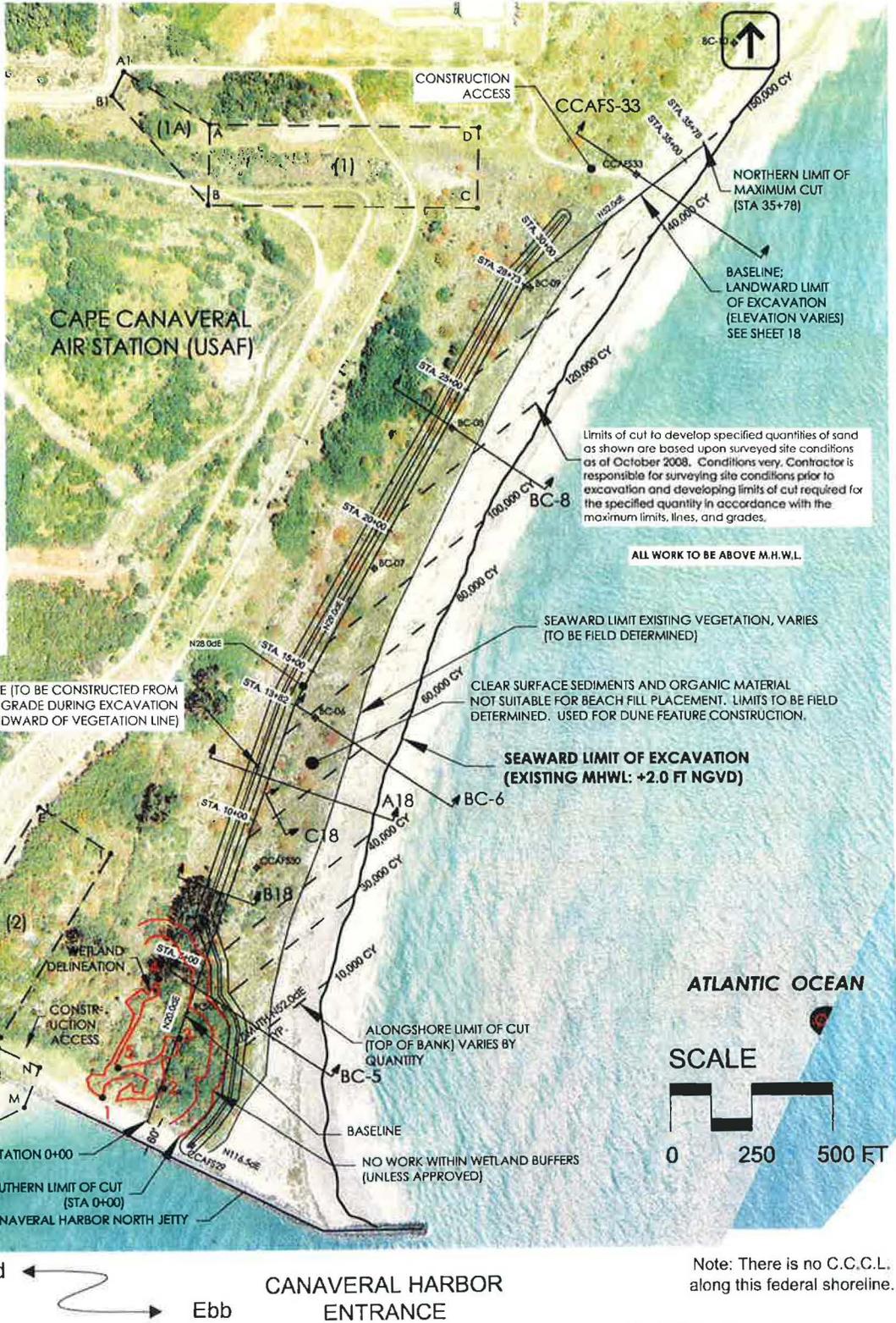
Areas 1 & 1A		
Point	Easting (FT-NAD83)	Northing (FT-NAD83)
A	789,687.4	1,485,865.6
B	789,682.4	1,485,616.9
C	790,514.9	1,485,606.9
D	790,519.9	1,485,855.6
A1	789,420.7	1,486,029.6
B1	789,384.0	1,485,954.2

Area 2		
Point	Easting (FT-NAD83)	Northing (FT-NAD83)
E	789,147.5	1,483,749.3
F	788,749.0	1,483,115.3
G	788,868.2	1,483,018.3
H	789,017.9	1,483,034.3
I	789,364.9	1,483,604.3

Area 3		
Point	Easting (FT-NAD83)	Northing (FT-NAD83)
J	788,731.6	1,483,097.7
K	788,521.5	1,482,752.6
L	788,532.1	1,482,537.8
M	789,089.2	1,482,815.0
N	789,137.9	1,482,940.6
O	789,011.5	1,483,000.4
P	788,893.5	1,482,991.9

Wetland Delineation		
Point	Easting (FT-NAD83)	Northing (FT-NAD83)
1	789,329.6	1,482,844.4
2	789,519.6	1,482,872.1
3	789,568.9	1,483,028.2
4	789,378.8	1,482,937.5
5	789,508.5	1,483,216.7

*Principal Limits



DUNE (TO BE CONSTRUCTED FROM SURFACE GRADE DURING EXCAVATION LANDWARD OF VEGETATION LINE)

CLEAR SURFACE SEDIMENTS AND ORGANIC MATERIAL NOT SUITABLE FOR BEACH FILL PLACEMENT. LIMITS TO BE FIELD DETERMINED. USED FOR DUNE FEATURE CONSTRUCTION.

SEAWARD LIMIT OF EXCAVATION (EXISTING MHWL: +2.0 FT NGVD)

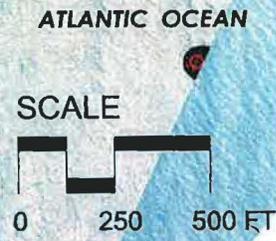


Photo Date: 04-16-2008



Note: There is no C.C.C.L. along this federal shoreline.



olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL, 32210
(904) 387-6114
COA No. 3491

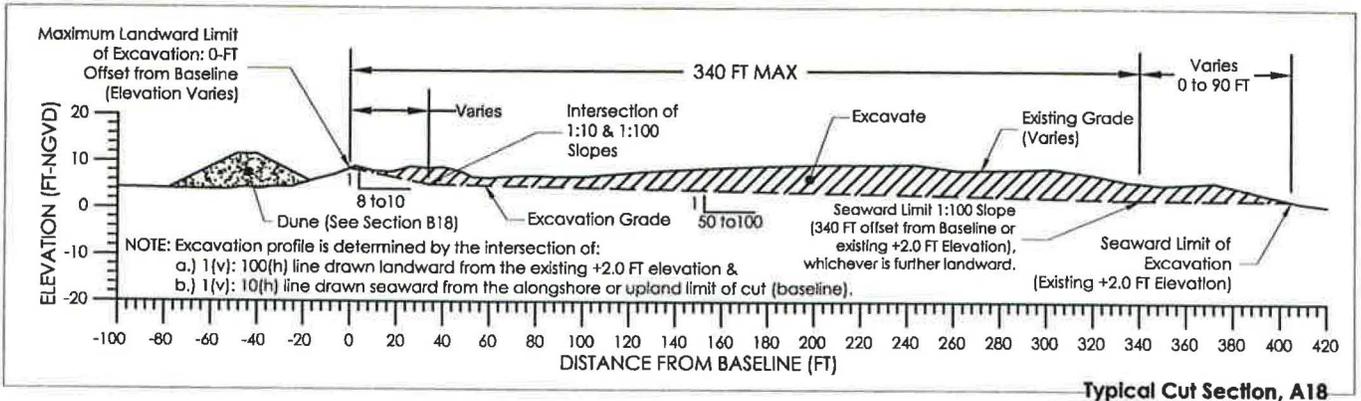
PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
CCAS UPLAND BORROW
AREA (PLAN)

Handwritten signature and date: 2/8/2011

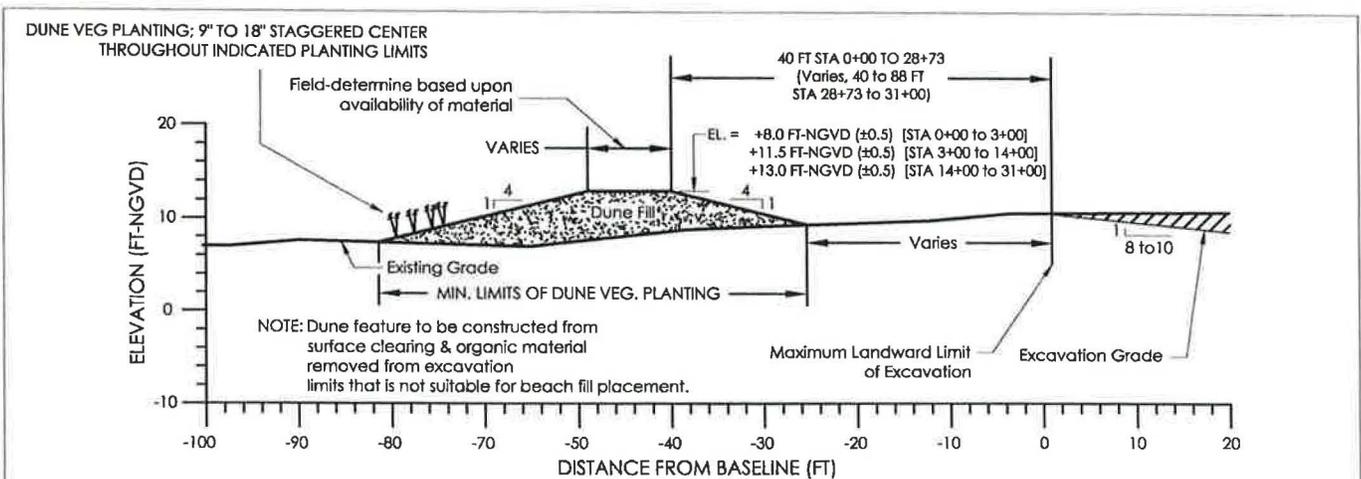
DATE: 02/08/2011	REVISION: Wetlands Buffer Added	DATE: 01/15/09
		DRAWN BY: ML
		SHEET 17 OF 19

PERMIT # 294526001

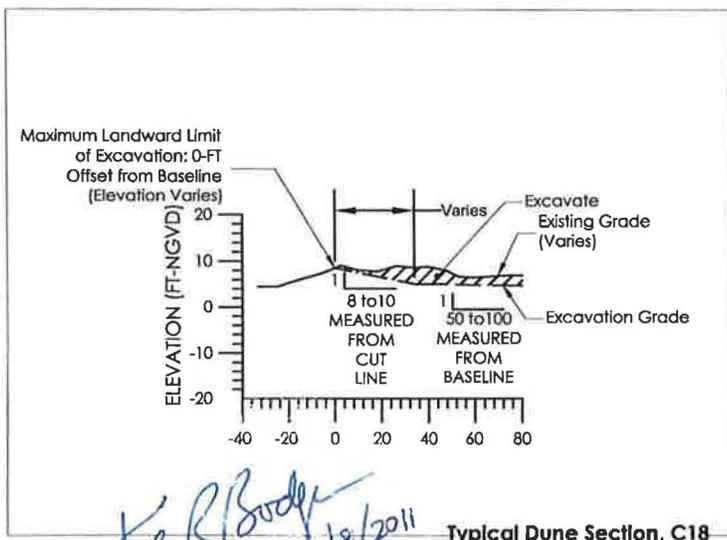
Z:\Projects\Brevard\PAF-B-Permitting_2008\Permit Drawings\PAF-B-Permitting_Sheets-17-updated_2011-02-08.dwg



Typical Cut Section, A18



Typical Dune Section, B18



Typical Dune Section, C18

CCAS Upland Borrow Area
Baseline coordinates.

Baseline Station	Easting (FT-NAD83)	Northing (FT-NAD83)	Grid Azimuth (Deg-Min)
0+00.0	789,467.6	1,482,765.8	N20.0dE
5+00.0	789,638.6	1,483,235.6	N20.0dE
10+00.0	789,809.6	1,483,705.5	N20.0dE
13+82.0	789,940.3	1,484,064.4	N28.0dE
15+00.0	789,995.6	1,484,168.6	N29.0dE
20+00.0	790,238.1	1,484,605.9	N29.0dE
25+00.0	790,480.5	1,485,043.2	N29.0dE
28+73.0	790,661.3	1,485,369.5	N52.0dE
30+00.0	790,761.4	1,485,447.7	N52.0dE
35+00.0	791,155.4	1,485,755.5	N52.0dE
35+78.0	791,216.8	1,485,803.5	N52.0dE

PERMIT # 294526001

Z:\Projects\Brevard\A18-Permitting_2009\Permit_Design\Sheet-B18-updated 02-08-11.dwg

K.R. Bodey
2/18/2011



olsen
associates, inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114
COA No. 3491

PATRICK AIR FORCE BASE
SHORE PROTECTION PROJECT
BREVARD COUNTY, FL
CCAS UPLAND BORROW AREA
TYPICAL SECTIONS

DATE: 4/17/09	REVISION: DUNE VEG. PLANTING DETAIL Wetlands Buffer Added	DATE: 01/15/09
02/08/2011		DRAWN BY: ML
		SHEET 18 OF 19

**Patrick Air Force Base Shore Protection Project
Brevard County, FL
Beach Fill Sediment QA/QC Plan**



Project Description

The project will place up to 310,000 cubic yards of beach-compatible sand fill along the northern 3.1 miles of the Patrick Air Force Base ocean shoreline, in Brevard County, Florida, between FDEP reference monument locations R53 and R70. The project area is located approximately 10 miles south of the Canaveral Harbor Entrance, immediately south of and adjoining the Brevard County Shore Protection Project (North Reach) and one mile north of the Brevard County Mid Reach shoreline.

The project shoreline is described in two reaches. Reach 1 includes the northern 2.1 miles (approximately) between R53 and R65. Reach 2 includes the southern one mile (approximately) between R65 and R70.

Placement of fill along Reach 1 will be by either hydraulic dredge or by truck-haul. Placement of fill along Reach 2 will be only by truck-haul. The sand sources for this project will include the offshore borrow areas of Canaveral Shoals I (CS-I) and/or Canaveral Shoals II (CS-II), and/or an upland source at the Cape Canaveral Air Station (CCAFS). The CS-I and CS-II borrow areas are located in State and Federal waters, respectively, approximately 2 and 5 miles southeast of Cape Canaveral. The CCAFS upland borrow area is located along the existing beach immediately north of the Canaveral Harbor Entrance, within 3600-ft of the north jetty, and within up to about 500-ft landward of the existing mean high water shoreline. Of these borrow areas, the source and ultimate volume of the beach fill material (anticipated to be up to 310,000 cy) will be determined as a function of beach conditions and renourishment requirements prior to actual construction.

Construction of the project using the CCAFS upland borrow area will employ direct truck-haul placement of the fill material along the entire limits of work. Construction of the project using an offshore borrow area will employ a hydraulic (hopper) dredge to place all of the sand along Reach 1, including construction of a temporary stockpile of sand upon the beach berm along the southern 4000 feet of Reach 1. The stockpiled sand will be then transferred and placed along Reach 2 via truck-haul.

Background – Sediment Borrow Sources.

The offshore borrow sites for this project have been previously permitted and utilized for beach nourishment along the Patrick Air Force Base and adjacent shorelines, including the Brevard County Shore Protection Project (North Reach, South Reach, and Mid Reach). Both borrow areas were previously investigated and developed through evaluation of Vibracore and sediment grain size data. The CS-II borrow area has been previously utilized on at least five occasions, from 2000 through 2005, for initial construction and subsequent renourishment of the Patrick AFB project area, as well as the North Reach and South Reach of the Brevard County Shore Protection Project. Material from this borrow area has proven to be consistent in quality and beach compatibility, as demonstrated by previous physical and environmental monitoring since 2001. The material dredged from the borrow area conformed very closely to that indicated by the original Vibracore and geotechnical data.

The median grain size of the CS-II borrow area ranges from about 0.3 to 0.4 mm (about 0.34 mm on composite-average). The mean grain size typically ranges from about 0.4 to 0.45 mm (three-point mean), but may locally vary between about 0.3 and 0.55 mm. Fine sediment content is low, typically less than 2% finer than the #200 and #230 sieves. As of the most recent survey in June 2008, there are approximately 22.9 million cubic yards of sand available within the permitted limits of the CS-II borrow area.

The median grain size of the CS-I borrow area ranges from about 0.18 to 0.3 mm (about 0.27 mm on composite-average). The mean grain size is about 0.33 mm (three-point average). Fine sediment content is variable but typically less than 3% to 5% finer than the #200 and #230 sieves. There are at least 16 million cubic yards of sand available within the permitted limits of the CS-I borrow area.

The CCAFS upland borrow source consists of littoral material impounded against the north jetty of the Canaveral Harbor Entrance by the inlet structure's interruption of the net southerly littoral drift. The borrow area is located immediately *landward* of the existing mean high water shoreline along the upper beach, and excavation will be above the mean high water elevation. (The Canaveral Harbor sand bypass borrow area is immediately east and adjacent to the CCAFS upland borrow area, *seaward* of the existing mean high water shoreline, for which all excavation is below the mean high water elevation.) The sediment within the CCAFS upland borrow area originates from the Brevard County native beach; and, in the absence of the inlet, would be otherwise transported southward as natural littoral drift to the Patrick AFB shoreline. As such, it is expected that the material is altogether compatible with the beach sediment along PAFB.

The median grain size of the CCAFS upland borrow material ranges from about 0.2 to 0.6 mm (about 0.4 mm on composite-average). The mean grain size is about 0.46 mm, with 0.44 mm standard deviation, on composite-average, as computed by method of

moments. (Equivalent folk statistic values are about 0.53 mm mean and 0.41 mm standard deviation.) The mean grain sizes among individual samples varies between about 0.18 and 0.7 mm. Fine sediment content is typically less than 1% measured at the #200 or #230 sieves. The color of the sediment is between approximately 10YR 7/1 and 7.5 YR 7/1 (dry). Measured carbonate content varies from 37% to 68% with average of about 51%. Based upon a survey in October-November, 2008, there are about 150,000 cubic yards of sediment within the specified limits of the borrow area.

Specifications, operations and monitoring required for the project, as outlined below, are in accordance with State of Florida requirements and reflect prior investigations and experience associated with the native beach sediment, offshore and upland borrow areas, and material previously placed to the beach from the borrow areas.

Native Beach Characteristics

The native beach material of the Patrick AFB project area is a fine to medium grain sand with variable carbonate and coarse shell content:

- The median grain size of the native beach ranges between 0.15 and 0.35 mm (sub-tidal to berm, respectively); with a typical composite-profile median grain size of about 0.18 to 0.2 mm, more or less.
- The median grain size of the native beach berm is about 0.35 mm. Grain size and coarse shell content varies significantly along the beach, with some areas of the berm frequently dominated by all sand or all shell lag.
- The existing beach sediment is dominated by beach nourishment material that was previously placed from the CS-II offshore borrow area. The granulometric properties of the CS-II material are similar to the native beach berm sediment, and coarser than the native beach composite sediment. The median grain size of the existing beach berm sediment is about 0.35 mm, more or less.
- Samples of the native beach sediment and existing berm sediment exhibit carbonate fractions ranging from about 25% to 54%, with a typical (average) value on the order of about 40%.
- The native sand color varies with shell content, but generally ranges from about 10YR 6.5/1 to 7.5/1 (wet), and from about 10YR 7/1 to 8/1 (dry). This ranges from medium to light gray (wet), or light to very light gray (dry).

Beach Fill Sediment Specifications

1. Beach fill material shall be beach compatible and meet the specifications required by Florida Administrative Codes 62B-41.007 (j), 62B-33.002 (8) and 62B-33.0015. In addition the fill shall meet the following requirements.
2. Beach fill material shall be clean sand/ from a permitted source, free of construction debris, asphalt, gravel, rocks, clay balls, branches, leaves and other organics, oil, pollutants and any other non-beach-compatible materials. The sand shall be similar to the existing beach sediments in color and texture.
3. The grain size of the fill material shall conform to the following, by weight measure (all sieve sizes refer to U.S. Std. sieves):
 - (a) not more than 5% finer than the No. 230 sieve
 - (b) not more than 5% coarser than the No. 4 sieve, and
 - (c) not more than 0.5% coarser than 3/4-inch sieve.
4. The mean grain size shall be between 0.2 and 0.45 mm.
5. Maximum carbonate content shall be 51%.
6. Sand color, based upon the Munsell Scale and when graded on the 7.5YR or 10YR Hues, shall have a Value of at least 6.0 or higher and a Chroma of 2.0 or less in moist sample conditions.
7. Sand fill shall be free of components prone to cause cementation, as determined by the 45th Space Wing. The potential for cementation shall consider the cohesion of a 5- to 10-ounce sample of material after being saturated-wet, manually compressed and oven-dried. Sand from the CS-I, CS-II, and CCAFS upland borrow areas are not anticipated to be prone to cementation.

Sediment Parameter	Compliance Value
Maximum Allowable Silt Content	< 5% (wt. passing #230 sieve)
Carbonate content	≤51%
Large whole shell & lag content	<0.5% (wt. retained on 3/4" sieve)
Allowable shell content	<5% (wt. retained on #4 sieve)
Munsell color (moist)	≥ 6.0 Value
7.5 YR or 10 YR Hue	≤ 2.0 Chroma
Allowable mean grain size	0.2 to 0.45 mm

8. The compliance values described above refer to the average values assessed over 10,000 square feet area of the placed fill material. Owing to the natural variability of the fill material, it is recognized that individual samples may deviate from the specified compliance values.

Dredge Location and Excavation Control

If hydraulic dredging and placement of beach fill is employed, the project contract documents shall require the following in regard to tracking and controlling dredge and disposal locations.

- 1) Electronic Positioning and Dredge Depth Monitoring Equipment. The Contractor shall continuously operate electronic positioning equipment approved by the Engineer to monitor the cutterhead or draghead (“intake”) locations and depths. A Differential Global Positioning System (DGPS) or equivalent shall be used to determine the horizontal position of the intake(s) and shall be interfaced with an appropriate depth measuring device to determine the intake depth(s). The horizontal positioning equipment shall maintain an accuracy of ± 3 feet. Corrections between the location of the master antenna on the dredge and the intake(s), if any, shall be reported on the Daily Reports.
- 2) Tide correction. The intake positioning devices shall maintain a vertical accuracy of ± 0.5 feet with continuous applicable tidal corrections measured proximate to the project site. The Contractor shall install and maintain a properly-functioning radio-transmitting tide gage in the project area and shall verify daily that the tide corrections are properly applied to the vertical position of the intake(s) on a continuous basis. Alternatively, the Contractor may apply continuously-correcting GPS elevation data to the vertical position of the intake(s).
- 3) Dredge Location Control. The Contractor shall certify on each Daily Report that all dredging has been performed within the permitted horizontal and vertical limits of the borrow area. The Contractor is required to operate the electronic positioning equipment continuously, record and plot the position of the dredge intakes while dredging. Such fixes, and the accompanying plots, shall be furnished to the Engineer upon request as an attachment to the Daily Reports. Plots shall include the State Plane Coordinate grid system and the borrow area limits, with format subject to approval by the Engineer. A printout of the intake positions and depths, corrected horizontally and for tide elevation, in State Plane coordinates and NAVD88 datum, with annotated time, shall be developed using an interval of 3 minutes or less. A digital ASCII file of the position data shall be provided to the Engineer upon request.

If either hydraulic dredging and/or truck-haul excavation and placement of beach fill is employed, the project contract documents shall require the following in regard to tracking and controlling excavation locations:

- 4) Excavation Limits. No dredging or excavation shall take place outside of the borrow area limits (horizontal and vertical) as shown on the permit drawings. The Contractor shall be responsible for establishing such controls as may be necessary to ensure that excavation in the borrow area shall not extend below the allowable depths or beyond the spatial limits indicated in the project permits and drawings. The Contractor shall establish and maintain visual marks and stakes that indicate the horizontal and vertical limits of the specified borrow area.

If truck-haul excavation from the CCAFS upland borrow site is employed, the following measures shall be required:

- 5) Dune reconstruction at CCAFS upland borrow site shall utilize beach-compatible material sediment excavated from the permitted horizontal and vertical limits of the borrow site as defined above. The Contractor shall screen and segregate non-conforming material, including branches, root-balls, debris and other non-compatible material from the sediment prior to incorporation to the dune feature. Minor naturally occurring vegetation and seaweed that is subject to normal organic decay, and comprising a minority fraction (<20%) of the dune reconstruction material at any given compliance location (10,000 sq.ft) may be permitted subject to the approval of the Engineer. Non-conforming material shall be removed from the work area and disposed to an approved upland area.

Project Monitoring and Quality Assurance

1. The project contract documents shall require the following:
 - a. For hydraulic dredge activities, the Contractor shall monitor the nature of the material filled to the hopper dredge and shall continuously monitor the sediment discharged to the fill area. If rock, clay, or excessive turbidity/shell content/dark-colored material is encountered in the borrow area, the Contractor shall raise the intake(s) and *the location of the dredging shall be immediately changed* by the Contractor. The location of undesirable material shall be noted, reported on the daily report, and avoided unless otherwise directed by the Engineer. Should undesirable sediments continue to be encountered, the Contractor shall cease excavation, move the dredge to another location within the permitted borrow area, and the Engineer shall be notified immediately.
 - b. A hopper-barge load with material judged to be non-beach compatible material shall be replaced to the borrow area at the area from which it was removed, and subsequently avoided; or, shall be replaced to the borrow area at an area that will be unaffected by future dredging; or, shall be placed to the existing ODMDS site subject to federal requirements for disposal to that site.
 - c. For truck-haul transport of borrow material from an upland source to the beach fill site, the contents of each sand delivery truck will be inspected upon arrival to the beach access site. Sand quality will be visually compared to FDEP approved benchmark samples before the sand is dumped. Sand shall be more closely inspected as the material is dumped. During visual inspection of the material upon arrival at the beach access site, if the quality of the material is uncertain, a physical sample will be taken with the option of quantitative analysis (sieving, color, etc). If in doubt the material will be loaded back into the truck and returned to the borrow source. Truck-haul transfer of material from the on-beach temporary sand stockpile area for placement to the adjacent beach, after the Engineer's approval of the in-place stockpile material, will not require inspection of each truckload.

d. Rock, clay balls or excessive shell deposited on the beach shall be removed from the site of the work and disposed of in permitted areas at the expense of the Contractor. A sample of the undesirable sediment shall be collected and retained for the Engineer prior to disposal. The sample shall mark station number, time, and day of occurrence. Burial of non-conforming fill within the existing beach or beach fill is not permitted.

2. During -construction sediment sampling will consist of the following:

Hydraulic beach fill – A 300-500 g physical sample from each hopper dredge load shall be collected, labeled with time/date/location, examined promptly for approval by the site inspector designated by the County, and archived for subsequent examination and/or analysis as warranted. For any placed material that visually appears to differ in texture, color or content from the specifications herein, and which is placed to the beach and not rejected prior to placement, samples shall be promptly analyzed for compliance. Samples will be processed to determine grain size distribution between U.S. Standard Sieve sizes 4 (4.76 mm) and 230 (0.625 mm) at half-phi intervals in addition to the weight fraction retained on the 3/4" sieve and categorized as PASS or FAIL with regard to the sand specification. Should non-compliant material be detected after placement, additional testing will be conducted to determine its extent, and all non-compliant fill will be removed and subsequently replaced with compliant fill.

3. The Engineer will seek to enforce the relevant Terms and Conditions of both the contract and FDEP permits related to sediment quality and quantity. In order to do so, the following steps will be followed:

- a. Construction observation by the 45th Space Wing and/or Engineer representative (site inspector) will be performed at the beach fill placement area during hydraulic dredging operations. Most inspections will be made during daylight hours; however, random night-time observations will also be made.
- b. The site inspector(s) shall have prior training or experience in beach nourishment and construction inspection and testing and shall be knowledgeable of the project design, permit conditions, and requirements for acceptable sediment quality.
- c. The site inspector(s) shall retain a physical sample ("standard") of the sediment that is expected to be placed upon the beach. The inspector shall notify the Contractor, 45th Space Wing and/or Engineer immediately if the material placed to the beach substantially deviates from that of the standard sample.
- d. The Contractor shall prepare and provide, for approval, a Quality Control Plan to be implemented by the Contractor that addresses, in part, requirements for sediment quality assurance. The Plan and its implementation shall be discussed as a matter of importance at the pre-construction meeting.
- e. The Contractor shall provide, and the Engineer shall review, daily reports which characterize the nature of the sediments encountered at the borrow area and

ultimately placed along the project shoreline. The occurrence of excessive shell hash, large shell, very fine or dark sediments, shall be estimated on a daily basis. Every occurrence of rock or clay balls must be catalogued by the shore crew and reported on the daily report.

- f. The Project Engineer, and his duly authorized representative, shall be continuously on call during the period of construction for purposes of making decisions regarding issues which involve QC Plan compliance.
- g. A project coastal engineer shall personally observe fill placement operations weekly. Communications will take place between the Engineer and his/her onsite inspector daily.
- h. To assure that the fill material placed on the beach is in compliance with 62B-41.007(2) (j) FAC, the Project Engineer or his duly authorized representative, on behalf of the 45th Space Wing, shall conduct assessments of the beach fill material as follows:

(1) If at any time during construction, non-compatible materials are encountered, the actions outlined in the Contingency Plan of the Quality Control Plan (Par. 1, above) shall be enacted. The Contractor is responsible for continuously monitoring the quality of the sediments and taking the appropriate remedial actions as required.

(2) Should rocks or excessive amounts of large shell or other non-beach compatible material be identified in excess of 50% of background in any 10,000 square ft area, then the non-compatible material shall be removed from the beach fill or remediated to the satisfaction of the 45th Space Wing at the Contractor's expense. This assessment shall take into account the potential occurrence of non-compatible materials below the surface. Additional acceptable fill shall be placed, as required, to meet but not exceed the construction template requirements.

(3) Post-construction sediment sampling shall be conducted by the Project Engineer or his/her duly authorized representative following the completion of each Acceptance Section. Sampling shall consist of two sand samples that are representative of the placed fill material at approximately 1000-ft spacing along the project fill area. Samples shall be taken at approximately 1 ft below the surface of the dry construction berm. At each 1000-ft station, one sample shall be collected from near the landward toe of the dune and one sample shall be midway across the berm. Sample analyses will include grain size distribution (including fines content) and color grading. Up to one-third of the samples, randomly selected, will additionally be analyzed for carbonate fraction.

(4) A summary report of the sediment sample data shall be prepared by the 45th Space Wing or Project Engineer and submitted to FDEP within 60 days after sample collection. The summary report shall also indicate the volume,

areal extent and location of any unacceptable beach areas, and remediated areas or areas determined to be subject to remediation.

- i. Methods of remediation in the event of non-beach-compatible material placed to beach are subject to approval by the 45th Space Wing, Engineer and FDEP. Remediation may include, but not limited to,
 - 1) Excavating the non-beach compatible material and mixing it with compatible material to achieve a sand mixture that acceptably complies with the project sand requirements,
 - 2) Excavating the non-beach compatible material, transporting the material to a permitted upland location, and replacing the material with sand that complies with the project sand requirements,
 - 3) Screening the non-beach compatible material from the fill, on-site, and removing the non-compatible material for placement to a permitted upland location.
- j. Any addendum or change order to the Contract between Owner and Contractor shall determine whether or not the change in scope will potentially affect the Sediment QA/QC Plan.



PHYSICAL MONITORING PLAN

Patrick Air Force Base Shore Protection Project

Brevard County, Florida

Permit No: 0294526-001-JC

Permittee: Patrick Air Force Base

June 1, 2009



Project Description

The project entails placement of up to 310,000 cubic yards of beach-compatible sand along the northern 3 miles (approximately) of the PAFB shoreline, between FDEP reference monuments R53 and R70. Placement of fill along the southern mile (R65-R70) shall be by truck-haul. Sources of the beach fill material shall include hydraulically dredged sand from the Canaveral Shoals I and/or II offshore borrow areas (in State and Federal waters, respectively) and/or truck-haul sand from an upland source on federal lands at the Cape Canaveral Air Force Station (CCAFS) above the mean high water shoreline within 3600-ft immediately north of the Canaveral Harbor Entrance north jetty, between survey monuments CCAFS29 and BC10. The source and ultimate volume of the beach fill material (anticipated to be up to 310,000 cy) will be determined as a function of beach conditions prior to actual construction.

Per prior permitting and construction, beach fill placement is described along two reaches of the project area:

- Reach 1 (R53-R65, “main” fill area), and
- Reach 2 (R65-R70, “thin” fill area).

Beach fill placement along Reach 2 shall be solely by mechanical (truck-haul) means and the sand shall be (1) directly from upland sources, and/or (2) from a temporary stockpile of offshore sand placed at the south end of Reach 1 between monuments R61 and R65. Beach fill in Reach 1 shall be placed *either* by truck-haul *or* by hydraulic dredge. Use of a hydraulic dredge would imply construction of the temporary sand stockpile in Reach 1 for subsequent truck-haul transfer to the beach along Reach 2, within the same season as it was constructed (i.e., prior to the beginning of the main marine turtle nesting season on May 1). Construction by truck-haul only, without a dredge, would not include construction of the temporary sand stockpile upon the beach; instead, sand would be placed from the upland sand sources to the beach fill areas.

The project fill template along Reach 1 consists of dune reconstruction, as required, at elevation +12.6 to +15 ft NAVD (to match existing) with an upper seaward sloping face of approximately 1(v):1.5(h) above +12.5 ft NAVD and lower sloping face of approximately 1(v):4(h), and a berm at elevation +10 ft NAVD slightly sloping seaward at 1(v):50(h) to elevation +9 ft NAVD at the seaward edge of the berm, thence sloping seaward at 1(v):8(h) to the mean high water level at elevation +0.6 ft NAVD,

thence sloping seaward at 1(v):18(h) below mean high water to the intersection with the existing seabed. The project fill template along Reach 2, R65-R70, is the same as Reach 1 except that the seaward slope shall be uniformly 1(v):8(h) both above and below the mean high water elevation, as per prior permits and construction. The maximum seaward extent (dimension) of the dune and berm are specified at each FDEP reference monument in the permit drawings. The temporary sand stockpile, between R-61 and R-65 shall be constructed at elevation up to +15.2 ft NAVD, with a 1(v):2(h) seaward slope intersecting the beach fill berm slope at elevation +5.6 ft NAVD or above.

The project has been previously constructed twice: initial construction in December 2000-April 2001 and renourished (after hurricane impacts) in February-March, 2005. A firm schedule for the next project construction has not yet been determined, but is anticipated to be between January 2010 and May 2011. Construction activity is limited by permits to November 1 through April 30 in any given year.

Predicted Performance (Design Life)

The project's beach fill design life is nominally 5- to 6-years predicated upon previously measured, average-annual project erosion rates of about 52,000 cy/yr, more or less, since initial construction in 2000-01. The 6-year project life is likewise consistent with that of the existing, adjacent shore protection and sand bypass projects in Brevard County. The rate of volumetric recovery along the upland borrow area at CCAFS, if utilized, is not certain because it is located above the high water line. The sediment in this borrow area is comprised of sand that accumulated since the construction of the Canaveral Harbor Entrance in the early 1950's. The overall rate of accretion along the upland borrow area shoreline, within the greater range of the Canaveral Harbor Federal Sand Bypass Project (for which the borrow area is located seaward of the mean high water line) has been about 173,400 cy/yr on annual average; but this rate is expected to increase to over 200,000 cy/yr on long-term average since improvements to the inlet's north jetty were completed in 2005.

Physical Monitoring Plan

A. Beach Profile and Borrow Area Surveys

1. Scope

- a) Beach profile surveys shall be made at existing FDEP Reference monuments R53 through R77. Surveys shall extend from the monument to at least 3600-ft offshore of the monument or -30 ft NGVD29 depth (-31.4 ft NAVD88). All surveys shall utilize the azimuths previously surveyed by FDEP and survey methods shall comply with the latest BBCS standards. The survey effort will be

combined with those of the adjacent project areas (Brevard County North Reach and Mid Reach) as applicable and/or practicable.

- b) The wading portion of all beach profiles shall extend from upland of the dune to at least -6 ft NGVD (-7.4 ft NAVD88) or deeper and shall identify the presence and limits of *sand seabed* versus *exposed rock* substrate (as described below).
- c) Bathymetric surveys of the offshore borrow area(s) dredged for the work shall be conducted at 250-ft maximum line spacing and shall extend a minimum of 250-ft beyond the borrow area limits.
- d) Surveys of the upland borrow area at CCAFS, if utilized, shall be made at approximately 500-ft alongshore spacing at existing monuments CCAFS29 through BC-10; or not less than 2000-ft north of the borrow activity. The profiles shall extend from upland of the dune (existing or reconstructed) to at least -6 ft NGVD (-7.4 ft NAVD88) or deeper.
- e) Engineering analysis and a report shall be prepared pursuant to the post-construction survey and each subsequent survey, per Item C below. Reports shall document, at minimum, (1) the measured changes in volumes and shoreline locations along the beach fill monitoring area, and (2) measured changes in seabed elevation and volumes across the borrow area, relative to the prior monitoring survey(s).

2. Schedule

- a) Surveys of the beach profile shall be conducted at pre- and post-construction, and at 1, 2, 3, and 5 years after initial project construction if there is substantial sand fill from the project within the profile. Additional surveys may be conducted pursuant to severe storm events, as deemed necessary after consultation with FDEP.
- b) Hydrographic surveys of the offshore borrow area(s) utilized for construction shall be conducted pre-construction, post-construction, and at year-3 post-construction.
- c) Pre- and post-construction surveys shall be measured within 60-days prior to and 90-days after construction; respectively. Annual beach profile and borrow area surveys shall be typically measured in the months of May through July.

B. Nearshore Rock Monitoring

1. Existing Nearshore Rock Reef (Physical Monitoring)

Physical monitoring of the existing (natural) rock reef will consist of the following elements.

- a) Wading Transects. The extent of exposed rock and profile fluctuations shall be identified, relative to pre-project conditions, along the project area and adjacent 1-mile shoreline, from monuments R-53 through R-77.

- b) Analysis. For each survey, the occurrence of exposed rock shall be graphically contrasted with all prior surveyed occurrences of exposed rock at that transect location. Additionally, the seabed profile (elevations) shall be graphically contrasted with the pre-project mean and standard deviation of the beach profile at that transect location. Further, the mean beach profile will be computed (updated) through each subsequent, *post-construction* survey. This result will be contrasted to the mean, *pre-project* profile. For purposes of this evaluation, “pre-project” refers to the baseline conditions surveyed prior to the 2005 renourishment from R70-R77, and to baseline conditions surveyed prior to the next construction event north of R70.

This measurement and analysis protocol, described above, conforms to that which has been conducted annually since 2005 to monitor the potential impact of beach fill placement along Patrick AFB upon adjacent nearshore rock; viz., from R70-R77. This monitoring program was prepared to meet requirements prescribed by the National Marine Fisheries Service (NMFS) to the U. S. Air Force (45th Space Wing) in regard to the project’s potential impacts upon Essential Fish Habitat, as stipulated in and conducted since January 2005.

Notwithstanding the above-described monitoring analyses, the evaluation of changes in nearshore hardbottom exposure shall be additionally assessed by comparison of the total aggregate length of exposed hardbottom along the beach survey lines (described above) between pre- and post-construction conditions.

- c) Controlled Color Aerial Photography will be collected along the project area shoreline (R53-R70), and extending to at least 1-mile along the adjacent south shoreline (approx. R70 through R77), as practicable, in conditions conducive to imaging of the nearshore rock resource. As noted, the timing and frequency of the aerial photography is dependent upon the occurrence of favorable conditions. These conditions include low tide, calm surf, clear water, clear skies and proper sun angle. The confluence of these factors, along with the ability to accurately identify favorable conditions in order to mobilize the aerial photographer, may occur less than annually and at variable times of the year.

2. Schedule.

Surveys shall be conducted in accordance with the schedule for Beach Profile and Borrow Area Surveys, described above. Photography shall be conducted as conditions allow.

All survey activities and deliverables shall be conducted in accordance with the latest update of the *BBCS Monitoring Standards for Beach Erosion Control Projects, Section 01000 – Beach Profile Topographic Surveying; Section 01100 – Offshore Profile Topographic Surveying; Section 01200 (Borrow Site, Shoal and Other Bathymetric Surveying); Section 02000 – Aerial Photography; and Section 02100 – Environmental Aerial Photography Acquisition.*

C. Engineering Analysis and Report

All survey and aerial photography data, and an engineering report, shall be submitted to BBCS within 90 days following the completion of the post-construction and each annual or biennial monitoring survey.

The report shall summarize and discuss the data, the performance of the beach fill project, and identify erosion and accretion patterns within the monitored area. In addition, the report shall include a comparative review of project performance to performance expectations and identification of adverse impacts attributable to the project. The report will specifically include analysis and discussion of the borrow activity's impact to the existing dune and shore along the upland borrow area, as appropriate.

Appendices shall include plots of survey profiles and graphical representations of volumetric and shoreline position changes for the monitoring area. Results shall be analyzed for patterns, trends, or changes between annual surveys and cumulatively since project construction, including additional reference to data and results measured since the initial construction of the existing project in 2000-01.

Coordination and Reporting. Surveys and other data acquisition and reports shall be coordinated with concurrent monitoring requirements for FDEP-permitted projects within and adjacent to the Patrick AFB beach fill project area (and CCAFS upland sand borrow area, if applicable). These projects include the Canaveral Harbor Sand Bypass Project and Brevard County Shore Protection Project (North Reach and Mid Reach).

Monitoring reports and data shall be submitted to the Bureau of Beaches & Coastal Systems (BBCS) in Tallahassee. Submittals shall be made in digital format plus two (2) hard-copies (one to JCP Compliance Officer and one to BBCS Project manager), and shall include a transmittal cover letter clearly labeled: **“This monitoring information is submitted in accordance with Item No. [XX] of the approved Monitoring Plan for the Patrick AFB shore protection project, Permit No. 0294526-001-JC, for the monitoring period [XX].**





APPROVED

Approved Dune Vegetation Plan

Permit #: 0294526-001-JC

Approval: July 2009 by MBN

Bureau of Beaches and Coastal Systems

PATRICK AFB BEACH FILL AND CCAS UPLAND SAND BORROW AREAS
DUNE VEGETATION MONITORING PLAN

June 1, 2009

1. Planting Unit Success Criteria. The success of the planting effort will be assessed by the Government approximately 10 days after each installation and 365 days from the end of the planting unit installation using three measures: (1) whole-site survival rate, (2) planting unit survival pattern, and (3) planting unit root penetration. The planting effort shall be deemed a success if all three of the described criteria are met at the 80% level.
2. Whole Site Survival Rate. A minimum survival rate of 80% of all planting units installed over the site as a whole shall be achieved. Plants will be considered to be surviving if they show clearly vigorous rhizomes and white, turgid roots, even in the absence of vital above-ground growth.
3. Survival Pattern. A minimum of 80% of the planting zone width perpendicular to the shoreline shall be occupied by surviving planting units at all locations. This success criteria may be waived, at the discretion of the Government, in areas where plant survival has been adversely impacted by unexpected pedestrian traffic, erosion, overwash, or inundation by the sea.
4. Unit Root Penetration. A minimum of 24 out of 30 (80%) randomly selected dune grass plants in each planting zone shall have achieved root penetration of 9" or greater for all grasses, as measured from the top of the root ball down. The 30 randomly selected plants used to determine this measure of success shall be tagged in the field by the Contractor and the Government immediately following plant installation. These success criteria may be waived, at the discretion of the Government, if lesser root penetration is otherwise determined to be acceptable, or if it was caused by factors outside the control of the Contractor (i.e., excessive natural rainfall).
5. Replanting. If any of the above success criteria are not met, as determined by the Government, the Contractor shall replant non-conforming units with viable, and within specification, planting units in all areas considered to be deficient according to the planting unit success criteria. The replanting of planting units will be the sole responsibility of the Contractor and be completed at no additional cost to the Government or the Owner. All warranty and survival provisions and requirements will apply to replanted planting units.
6. Initial Planting Unit Survival. Planting units that do not survive for a minimum of 10 days after installation will be rejected and not be considered eligible for payment. New planting units, within specification, will be installed by the Contractor in the areas which do not survive 10 days. The Contractor will be responsible for installing the new replacement planting units within 5 days of notification by the Government that an area of initial planting units did not survive for 10 days. The replacement planting units will be considered eligible for payment as original planting units only after they have survived a minimum of 10 days from installation.

PATRICK AIR FORCE BASE, FLORIDA, SHORE PROTECTION PROJECT

BIOLOGICAL MONITORING PLAN FOR NEARSHORE HARDBOTTOM

DECEMBER 10, 2010



APPROVED

PAFB Biological Monitoring Plan
Permit #: **0294526-001-JC**
Approval: **December 10, 2010**

Bureau of Beaches and Coastal Systems

Project Description.

The project entails placement of up to 310,000 cubic yards of beach-compatible sand along the northern 3 miles (approximately) of the Patrick Air Force Base (PAFB) shoreline, between Florida Department of Environmental Protection (FDEP) reference monuments R53 and R70. Sources of the beach fill material shall include hydraulically dredged sand from the Canaveral Shoals I and/or II offshore borrow areas (in State and Federal waters, respectively) and/or truck-haul sand from an upland source on federal lands at the Cape Canaveral Air Force Station (CCAFS) above the mean high water shoreline north of the Canaveral Harbor Entrance. The source and ultimate volume of the beach fill material will be determined as a function of beach conditions prior to actual construction.

Per prior permitting and construction, beach fill placement is described along two reaches of the PAFB project area:

- Reach 1 (R53-R65, “main” fill area), and
- Reach 2 (R65-R70, “thin” fill area).

Dune restoration is additionally undertaken above the mean high water line along Reach 3 (R70-R75.4, “dune fill” only) – which comprises the southern mile of the PAFB shoreline -- to repair erosion damage after severe storms, in limited instances.

Beach fill placement in Reach 1 shall be either by truck-haul or by hydraulic dredge. Beach fill placement along Reach 2 shall be by mechanical means and the sand shall be (1) directly from upland sources, and/or (2) from a temporary stockpile of offshore sand placed at the south end of Reach 1, between monuments R61 and R65. Use of a hydraulic dredge would imply construction of the temporary sand stockpile in Reach 1 for subsequent truck-haul transfer to the beach along Reach 2, within the same season as it was constructed (i.e., prior to the beginning of the main marine turtle nesting season on May 1). Construction by truck-haul only, without a dredge, would not include construction of the temporary sand stockpile upon the beach; instead, sand would be placed from the upland sand sources to the beach fill areas.

The project has been previously constructed in December 2000-April 2001 (initial construction) and in February-March, 2005 (post-hurricane renourishment). A firm schedule for the next project construction has not yet been determined, but is anticipated to be between January 2010 and May 2011. Construction activity is limited by permits to November 1 through April 30 in any given year.

Background Information Relating to Project Monitoring

The south end of the Patrick AFB shoreline features rock outcrops that are variously exposed above the sand seabed, occurring in a band of about 280-ft width below the mean low water shoreline, more or less. This nearshore hardbottom principally occurs south of R65, increasing in abundance and exposure toward the south, particularly south of R70. To avoid and minimize impact to the nearshore hardbottom, the project's fill template was designed to create a 3-mile long transition between the Brevard County Federal Shore Protection Project (at the north end of PAFB) and the significant hardbottom along the Brevard County Mid Reach shoreline (south of, and including the southern mile of PAFB). Along the three reaches of the PAFB shoreline, respectively, the template creates (1) a narrower, higher terminus to the Brevard County project that tapers along the northern two-thirds of the beach fill project area, (2) a tapered, minimum-fill width along the southern third of the project area, and (3) dune restoration only along the southern mile of PAFB (south of monument R-70.)

Monitoring of beach profiles and exposed rock outcrops, since 2005, has shown no clear evidence that the beach fill has encroached onto the nearshore hardbottom. Observed variations in the nearshore seabed elevation and rock exposure are consistent with those observed in pre-project conditions.

Physical monitoring of the nearshore hardbottom, through surveys of the beach profile and exposed rock occurrence, will continue with the project. These monitoring surveys will be expanded to include the entirety of the PAFB shoreline (and 2000-ft southward), from R53 to R77, and shall be conducted at pre-, post-, 1-, 2-, 3-, and 5-years after construction of the next beach fill activity. Details are presented in the Physical Monitoring Plan for the project dated 1 June 2009. The principal elements of the plan, as related to physical monitoring of the nearshore hardbottom, are summarized as follows:

Nearshore Rock (Physical Monitoring)

- a) **Wading Transects.** The extent of exposed rock and profile fluctuations shall be identified by wading survey to -7.4 ft NAVD88 or deeper, along the project beach fill area and adjacent 1-mile shoreline, at FDEP monuments R-53 through R-77, inclusive.
- b) **Analysis.** For each survey, the occurrence of exposed rock shall be graphically contrasted with all prior surveyed occurrences of exposed rock at that transect location. Additionally, the seabed profile (elevations) shall be graphically contrasted with the pre-project mean and standard deviation of the beach profile at that transect location. Further, the mean beach profile will be computed (updated) through each subsequent, *post-construction* survey. This result will be contrasted to the mean *pre-project* profile. Additionally, the total aggregate length of exposed hardbottom along the beach survey lines shall be contrasted between surveys. For purposes of this evaluation, "pre-project" refers to the baseline conditions surveyed prior to the 2005 renourishment from R70-R77, and to baseline conditions surveyed prior to the next construction event north

of R70. The measurement and analysis protocol shall conform to that which has been conducted annually since 2005 to monitor the potential impact of beach fill placement along Patrick AFB upon adjacent nearshore rock (from R70-R77) pursuant to consultation between National Marine Fisheries Service (NMFS) and the 45 SW in January 2005.

- c) Controlled color aerial photography will be collected along the shoreline monitoring area (minimum R53 through R77), as practicable, in conditions conducive to imaging of the nearshore rock resource. The timing and frequency of the aerial photography is dependent upon the occurrence of favorable conditions, including low tide, calm surf, clear water, clear skies and proper sun angle. The confluence of these factors, along with the ability to accurately identify favorable conditions in order to mobilize the aerial photographer, may occur less than annually and at variable times of the year.
- d) A summary engineering report shall be prepared subsequent to each beach-fill placement activity and each annual or biennial post-construction survey. The report shall summarize and discuss the data collected, the performance of the beach fill project, and erosion and accretion rates/patterns within the monitored areas. The report shall include a comparative review of project performance relative to and identification of adverse impacts attributable to the project. Analysis of the nearshore rock and seabed monitoring data shall be included, per paragraph b, above. Results shall be analyzed for patterns, trends, or changes between annual surveys and cumulatively since project construction, including additional reference to data and results measured since the initial construction of the existing project in 2000-01.

Biological Monitoring Plan

1. Scope and Objectives

- a) A baseline biological monitoring survey shall be conducted of the existing nearshore rock hardbottom along the south shoreline of Patrick AFB. Monitoring objectives will include surveys to document the presence and abundance of species of fishes, macroalgae, as well as mobile and sessile macroinvertebrates (e.g., reef-building sabellariid worms, tunicates, bryozoans), and marine turtles in this habitat.
- b) These data shall document the existing condition; i.e., prior to placement of beach fill along or below the mean high water line. As such, the data shall serve as the principal baseline of comparison for future biological surveys of the area's nearshore hardbottom subsequent to project construction. Future, post-construction biological surveys will be conducted if the results of physical monitoring, described above, indicate that the project activity may have resulted in adverse impact of nearshore rock (e.g., burial or changes in rock exposure beyond that expected through natural variation, as determined by mutual agreement between the Permittee and the Department).

2. Survey Design

- a) The design of the biological monitoring plan follows that developed and approved by FDEP and NMFS for the Brevard County Mid Reach Beach Restoration project, located immediately south of the PAFB shoreline. The Mid Reach monitoring plan includes the south end of the PAFB shoreline as a reference (control) area, approximately between FDEP reference monuments R72 and R74.
- b) The ultimate scope and design of the efforts will be highly dependent upon site conditions; and timing of surveys will vary as a function of sea conditions. The habitat study area is characterized by shallow water (less than 6 feet depth), pervasive breaking surf, and typically low visibility. These natural factors greatly restrict the practical ability to conduct biological surveys at this site relative to that which is typically possible in deeper, clearer, less turbulent waters.
- c) The study area includes approximately 11,000 feet alongshore (R64-R75.4) and 280 feet cross-shore, beginning seaward of the mean low water line. This corresponds to the approximate limits of principal nearshore rock occurrence along the PAFB shoreline established in the project baseline (2004), between R70 and R75.4, in addition to up to approximately 1900 feet of shoreline north thereof, between R68 and R70, where rock exposure occurs but is less abundant and highly variable in natural conditions, and further including an additional 4000 feet of shoreline north thereof, between R64 and R68, wherealong areas of exposed hardbottom have been observed.
- d) The survey shall assess (1) epibiota cover and taxonomic composition (macroalgae and sessile invertebrates, including worm rock); (2) fish species composition and relative abundance; and (3) abundance, life-stage, distribution and activity of marine turtles.

3. Epibiota and Fishes

- a) The survey design for epibiota and fishes, inclusive of macroinvertebrates, incorporates spatial variation at several scales. The basis of the field program for monitoring epibiota and fishes shall be a sampling “unit”, each approximately 40 x 75 feet in size. This sampling unit shall be divided into three cells of equal 40 x 25 feet area. Within each cell shall be three randomly located subsamples that are collected (assessed) for the biological response variables. Each sampling unit thus consists of $3 \times 3 = 9$ subsample assessment points. Six sampling units will be established along the study area: two each near the north, central, and south ends, with one unit at each location being near the inshore edge of the hardbottom and one being near the central-seaward edge of the hardbottom. These will respectively reflect “inshore” and “offshore” strata across the habitat within the narrow nearshore band of existing hardbottom. This plan shall result in a total of $6 \times 9 = 54$ subsample assessment points.
- b) Sampling units will be randomly positioned within the general plan locations described above. Random placement of units will be constrained by the presence of suitable hard bottom; and the final location of the units will be established so as to include exposed

hardbottom within each. Once established, the coordinate locations of sampling units shall be recorded by DGPS. For purposes of safety, the locations shall not be marked by permanent rods but shall be recoverable within the physical accuracy limits of a high-resolution DGPS instrument. Random coordinates for subsample placement within cells will be generated prior to the field survey (“targets”). Owing to the challenging field conditions of the project area, the final sampling points will be in the vicinity of these random selected targets.

c) Epibiota

- i. Epibiota will be sampled using digital video or still cameras mounted to rigid, portable stainless steel frames. The dimensions of the frame will be dictated by the height of the imaging camera(s) above the seafloor. Because of the marginal visibility conditions in the area, sample images will be collected much closer to the bottom than typical quantitative imagery (e.g., less than 45 cm).
- ii. A mosaic of multiple images within each subsample assessment point may be developed to create the requisite total photoquadrat size per subsample point. Minimum size per photoquadrat is anticipated to be approximately 2400 square centimeters (i.e., roughly equivalent to the image provided through a camera height of 40~45 cm above the seafloor).
- iii. Digital photography of the stations shall be made directly, by still or videocamera, as water clarity dictates. Representative samples of algae and sessile organisms will be collected as needed from or adjacent to the photoquadrat areas to confirm identifications.
- iv. Digital images from the photoquadrat stations will be evaluated to assess invertebrate and algal cover and taxonomic composition, including reef-building sabellariid worms. Identification shall be made to the lowest practical taxon and ranked in order of percent cover. Total percent cover will be assessed by superimposing a random-dot overlay upon the photographic images (or mosaic image, if applicable) using image analysis software.
- v. The number of random points to be employed for point-count assessment on photograph and video images shall be established through sensitivity analysis of image evaluation. The data shall be analyzed with tests of 25, 50, and 100 random points on multiple frames, and the results shall be intercompared. The degree of difference of biotic estimates between each test, per image, will be assessed to determine the requisite number of sampling points (“dots”) to achieve an adequate level of precision.
- vi. Image analyses will yield percent cover estimates for all identifiable taxa and major substrate types. Epibiotical taxa may be aggregated into broader taxonomic groups such as macroalgae, sponges, hydrozoans, bryozoans, worm rock, and tunicates. Substrate types include sand, bare rock, and dead wormrock, and algal turf.

- vii. The image sizes within each of the three sub-sample assessment points within each cell shall be determined based upon the conditions at the time of each survey. It is anticipated that the minimum single image size shall be not less than 300 cm² /image. Regardless of the image size that is established and used to create each photoquadrat, the biota within the photoquadrat shall be expressed in terms of percent coverage; i.e., normalized by the total area of the image.

d) Fishes (Elective Monitoring Element)

- i. The monitoring plan recognizes that the ability to assess fish assemblages associated with the nearshore hardbottom is limited given the conditions of this area. At the election of the Permittee, and/or if required by federal agencies and agreed to by the Permittee, the monitoring may include efforts to assess fish assemblages, including those efforts described as follows.
- ii. To provide estimates of a portion (carnivorous species) of extant fish assemblages, the survey shall use baited remote video cameras^{1, 2}. Fixed duration (e.g., 10-minute) deployments of a video camera mounted to a heavy tripod will be made at the sampling units. Camera tripods will be equipped with a plastic mesh bag filled with cut shrimp or fish. Three samples will be taken within each of three sampling units located on the “offshore” (central-seaward) area of the hardbottom. All fish sampling will be dependent on sea conditions as well as horizontal visibility. It is anticipated that at least 1.0 m visibility will be needed to gather adequate data.
- iii. Video segments will be analyzed in the laboratory. Species observed in the video segments will be identified, and then the maximum number of each species seen at any one time shall be recorded as a measure of relative abundance.

4. Marine Turtles

- a) Monitoring of marine turtles will provide baseline data on marine turtle distribution in the project and study area. Abundance, distribution, life stage, and activity of marine turtles will be recorded. Data will be used to describe sightings per survey and kilometer, and to determine variability of turtle distribution within the project area.
- b) Two observers and a boat driver, trained in the identification of marine turtles, will conduct systematic visual transect surveys from a shallow draft watercraft equipped with a sighting tower³. When a turtle is observed, the boat driver will enter a time-stamped

¹ Watson D.L., Harvey E.S., Anderson M.J. and Kendrick G.A. 2005. A comparison of temperate reef fish assemblages recorded by three underwater stereo-video techniques. *Marine Biology* 148:415–425.

² Willis T.J., Millar R.B. and Babcock R.C. 2000. Detection of spatial variability in relative density of fishes: comparison of visual census, angling, and baited underwater video. *Marine Ecology Progress Series* 198:249–260.

³ Holloway-Adkins, K. G., and J. A. Provanca. 2005. Abundance and foraging activity of marine turtles using nearshore rock resources along the Mid Reach of Brevard County, Florida. *Dynamac, Jacksonville, FL*. pp 45.



APPROVED

PAFB Biological Monitoring Plan

Permit #: **0294526-001-JC**

Approval: **December 10, 2010**

Bureau of Beaches and Coastal Systems

GPS waypoint, record the turtle species and its life-history stage (juvenile or adult). The following data will be recorded for turtles sighted during surveys: turtle's location in relation to the transect track (inside, outside or on the transect line), turtle's location within the water column (top, middle, or bottom), and behavior (swimming, breathing, resting, foraging, etc.).

- c) Transects will be conducted parallel to shore at approximately 7 mph. A survey day will consist of conducting at least two transects along the nearshore hard bottom (NHB) in approximately 4-6' water depth. Depending on inshore swell activity, NHB surveys will be conducted approximately 100 to 300 feet from shore. Transects will be alternated to begin at either the north or south ends of the study area shoreline.
- d) Not less than three survey days or seven transects will be conducted for marine turtle distribution. These surveys are anticipated to occur in summer. Approximate water depth, temperature and clarity will be noted during the surveys, in addition to the air temperature, wind speed and direction, sea state and swell conditions. These data will be updated as conditions change.

5. Report

- a) A report of the survey details and methodologies, collected data, and findings will be prepared within 120 days after completion of the field surveys. Results for each sub-study (e.g., epibiota, fishes, turtles) may be produced separately.
- b) The report(s) shall include those data and information required to utilize the survey results as a baseline for future surveys, should they be required or conducted. Future surveys may comprise monitoring along or near the Patrick AFB shoreline, including those conducted as reference surveys for beach fill activities along the adjacent Mid Reach shoreline. At minimum, the report shall assess (1) the total biotic cover, composition and cover of major taxa, and total number of taxa for epibiota including macroalgae, rock-building worms, and sessile invertebrates); (2) fish species composition and relative abundance; and (3) abundance, life-stage, distribution and activity of marine turtles.

6. Schedule

The biological monitoring survey shall be conducted prior to beach fill placement. The survey shall be repeated after beach fill construction if the results of physical monitoring⁴, summarized above, indicate that the project activity may have resulted in burial or related adverse impact to the rock habitat beyond that expected through natural variation. Surveys will be conducted within, or as close as possible to, summer months as conditions and schedules allow. Surveys will be conducted as close as possible by month to minimize temporal (seasonal) differences.

⁴ Physical Monitoring Plan, Patrick AFB Shore Protection Project, 0294526-001-JC; dated 1 June 2009.