DEPARTMENT OF THE ARMY PERMIT

Permittee: CITY OF ISLE OF PALMS
C/O MS. LINDA TUCKER

POST OFFICE BOX 508
ISLE OF PALMS, SC 29451

Permit No: 2007-02631-2IG

Issuing Office: CHARLESTON DISTRICT

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description:
The work consists of placement of fill material in waters of the U.S to restore the severely eroded shoreline of the northern end of the Isle of Palms for protection of property and for recreational use in accordance with the attached drawings entitled: Applicant: City Of Isle Of Palms, P O Drawer 508, Isle Of Palms, SC 29451. Sheets 1, 4 thru 10 and 13 thru 16 of 16 dated January 2008 and sheets 2 and 3 of 16 revised April 11, 2008 and sheets 11 and 12 of 16 dated November 2007.

Project Location:
This project is located in the Atlantic Ocean offshore of the northern end of the Isle of Palms (borrow site) and on the shoreline of the Atlantic Ocean from 53rd Avenue extending north to the existing groin at Dewees Inlet (renourishment site) on the Isle of Palms, in Charleston County, South Carolina.

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **30 June 2013.** If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

SEE PAGES 4 & 5.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

☒ Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

☒ Section 404 of the Clean Water Act (33 U.S.C. 1344).

☐ Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

Linda Tucker — 5/7/08

(PERMITTEE) — (DATE)

CITY OF ISLE OF PALMS
C/O MS. LINDA TUCKER

Linda Tucker

PRINT NAME

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Tina B. Hadden — 5/7/08

(DISTRICT ENGINEER) — (DATE)

J. RICHARD JORDAN III, LTC
or his Designee
Tina B. Hadden
Chief, Regulatory Division

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE) — (DATE)

A. SPECIAL CONDITIONS FOR PERMIT #: 2007-02631-2IG

a. That the permittee agrees to provide all contractors associated with construction of the authorized activity a copy of the permit and drawings. A copy of the permit will be available at the construction site at all times.

b. That the permittee shall submit a signed compliance certification to the Corps within 60 days following completion of the authorized work and any required mitigation. The certification will include:
   1. A copy of this permit;
   2. A statement that the authorized work was done in accordance with the Corps authorization, including any general or specific conditions;
   3. A statement that any required mitigation was completed in accordance with the permit conditions;
   4. The signature of the permittee certifying the completion of the work and mitigation.

c. The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

d. That the permittee performs all nourishment activities in accordance with the eleven reasonable and prudent measures and fourteen terms and conditions for the loggerhead sea turtle (Caretta caretta) included in the attached biological opinion dated February 28, 2008, by the U.S. Fish and Wildlife Service.

e. That the permittee agrees that dredging and vessel mooring shall not be allowed within 600 feet of hard bottom habitat. To facilitate enforcement of this restriction, the applicant shall be required before construction begins to provide NMFS and the Charleston District with a map showing the locations of any hard bottom habitat present within 600 feet of the borrow areas. Dredging also shall be confined to locations devoid of significant accumulations of clay, mud, or other materials that might substantially elevate turbidity and cause sedimentation over large areas.

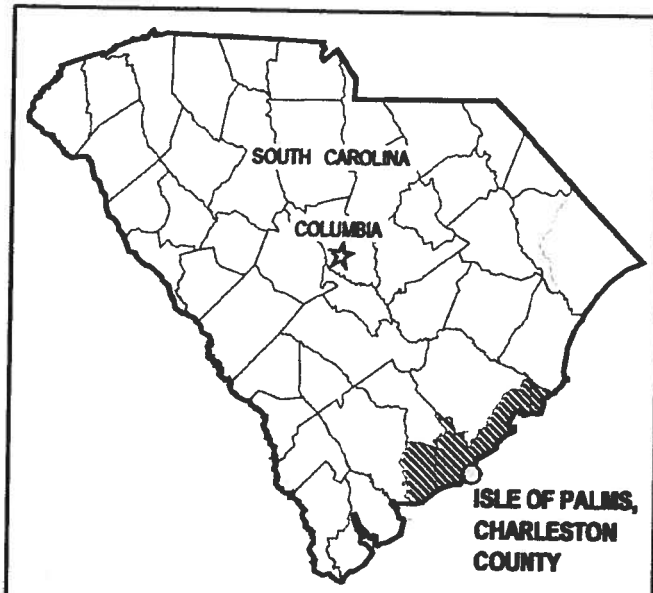
f. That the permittee agrees that bathymetric surveys shall be conducted immediately after and one year after project completion to demonstrate compliance with dredging depth restrictions and to demonstrate the borrow areas are filling at rates presumed acceptable for fishery resources.

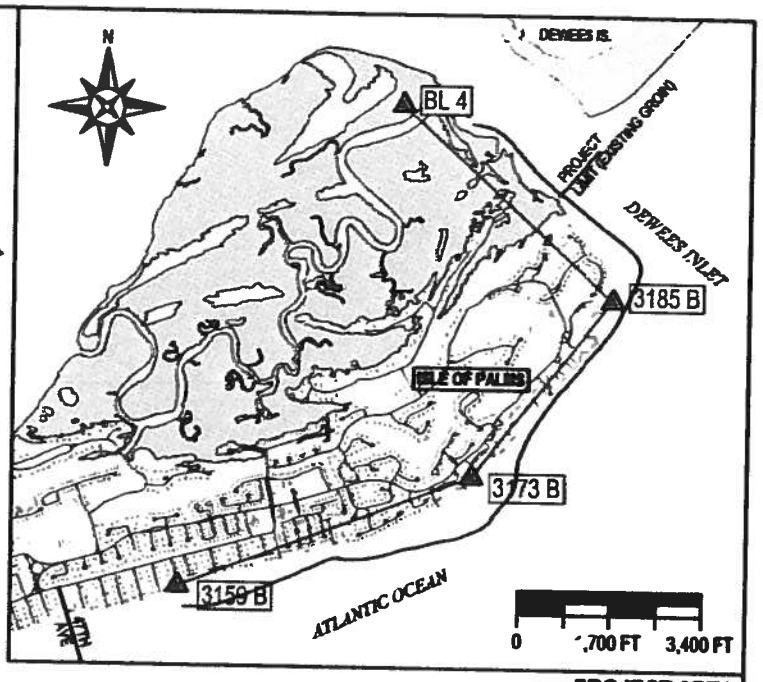
g. That the permittee agrees that to the extent practicable, borrow areas shall be mined selectively to reduce the amount of gravel and shell placed on the beach. A monitoring program shall be implemented to document any changes to sediment texture along the beach and to characterize, relative to reference areas, the abundance and fishery value of infauna within the fill area. The monitoring plans shall be submitted to NMFS and the Charleston District for approval prior to construction.

h. That the permittee agrees to provide the Corps an "Operations, Monitoring and Contingency Plan," to include contingency measures. This plan must address the following in detail: material quality control for beach fill, nourishment and dredging operations, beach compaction and tilling of the

renourishment site, pre and post dredging bathymetric surveys of the borrow site, benthic surveys, sand bag removal and time frame for removal of equipment from the beach. This plan must be provided to this office and approved before construction may begin.

i. That the permittee obtain the services of an independent contractor to provide inspectors during ALL beach nourishment operations. These inspectors must be acceptable and answerable to the District Engineer and are wholly funded by the permittee. Prior to ANY work being performed that is authorized herein, the permittee will provide this office with the names of the inspectors and their credentials for review and approval. It is understood that these inspectors MUST be qualified for this type of work. These inspectors will insure compliance with all those terms and conditions in the permit, the USFWS Biological Opinion and "Operations, Monitoring and Contingency Plan". Inspectors will prepare a daily report that will be provided to this office on a weekly basis via fax or hand delivery each Friday by noon. The daily inspection log will be kept current and on site at all times. It is fully and completely understood that the inspector has the ability and responsibility to temporarily halt renourishment operations until such time as remedial actions have been taken to the satisfaction of the inspector. It is further understood that the inspector will notify this office IMMEDIATELY when they have halted operations for noncompliance with the terms and conditions of this permit and all actions will be documented in a non-compliance report. The District Engineer may require replacement of any inspector and/or independent contractor who does not comply with the conditions of this permit.

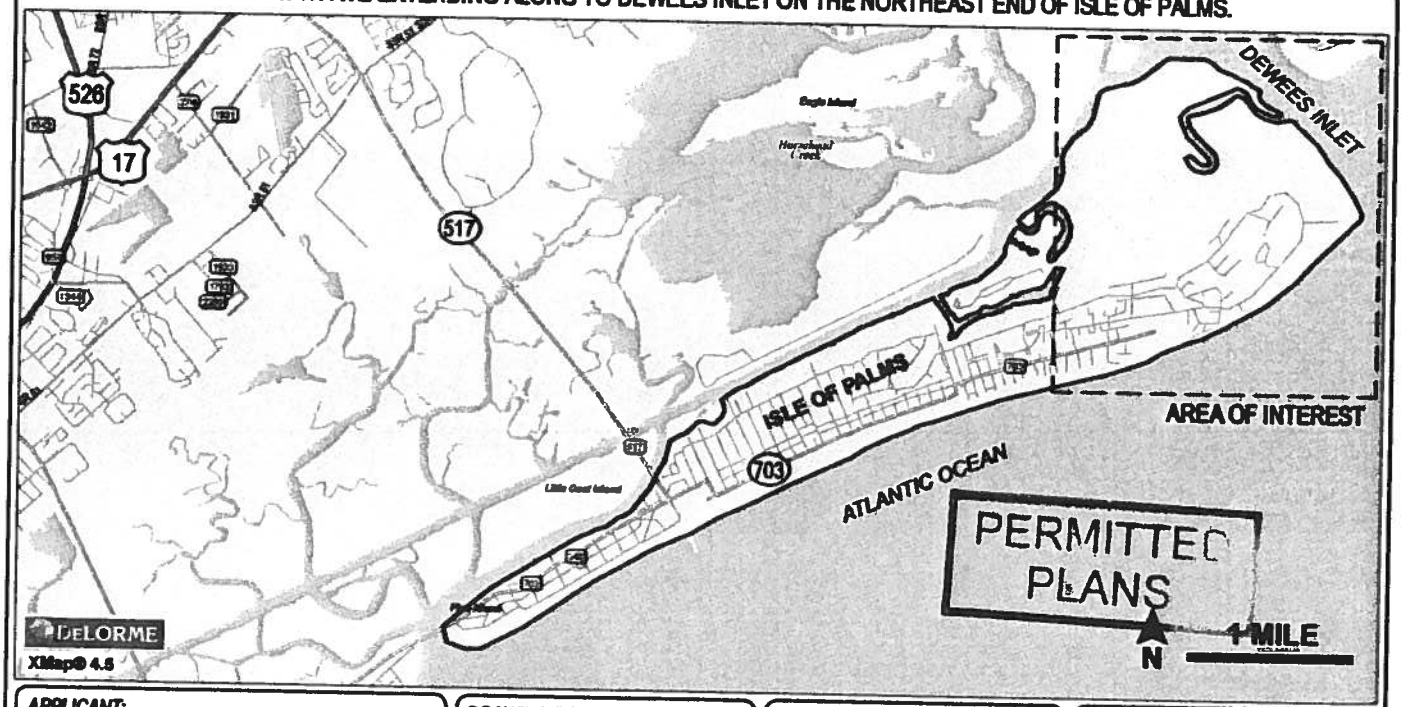




PROJECT AREA

DIRECTIONS:

FROM CHARLESTON, TAKE US-17 NORTH. TURN RIGHT ONTO SC 517 (ISLE OF PALMS CONNECTOR). TURN LEFT ONTO PALM BLVD. SITE IS NORTHEAST OF 47TH AVE EXTENDING ALONG TO DEWEES INLET ON THE NORTHEAST END OF ISLE OF PALMS.



APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

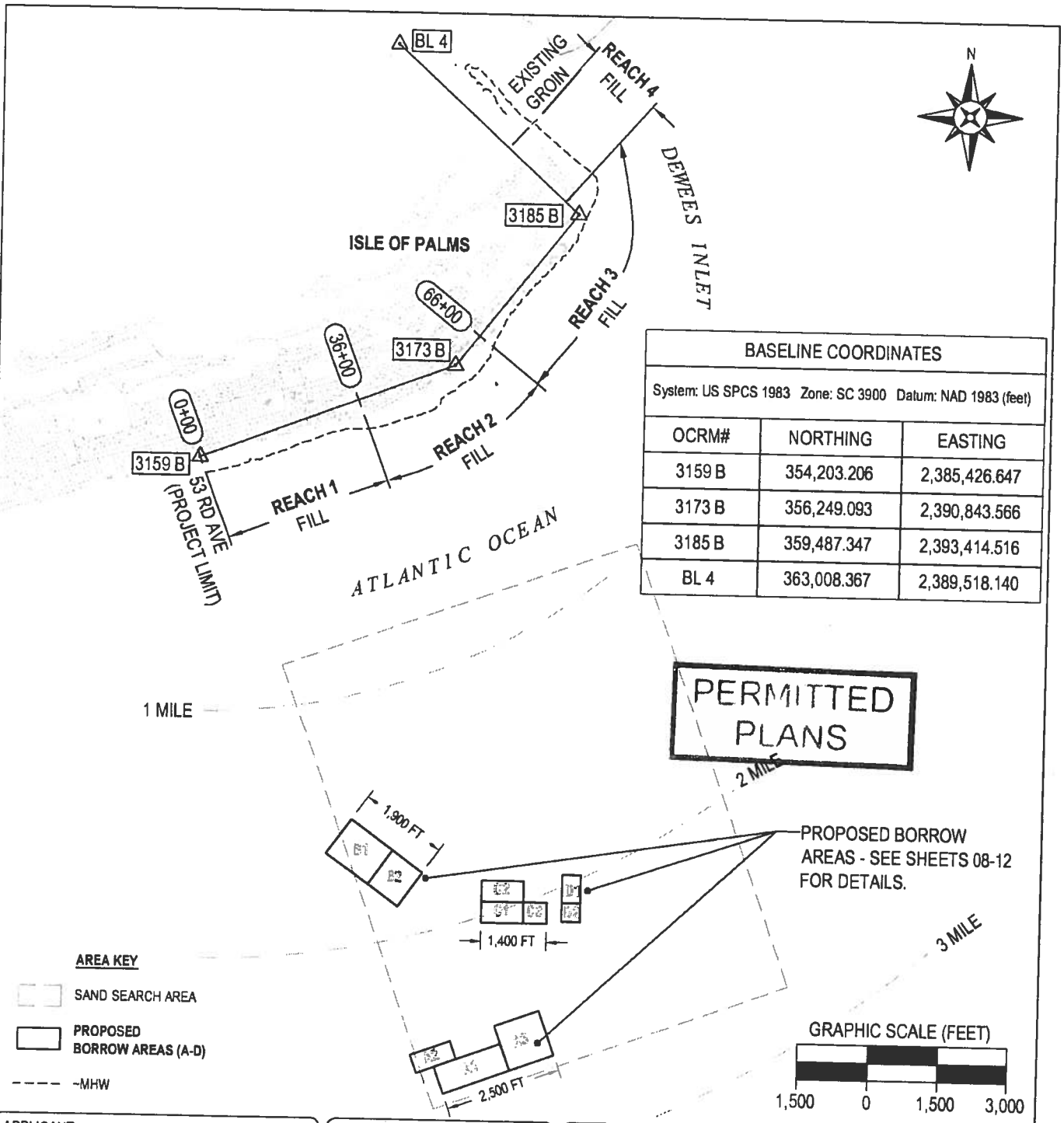
DRAWING TITLE:
VICINITY MAP

AGENT: *P/N 2007-02631-2IG-P (REVISED)*
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN	SHEET #: 01
DATE: JAN 2008	
TMS#: 604-11-00-211	
PROJECT #: 2277	OF: 16

SOUTH CAROLINA COASTAL SCIENCE & ENGINEERING No. C01950 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23707 JAMES V. ROBERTS JR.



PERMITTED PLANS

BASELINE COORDINATES		
System: US SPCS 1983 Zone: SC 3900 Datum: NAD 1983 (feet)		
OCRM#	NORTHING	EASTING
3159 B	354,203.206	2,385,426.647
3173 B	356,249.093	2,390,843.566
3185 B	359,487.347	2,393,414.516
BL 4	363,008.367	2,389,518.140

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

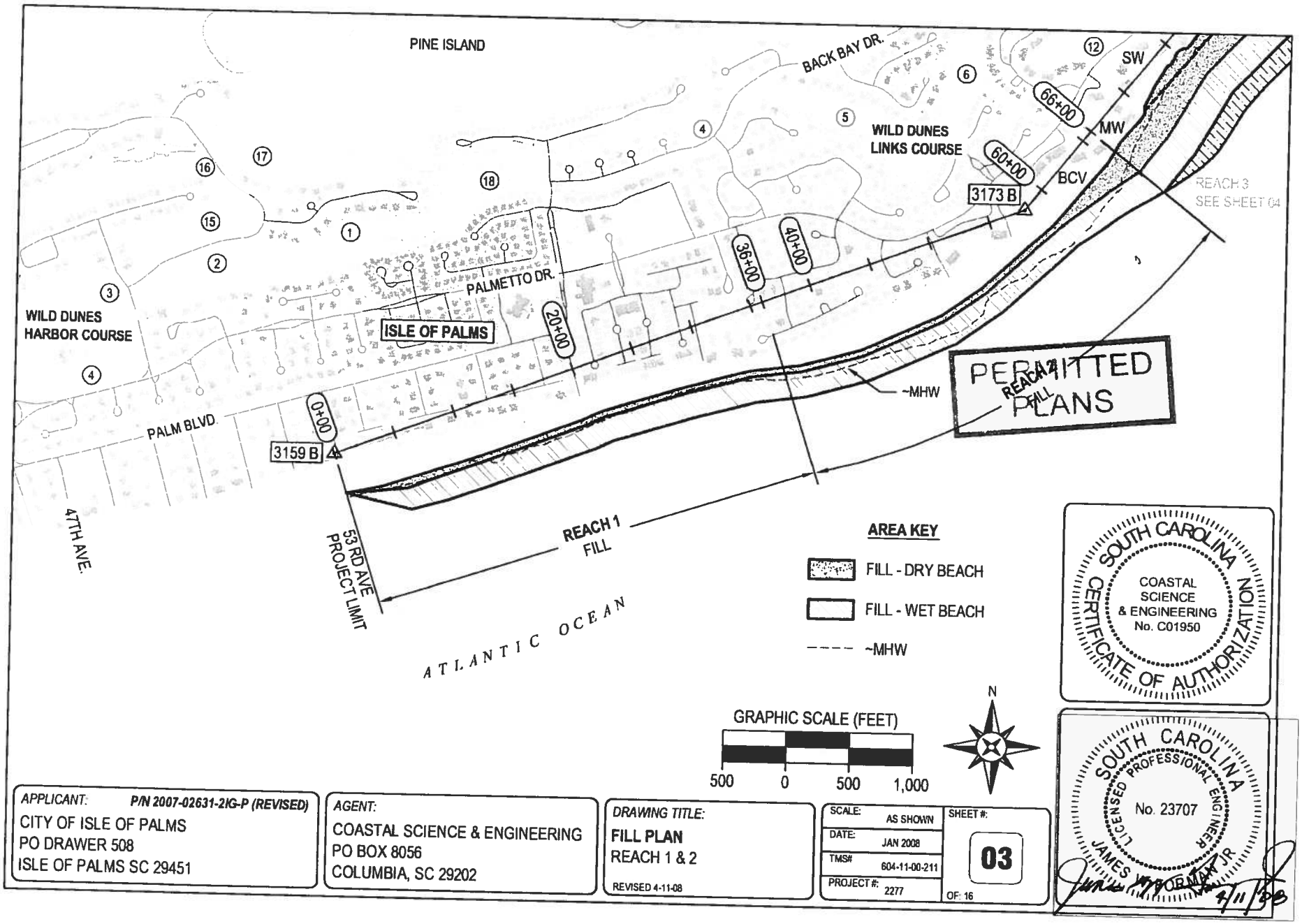
AGENT: ***P/N 2007-02631-2IG-P (REVISED)***
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
PROJECT PLAN MAP
REVISED 4-11-08

SCALE: AS SHOWN	SHEET #: 02
DATE: JAN 2008	
TMS# 604-11-00-211	
PROJECT # 2277	OF: 16

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
COASTAL SCIENCE & ENGINEERING
No. C01950

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES A. TORMAN JR
4/11/08



SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING
No. C01950
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. NORMAN JR.
4/11/08

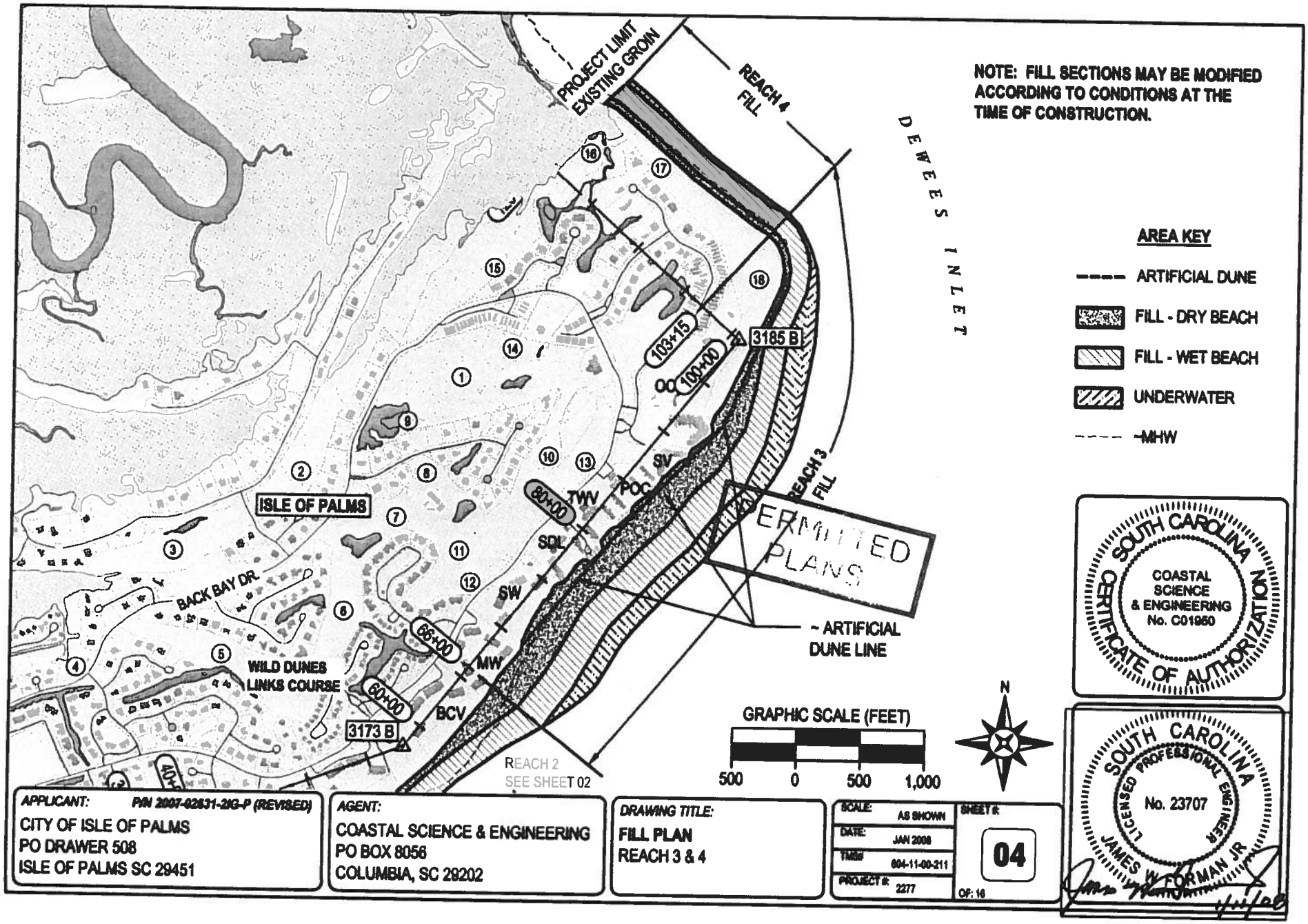
APPLICANT: ***P/N 2007-02631-2IG-P (REVISED)***
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
FILL PLAN
REACH 1 & 2
REVISED 4-11-08

SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	604-11-00-211
PROJECT #:	2277

SHEET #: **03** OF: 16



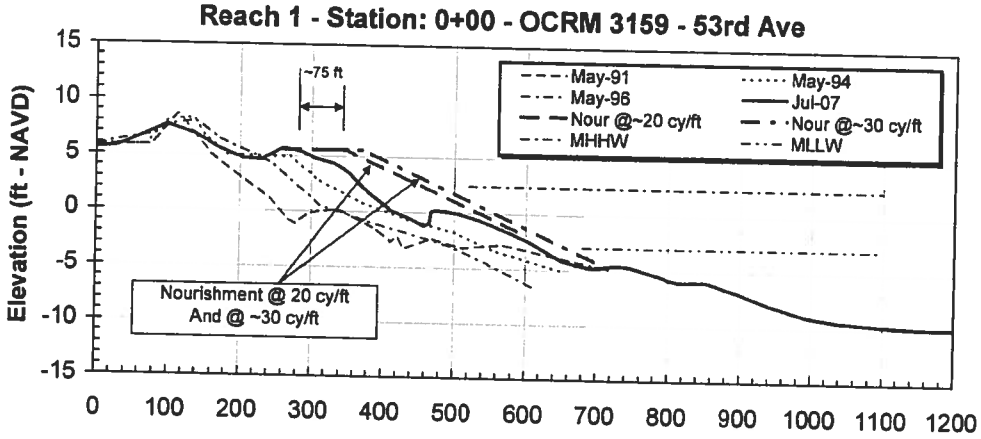
APPLICANT: PIN 2007-02631-2IG-P (REVISED)
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

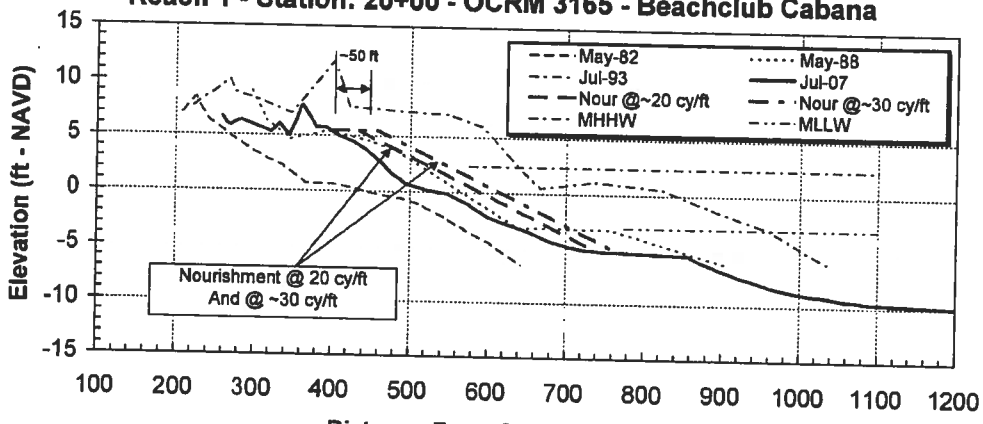
DRAWING TITLE:
FILL PLAN
REACH 3 & 4

SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	604-11-00-211
PROJECT #:	2277
SHEET #:	04
OF:	16

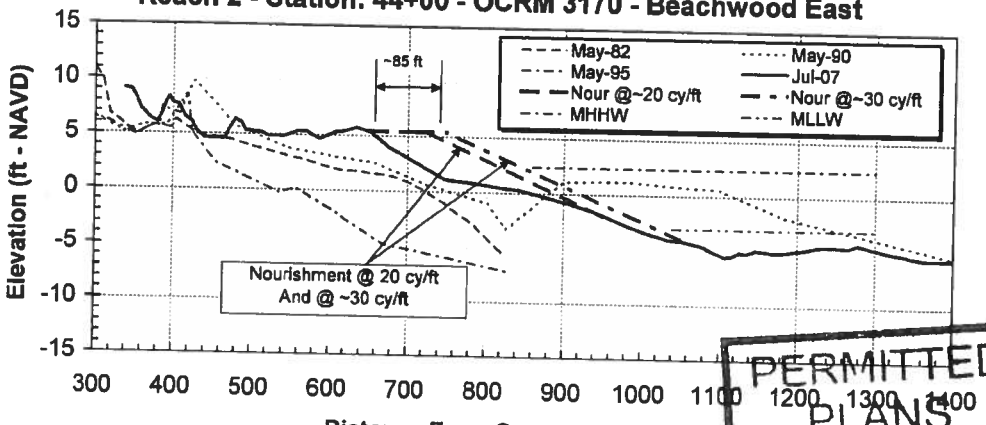
Reach 1 - Station: 0+00 - OCRM 3159 - 53rd Ave



Reach 1 - Station: 20+00 - OCRM 3165 - Beachclub Cabana



Reach 2 - Station: 44+00 - OCRM 3170 - Beachwood East



PERMITTED PLANS

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

DRAWING TITLE:
FILL SECTIONS
STA 0+00 TO 44+00

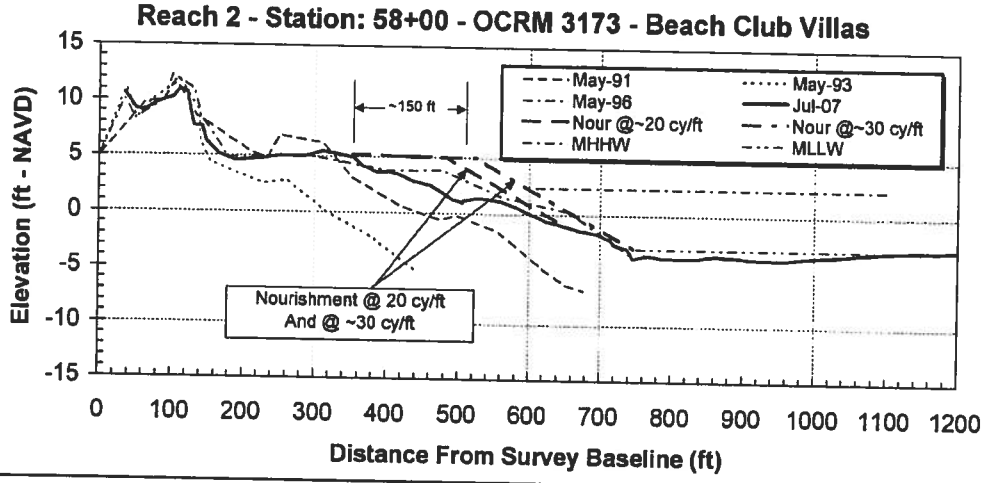
SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING
No. C01950
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR.
1/11/08

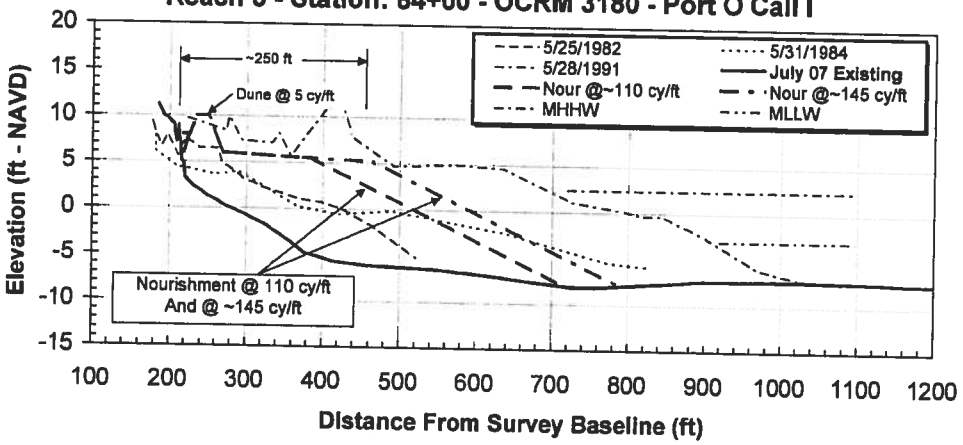
AGENT: *P/N 2007-02631-2IG-P (REVISED)*
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN	SHEET #: 05
DATE: JAN 2008	
TMS# 604-11-00-211	
PROJECT #: 2277	OF: 1612

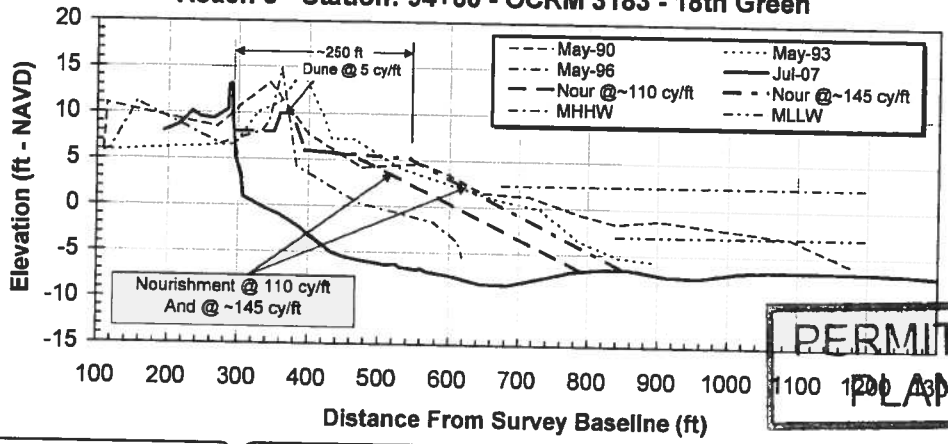
Reach 2 - Station: 58+00 - OCRM 3173 - Beach Club Villas



Reach 3 - Station: 84+00 - OCRM 3180 - Port O Call I



Reach 3 - Station: 94+00 - OCRM 3183 - 18th Green



PERMITTE
PLANS

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

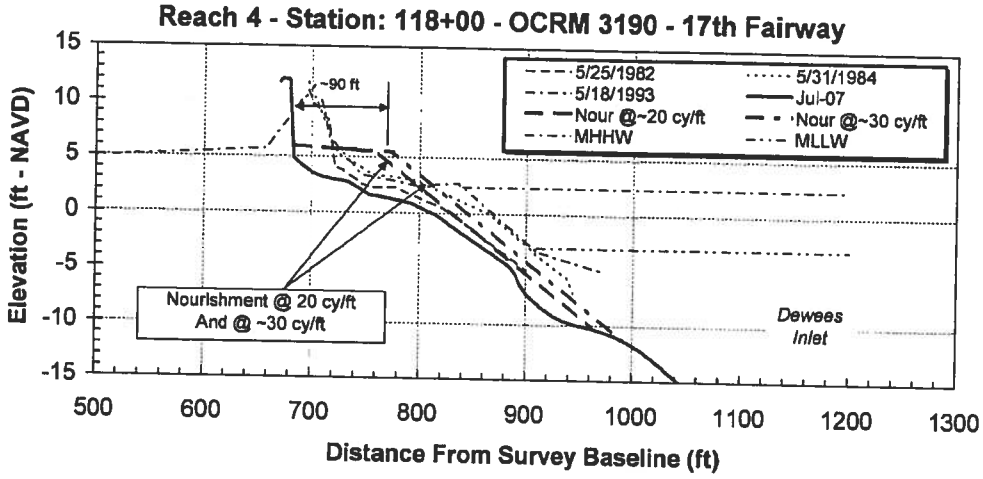
DRAWING TITLE:
FILL SECTIONS
STA 58+00 TO 94+00

SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING
No. C01950
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. NORMAN JR
1/11/08

AGENT: *P/N 2007-02631-2IG-P (REVISED)*
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN	SHEET #: 06
DATE: JAN 2008	
TMS#: 604-11-00-211	
PROJECT #: 2277	OF: 1612



NOTE: INDICATED FILL SECTIONS PROVIDE THE TYPICAL RANGE OF NOURISHMENT VOLUMES ANTICIPATED BASED ON EXISTING CONDITIONS (JULY 2007 SURVEY). SECTIONS WILL ALSO BE VARIED WITHIN EACH REACH SO AS TO CREATE SMOOTH TRANSITIONS FROM STATION TO STATION.

SOURCE DATA: COASTAL SCIENCE & ENGINEERING 1984-2007

OCRM 1988 TO PRESENT

RESEARCH PLANNING INSTITUTE 1982-1984

PERMITTED PLANS

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

DRAWING TITLE:
FILL SECTIONS
STA 118+00

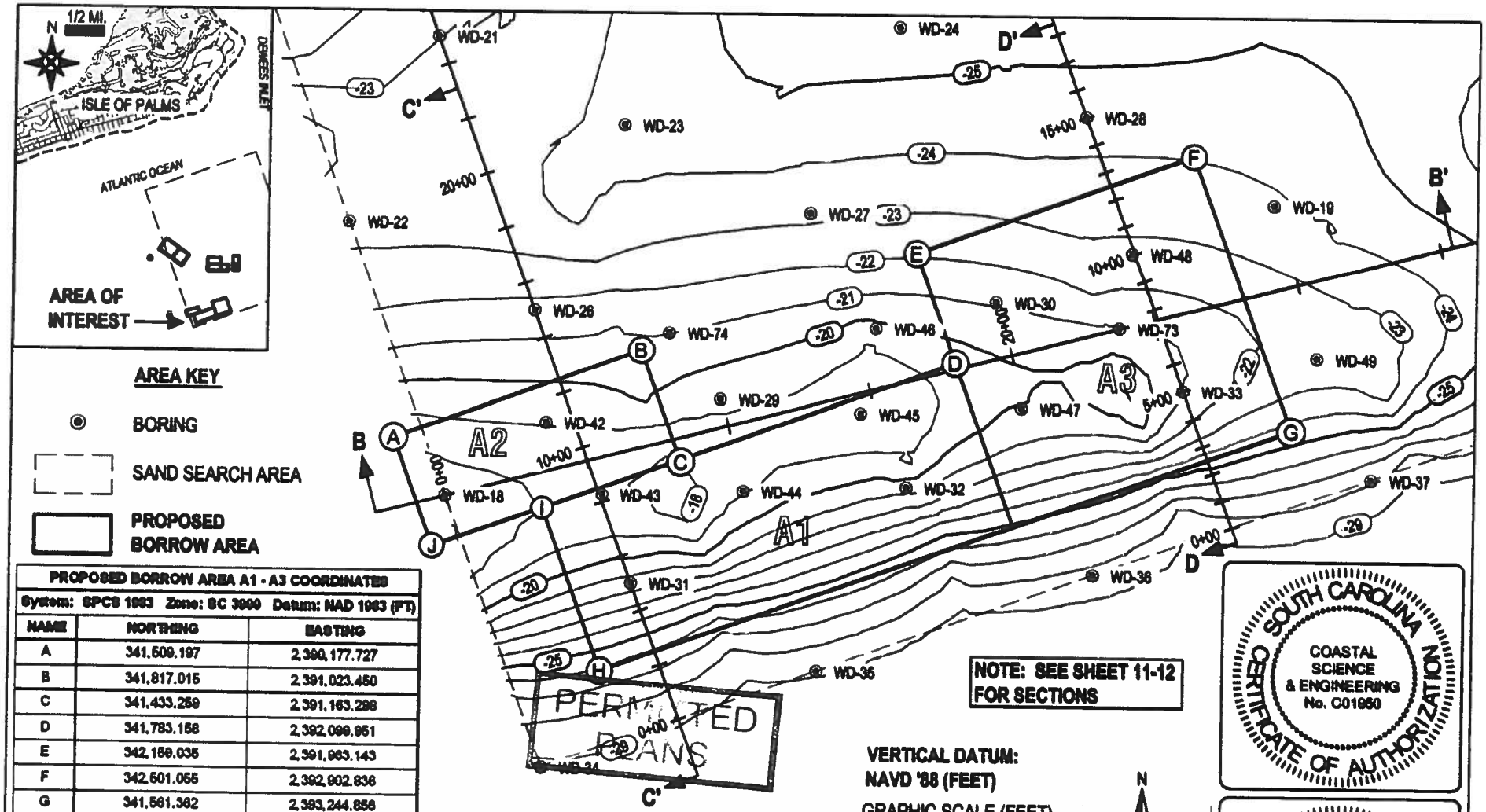
SOUTH CAROLINA COASTAL SCIENCE & ENGINEERING No. C01950 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23707 JAMES W. FORMAN JR

1/11/10

AGENT: ***P/N 2007-02631-2IG-P (REVISED)***
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN
DATE: JAN 2008
TMS# 604-11-00-211
PROJECT #: 2277
SHEET #: 07
OF: 1612



PROPOSED BORROW AREA A1 - A3 COORDINATES

System: SPCS 1983 Zone: SC 3900 Datum: NAD 1983 (FT)

NAME	NORTHING	EASTING
A	341,509.197	2,390,177.727
B	341,817.015	2,391,023.450
C	341,433.259	2,391,163.298
D	341,783.158	2,392,099.951
E	342,159.035	2,391,963.143
F	342,501.055	2,392,902.836
G	341,561.362	2,393,244.856
H	340,706.312	2,390,895.624
I	341,278.128	2,390,690.412
J	341,133.320	2,390,314.535

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
COASTAL SCIENCE & ENGINEERING
No. C01950

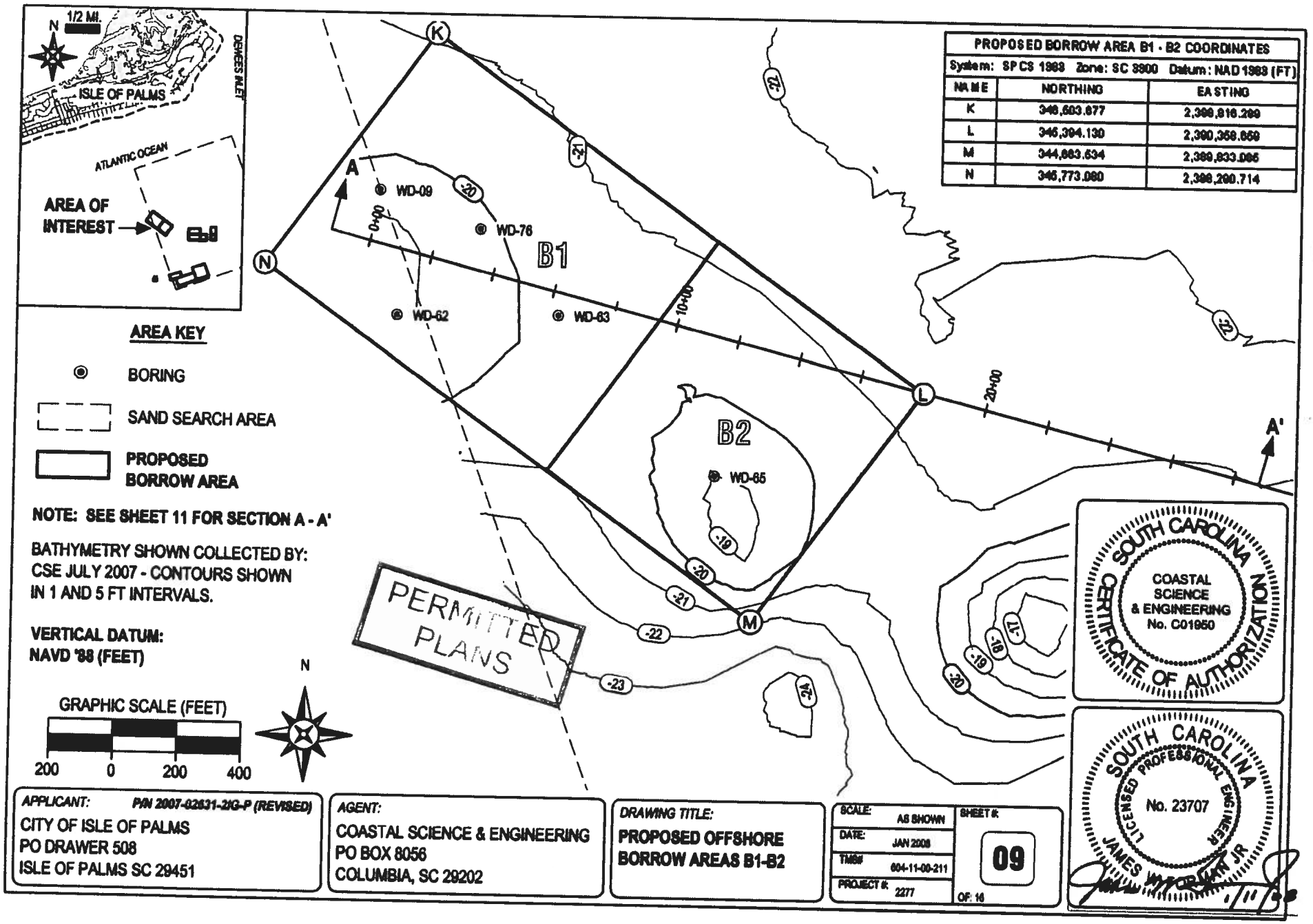
SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES [illegible] GRIMM, JR

APPLICANT: *P/N 2007-02631-2IG-P (REVISED)*
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

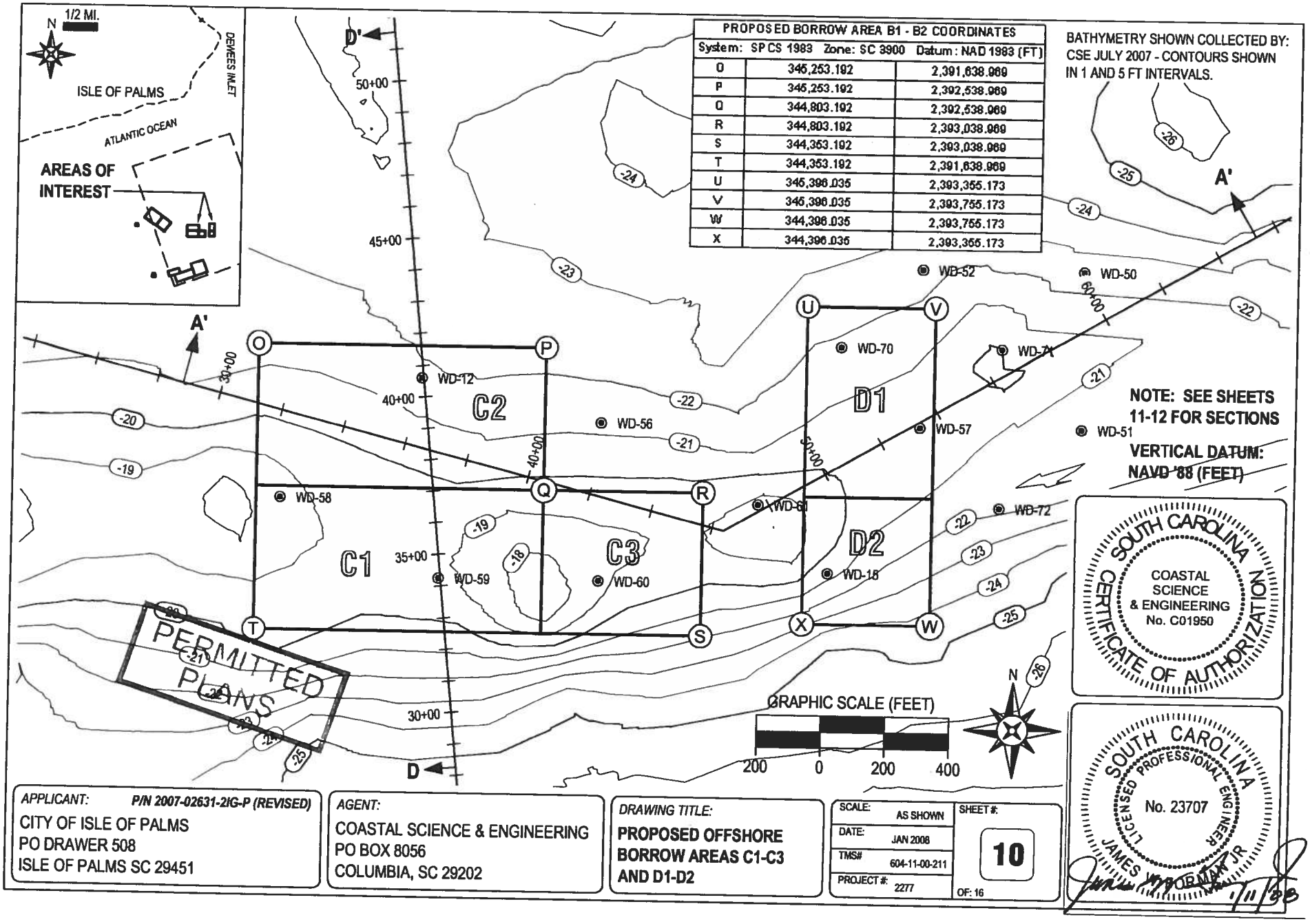
AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
PROPOSED OFFSHORE BORROW AREAS A1-A3

SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	604-11-00-211
PROJECT #:	2277
SHEET #:	08
OF:	16



APPLICANT:	P/N 2007-02631-2IG-P (REVISED)
CITY OF ISLE OF PALMS PO DRAWER 508 ISLE OF PALMS SC 29451	
AGENT:	
COASTAL SCIENCE & ENGINEERING PO BOX 8056 COLUMBIA, SC 29202	
DRAWING TITLE:	
PROPOSED OFFSHORE BORROW AREAS B1-B2	
SCALE: AS SHOWN	SHEET #: 09
DATE: JAN 2008	
TMS#: 004-11-00-211	
PROJECT #: 2277	OF: 16



PROPOSED BORROW AREA B1 - B2 COORDINATES		
System: SPCS 1983 Zone: SC 3900 Datum: NAD 1983 (FT)		
O	345,253.192	2,391,638.969
P	345,253.192	2,392,538.969
Q	344,803.192	2,392,538.969
R	344,803.192	2,393,038.969
S	344,353.192	2,393,038.969
T	344,353.192	2,391,638.969
U	345,396.035	2,393,355.173
V	345,396.035	2,393,755.173
W	344,396.035	2,393,755.173
X	344,396.035	2,393,355.173

BATHYMETRY SHOWN COLLECTED BY: CSE JULY 2007 - CONTOURS SHOWN IN 1 AND 5 FT INTERVALS.

NOTE: SEE SHEETS 11-12 FOR SECTIONS

VERTICAL DATUM: NAVD 88 (FEET)

SOUTH CAROLINA COASTAL SCIENCE & ENGINEERING No. C01950 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23707 JAMES W. PORMAK JR

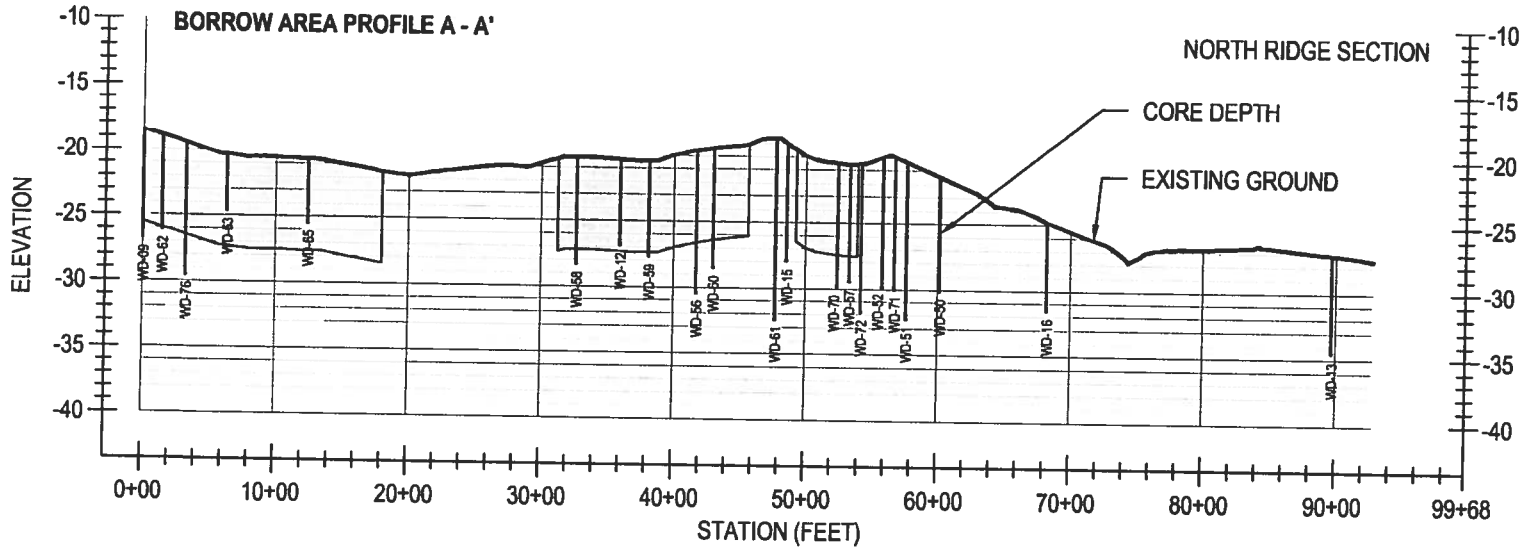
7/11/08

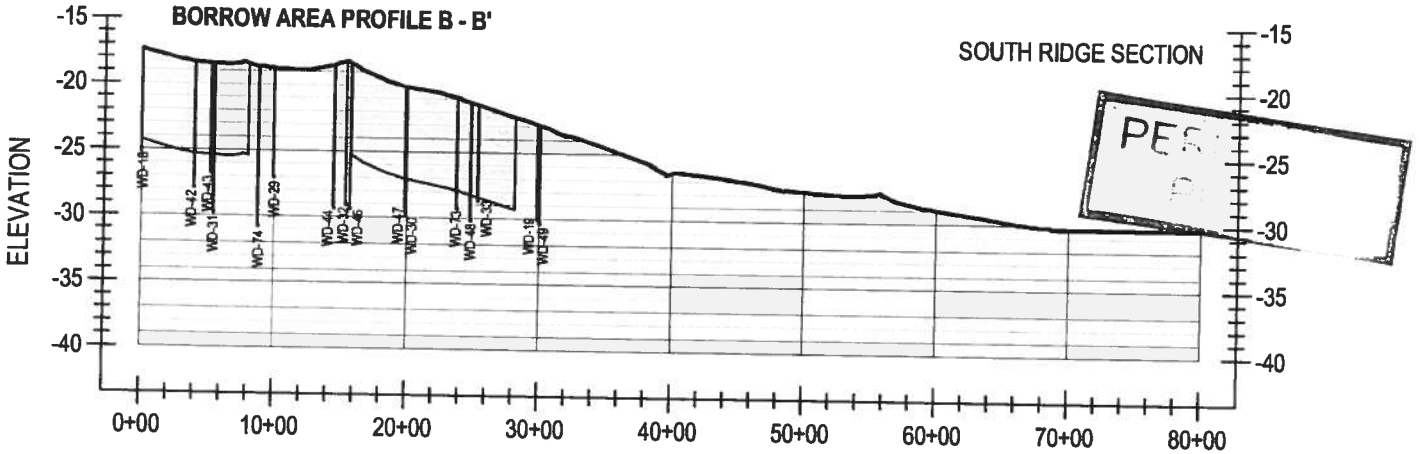
APPLICANT: ***P/N 2007-02631-2IG-P (REVISED)***
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
PROPOSED OFFSHORE BORROW AREAS C1-C3 AND D1-D2

SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	604-11-00-211
PROJECT #:	2277
SHEET #:	10
	OF: 16





SURVEY DATUM:

HORIZONTAL:
SPCS NAD 83 FEET
SC ZONE 3900

VERTICAL:
NAVD 1988 FEET
EXAGGERATION: 100

BATHYMETRY SHOWN COLLECTED BY:
CSE JULY 2007 - CONTOURS SHOWN
IN 1 AND 5 FT INTERVALS.

SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING
No. C01950
CERTIFICATE OF AUTHORIZATION

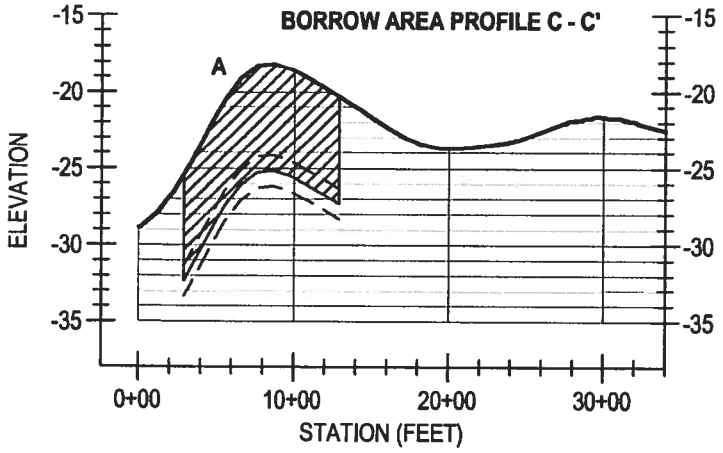
SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR
1/11/08

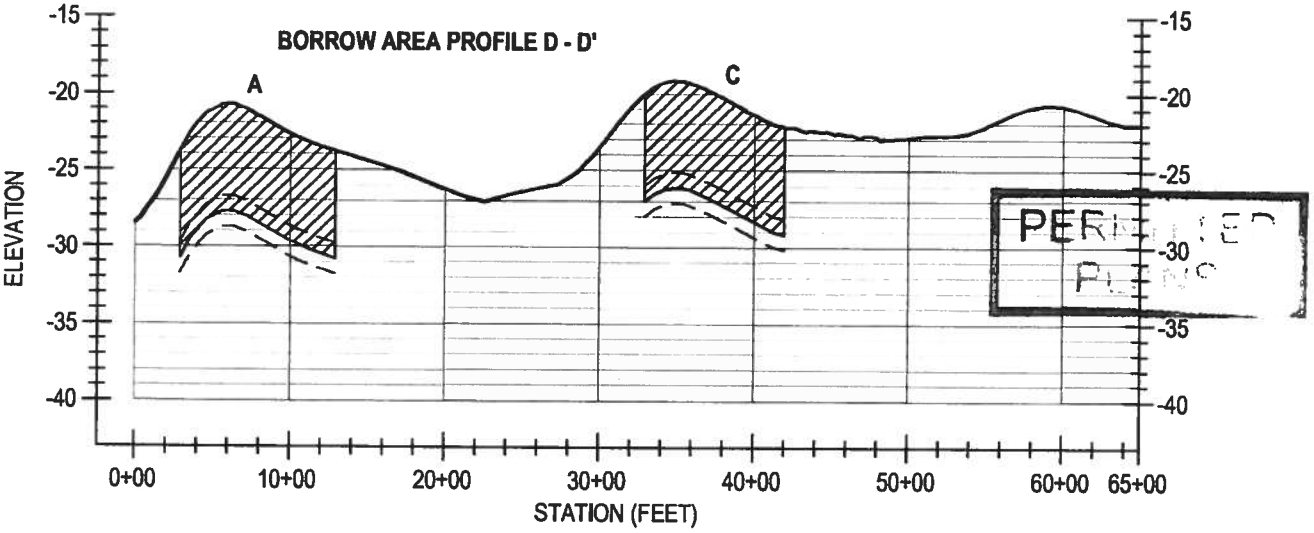
APPLICANT: ***P/N 2007-02631-2IG-P (REVISED)***
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
PROPOSED OFFSHORE BORROW AREA SECTIONS SECTIONS 1-2

SCALE: AS SHOWN	SHEET #: 11
DATE: NOV 2007	
TMS#: 604-11-00-211	
PROJECT #: 2277	OF: 16





LINE KEY

EXISTING GROUND

PROPOSED EXCAVATION

EXCAVATION ±1 FT

SURVEY DATUM:

HORIZONTAL:
SPCS NAD 83 FEET
SC ZONE 3900

VERTICAL:
NAVD 1988 FEET
EXAGGERATION: 100

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SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR.
11/11/08

APPLICANT: ***P/N 2007-02631-2IG-P (REVISED)***	CITY OF ISLE OF PALMS PO DRAWER 508 ISLE OF PALMS SC 29451
AGENT:	COASTAL SCIENCE & ENGINEERING PO BOX 8056 COLUMBIA, SC 29202
DRAWING TITLE:	**PROPOSED OFFSHORE BORROW AREA SECTIONS SECTIONS 1-2**
SCALE: AS SHOWN DATE: NOV 2007 TMS#: 604-11-00-211 PROJECT #: 2277	SHEET #: 12 OF: 16

SUMMARY SEDIMENT QUALITY MEASURES FOR THE RECOMMENDED OFFSHORE BORROW AREAS A1, A3, B1, C1 & D2		
PARAMETER	NATIVE BEACH SAMPLES (COMPOSITE)	BORROW AREA (COMPOSITES TO 8 FT)
MEAN GRAIN SIZE MM *	0.253 MM	0.408 MM
SORTING MM	0.523 MM	0.342 MM
PERCENT >2 MM	5	12.7
PERCENT SHELL >2 MM	~4.7	12.7
PERCENT SHELL <2 MM	~6.4	15.6
DOMINANT SHELL SPECIES	DONAX SP	DONAX SP
SEDIMENT DESCRIPTION	MEDIUM SAND	MEDIUM SAND

SOURCE: CSE. 2007. SHORELINE ASSESSMENT AND LONG-RANGE PLAN FOR BEACH RESTORATION ALONG THE NORTHEAST EROSION ZONE, ISLE OF PALMS, SOUTH CAROLINA. COASTAL SCIENCE & ENGINEERING, COLUMBIA, SC 74 PP. & CSE 2008, GEOTECHNICAL DATA REPORT, ISLE OF PALMS BEACH RESTORATION PROJECT, COASTAL SCIENCE & ENGINEERING, COLUMBIA, SC, IN PREPERATION.

* UNWEIGHTED

PERMITTED PLANS

Proposed Dredging Sub-Areas (7 ft Dredge Depth)							
Sub-Area	**Volume (cy)**	**Mz (mm)**	**% Mud**	**% Shell**	**% > 2 mm**	**% Shell < 2 mm**	**Core Density (acres/core)**
A1	235,000	0.373	1.9	26.5	12.4	14.1	4.1
A3	260,000	0.464	2.7	34.6	14.4	20.2	5.7
B1	255,000	0.409	3	21.1	10.1	11	4.7
C1	105,000	0.419	1.2	33.8	15.4	18.4	4.6
D2	40,000	0.289	2.9	32.6	11.9	20.7	3.7
Total (weighted by volume)	**895,000**	**0.411**	**2.4**	**28.4**	**12.65**	**15.6**	**4.75**

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

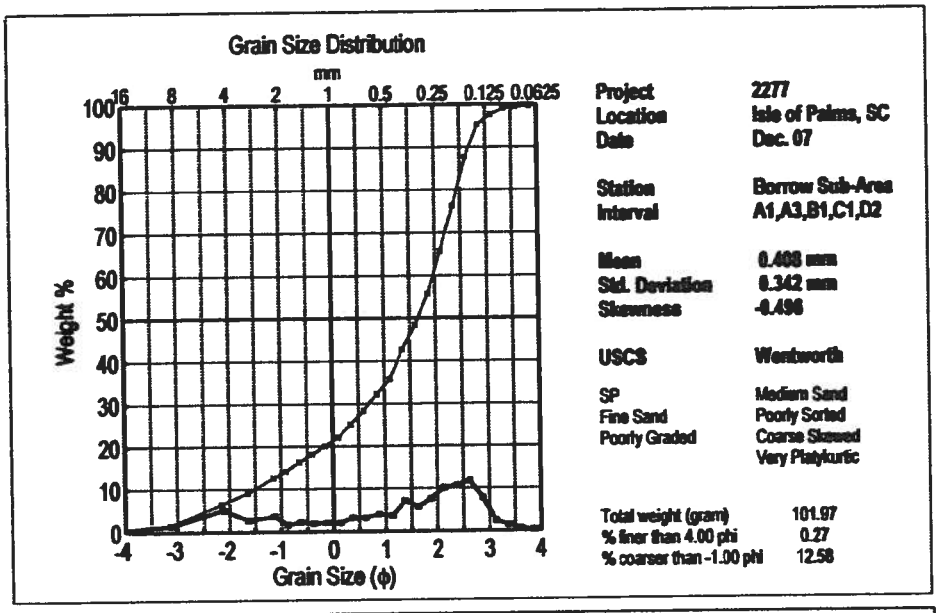
DRAWING TITLE:
SEDIMENT CHARACTERISTICS

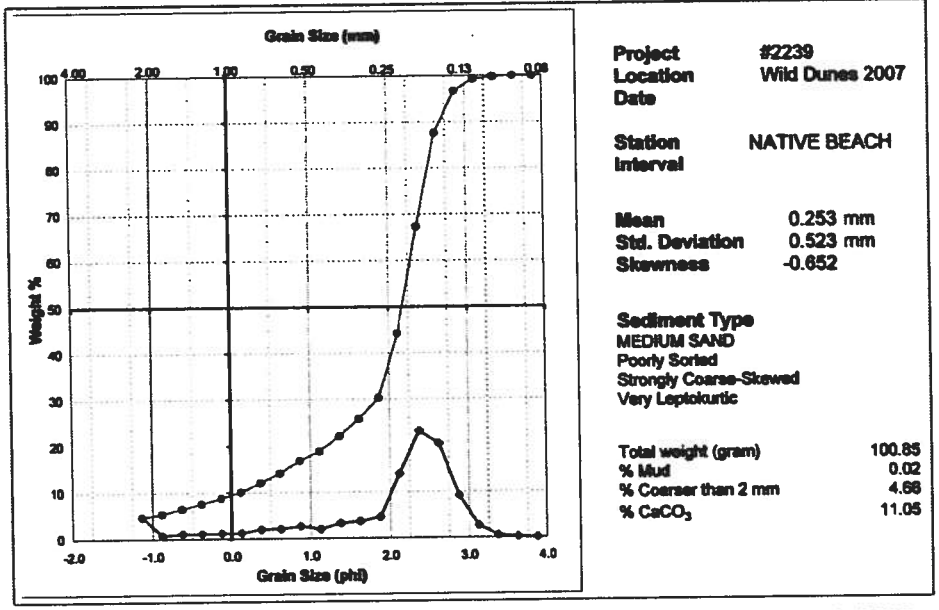
AGENT: ***P/N 2007-02631-2IG-P (REVISED)***
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN
DATE: JAN 2008
TMS# 604-11-00-211
PROJECT #: 2277
SHEET #: 13
OF: 16

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
COASTAL SCIENCE & ENGINEERING No. C01950

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR
1/11/08





SEDIMENT GRAIN-SIZE DISTRIBUTION FOR THE PROPOSED OFFSHORE BORROW SUB AREAS BASED ON A COMPOSITE SIZE DISTRIBUTION FROM SIX CORES TO A TARGET EXCAVATION THICKNESS OF ~8 FT. LOWER GRAPH SHOWS A REPRESENTATIVE NATIVE BEACH COMPOSITE FOR REACHES 2 AND 3 AT WILD DUNES.

PERMITTED PLANS

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT: *P/N 2007-02631-2/G-P (REVISED)*
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
SEDIMENT CHARACTERISTICS

SCALE: AS SHOWN	SHEET #: 14
DATE: JAN 2008	OF: 16
TMS# 604-11-00-211	
PROJECT #: 2277	

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
COASTAL SCIENCE & ENGINEERING
No. C01950

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. MORAN JR

Sediment Compatibility

Overfill ratios are Based on 2007 Beach Surface Samples and Proposed Borrow Area Cores.

		Mean Grain Size			Std.Dev			
		(mm)	(phi)		(mm)	(phi)		
Native Beach								
Beach Composite		0.253	1.984		0.523	0.935		

Offshore Borrow Area		Limits (feet)	Sediment	% Mud	Moment Measures		X	Y	Overfill Ratio	Overfill Ratio
2007 Borings	Sample ID		Description*		$M_{\phi b}$	$\sigma_{\phi b}$	$(M_{\phi b}-M_{\phi n})/\sigma_{\phi n}$	$\sigma_{\phi b}/\sigma_{\phi n}$	(RA)	RA + Mud
9	Comp 7'	0 - 7	FS,mws,c-s	1.23	2.153	0.694	0.18	0.74	1.77	1.78
12	Comp 7'	0 - 7	CS,ps,sym	1.00	0.729	1.920	-1.34	2.05	1.08	1.09
15	Comp 7'	0 - 7	MS,ps,sym	2.87	1.664	1.213	-0.34	1.30	1.04	1.07
18	Comp 7'	0 - 7	MS,ps,sym	1.00	1.070	1.678	-0.98	1.79	1.07	1.08
30	Comp 7'	0 - 7	CS,ps,sym	1.00	0.783	1.571	-1.28	1.68	1.03	1.04
31	Comp 7'	0 - 7	MS,ps,c-s	1.00	1.661	1.487	-0.34	1.59	1.13	1.14
32	Comp 7'	0 - 7	MS,ps,c-s	5.37	1.396	1.439	-0.63	1.54	1.06	1.12
33	Comp 7'	0 - 7	MS,ps,c-s	1.00	1.400	1.414	-0.62	1.51	1.06	1.07
42	Comp 7'	0 - 7	CS,ps,sym	1.38	0.696	1.742	-1.38	1.86	1.05	1.06
43	Comp 7'	0 - 7	MS,ps,c-s	0.96	1.473	1.455	-0.55	1.56	1.08	1.09
44	Comp 7'	0 - 7	MS,ps,c-s	1.14	1.212	1.621	-0.83	1.73	1.08	1.09
45	Comp 7'	0 - 7	MS,ps,c-s	1.19	1.370	1.509	-0.66	1.61	1.08	1.09
47	Comp 7'	0 - 7	MS,ps,c-s	1.84	1.254	1.642	-0.78	1.76	1.09	1.11
48	Comp 7'	0 - 7	MS,ps,sym	9.13	1.154	1.559	-0.89	1.67	1.06	1.15
57	Comp 7'	0 - 7	CS,ps,sym	2.03	0.667	1.781	-1.41	1.90	1.05	1.07
58	Comp 7'	0 - 7	MS,ps,sym	1.33	1.029	1.712	-1.02	1.83	1.07	1.09
59	Comp 7'	0 - 7	MS,ps,c-s	1.00	1.480	1.479	-0.54	1.58	1.09	1.09
60	Comp 7'	0 - 7	MS,ps,c-s	7.85	1.880	1.811	-0.11	1.94	1.28	1.36
62	Comp 7'	0 - 7	CS,ps,sym	3.38	0.751	1.510	-1.32	1.61	1.02	1.05
63	Comp 7'	0 - 7	CS,ps,sym	1.73	0.761	1.452	-1.31	1.55	1.01	1.03
65	Comp 7'	0 - 7	MS,ps,sym	3.20	1.053	1.826	-1.00	1.95	1.10	1.13
70	Comp 7'	0 - 7	MS,ps,sym	3.86	1.269	1.785	-0.77	1.91	1.12	1.16
73	Comp 7'	0 - 7	CS,ps,sym	1.18	0.952	1.580	-1.10	1.69	1.04	1.05
76	Comp 7'	0 - 7	MS,ps,c-s	5.21	1.287	1.721	-0.75	1.84	1.11	1.16
Composite	Borrow Area	0-7	MS,ps,c-s	2.5	1.220	1.594	-0.82	1.70	1.07	1.10
Composite	A1,A3,B1,C1,D2	0-7	MS,ps,c-s	2.4	1.294	1.517	-0.74	1.62	1.07	1.09

PERMITTED PLANS

SOUTH CAROLINA COASTAL SCIENCE & ENGINEERING No. C01950 CERTIFICATE OF AUTHORIZATION

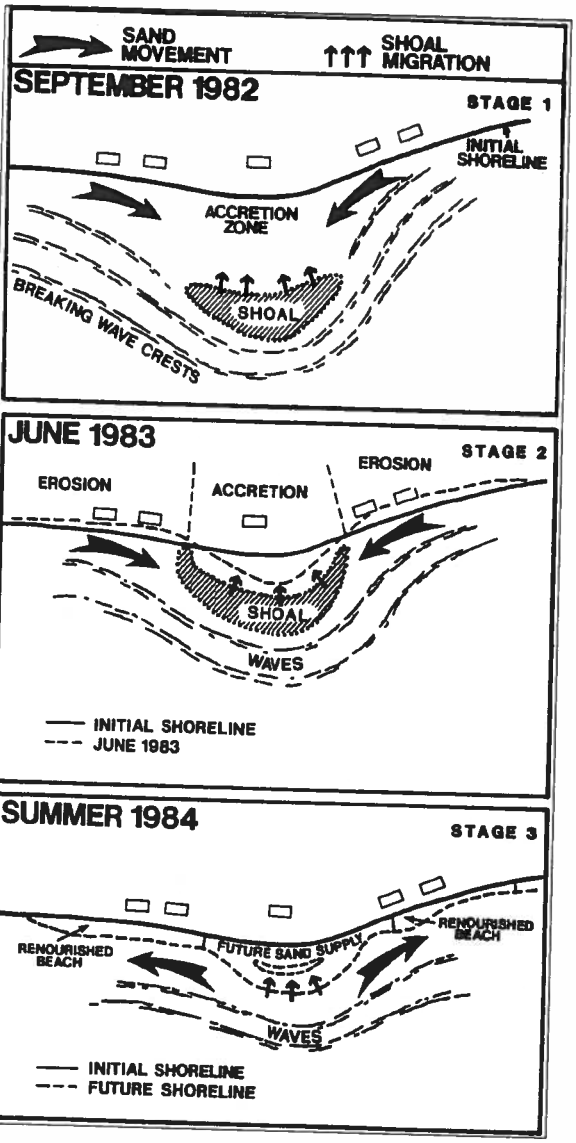
SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23707 JAMES W. FORMAN JR

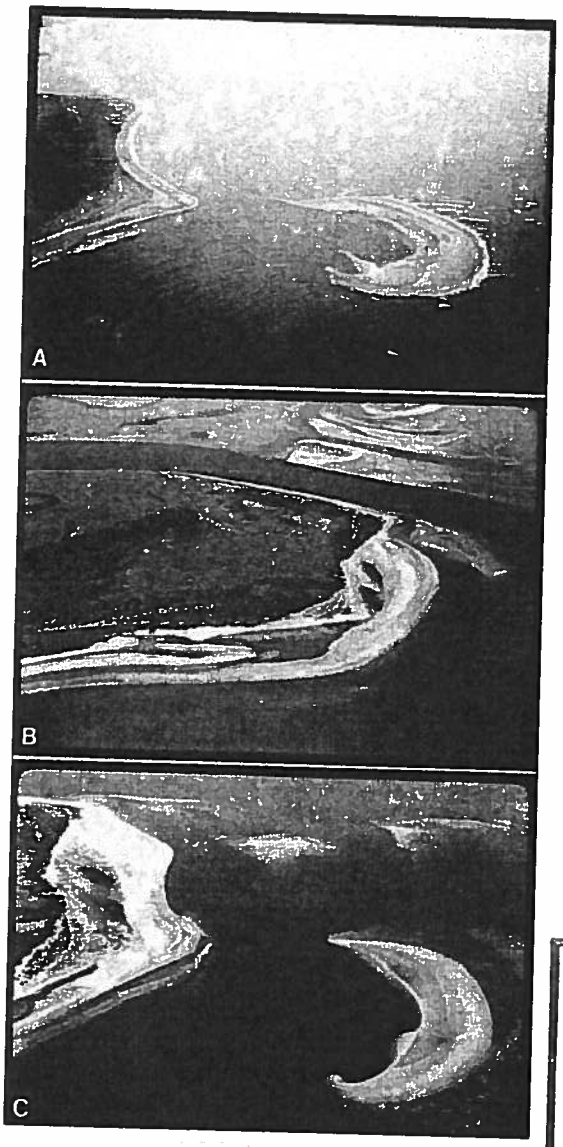
APPLICANT: P/N 2007-02631-2IG-P (REVISED)
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
SEDIMENT COMPATIBILITY

SCALE: AS SHOWN
DATE: JAN 2008
TMS#: 604-11-00-211
PROJECT #: 2277
SHEET #: 15 OF: 16





[LEFT] THE THREE STAGES OF SHOAL BYPASSING BASED ON A CASE STUDY AT DEWEES INLET/ISLE OF PALMS (AFTER KANA ET AL 1985). **[RIGHT]** SHOAL-BYPASS EVENT INVOLVING ~1 MILLION CUBIC YARDS OF SAND AT STONO INLET/KIAWAH ISLAND BETWEEN 1977(A) AND 1983 (B). A SUCCESSIVE EVENT BEGAN AROUND 1986 (C), CULMINATING IN ATTACHMENT AROUND 1990. VIEWS ARE LOOKING NORTH AT LOW TIDE. NOTE MAJOR CHANGES IN THE ADJACENT SHORELINE. SUCH LARGE SWINGS IN SHORELINE POSITION ARE COMMON AROUND ALL SOUTH CAROLINA INLETS. [FROM KANA ET AL 1999, FIG 6]

PERMITTED PLANS

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

DRAWING TITLE:
SHOAL BYPASSING STAGES

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN	SHEET #: 16
DATE: JAN 2008	OF: 16
TMS# 604-11-00-211	
PROJECT #: 2277	

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
COASTAL SCIENCE & ENGINEERING
No. C01950

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
176 Croghan Spur Road, Suite 200
Charleston, South Carolina 29407

February 28, 2008

Lt. Colonel J. Richard Jordan, III
District Engineer
U.S. Army Corps of Engineers
69A Hagood Avenue
Charleston, S.C. 29403-5107

Attn: Mary Hope Glenn

Re: Isle of Palms Beach Renourishment
Charleston County, SC
FWS Log No. 2008-F-0245

Dear Colonel Jordan:

This document is the U.S. Fish and Wildlife Service's (Service) biological opinion based on our review of the proposed beach renourishment along the shoreline of the Isle of Palms, Charleston County, South Carolina, and its effects on the loggerhead sea turtle (*Caretta caretta*), piping plover (*Charadrius melodus*), and sea-beach amaranth (*Amaranthus pumilus*) per section 7 of the Endangered Species Act (Act) of 1973, as amended (16 United States Code [U.S.C.] 1531 *et seq.*). Your January 18, 2008, request for formal consultation was received on January 24, 2008.

This biological opinion is based on information provided in the Isle of Palms biological assessment, the December 4, 2007, and December 12, 2007, meetings, other sources of information, and further communication with related parties. A complete administrative record of this consultation is on file at the Charleston Field Office, 176 Croghan Spur Road, Suite 200, Charleston, South Carolina 29407.

CONSULTATION HISTORY

December 4, 2007 – The Service received the Charleston District Corps of Engineers (Corps) and South Carolina Department of Health and Environmental Control Office of Ocean and Coastal Resource Management (SCDHEC-OCRM) joint public notice. The Service attended

a meeting with staff from the Corps, SCDHEC-OCRM, SCDHEC, NOAA-NMFS, and the South Carolina Department of Natural Resources (SCDNR) to discuss the public notice.

December 12, 2007–The Service attended a meeting with the applicant, consultant, and staff from the Corps, SCDHEC-OCRM, SCDHEC, NOAA-NMFS, and SCDNR to discuss the project.

January 24, 2008–The Service received the revised Charleston District Corps of Engineers (Corps) and South Carolina Department of Health and Environmental Control Office of Ocean and Coastal Resource Management (SCDHEC-OCRM) joint public notice.

February 19, 2008–The Service received the biological assessment for the project. The Service provided comments to the Corps regarding the project and acknowledged receipt of all information necessary to initiate formal consultation on the proposed action, as required in the regulations governing interagency consultations (50 (Code of Federal Regulations) [CFR] 402.14).

SPECIES PRESENT IN THE ACTION AREA

Table 1. Species evaluated for effects and those where the Service has concurred with a "not likely to be adversely affected" determination.

SPECIES	PRESENT IN ACTION AREA
Sea-beach amaranth	Possible
Piping plover	Possible
West Indian manatee	Possible

The above species are not likely to be adversely affected by this action because they are not likely to be or are not present in the action area. Therefore, they will not be discussed further in this biological opinion.

The Service has the responsibility for implementing recovery of sea turtles when they come ashore to nest. This opinion addresses nesting Loggerhead and Green sea turtles and hatchlings only, it does not address potential impacts of this project on sea turtles while in the open ocean. The National Oceanic and Atmospheric Administration-National Marine Fisheries Service (NOAA-NMFS) has jurisdiction over sea turtles in the marine environment.

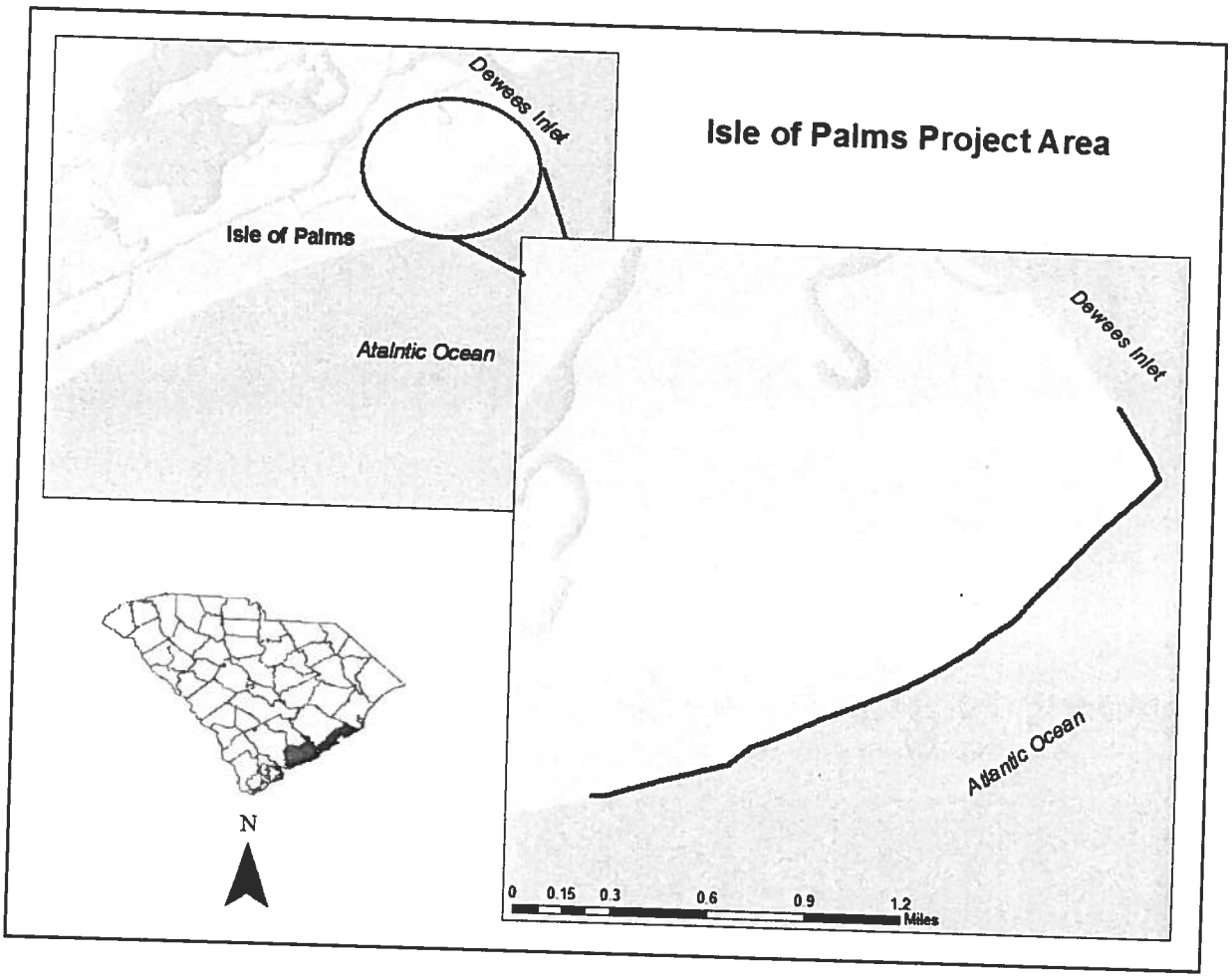
BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The proposed action is a beach nourishment project along the northeast end of the Isle of Palms located in Charleston County. Work will include placement via hydraulic dredge of up to 885,000 cubic yards (cy) of beach-quality sediment along the ocean shoreline. The

overall project length is 13,785 linear feet (2.7 miles). The project extends from 47th Avenue to an existing groin along Dewees Inlet. The borrow source will be a series of off-shore shoals situated ~2-3 miles south of Dewees Inlet.

Figure 1. Isle of Palms Renourishment Project Area



Conservation Measures

The applicant has agreed to complete construction of the project prior to August 1, 2008, in order to minimize disorientation of sea turtle hatchlings that may occur as a result of lighting associated with night construction. Any remaining work would be completed after the 2008 sea turtle season and prior to the 2009 sea turtle season (November 1, 2008, through April 30, 2009).

Action Area

The Service has described the action area to include the four contiguous reaches where sand will be deposited, the borrow sites, and the areas in between the reaches and borrow sites for reasons that will be explained and discussed in the 'Effects of the Action' section of this consultation.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle (*Caretta caretta*), listed as a threatened species on July 28, 1978, (Service 1978), inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. Loggerhead sea turtles nest within the continental U.S. from Louisiana to Virginia. Major nesting concentrations in the U.S. occur on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (Hopkins and Richardson, 1984).

The loggerhead sea turtle grows to an average weight of about 200 pounds and is characterized by a large head with blunt jaws. Adults and subadults have a reddish-brown carapace. Scales on the top of the head and top of the flippers are also reddish-brown with yellow on the borders. Hatchlings are a dull brown color (NOAA-NMFS, 2002a). The loggerhead feeds on mollusks, crustaceans, fish, and other marine animals.

Major loggerhead sea turtle nesting beaches are located in the Sultanate of Oman, southeastern U.S., and eastern Australia. The species is widely distributed within its range. It may be found hundreds of miles out to sea, as well as in inshore areas such as bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Coral reefs, rocky places, and ship wrecks are often used as feeding areas. Nesting occurs mainly on open beaches or along narrow bays having suitable sand, and often in association with other species of sea turtles.

Recovery Criteria for the United States

The southeastern U.S. population of the loggerhead can be considered for delisting where, over a period of 25 years, the following conditions are met:

1. The adult female population in Florida is increasing and in North Carolina, South Carolina, and Georgia, it has returned to pre-listing levels (NC - 800, SC - 10,000, and GA - 2,000 nests per season). The above conditions must be met with the data from standardized surveys which would continue for at least five years after delisting.

2. At least 25 percent (348 miles) of all available nesting beaches (1,400 miles) are in public ownership, distributed over the entire nesting range and encompassing at least 50 percent of the nesting activity in each state.

3. All priority one tasks identified in the recovery plan have been successfully implemented.

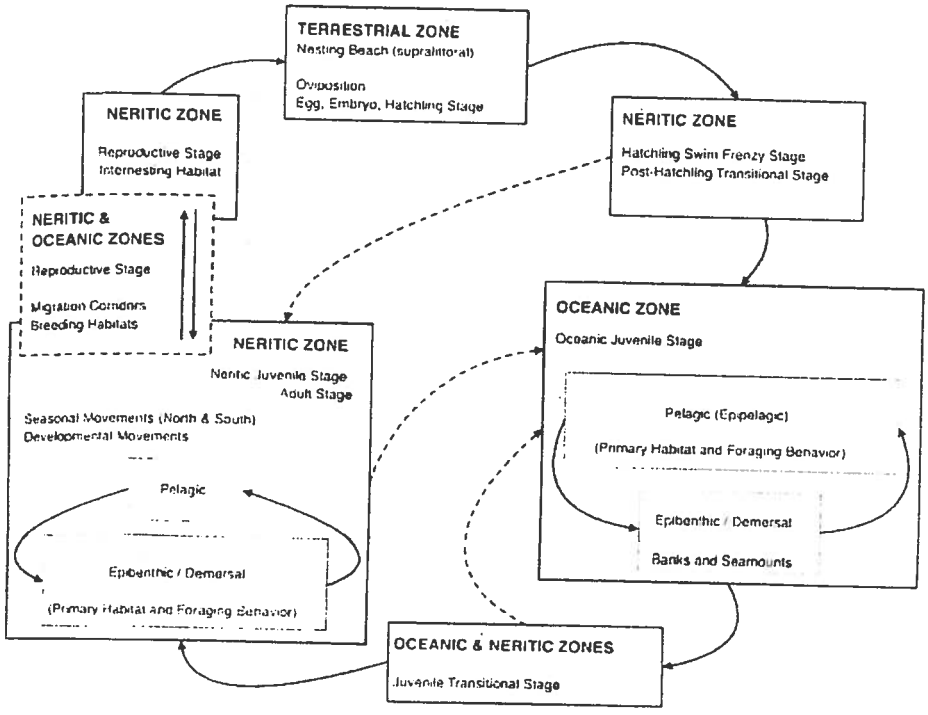
No critical habitat has been designated for the loggerhead sea turtle.

Life history (growth, life span, survivorship and mortality)

Loggerhead Sea Turtle

Loggerheads are known to nest from one to seven times within a nesting season (Talbert *et al.*, 1980; Richardson and Richardson, 1982; Lenarz *et al.*, 1981, among others); the mean is about 4.1 (Murphy and Hopkins, 1984). The interval between nesting events within a season varies around a mean of about 14 days (Dodd, 1988). Mean clutch size varies from about 100 to 126 eggs along the southeastern United States coast (NOAA-NMFS and Service, 1991b). Nesting migration intervals of 2 to 3 years are most common in loggerheads, but the number can vary from 1 to 7 years (Dodd, 1988). Age at sexual maturity is believed to be about 20 to 30 years (Turtle Expert Working Group, 1998).

Figure 2. Life history stages of a loggerhead turtle (Bolten, 2003).



Population dynamics

Loggerhead Sea Turtle

Total estimated nesting in the southeast United States is about 50,000 to 90,000 nests per year (FWC statewide nesting database 2004, Georgia Department of Natural Resources statewide nesting database 2004, SCDNR statewide nesting database 2004, North Carolina Wildlife Resources Commission statewide nesting database 2004). In 1998, 85,988 nests were documented in Florida alone. However, in 2001, 2002, 2003, and 2004, this number dropped to 69,657, 62,905, 56,852, and 47,173, respectively. An analysis of nesting data from the Florida Index Nesting Beach Survey (INBS) Program from 1989 to 2004, a period encompassing index surveys that are more consistent and more accurate than surveys in previous years, has shown no detectable trend but, more recently (1998 through 2004), has shown evidence of a declining trend (Witherington, 2005, personal communication). Given inherent annual fluctuations in nesting and the short time period over which the decline has been noted, caution is warranted in interpreting the decrease in terms of nesting trends.

From a global perspective, the southeastern U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to that which nests on islands in the Arabian Sea off Oman (Ross, 1982; Ehrhart, 1989; NOAA-NMFS and Service, 1991b). The status of the Oman loggerhead nesting population, reported to be the largest in the world (Ross, 1979), is uncertain because of the lack of long-term standardized nesting or foraging ground surveys and its vulnerability to increasing development pressures near major nesting beaches and threats from fisheries interactions on foraging grounds and migration routes (Possardt, 2005, personal communication). The loggerhead nesting aggregations in Oman, the southeastern U.S., and Australia have been estimated to account for about 88 percent of nesting worldwide (NOAA-NMFS and Service, 1991b). About 80 percent of loggerhead nesting in the southeastern U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward counties) (NOAA-NMFS and Service, 1991b).

Status and distribution

Loggerhead Sea Turtle

Genetic research involving analysis of mitochondrial DNA has identified five different loggerhead subpopulations/nesting aggregations in the western North Atlantic: (1) the Northern Subpopulation occurring from North Carolina to around Cape Canaveral, Florida (about 29° N.); (2) South Florida Subpopulation occurring from about 29° N. on Florida's east coast to Sarasota on Florida's west coast; (3) Dry Tortugas, Florida, Subpopulation, (4) Northwest Florida Subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and (5) Yucatán Subpopulation occurring on the eastern Yucatán Peninsula, Mexico (Bowen, 1994, 1995; Bowen *et al.*, 1993; Encalada *et al.*, 1998; Pearce, 2001). These data indicate that gene flow between these five regions is very low. If nesting females

are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting subpopulation.

The Northern Subpopulation has declined substantially since the early 1970s. Recent estimates of loggerhead nesting trends from standardized daily beach surveys showed significant declines ranging from 1.5% to 1.9% annually (Dodd, 2005, personal communication). Nest totals from aerial surveys conducted by the SCDNR showed a 3.3% annual decline in nesting since 1980. Overall, there is strong statistical evidence to suggest the Northern Subpopulation has sustained a long-term decline.

Data from all beaches where nesting activity has been recorded indicate that the South Florida Subpopulation has shown significant increases over the last 25 years. However, an analysis of nesting data from the Florida Index Nesting Beach Survey (INBS) Program from 1989 to 2002 (a period encompassing index surveys that are more consistent and more accurate than surveys in previous years), has shown no detectable trend and, more recently (1998 through 2002), has shown evidence of a declining trend (Witherington, 2003, personal communication.). Given inherent annual fluctuations in nesting and the short time period over which the decline has been noted, caution is warranted in interpreting the decrease in terms of nesting trends.

A near census of the Florida Panhandle Subpopulation undertaken from 1989 to 2002 reveals a mean of 1,028 nests per year, which equates to about 251 females nesting per year (Florida FWC, 2003). Evaluation of long-term nesting trends for the Florida Panhandle Subpopulation is difficult because of changed and expanded beach coverage. Although there are now 8 years (1997-2004) of INBS data for the Florida Panhandle Subpopulation, the time series is too short to detect a trend (Witherington, FWC, personal communication, 2005).

A near census of the Dry Tortugas Subpopulation undertaken from 1995 to 2001 reveals a mean of 213 nests per year, which equates to about 50 females nesting per year (Florida Fish and Wildlife Conservation Commission, 2003). The trend data for the Dry Tortugas Subpopulation are from beaches that were not included in Florida's INBS program prior to 2004 but have moderately good monitoring consistency. There are 7 continuous years (1995-2001) of data for this Subpopulation, but the time series is too short to detect a trend (Witherington, 2005, personal communication).

Nesting surveys in the Yucatán Subpopulation has been too irregular to date to allow for a meaningful trend analysis (Turtle Expert Working Group 1998, 2000). Anthropogenic (human) factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, armoring and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; and poaching. An increased human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs, and an increased presence of native species (e.g., raccoons, armadillos, and opossums), which raid

and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the western North northwest Atlantic coast, other areas along these coasts have limited or no protection.

Loggerhead turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; poaching, and fishery interactions. In the pelagic environment, loggerheads are exposed to a series of longline fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various fleets in the Mediterranean Sea (Aguilar *et al.*, 1995; Bolten *et al.*, 1994; Crouse, 1999). There is particular concern about the extensive incidental take of juvenile loggerheads in the eastern Atlantic by longline fishing vessels. In the benthic environment in waters off the coastal U.S., loggerheads are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gillnet, pound net, longline, dredge, and trap fisheries

Common threats loggerhead sea turtles in South Carolina

Coastal development, light pollution, and unsuitable material deposited on beaches has increasingly modified sea turtle nesting habitat in South Carolina over the years.

Analysis of the species/critical habitat likely to be affected

The proposed action may adversely affect nesting females, nests, and hatchlings within the proposed project area. The effects of the proposed action on sea turtles will be considered further in the remaining sections of this biological opinion. Potential effects include destruction of nests deposited within the boundaries of the proposed project, harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities, disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting, behavior modification of nesting females due to escarpment formation within the project area during a nesting season resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs. The quality of the placed sand could affect the ability of female turtles to nest, the suitability of the nest incubation environment, and the ability of hatchlings to emerge from the nest.

Critical habitat has not been designated in the continental United States; therefore, the proposed action would not result in an adverse modification.

ENVIRONMENTAL BASELINE

Status of the species within the Action Area

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for South Carolina extends from May 1 through October 31. Incubation ranges from about 45 to 60 days.

Loggerhead sea turtle nesting within the project area averages 9.4 nests per year based on a eight year average (SCDNR).

Table 2. Loggerhead Nesting History in Action Area of the Isle of Palms Renourishment Project

Year	Number of Nests
2000	7
2001	2
2003	4
2004	3
2005	15
2006	3
2007	4

Factors affecting the species environment within the action area

Coastal development, light pollution, and sandbags affect sea turtles' nesting environment within the action area.

EFFECTS OF THE ACTION

This section is an analysis of the beneficial, direct and indirect effects of the proposed action on nesting sea turtles, nests, eggs, and hatchling sea turtles within the Action Area. The analysis includes effects interrelated and interdependent of the project activities. An interrelated activity is an activity that is part of a proposed action and depends on the proposed activity. An interdependent activity is an activity that has no independent utility apart from the action.

Factors to be considered

Proximity of the action

The proposed project is in the immediate vicinity of habitats important to nesting sea turtles

Distribution

Disturbance activities that will impact sea turtles will primarily occur on the Atlantic shoreline of the Isle of Palms. As mobile species, sea turtles may also be affected in nearby waterways and on adjacent islands by intraspecific competition, excessive energy expenditure, and marginally suitable habitat selection.

Timing

The timing of the proposed project will result in direct impacts occurring during sea turtle nesting seasons.

Nature of the Effect

The effects of the action may destroy habitat and alter, or diminish the nesting success of sea turtles. Any reduction in productivity and/or survival rates will contribute to a vulnerability to extinction in sea turtles.

Duration

The duration of the direct impacts resulting from construction operations may continue through two sea turtle nesting seasons. Indirect impacts can last several years depending on sand compaction and escarpments.

Analyses for effects of the action

Beneficial Effects

The placement of sand on a beach with reduced dry fore-dune habitat may increase sea turtle nesting habitat if the placed sand is highly compatible (i.e., grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project. In addition, a nourished beach that is designed and constructed to mimic a natural beach system may be more stable than the eroding one it replaces, thereby benefiting sea turtles.

Direct Effects

Direct effects are those direct or immediate effects of a project on the species or its habitat. Placement of sand on a beach in and of itself may not provide suitable nesting habitat for sea turtles. Although beach nourishment may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during project construction. Nourishment during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings and, along with other mortality sources, may significantly impact the long-term survival of the species. For

instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program would reduce these impacts, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, and/or tides) or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best of conditions, about 7 percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder, 1994).

1. *Nest relocation*

Besides the potential for missing nests during a nest relocation program, there is a potential for eggs to be damaged by nest movement or relocation, particularly if eggs are not relocated within 12 hours of deposition (Limpus *et al.*, 1979). Nest relocation can have adverse impacts on incubation temperature (and hence sex ratios), gas exchange parameters, hydric environment of nests, hatching success, and hatchling emergence (Limpus *et al.*, 1979; Ackerman, 1980; Parmenter, 1980; Spotila *et al.*, 1983; McGehee, 1990). Relocating nests into sands deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard *et al.*, 1984), mobilization of calcium (Packard and Packard, 1986), mobilization of yolk nutrients (Packard *et al.*, 1985), hatchling size (Packard *et al.*, 1981; McGehee, 1990), energy reserves in the yolk at hatching (Packard *et al.*, 1988), and locomotory ability of hatchlings (Miller *et al.*, 1987).

In a 1994 Florida study comparing loggerhead hatching and emergence success of relocated nests with *in situ* nests, Moody (1998) found that hatching success was lower in relocated nests at 9 of 12 beaches evaluated. She also found emergence success was lower in relocated nests at 10 of 12 beaches surveyed in 1993 and 1994.

2. *Equipment*

The placement of pipelines and the use of heavy machinery on the beach during a construction project may also have adverse effects on sea turtles. They can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditure.

3. *Artificial lighting*

Visual cues are the primary sea-finding mechanism for hatchling sea turtles (Mrosovsky and Carr, 1967; Mrosovsky and Shettleworth, 1968; Dickerson and Nelson, 1989; Witherington and Bjorndal, 1991). When artificial lighting is present on or near the beach, it can misdirect hatchlings once they emerge from their nests and prevent them from reaching the ocean (Philibosian, 1976; Mann, 1977; FWC sea turtle disorientation database). In addition, a significant reduction in sea turtle nesting activity has been documented on beaches illuminated with artificial lights (Witherington, 1992). Therefore, construction lights along a project beach and on the dredging vessel may deter females from coming ashore to nest,

misdirect females trying to return to the surf after a nesting event, and misdirect emergent hatchlings from adjacent non-project beaches. Any source of bright lighting can profoundly affect the orientation of hatchlings, both during the crawl from the beach to the ocean and once they begin swimming offshore. Hatchlings attracted to light sources on dredging barges may not only suffer from interference in migration, but may also experience higher probabilities of predation to predatory fishes that are also attracted to the barge lights. This impact could be reduced by using the minimum amount of light necessary (may require shielding) or low pressure sodium lighting during project construction.

Beach nourishment projects create a wider and higher beach. The newly created beach berm also exposes sea turtles and their nests to lights that were less visible, or not at all visible, from nesting areas before the beach nourishment. Following a beach nourishment project in Brevard County, Florida, completed in the spring of 2001, up to 70 percent of the hatchlings from nests located along the restored beach were disoriented. Reducing beachfront lighting is the most effective method to decrease the number of disorientations on a restored beach. Changing to sea turtle compatible lighting can be easily accomplished at the local level through voluntary compliance or by adopting appropriate regulations. Of the 64 coastal counties in Florida, 17 have passed beachfront lighting ordinances in addition to 47 municipalities.

Indirect Effects

Indirect effects are those effects that are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Effects from the proposed project may continue to affect sea turtle nesting on the project beach and adjacent beaches in future years.

Many of the direct effects of beach nourishment may persist over time and become indirect impacts. These indirect effects include increased susceptibility of relocated nests to catastrophic events, the consequences of potential increased beachfront development, changes in the physical characteristics of the beach, the formation of escarpments, and future sand migration.

1. *Increased susceptibility to catastrophic events*
Nest relocation may concentrate eggs in an area making them more susceptible to catastrophic events. Hatchlings released from concentrated areas also may be subject to greater predation rates from both land and marine predators, because the predators learn where to concentrate their efforts (Glenn, 1998; Wyneken *et al.*, 1998).

2. *Increased beachfront development*
Pilkey and Dixon (1996) state that beach replenishment frequently leads to more development in greater density within shorefront communities that are then left with a future of further replenishment or more drastic stabilization measures. Dean (1999) also notes that the very existence of a beach nourishment project can encourage more development in coastal areas. Following completion of a beach nourishment project in Miami during 1982,

investment in new and updated facilities substantially increased tourism there (National Research Council, 1995). Increased building density immediately adjacent to the beach often resulted as older buildings were replaced by much larger ones that accommodated more beach users. Overall, shoreline management creates an upward spiral of initial protective measures resulting in more expensive development which leads to the need for more and larger protective measures. Increased shoreline development may adversely affect sea turtle nesting success. Greater development may support larger populations of mammalian predators, such as foxes and raccoons, than undeveloped areas (National Research Council, 1990a), and can also result in greater adverse effects due to artificial lighting, as discussed above.

3. *Changes in the physical environment*

Beach nourishment may result in changes in sand density (compaction), beach shear resistance (hardness), beach moisture content, beach slope, sand color, sand grain size, sand grain shape, and sand grain mineral content if the placed sand is dissimilar from the original beach sand (Nelson and Dickerson, 1988a). These changes could result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings (Nelson and Dickerson, 1987; Nelson, 1988).

Beach compaction and unnatural beach profiles that may result from beach nourishment activities could negatively impact sea turtles regardless of the timing of projects. Very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson *et al.*, 1987; Nelson and Dickerson, 1988a). Significant reductions in nesting success (i.e., false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Fletemeyer, 1980; Raymond, 1984; Nelson and Dickerson, 1987; Nelson *et al.*, 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests and also cause increased physiological stress to the animals (Nelson and Dickerson, 1988b). Nelson and Dickerson (1988c) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more.

These impacts can be minimized by using suitable sand and by tilling compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson, 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that a tilled nourished beach will remain uncompacted for up to 1 year. Multi-year beach compaction monitoring and, if necessary, tilling, would ensure that project impacts on sea turtles are minimized.

A change in sediment color on a beach could change the natural incubation temperatures of nests in an area, which, in turn, could alter natural sex ratios. To provide the most suitable sediment for nesting sea turtles, the color of the nourished sediments must resemble the

natural beach sand in the area. Natural reworking of sediments and bleaching from exposure to the sun would help to lighten dark nourishment sediments; however, the timeframe for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

4. *Escarpment formation*
On nourished beaches, steep escarpments may develop along their water line interface as they adjust from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center, 1984; Nelson *et al.*, 1987). These escarpments can hamper or prevent access to nesting sites (Nelson and Blihovde, 1998). Researchers have shown that female turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (e.g., in front of the escarpments, which often results in failure of nests due to prolonged tidal inundation). This impact can be minimized by leveling any escarpments prior to the nesting season.

5. *Erosion*
Future sand displacement on nesting beaches is a potential effect of the nourishment project. Dredging of sand offshore from a project area has the potential to cause erosion of the newly created beach or other areas on the same or adjacent beaches by creating a sand sink. The remainder of the system responds to this sand sink by providing sand from the beach to attempt to reestablish equilibrium (National Research Council, 1990b).

Species' response to a proposed action

Ernest and Martin (1999) conducted a comprehensive study to assess the effects of beach nourishment on loggerhead sea turtle nesting and reproductive success. The following findings illustrate sea turtle responses to and recovery from a nourishment project. A significantly larger proportion of turtles emerging on nourished beaches abandoned their nesting attempts than turtles emerging on Control or pre-nourished beaches. This reduction in nesting success was most pronounced during the first year following project construction and is most likely the result of changes in physical beach characteristics associated with the nourishment project (e.g., beach profile, sediment grain size, beach compaction, frequenCY and extent of escarpments). During the first post-construction year, the time required for turtles to excavate an egg chamber on the untilled, hard-packed sands of one treatment area increased significantly relative to Control and background conditions. However, in another treatment area, tilling was effective in reducing sediment compaction to levels that did not significantly prolong digging times. As natural processes reduced compaction levels on nourished beaches during the second post-construction year, digging times returned to background levels.

During the first post-construction year, nests on the nourished beaches were deposited significantly seaward of the toe of the dune and significantly landward of the tide line than nests on Control beaches. This indicates that the nests were laid in the middle of the beach

and not clustered near the dune as they were in the Control. As the width of nourished beaches decreased during the second year, among-treatment differences in nest placement diminished. More nests were washed out on the wide, flat beaches of the nourished treatments than on the narrower steeply sloped beaches of the Control. This phenomenon persisted through the second post-construction year monitoring and resulted from the placement of nests near the seaward edge of the beach berm where dramatic profile changes, caused by erosion and scarping, occurred as the beach equilibrated to a more natural contour.

Ernest and Martin (1999), as with other beach nourishment projects, found that the principal effect of nourishment on sea turtle reproduction was a reduction in nesting success during the first year following project construction. Although most studies have attributed this phenomenon to an increase in beach compaction and escarpment formation, Ernest and Martin indicate that changes in beach profile may be more important. Regardless, as a nourished beach is reworked by natural processes in subsequent years and adjusts from an unnatural construction profile to a more natural beach profile, beach compaction and the frequency of escarpment formation decline, and nesting and nesting success return to levels found on natural beaches.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of any cumulative effects in the project area.

CONCLUSION

After reviewing the current status of the loggerhead sea turtle, the environmental baseline for the action area, the effects of the proposed beach nourishment, and the cumulative effects, it is the Service's biological opinion that the beach nourishment project, as proposed, is not likely to jeopardize the continued existence of the loggerhead sea turtle and is not likely to destroy or adversely modify designated critical habitat. No critical habitat has been designated for the loggerhead sea turtle in the continental United States; therefore, none will be affected.

The proposed project will affect 2.7 miles of the about 1,400 miles of available sea turtle nesting habitat in the southeastern U.S. Research has shown that the principal effect of beach nourishment on sea turtle reproduction is a reduction in nesting success, and this reduction is most often limited to the first year following project construction. Research has also shown that the impacts of a nourishment project on sea turtle nesting habitat are typically short-term because a nourished beach will be reworked by natural processes in subsequent years, and beach compaction and the frequency of escarpment formation will decline. Although a variety of factors, including some that cannot be controlled, can influence how a nourishment

project will perform from an engineering perspective, measures can be implemented to minimize impacts to sea turtles.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service anticipates 2.7 miles of nesting beach habitat could be taken as a result of this proposed action; however, incidental take of sea turtles will be difficult to detect for the following reasons:

(1) the turtles nest primarily at night and all nests are not found because
    [a] natural factors, such as rainfall, wind, and tides may obscure crawls and
    [b] human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program;
(2) the total number of hatchlings per undiscovered nest is unknown;

(3) the reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown;
(4) an unknown number of females may avoid the project beach and be forced to nest in a less than optimal area;
(5) lights may misdirect an unknown number of hatchlings and cause death; and
(6) escarpments may form and cause an unknown number of females from accessing a suitable nesting site.

However, the level of take of these species can be anticipated by the disturbance and nourishment of suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) beach nourishment will likely occur during a portion of the nesting season; (3) the nourishment project will modify the incubation substrate, beach slope, and sand compaction; and (4) artificial lighting will deter and/or misdirect nesting females and hatchlings.

The take is expected to be in the form of: (1) destruction of some nests and eggs that may be constructed and eggs that may be missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of some nests deposited after the nest survey and relocation program is completed within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities; (5) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service.

Table 3 below represents the level of take that could occur if the reasonable and prudent measures were not implemented. According to Schroeder (1994), there is an average survey error of seven percent; therefore, there is the possibility that some nests in the project area may be missed. However, due to implementation of the sea turtle protection measures, we anticipate that the take will not exceed seven percent of the nesting average in the project area. This number is not the level of take exempted because the exact number cannot be predicted nor can the level of incidental take be monitored.

Table 3. The average number of sea turtle nests that will be taken, based on the best available commercial and scientific information.

SPECIES	NESTS*	TAKE TYPE	CRITICAL HABITAT AFFECTED
loggerhead sea turtle	9.4	harm/harassment	none

Table 4 represents the amount of turtle nesting habitat that will be affected by the project.

Table 4. Monitoring the incidental take for the proposed project will be done by amount of habitat affected

SPECIES	CRITICAL HABITAT AFFECTED	HABITAT AFFECTED
loggerhead sea turtle	none	2.7 miles of nesting

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. Critical habitat has not been designated in the project area; therefore, the project will not result in destruction or adverse modification of critical habitat.

Incidental take of nesting and hatchling sea turtles is anticipated to occur during the project construction and during the life of the project. The take will occur on nesting habitat consisting of the length of the beach where the restoration material will be placed.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of loggerhead sea turtles in the proposed beach restoration Action Area.

1. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence must be used for the beach nourishment project. Any unsuitable material placed in the project area will be removed (rock, silts, and fines).

2. If the beach nourishment project will be conducted during the sea turtle nesting season, the applicant must hire qualified personnel to survey for nesting sea turtles daily before daytime work activities begin. If nests are constructed in the area of beach nourishment, the eggs must be relocated to minimize sea turtle nest burial, crushing of eggs, or nest excavation. The applicant must also hire qualified personnel to monitor the project area nightly.

3. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, beach compaction must be monitored and tilling must be conducted as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

4. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, monitoring must be conducted to determine if escarpments are present and escarpments must be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

5. The applicant must ensure that contractors doing the beach nourishment work fully understand the sea turtle protection measures detailed in this incidental take statement.

6. During the sea turtle nesting season, construction equipment and materials must be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable.

7. During the May, June, and July, lighting associated with the project must be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles.

8. No work will occur between August 1 and October 31, 2008, in order to minimize disrupting and/or disorienting hatchling sea turtles.

9. All existing sandbags must be removed. No sandbags will be covered with sand.

10. All dune restoration and planting will be designed and conducted to minimize impacts to sea turtles and construction will occur outside of the nesting season.

11. The project will be constructed and maintained according to the natural slope of the beach.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

Protection of sea turtles

1. All fill material placed on beaches will be sand that is similar to that already existing at the beach site in both coloration and grain size distribution. All such fill material must be free of construction debris, rocks, organic materials, or other foreign matter and will generally not contain, on average, greater than ten percent fines (i.e., silt and clay; passing the # 200 sieve) and must not contain, on average, greater than five percent coarse gravel or cobble, exclusive of shell material (retained by the # 4 sieve). Based on the borrow site for the project, the dredge depth is not to exceed 7 feet below grade.

2. Daily early morning surveys for sea turtle nests will be required if any portion of the beach nourishment project occurs during the period from May 1 to September 30. Nesting surveys must be initiated 75 days prior to nourishment activities or by May 1, whichever is later. Nesting surveys must continue through the end of the project or through September 30, whichever is earlier. If nests are constructed in areas where they may be affected by construction activities, eggs must be relocated per the following requirements.

   2a. Nesting surveys and egg relocations will only be conducted by hired personnel with prior experience and training in nesting survey and egg relocation procedures. Surveyors must be trained by qualified personnel and have a valid SCDNR permit. Nesting surveys must be conducted daily between sunrise and 9 am (this is for all time zones). 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.

   2b. Only those nests that may be affected by construction activities will be relocated. 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. Nest relocations in association with construction activities must cease when construction activities no longer threaten nests. Nests deposited within areas where construction activities have ceased or will not occur for 75 days must be marked and left in place unless other factors threaten the success of the nest. Any nests left in the active construction zone must be clearly marked, and all mechanical equipment must avoid nests by at least 10 feet.

   2c. Nests deposited within areas where restoration activities have ceased or will not occur for 75 days must be marked and left *in situ* unless other factors threaten the success of the nest. The turtle permit holder must install an on-beach marker at the nest site and 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 an area of 10 feet radius surrounding the nest. No activity will occur within this area nor will any activity occur which 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 and all nest sites will continue to be monitored through the nest inventories.

2d. The applicant will hire nighttime monitors with sea turtle experience to patrol the length of the pipeline and the beach adjacent to operating construction equipment for sea turtles attempting to nest. Two monitors will work the beach nightly from 9 pm until 6 am and coordinate with the daytime monitors about any nests laid the previous night.

2e. The nighttime monitors will ensure that a 100 foot buffer remains around any sea turtle attempting to nest in the action area and all construction equipment excluding the dredge must be shut down until the turtle returns to the ocean.

3. Immediately after completion of the beach nourishment project and prior to May 1 for 3 subsequent years, sand compaction must be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the State regulatory agency, and the applicant. At a minimum, the protocol provided under 3a and 3b below must be followed. If required, the area must be tilled to a depth of 36 inches. All tilling activity must be completed prior to May 1. Each pass of the tilling equipment must be overlapped to allow more thorough and even tilling. If the project is completed during the nesting season, tilling will not be performed in areas where nests have been left in place or relocated. A report on the results of the compaction monitoring shall be submitted to the Service prior to any tilling actions being taken. (NOTE: The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.)

3a. Compaction sampling stations must be located at 500-foot intervals along the project area. One station must be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station must be midway between the dune line and the high water line (normal wrack line).

At each station, the cone penetrometer will 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 lay over less compact layers. Replicates will be located as close to each other as possible, without

interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth will be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final 6 averaged compaction values.

3b. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area must be tilled immediately prior to May 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 Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

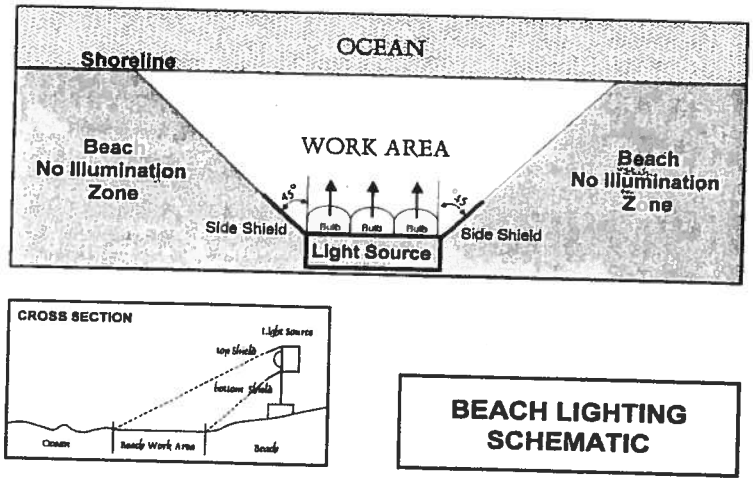
4. Visual surveys for escarpments along the project area must be made immediately after completion of the beach nourishment project and prior to May 1 for 3 subsequent years. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet must be leveled to the natural beach contour by May 1. If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. The Service must be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken must be submitted to the Service. To ensure compliance with this condition, turtle nesting surveys must be conducted for 3 years following beach restoration. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the beach.)

5. The applicant must arrange a meeting between representatives of the contractor, the Service, the SCDNR, the night monitors, and the permitted people responsible for egg relocation at least 30 days prior to the commencement of work on this project. At least 10 days advance notice must be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.

6. From May 1 to July 31, staging areas for construction equipment must be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach must be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes

must be off the beach to the maximum extent possible. Temporary storage of pipes on the beach must be in such a manner so as to impact the least amount of nesting habitat and must likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

7. From May 1 to July 31, direct lighting of the beach and near shore waters must be limited to the immediate construction area and must comply with safety requirements. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (see below schematic).



BEACH LIGHTING SCHEMATIC

8. All pipeline and heavy equipment will be removed from the beach prior to August 1, 2008. No tilling or escarpment removal needed will occur between August 1, 2008 and October 31, 2008. If the project is not completed prior to August 1, 2008, project construction cannot start again until November 1, 2008.

9. All sandbags will be removed during project construction. The length and width of the beach where sandbags were placed must be probed in order to locate any buried bags or remnants. If sandbags are to be cut open and the material is left in the project area, it must be beach compatible. Any incompatible material will be removed and disposed of offsite. The applicant will hire an inspector responsible for ensuring sandbag removal and disposal offsite.

10. All dune vegetation must be native to South Carolina. Sand fencing must be installed correctly and spaced ten feet apart outside of the nesting season.

11. Immediately after completion of the beach nourishment project and prior to May 1 for 3 subsequent years, beach slope must be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the State regulatory agency, and the applicant.

Reporting

1. A report describing the actions taken to implement the terms and conditions of this incidental take statement must be submitted to the Service within 60 days of completion of the proposed work for each year when the activity has occurred. This report will include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of self-release beach sites, nest survey and relocation results, and hatching success of nests.

2. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project must be notified so the eggs can be moved to a suitable relocation site.

3. Upon locating a sea turtle adult, hatchling, or egg harmed or destroyed as a direct or indirect result of the project, initial notification must be made to the Service Law Enforcement Office at (843) 727-4707 ext. 210 or 211 or (843) 514-3260 or (843) 297-9829. Additional notification must also be made to Melissa Bimbi of the Charleston Field Office at (843) 727-4707 ext. 217 and DuBose Griffin of the SCDNR at (843) 870-3667. Care should be taken in handling injured 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.

The Service believes that incidental take will be limited to the 2.7 miles of beach that have been identified for sand placement. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than the following types of incidental take will result from the proposed action: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) destruction of all nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest

within the construction area or on adjacent beaches as a result of construction activities; (5) disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (6) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (7) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Service.

The amount or extent of incidental take for sea turtles will be considered exceeded if the project results in more than a one-time placement of sand on the 2.7 miles of beach that have been identified for sand placement. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Construction activities for this project and similar future projects should be planned to take place outside the main part of the sea turtle nesting and hatching season.

2. In order to offset impacts to loggerhead sea turtles during the nesting and hatching season on the Isle of Palms, contributions would be accepted by the Cape Romain National Wildlife Refuge Turtle Project in order to support recovery actions for the species.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the action outlined in your request for formal consultation on the Isle of Palms renourishment project. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that

causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

For this biological opinion, the incidental take will be exceeded when the renourishment of 2.7 miles of beach extends beyond the project's authorized boundaries. Incidental take of an undetermined number of young or eggs of sea turtles and piping plovers has been exempted from the prohibitions of section 9 by this opinion. The Service appreciates the cooperation of the Corps during this consultation. We would like to continue working with you and your staff regarding this project. For further coordination please contact Melissa Bimbi at (843) 727-4707, ext. 217. In future correspondence concerning the project, please reference FWS Log No. 2008-F-0245.

Sincerely,

Timothy N. Hall
Field Supervisor

TNH/MKB

cc: USFWS, Atlanta, GA (Ken Graham) (via email)
USFWS, Jacksonville, FL (Nicole Adimey)
SCDNR, Charleston, SC (DuBose Griffin)
SCDNR, Charleston, SC (Susan Davis)
DHEC-OCRM, Charleston, SC (Bill Eiser)
Coastal Science and Engineering, Columbia, SC (Tim Kana, PhD)

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D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

Deed 3/21/08
MWS

March 18, 2008

Dr. Timothy W. Kana
Coastal Science & Engineering
PO Box 8046
Columbia, SC 29202-8056

Re: 2007-02631-2IG-P
City of Isle of Palms

Dear Dr. Kana:

The SCDHEC Office of Ocean and Coastal Resource Management has reviewed your application to perform beach renourishment between 47th Ave. and Dewees Inlet, Isle of Palms, Charleston County, South Carolina and has issued a permit for this work. You should carefully read the description of the authorized project and any special conditions that have been placed on the permit, as these conditions may modify the permitted activity. In addition, there are a series of general conditions that should be reviewed. The original and one photocopy of the permit, as issued, are enclosed. After carefully reading the permit, if you wish to accept the permit as issued, sign and date in the signature block entitled "PERMITTEE" on the original version of the permit **and return it to this Department. Keep the photocopy for your records.**

PLEASE READ CAREFULLY: You are required to sign and return the original version of your permit to this Department. If this permit is not signed and returned within thirty (30) days of issuance, *OR* appealed within 15 days as described on the enclosed "Notice of Appeal Procedure", the Department reserves the right to cancel this permit. Please carefully review the enclosed "Notice of Appeal Procedure" for information and deadlines for appealing this permit.

We have also enclosed a "request for a construction placard" card. You must send in this card before the time you wish to start construction. At that time a construction placard will be sent to you to post at the construction site.

PLEASE NOTE: You are not authorized to commence work under the permit until we have received the original version of the entire permit signed and accepted by you, and a construction placard has been issued and posted at the construction site. The receipt of this permit does not relieve you of the responsibility of acquiring any other federal or local permits that may be required.

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)
For delivery information, visit our website at www.usps.com®
OFFICIAL USE

Postage	$
Certified Fee	
Return Receipt Fee (Endorsement Required)	
Restricted Delivery Fee (Endorsement Required)	
Total Pc	

Postmark Here
3/5/08

Sent To
DR. TIMOTHY W KANA
COASTAL SCIENCE & ENGINEERING
PO BOX 8046
COLUMBIA, SC 29202-8056

Street, Ap
or PO Bo
City, Stat

RE: 2007-02631-2IG-P
CITY OF ISLE OF PALMS

OF HEALTH AND ENVIRONMENTAL CONTROL
Coastal Resource Management
Millan Avenue, Suite 400 · Charleston, SC 29405
· Fax: 843-953-0201 · www.scdhec.gov

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

Notice of Appeal Procedure

The following procedures are in effect beginning July 1, 2006, pursuant to 2006 Act No. 387:

1. This decision of the S.C. Department of Health and Environmental Control (Department) becomes the final agency decision 15 days after notice of the decision has been mailed to the applicant or respondent, unless a written request for final review is filed with the Department by the applicant, permittee, licensee, or affected person.

2. An applicant, permittee, licensee, or affected person who wishes to appeal this decision must file a written request for final review with the Clerk of the Board at the following address or by facsimile at 803-898-3393.

   Clerk of the Board
   SC DHEC
   2600 Bull Street
   Columbia, SC 29201

3. The request for final review should include the following:
   a. the grounds on which the Department's decision is challenged and the specific changes sought in the decision
   b. a statement of any significant issues or factors the Board should consider in deciding how to handle the matter
   c. a copy of the Department's decision or action under review

4. In order to be timely, a request for final review must be received by the Clerk of the Board within 15 days after notice of the decision has been mailed to the applicant or respondent. If the 15th day occurs on a weekend or State holiday, the request is due to be received by the Clerk of the Board on the next working day. The request for final review must be received by the Clerk of the Board by 5:00 p.m. on the date it is due.

5. If a timely request for final review is filed with the Clerk of the Board, the Clerk will provide additional information regarding procedures.

6. The Board of Health and Environmental Control has 60 days from the date of receipt of a request for final review to conduct a final review conference. The conference may be conducted by the Board, its designee, or a committee of three members of the Board appointed by the chair.

7. If a final review conference is not conducted within 60 days, the Department decision becomes the final agency decision, and a party may request a contested case hearing before the Administrative Law Court within 30 days after the deadline for the final review conference.

The above information is provided as a courtesy; parties are responsible for complying with all applicable legal requirements.

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The following procedures are in effect beginning July 1, 2006, pursuant to 2006 Act No. 387:

1. This decision of the S.C. Department of Health and Environmental Control (Department) becomes the final agency decision 15 days after notice of the decision has been mailed to the applicant or respondent, unless a written request for final review is filed with the Department by the applicant, permittee, licensee, or affected person.

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D H E C

PROMOTE PROTECT PROSPER

CRITICAL AREA & WATER QUALITY CERTIFICATION PERMIT

Permittee: City of Isle of Palms

Permit Number: 2007-02631-2IG-P

Date of Issuance: March 18, 2008

Expiration Date: March 18, 2013

Location: On and adjacent to the Atlantic Ocean between 47th Ave. North and Dewees Inlet, Isle of Palms, Charleston County, South Carolina.

This permit/certification is issued under the provisions of 25A S.C. Code Ann. Regs. 61-101 (Supp. 2005), *et seq.*, and 23A S.C. Code Ann. Regs. 30-1 through 30-18 (Supp. 2005). Additionally, as required by R.61-101, Department staff have reviewed plans for this project and determined there is a reasonable assurance the project will be conducted in a manner consistent with Certification requirements of Section 401 of the Clean Water Act. We also certify that this project, subject to the indicated conditions, is consistent with applicable provisions of Section 303 of the Clean Water Act, as amended, that there are no applicable effluent limitations under Sections 301(b) and 302, and that there are no applicable standards under Sections 306 and 307.

This permit contains required certification pursuant to Section 401 of the Clean Water Act. Work may not commence under this permit until thirty (30) days after final signature by an OCRM official. PLEASE CAREFULLY READ THE ENCLOSED "NOTICE OF APPEAL PROCEDURE."

Please carefully read the project description and any special conditions, which may appear on this permit/certification, as they will affect the work that is allowed. If there are no special conditions, then the work is authorized as described in the project description and as modified by general conditions. The general conditions are also a part of this permit/certification and should be read in their entirety. The S. C. Contractor's Licensing Act of 1999, enacted as Section 40-11-5 through 430, requires that all construction with a total cost of $5,000 or more be performed by a licensed contractor with a valid contractor's license for marine class construction, except for construction performed by a private landowner for strictly private purposes. Your signature on and acceptance of this permit denotes your understanding of the stated law regarding use of licensed contractors. **All listed special and general conditions will remain in effect for the life of the project if work commences during the life of the permit. This applies to permittee, future property owners, or permit assignees.**

DESCRIPTION OF THE PROJECT, AS AUTHORIZED

The plans submitted by you, attached hereto, show the work consists of beach nourishment. Up to 885,000 cubic yards of sand will be dredged from four offshore borrow sites and pumped via hydraulic pipeline to renourish 13,785 linear feet of beach. The purpose of the proposed activity is for beach restoration and erosion control.

CRITICAL AREA PERMIT SPECIAL CONDITIONS

1. Provided that the permittee must follow the Terms and Conditions for the protection of sea turtles listed in the Biological Opinion letter from the U.S. Fish and Wildlife Service dated February 28, 2008 (see Attachment A).

2. Provided that all work must be performed in accordance with the revised drawings submitted by the permittee on January 11, 2008 and revised and modified by the Department with respect to the fill taper area of the project. Department Staff have determined that the fill taper area will be reduced from a 6 block range to a 3 block range and will now extend from 53rd Ave. to 56th Ave. The reduced taper area is shown on page 7 of 20.

3. Provided that all sand bags must be removed from the beach concurrent with renourishment. No sand bags can be covered with renourishment sand.

4. Provided that dredging plans are designed to utilize the borrow sites with the lowest shell and gravel content, based on monitoring of fill material during construction. All fill material must be similar to the native beach sand in color and grain size and must not contain, on average, greater than 5% coarse gravel (excluding shell material) or greater than 10% fines (silt or clay passing the #200 sieve).

5. Provided that bathymetric surveys of the borrow sites are conducted immediately following dredging and again one year later, to document their initial post-project configuration and evaluate any significant infilling after one year.

6. Provided that in the event that archaeological or paleontological remains are found during the course of work, the applicant should notify the South Carolina Institute of Archaeology and Anthropology (Mr. James Spirek at 803-777-8170) pursuant to South Carolina Underwater Antiquities Act of 1991, (Article 5 Chapter 7, Title 54, Code of Laws of South Carolina, 1976). Archaeological remains consist of any materials made or altered by man, which remain from past historic or prehistoric times (ie, older than 50 years). Examples include old pottery fragments, metal, wood, arrowheads, stone implements or tools, human burials, historic docks, structures, or non-recent vessel remains. Paleontological remains consist of old animal remains, original or fossilized, such as teeth, tusks, bone, or entire skeletons.

WATER QUALITY SPECIAL CONDITIONS

1. The applicant must implement best management practices that will minimize erosion and migration of sediments on and off the project site during and after construction. These practices should include the use of appropriate grading and sloping techniques, mulches, hay bales, silt fences, or other devices capable of preventing erosion, migration of sediments and bank failure.
2. Material used for beach nourishment must be at least 80 percent sand.
3. The excavated and/or dredged area must be sloped such that the rear is no deeper than the front and the front is no deeper than the adjacent waterbody to maintain water circulation.
4. All necessary measures must be taken to prevent oil, tar, trash, debris and other pollutants from entering the adjacent waters or wetlands.
5. Only clean sand free of all potential sources of pollution must be used for beach renourishment.
6. To minimize the amount of fines settling in the area and hasten the overall recovery, excavation and/or dredging should be conducted in a manner to insure that the underlying mud bottoms are not disturbed.

7. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, beach compaction must be monitored and tilling must be conducted as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

8. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, monitoring must be conducted to determine if escarpments are present and must be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

9. During the turtle nesting season, construction equipment and materials must be stored in a manner that will minimize impacts to sea turtles to maximum extent possible.

10. During May, June, and July, lighting associated with project must be minimized to reduce the possibility of disrupting or disorienting nesting and/or hatchling sea turtles.

11. No work will occur between August 1 and October 31, 2008, in order to minimize disrupting and/or disorienting hatchling sea turtles.

12. All existing sandbags must be removed. No sandbags will be covered with sand.

13. The project must be constructed and maintained according to the natural slope of the beach.

PERMITTEE'S ATTENTION IS DIRECTED TO GENERAL CONDITIONS NUMBERS FOUR (4) AND (5), BY ACCEPTANCE OF THIS PERMIT, PERMITTEE IS PLACED ON NOTICE THAT THE STATE OF SOUTH CAROLINA, BY ISSUING THIS PERMIT, DOES NOT WAIVE ITS RIGHTS TO REQUIRE PAYMENT OF A REASONABLE FEE FOR USE OF STATE LANDS AT A FUTURE DATE IF SO DIRECTED BY STATUTE. THE PERMITTEE, BY ACCEPTANCE OF THIS PERMIT, AGREES TO ABIDE BY THE TERMS AND CONDITIONS CONTAINED HEREIN AND TO PERFORM THE WORK IN STRICT ACCORDANCE WITH THE PLANS AND SPECIFICATIONS ATTACHED HERETO AND MADE A PART HEREOF. ANY DEVIATION FROM THESE CONDITIONS, TERMS, PLANS AND SPECIFICATIONS SHALL BE GROUNDS FOR REVOCATION, SUSPENSION OR MODIFICATION OF THIS PERMIT AND THE INSTITUTION OF SUCH LEGAL PROCEEDINGS AS THE DEPARTMENT MAY CONSIDER APPROPRIATE.

2007-02631-2IG-P

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

(PERMITTEE) (DATE)

City of Isle of Palms

This permit becomes effective when the State official, designated to act for the Office of Ocean and Coastal Resource Management, has signed below.

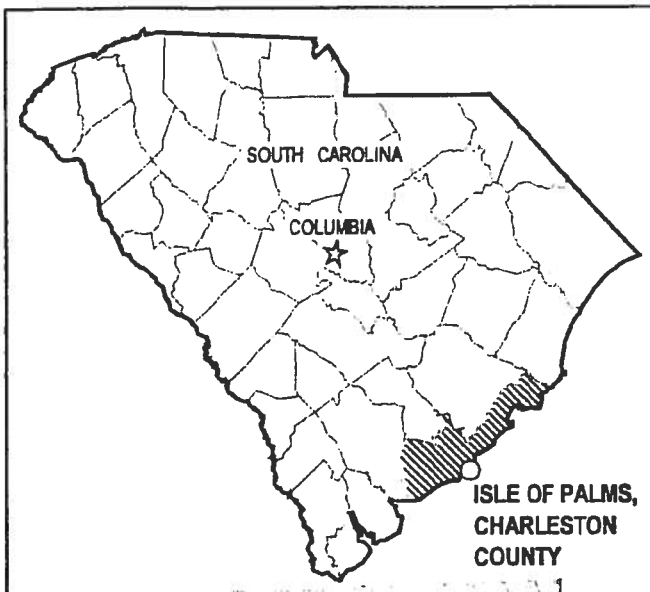
(MANAGER, CRITICAL AREA PERMITTING) (DATE)

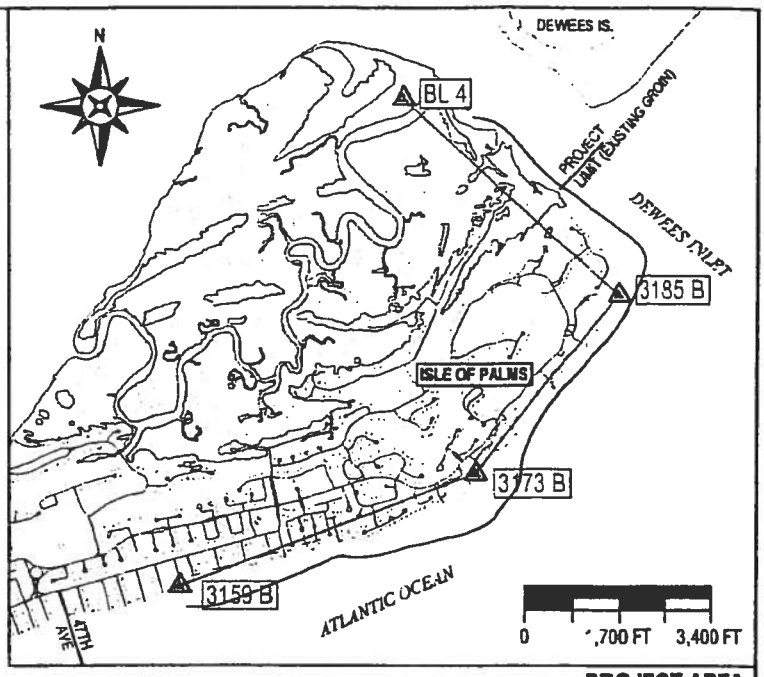
Curtis M. Joyner
or his Designee Other Authorized State Official

GENERAL CONDITIONS:

This construction and use permit is expressly contingent upon the following conditions which are binding on the permittee:

1. That the permittee, in accepting this permit, covenants and agrees to comply with and abide by the provisions and conditions herein and assumes all responsibility and liability and agrees to save OCRM and the State of South Carolina, its employees or representatives, harmless from all claims of damage arising out of operations conducted pursuant to this permit.
2. That if the activity authorized herein is not constructed or completed within five years of the date of issuance, this permit shall automatically expire. A request, in writing, for an extension of time shall be made not less than thirty days prior to the expiration date.
3. That all authorized work shall be conducted in a manner that minimizes any adverse impact on fish, wildlife and water quality.
4. That this permit does not relieve the permittee from the requirements of obtaining a permit from the U. S. Army Corps of Engineers or any other applicable federal agency, nor from the necessity of complying with all applicable local laws, ordinances, and zoning regulations. This permit is granted subject to the rights of the State of South Carolina in the navigable waters and shall be subject, further, to all rights held by the State of South Carolina under the public trust doctrine as well as any other right the State may have in the waters and submerged lands of the coast.
5. That this permit does not convey, expressly or impliedly, any property rights in real estate or material nor any exclusive privileges; nor does it authorize the permittee to alienate, diminish, infringe upon or otherwise restrict the property rights of any other person or the public; nor shall this permit be interpreted as appropriating public properties for private use.
6. That the permittee shall permit OCRM or its authorized agents or representatives to make periodic inspections at any time deemed necessary in order to ensure that the activity being performed is in accordance with the terms and conditions of this permit.
7. That any abandonment of the permitted activity will require restoration of the area to a satisfactory condition as determined by OCRM.
8. That this permit may not be transferred to a third party without prior written notice to OCRM, either by the transferee's written agreement to comply with all terms and conditions of this permit or by the transferee subscribing to this permit and thereby agreeing to comply.
9. That if the display of lights and signals on any structure or work authorized herein is not otherwise provided for by law, such lights and special signals as may be prescribed by the United States Coast Guard shall be installed and maintained by and at the expense of the permittee.
10. That the permit construction placard or a copy of the placard shall be posted in a conspicuous place at the project site during the entire period of work.
11. That the structure or work authorized herein shall be in accordance with the plans and drawing attached hereto, and shall be maintained in good condition. Failure to build in accordance with the plans and drawings attached hereto, or failure to maintain the structure in good condition, shall result in the revocation of this permit.
12. That the authorization for activities or structures herein constitutes a revocable license. OCRM may require the permittee to modify activities or remove structures authorized herein if it is determined by OCRM that such activity or structures violates the public's health, safety, or welfare, or if any activity is inconsistent with the public trust doctrine. Modification or removal under this condition shall be ordered only after reasonable notice stating the reasons therefore and provision to the permittee of the opportunity to respond in writing. When the Permittee is notified that OCRM intends to revoke the permit, Permittee agrees to immediately stop work pending resolution of the revocation.
13. That OCRM shall have the right to revoke, suspend, or modify this permit in the event it is determined the permitted structure (1) significantly impacts the public health, safety and welfare, and/or is violation of Section 48-39-150, (2) adversely impacts public rights. (3) that the information and data which the permittee or any other agencies have provided in connection with the permit application is either false, incomplete or inaccurate, or (4) that the activity is not in compliance with the drawings submitted by the applicant. That the permittee, upon receipt of OCRM's written intent to revoke, suspend, or modify the permit has the right to a hearing. Prior to revocation, suspension, or modification of this permit, OCRM shall provide written notification of intent to revoke to the permittee, and permittee can respond with a written explanation to OCRM. (South Carolina Code Section 1-023-370 shall govern the procedure for revocation, suspension or modification herein described).
14. That any modification, suspension or revocation of this permit shall not be the basis of any claim for damages against OCRM or the State of South Carolina or any employee, agent, or representative of OCRM or the State of South Carolina.
15. That all activities authorized herein shall, if they involve a discharge or deposit into navigable waters or ocean waters, be at all times consistent with all applicable water quality standards, effluent limitations and standards of performance, prohibitions, and pretreatment standards established pursuant to applicable federal, state and local laws.
16. That extreme care shall be exercised to prevent any adverse or undesirable effects from this work on the property of others. This permit authorizes no invasion of adjacent private property, and OCRM assumes no responsibility or liability from any claims of damage arising out of any operations conducted by the permittee pursuant to this permit.

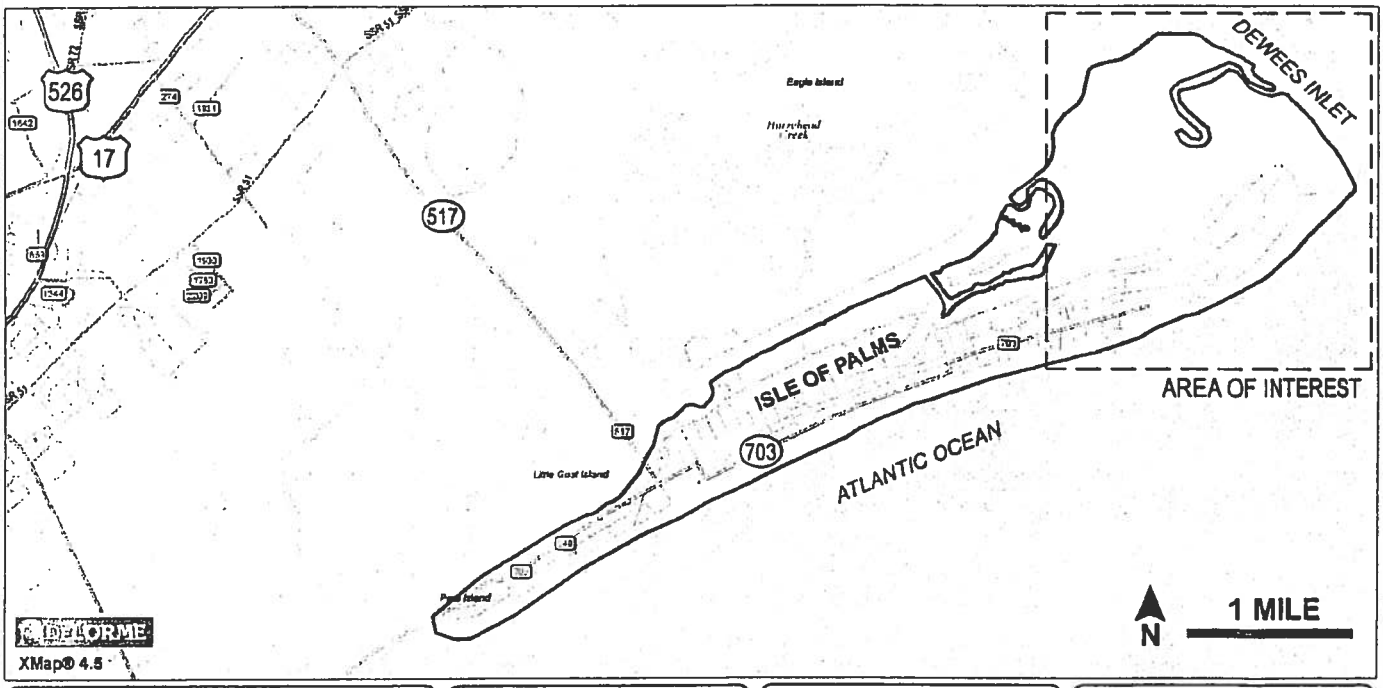




PROJECT AREA

DIRECTIONS:

FROM CHARLESTON, TAKE US-17 NORTH. TURN RIGHT ONTO SC 517 (ISLE OF PALMS CONNECTOR). TURN LEFT ONTO PALM BLVD. SITE IS NORTHEAST OF 47TH AVE EXTENDING ALONG TO DEWEES INLET ON THE NORTHEAST END OF ISLE OF PALMS.

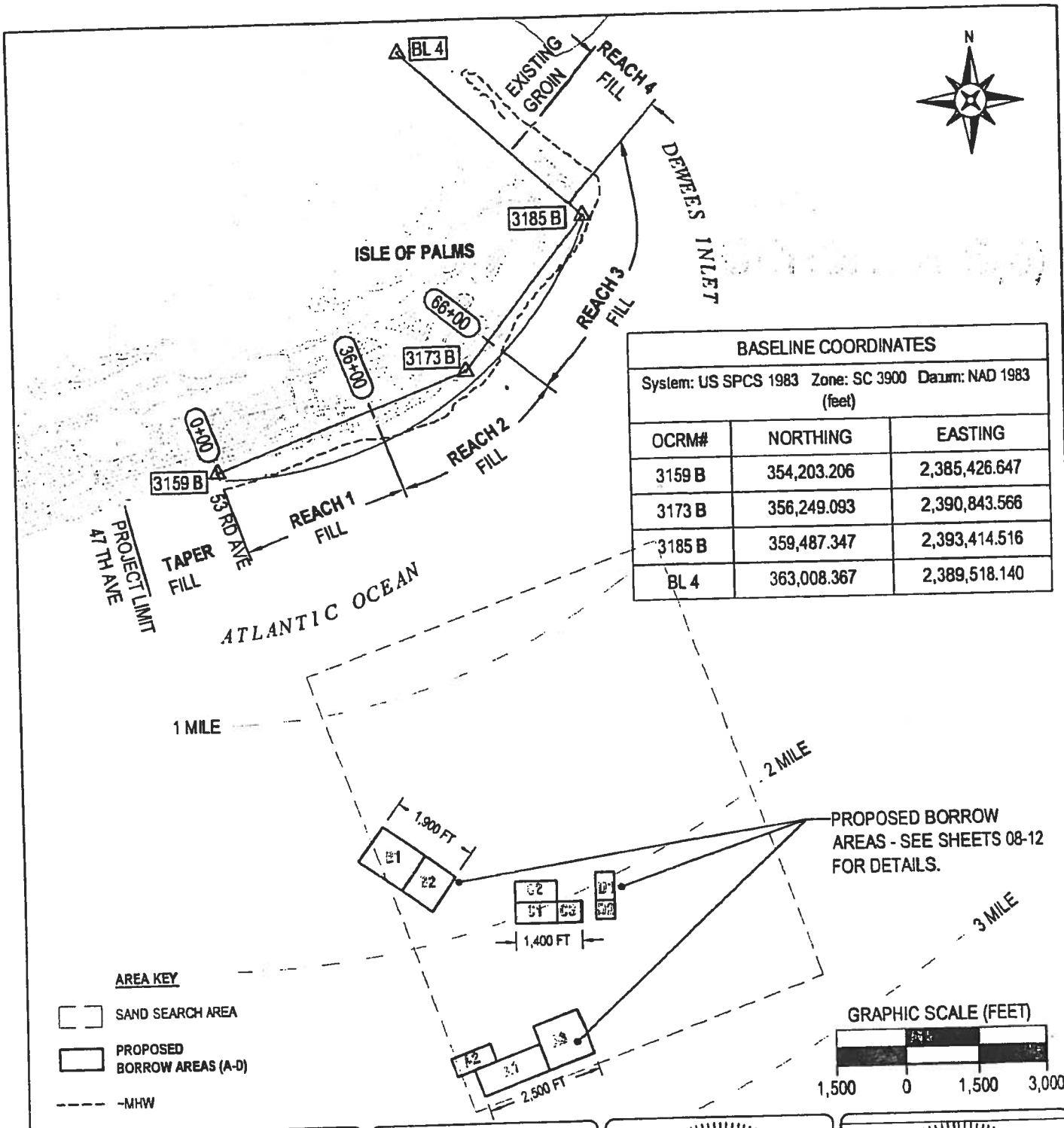


APPLICANT: CITY OF ISLE OF PALMS PO DRAWER 508 ISLE OF PALMS SC 29451	*DRAWING TITLE:* VICINITY MAP
AGENT: *P/N 2007-02631-2IG-P (REVISED)* COASTAL SCIENCE & ENGINEERING PO BOX 8056 COLUMBIA, SC 29202	SCALE: AS SHOWN DATE: JAN 2008 TMS#: 6C4-11-00-211 PROJECT #: 2277 SHEET #: 01 OF: 18

SOUTH CAROLINA COASTAL SCIENCE & ENGINEERING No. C01950 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23707 JAMES MAJOR MAY JR

1/11/08



BASELINE COORDINATES		
System: US SPCS 1983 Zone: SC 3900 Datum: NAD 1983 (feet)		
OCRM#	NORTHING	EASTING
3159 B	354,203.206	2,385,426.647
3173 B	356,249.093	2,390,843.566
3185 B	359,487.347	2,393,414.516
BL 4	363,008.367	2,389,518.140

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

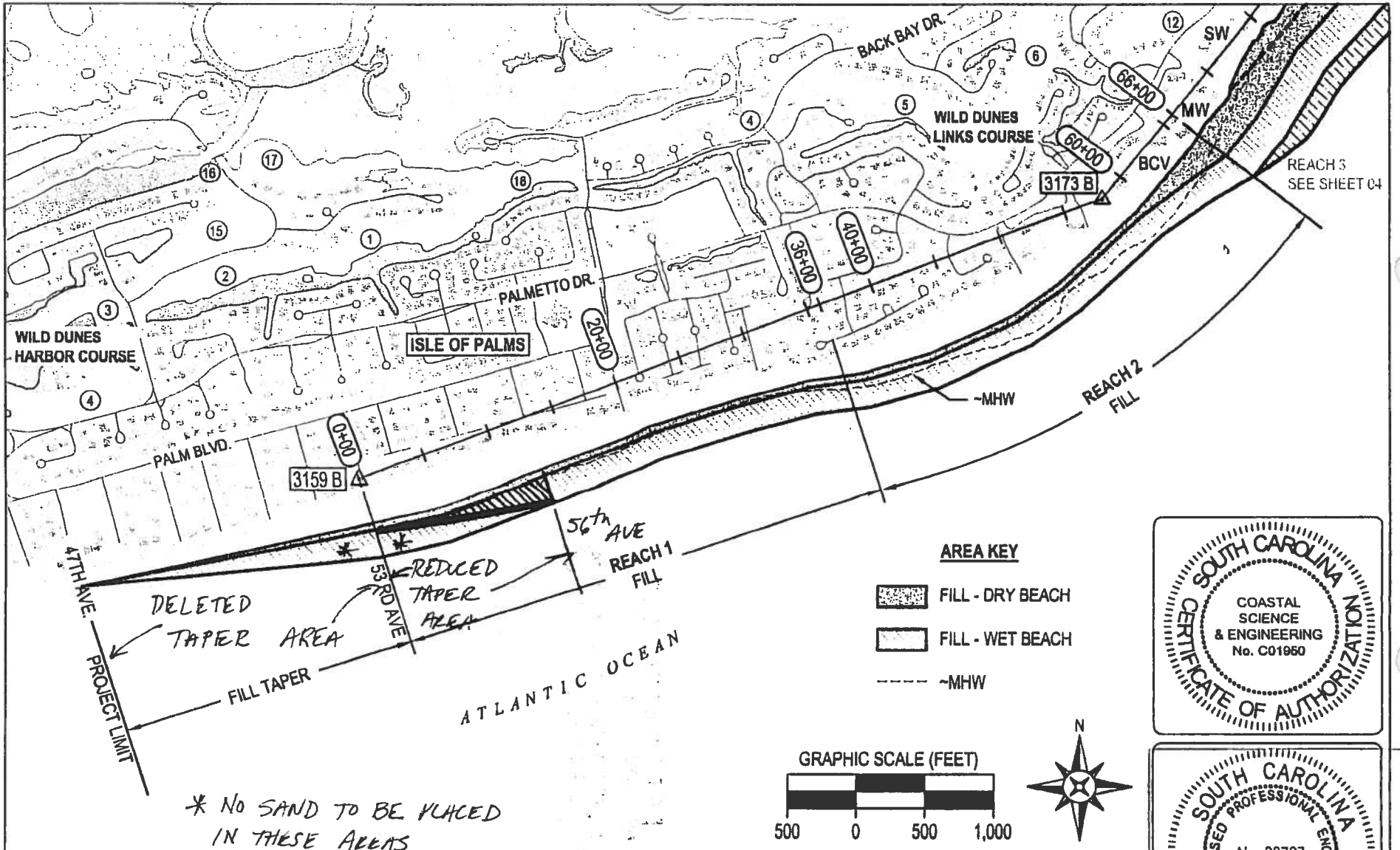
DRAWING TITLE:
PROJECT PLAN MAP

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
COASTAL SCIENCE & ENGINEERING
No. C01950

SOUTH CAROLINA PROFESSIONAL ENGINEER
LICENSED
No. 23707
JAMES W. POPLAK JR.
7/11/08

AGENT: *P/N 2007-02631-2IG-P (REVISED)*
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

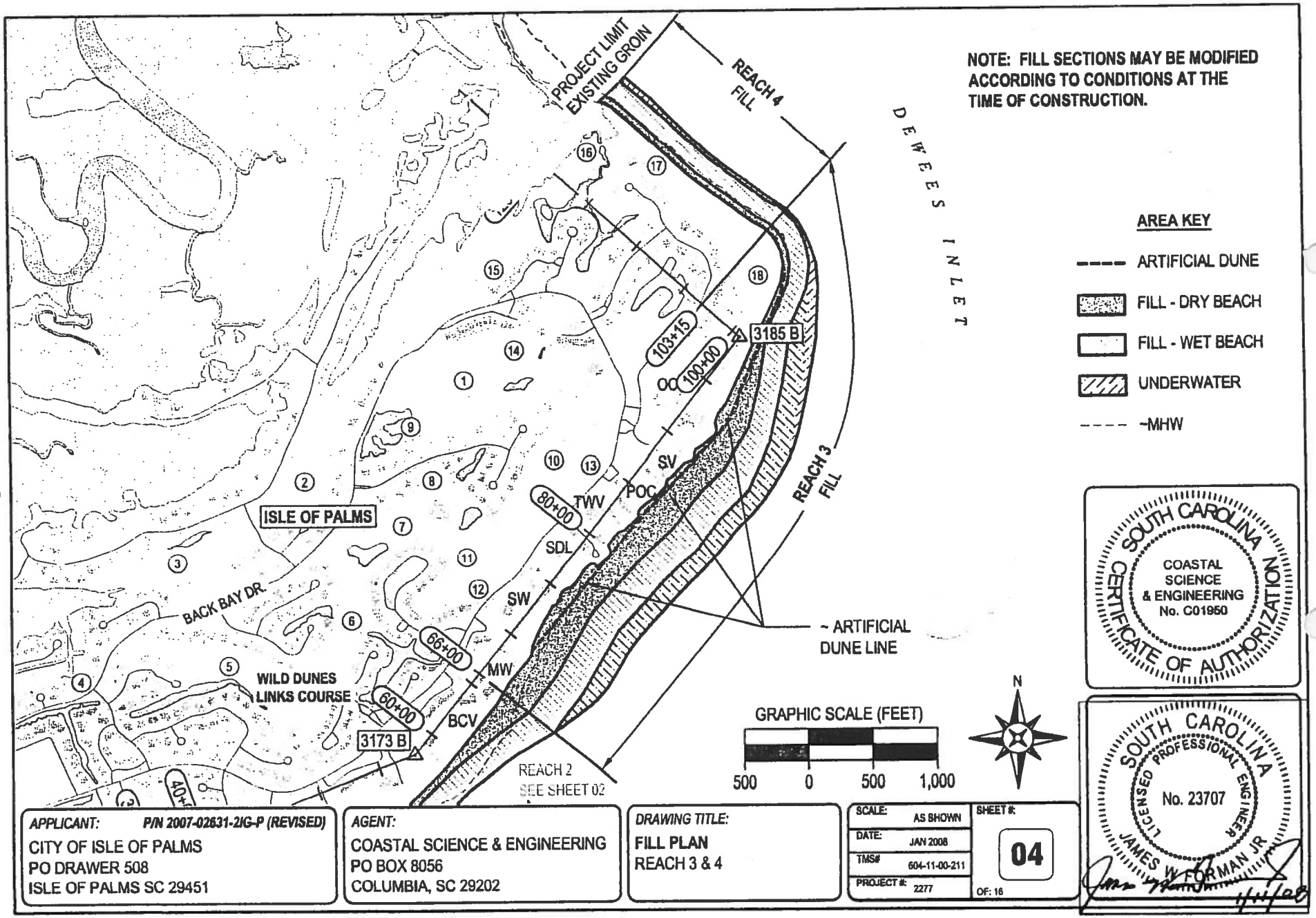
SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	6C4-11-00-211
PROJECT#:	2277
SHEET #:	02
OF:	16



SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING
No. C01950
CERTIFICATE OF AUTHORIZATION

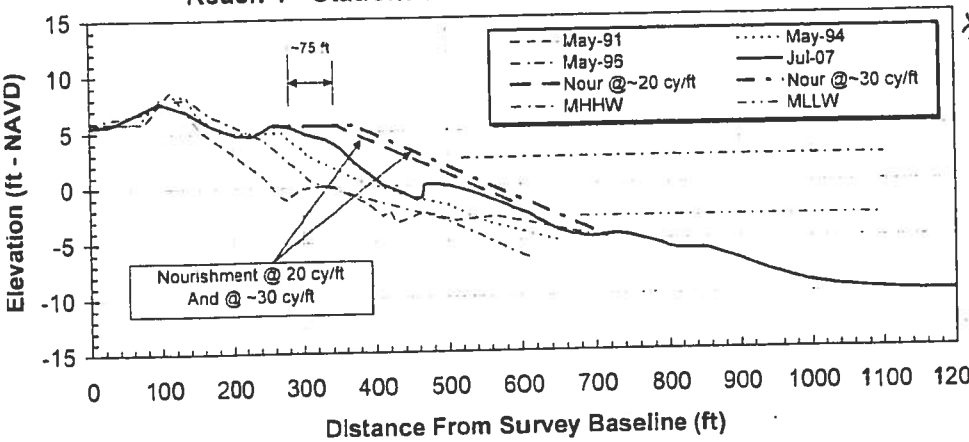
SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES A. GRIMM, JR.

APPLICANT: P/N 2007-02631-2IG-P (REVISED) CITY OF ISLE OF PALMS PO DRAWER 508 ISLE OF PALMS SC 29451	AGENT: COASTAL SCIENCE & ENGINEERING PO BOX 8056 COLUMBIA, SC 29202	DRAWING TITLE: FILL PLAN REACH 1 & 2	SCALE: AS SHOWN DATE: JAN 2008 TMS#: 604-11-00-211 PROJECT #: 2277 SHEET #: 03 OF: 16


PROJECT LIMIT
EXISTING GROIN
REACH 4
FILL
DEWEES INLET
NOTE: FILL SECTIONS MAY BE MODIFIED ACCORDING TO CONDITIONS AT THE TIME OF CONSTRUCTION.
AREA KEY
ARTIFICIAL DUNE
FILL - DRY BEACH
FILL - WET BEACH
UNDERWATER
~MHW
3185 B
103+15
100+00
80+00
66+00
60+00
3173 B
TWV
POC
SV
SDL
SW
MW
BCV
REACH 3
FILL
~ ARTIFICIAL
DUNE LINE
ISLE OF PALMS
BACK BAY DR.
WILD DUNES
LINKS COURSE
REACH 2
SEE SHEET 02
GRAPHIC SCALE (FEET)
500 0 500 1,000
N
SOUTH CAROLINA
COASTAL
SCIENCE
& ENGINEERING
No. C01950
CERTIFICATE OF AUTHORIZATION
SOUTH CAROLINA
PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR.
APPLICANT: P/N 2007-02631-2IG-P (REVISED)
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451
AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202
DRAWING TITLE:
FILL PLAN
REACH 3 & 4
SCALE: AS SHOWN
DATE: JAN 2008
TMS#: 604-11-00-211
PROJECT #: 2277
SHEET #: 04
OF: 16

8 of 20

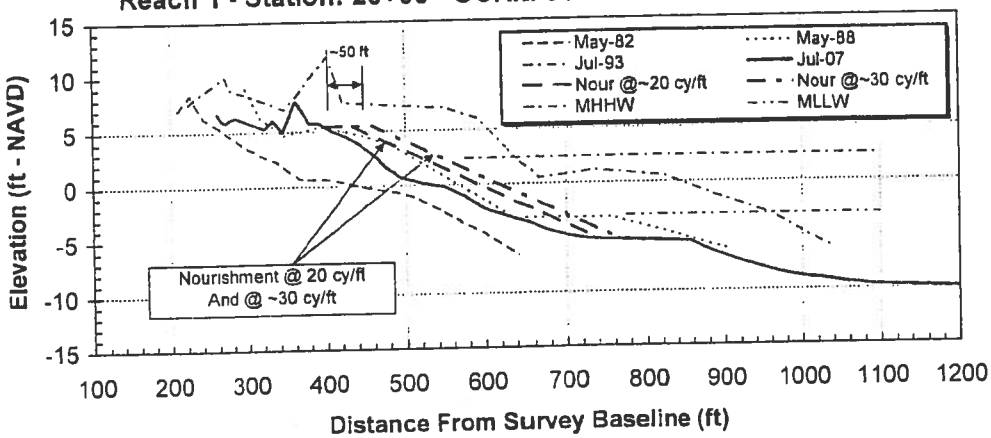
Reach 1 - Station: 0+00 - OCRM 3159 - 53rd Ave



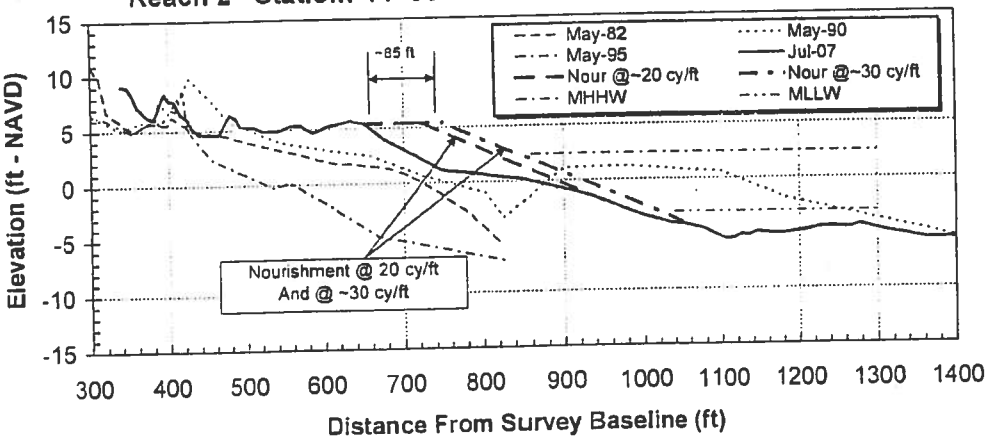
* NO SAND TO BE PLACED IN THIS AREA

SEE PAGE 7 of 20.

Reach 1 - Station: 20+00 - OCRM 3165 - Beachclub Cabana



Reach 2 - Station: 44+00 - OCRM 3170 - Beachwood East



APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

DRAWING TITLE:
FILL SECTIONS
STA 0+00 TO 44+00

SOUTH CAROLINA COASTAL SCIENCE & ENGINEERING No. C01950 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23707 JAMES W. FORMAN JR.

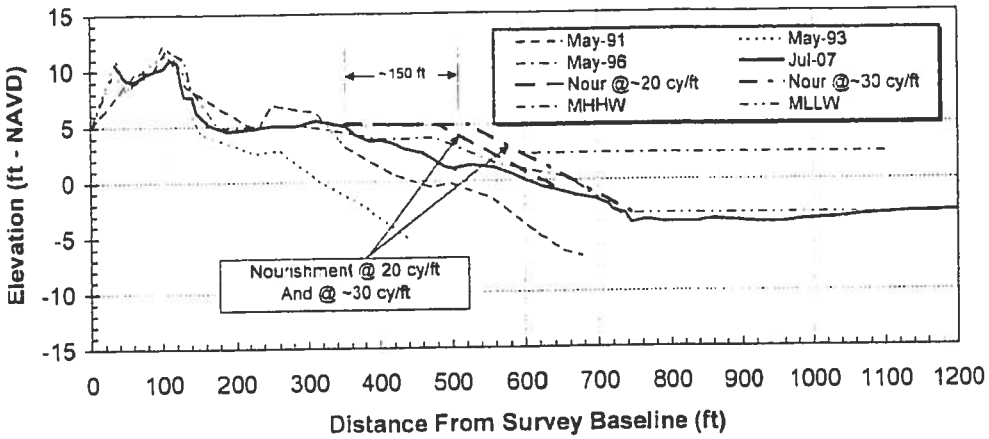
1/11/08

AGENT: *P/N 2007-02631-2IG-P (REVISED)*
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

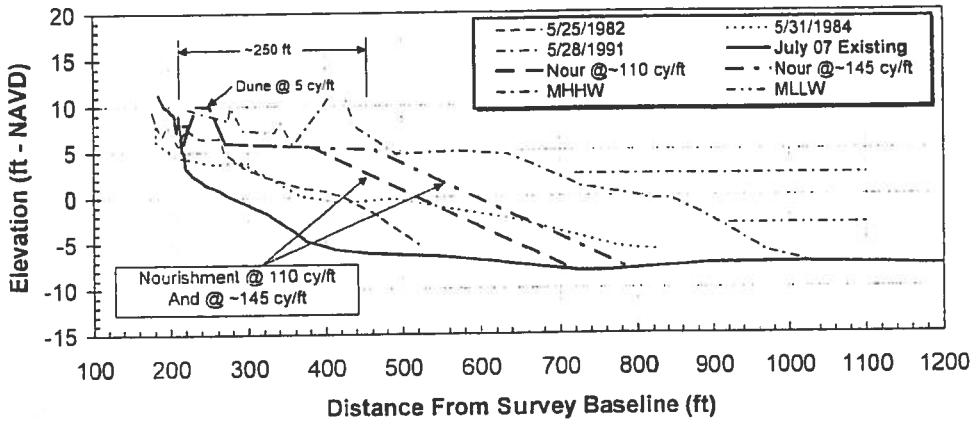
SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	604-11-00-211
PROJECT #:	2277

SHEET #: 05 OF: 1612

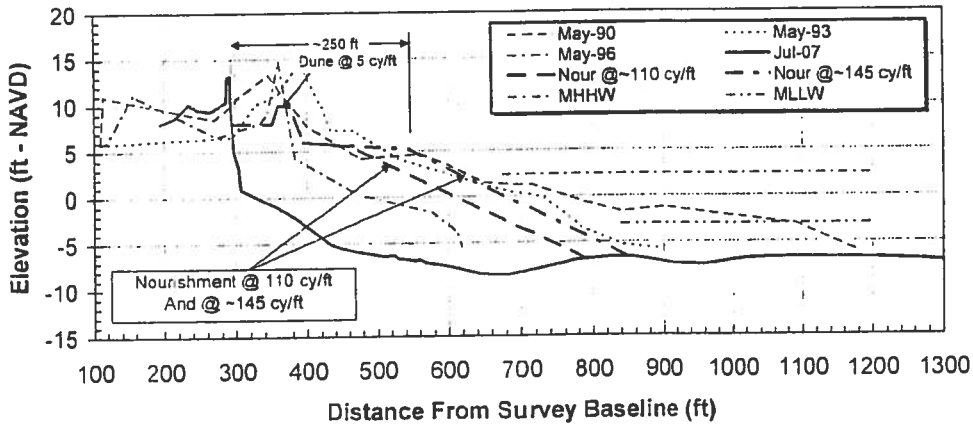
Reach 2 - Station: 58+00 - OCRM 3173 - Beach Club Villas



Reach 3 - Station: 84+00 - OCRM 3180 - Port O Call I



Reach 3 - Station: 94+00 - OCRM 3183 - 18th Green



APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

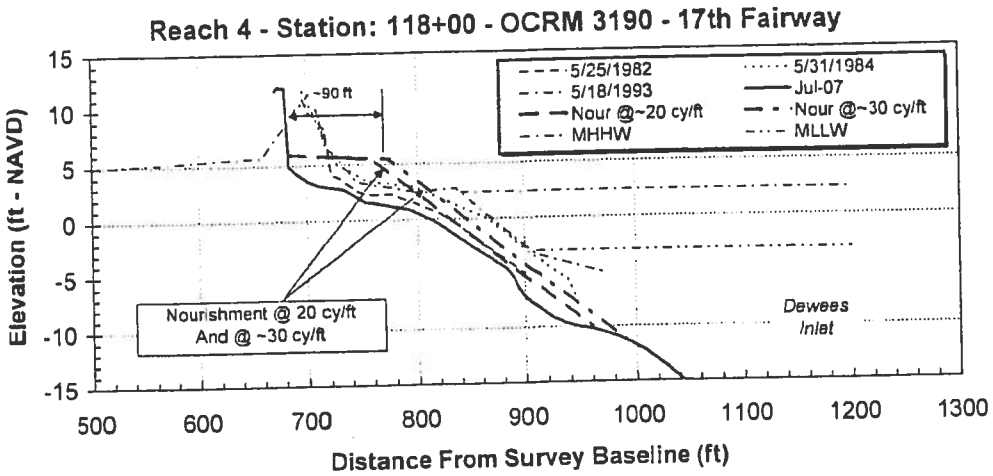
DRAWING TITLE:
FILL SECTIONS
STA 58+00 TO 94+00

SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING No. C01950
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. NORMAN JR
1/11/08

AGENT: *P/N 2007-02631-2IG-P (REVISED)*
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

SCALE: AS SHOWN	SHEET #: 06
DATE: JAN 2008	
TMS# 634-11-00-211	
PROJECT #: 2277	OF: 1612



NOTE: INDICATED FILL SECTIONS PROVIDE THE TYPICAL RANGE OF NOURISHMENT VOLUMES ANTICIPATED BASED ON EXISTING CONDITIONS (JULY 2007 SURVEY). SECTIONS WILL ALSO BE VARIED WITHIN EACH REACH SO AS TO CREATE SMOOTH TRANSITIONS FROM STATION TO STATION.

SOURCE DATA: COASTAL SCIENCE & ENGINEERING 1984-2007

OCRM 1988 TO PRESENT

RESEARCH PLANNING INSTITUTE 1982-1984

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT: P/N 2007-02631-2IG-P (REVISED)
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
FILL SECTIONS
STA 118+00

SCALE: AS SHOWN
DATE: JAN 2008
TMS# 604-11-00-211
PROJECT #: 2277
SHEET #: 07
OF: 1612

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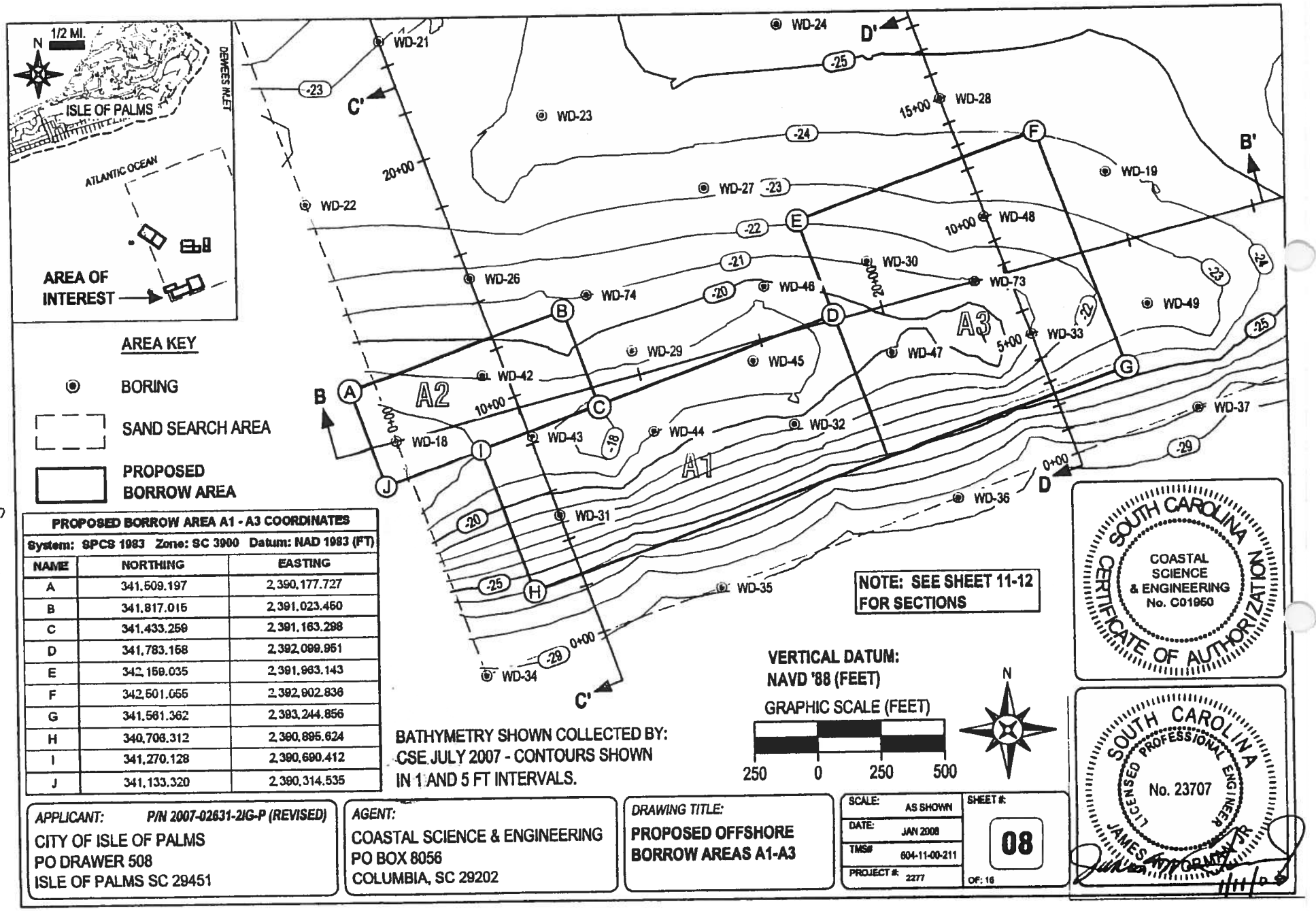
COASTAL SCIENCE & ENGINEERING
No. C01950
CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR
1/11/08



PROPOSED BORROW AREA A1 - A3 COORDINATES		
System: SPCS 1983 Zone: SC 3900 Datum: NAD 1983 (FT)		
NAME	NORTHING	EASTING
A	341,509.197	2,390,177.727
B	341,817.015	2,391,023.460
C	341,433.259	2,391,163.298
D	341,783.158	2,392,099.951
E	342,159.035	2,391,963.143
F	342,501.055	2,392,902.836
G	341,561.362	2,393,244.856
H	340,706.312	2,390,895.624
I	341,270.128	2,390,690.412
J	341,133.320	2,390,314.535

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COASTAL SCIENCE & ENGINEERING
No. C01950
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SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES [illegible] JR

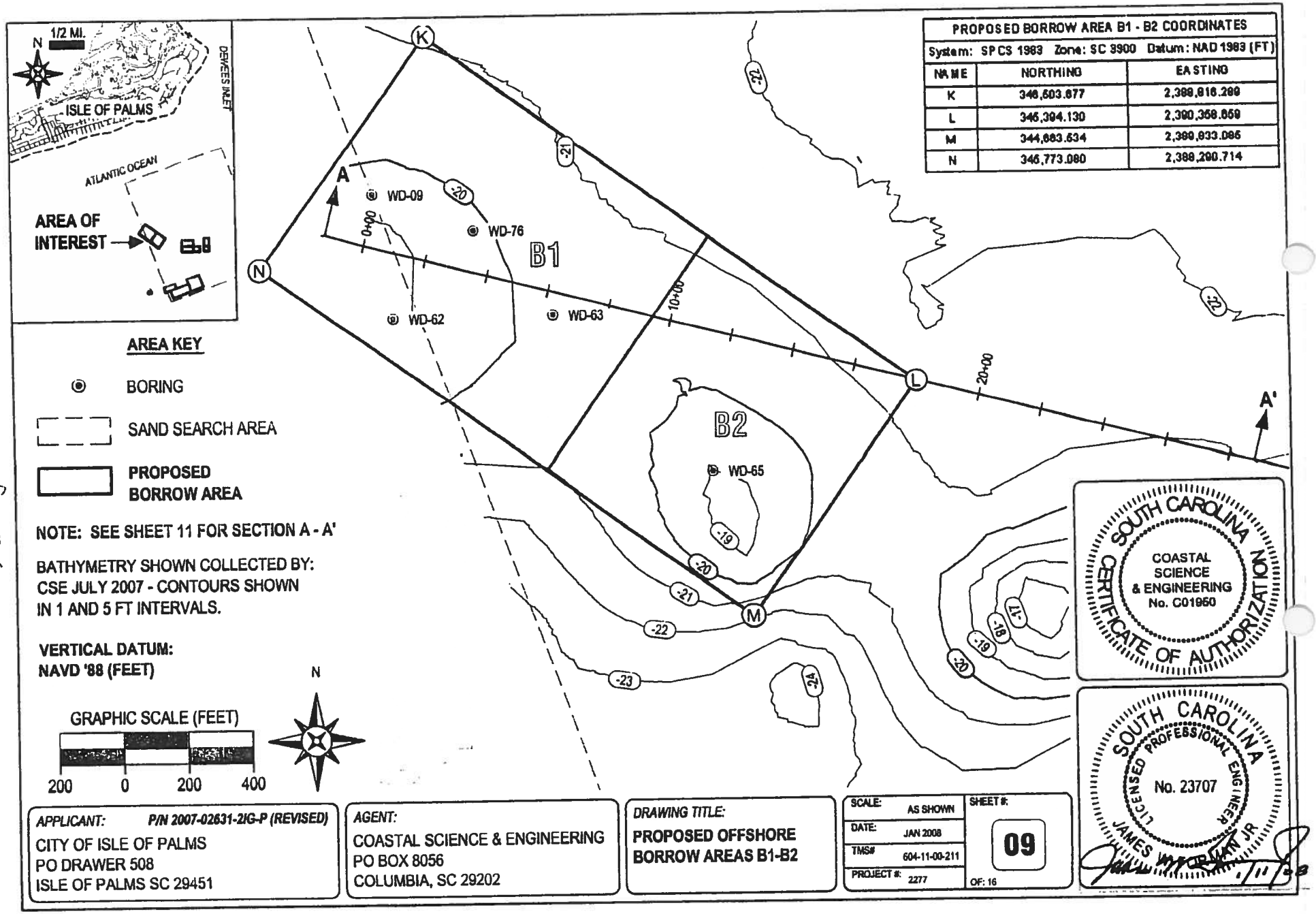
APPLICANT: *P/N 2007-02631-2IG-P (REVISED)*
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

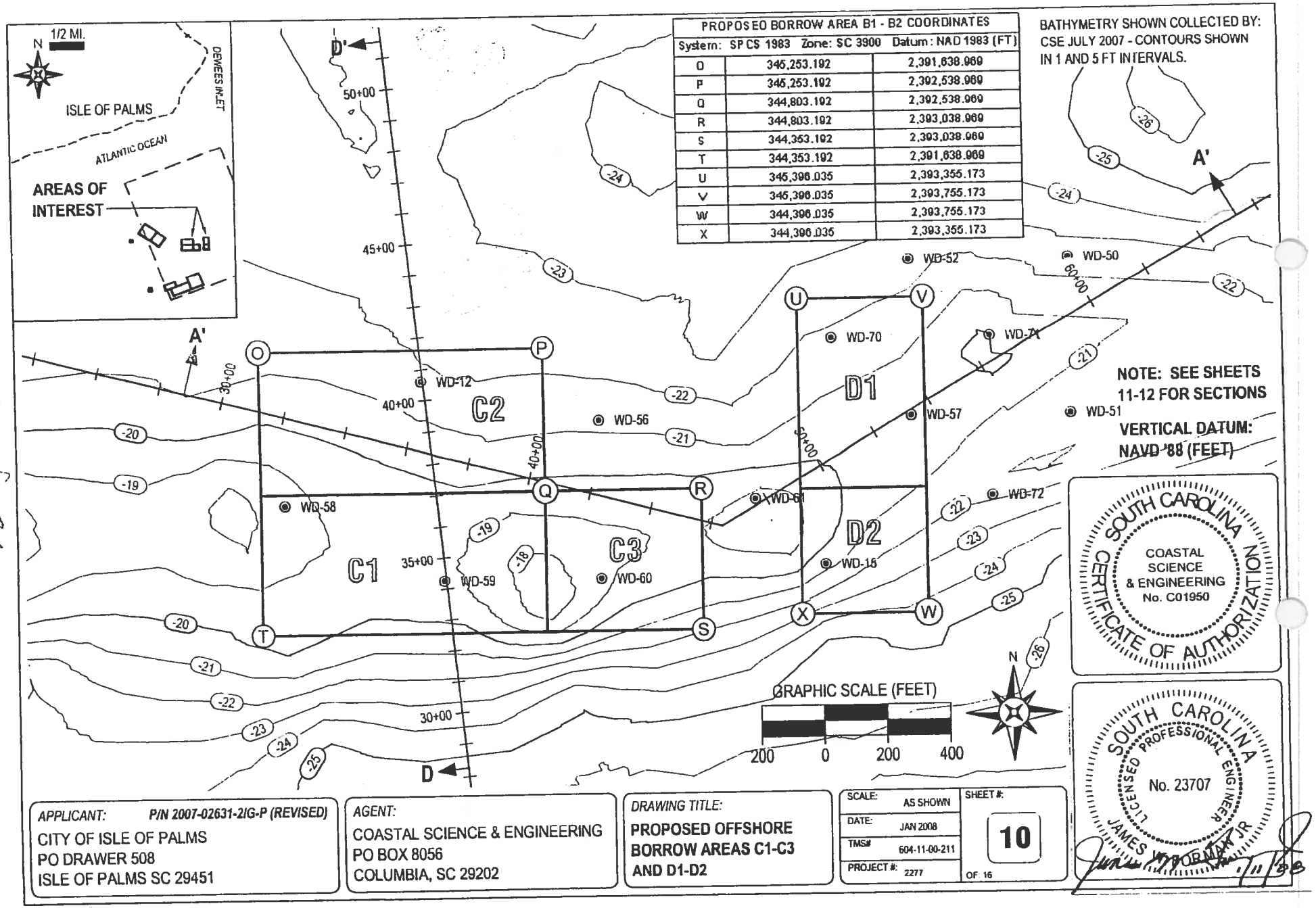
DRAWING TITLE:
PROPOSED OFFSHORE BORROW AREAS A1-A3

SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	604-11-00-211
PROJECT #:	2277
SHEET #:	08
OF:	16

12 of 20


1/2 MI.
N
ISLE OF PALMS
DEWEES INLET
ATLANTIC OCEAN
AREA OF INTEREST
AREA KEY
BORING
SAND SEARCH AREA
PROPOSED BORROW AREA
NOTE: SEE SHEET 11 FOR SECTION A - A'
BATHYMETRY SHOWN COLLECTED BY:
CSE JULY 2007 - CONTOURS SHOWN
IN 1 AND 5 FT INTERVALS.
VERTICAL DATUM:
NAVD '88 (FEET)
GRAPHIC SCALE (FEET)
200 0 200 400
K
L
M
N
A
A'
B1
B2
WD-09
WD-76
WD-62
WD-63
WD-65
0+00
10+00
20+00
-20
-21
-22
-19
-23
-24
-17
-18
PROPOSED BORROW AREA B1 - B2 COORDINATES
System: SPCS 1983 Zone: SC 3900 Datum: NAD 1983 (FT)
NAME | NORTHING | EASTING
K | 346,603.677 | 2,389,816.289
L | 345,394.130 | 2,390,358.859
M | 344,683.634 | 2,389,933.086
N | 345,773.080 | 2,388,290.714
SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING
No. C01960
CERTIFICATE OF AUTHORIZATION
SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES MORMAN JR
APPLICANT: P/N 2007-02631-2IG-P (REVISED)
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451
AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202
DRAWING TITLE:
PROPOSED OFFSHORE BORROW AREAS B1-B2
SCALE: AS SHOWN
DATE: JAN 2008
TMS#: 604-11-00-211
PROJECT #: 2277
SHEET #: 09
OF: 16

13 of 28



PROPOSED BORROW AREA B1 - B2 COORDINATES		
System: SPCS 1983 Zone: SC 3900 Datum: NAD 1983 (FT)		
O	345,253.192	2,391,638.969
P	345,253.192	2,392,538.969
Q	344,803.192	2,392,538.969
R	344,803.192	2,393,038.969
S	344,353.192	2,393,038.969
T	344,353.192	2,391,638.969
U	345,396.035	2,393,355.173
V	345,396.035	2,393,755.173
W	344,396.035	2,393,755.173
X	344,396.035	2,393,355.173

SOUTH CAROLINA
COASTAL SCIENCE & ENGINEERING
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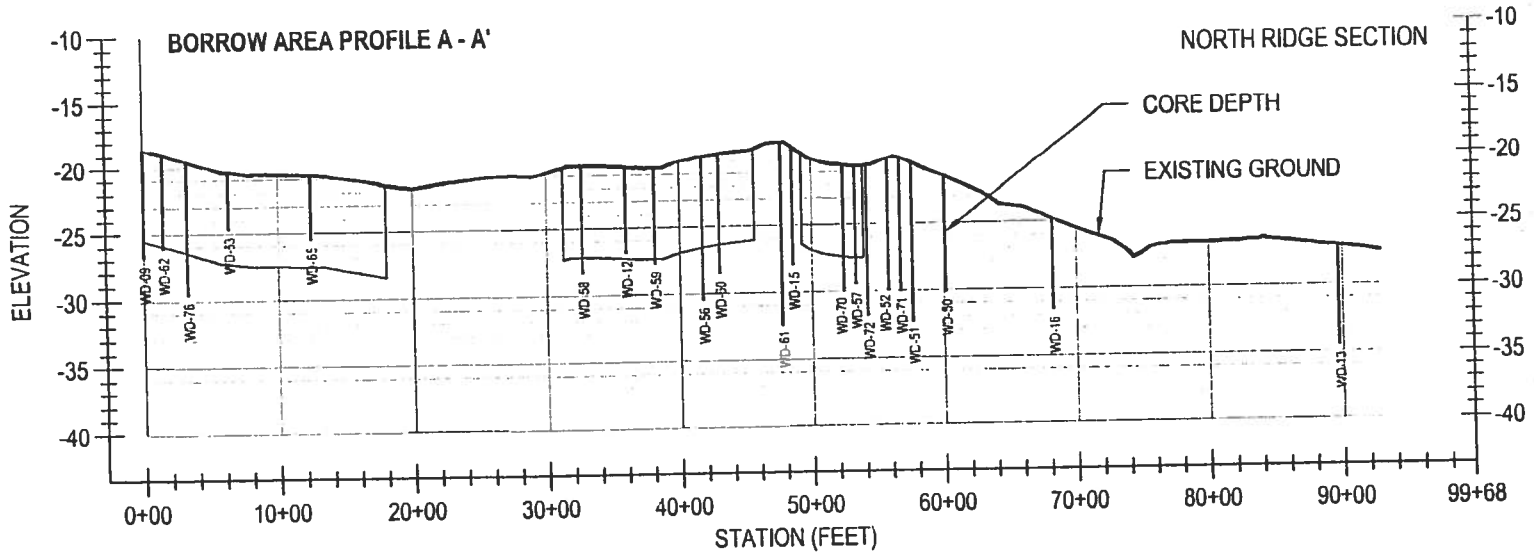
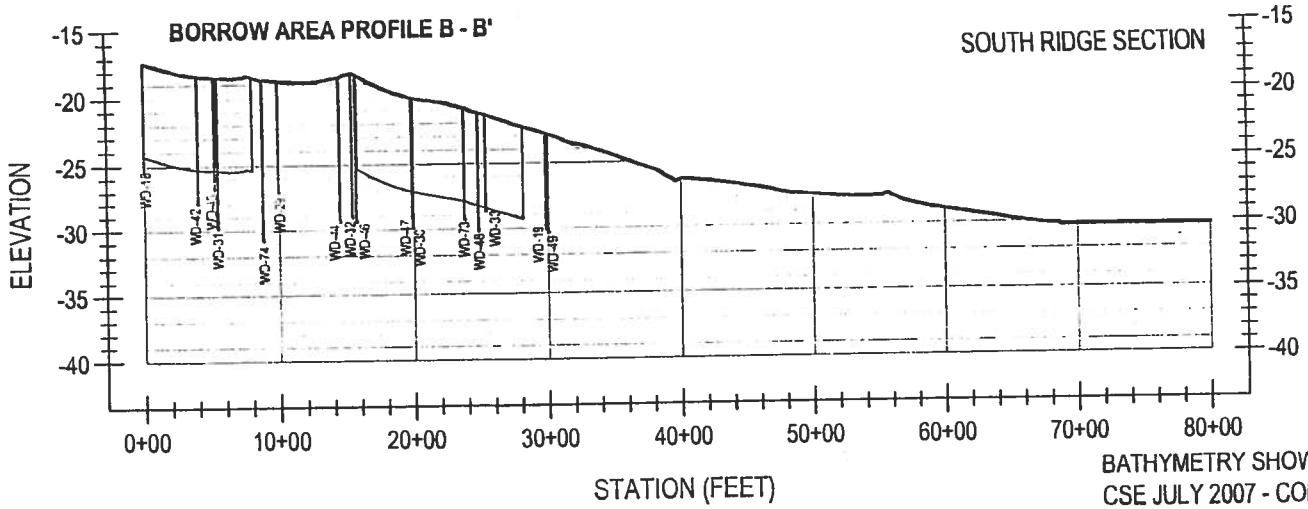
SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. POPLIN JR

APPLICANT: P/N 2007-02631-2IG-P (REVISED)	CITY OF ISLE OF PALMS PO DRAWER 508 ISLE OF PALMS SC 29451
AGENT:	COASTAL SCIENCE & ENGINEERING PO BOX 8056 COLUMBIA, SC 29202
DRAWING TITLE:	PROPOSED OFFSHORE BORROW AREAS C1-C3 AND D1-D2
SCALE: AS SHOWN	
DATE: JAN 2008	
TMS# 604-11-00-211	
PROJECT #: 2277	
SHEET #: 10 OF 16	





SURVEY DATUM:

HORIZONTAL:
SPCS NAD 83 FEET
SC ZONE 3900

VERTICAL:
NAVD 1988 FEET
EXAGGERATION: 100

SOUTH CAROLINA
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BATHYMETRY SHOWN COLLECTED BY:
CSE JULY 2007 - CONTOURS SHOWN
IN 1 AND 5 FT INTERVALS.

SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR

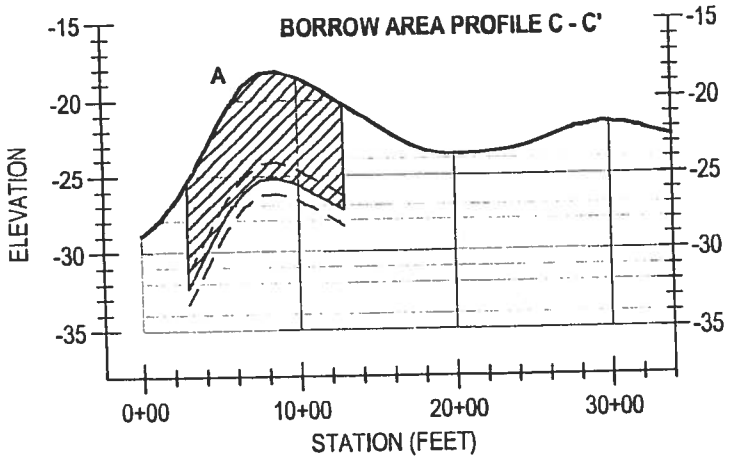
APPLICANT: ***P/N 2007-02631-2IG-P (REVISED)***
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

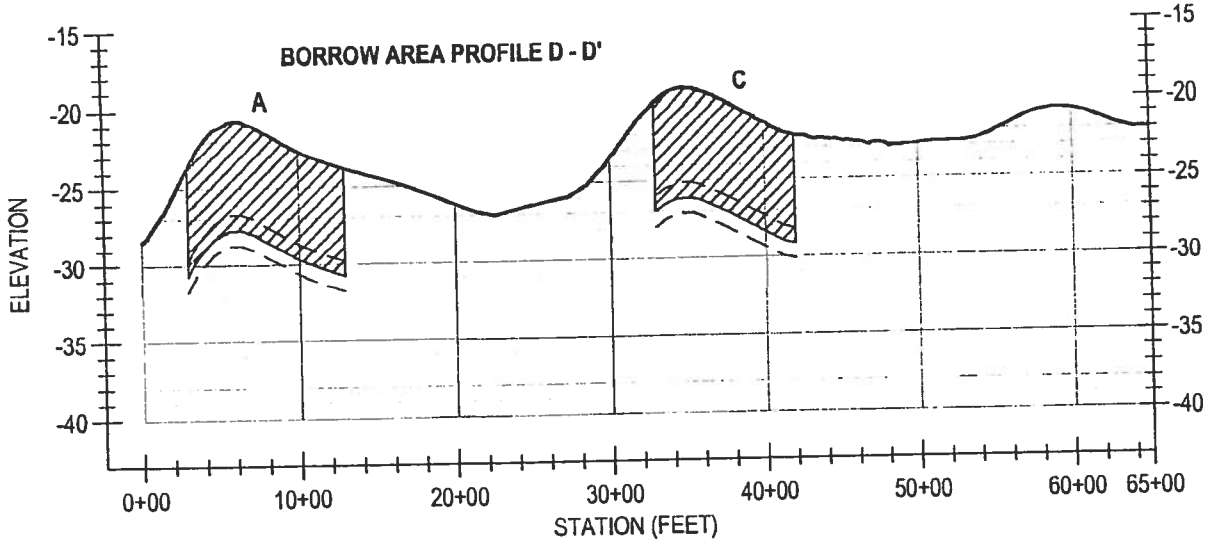
AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
PROPOSED OFFSHORE BORROW AREA SECTIONS SECTIONS 1-2

SCALE: AS SHOWN	SHEET #: 11
DATE: NOV 2007	
TMS# 604-11-00-211	
PROJECT #: 2277	OF: 16

15 of 20





LINE KEY

EXISTING GROUND

PROPOSED EXCAVATION

EXCAVATION ±1 FT

SURVEY DATUM:

HORIZONTAL:
SPCS NAD 83 FEET
SC ZONE 3900

VERTICAL:
NAVD 1988 FEET
EXAGGERATION: 100

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No. C01950
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SOUTH CAROLINA
LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR.

02 of 91

APPLICANT: **P/N 2007-02631-2IG-P (REVISED)**	*AGENT:*
CITY OF ISLE OF PALMS PO DRAWER 508 ISLE OF PALMS SC 29451	COASTAL SCIENCE & ENGINEERING PO BOX 8056 COLUMBIA, SC 29202

DRAWING TITLE:
PROPOSED OFFSHORE BORROW AREA SECTIONS SECTIONS 1-2

SCALE:	AS SHOWN
DATE:	NOV 2007
TMS#	604-11-00-211
PROJECT #:	2277

SHEET #: **12** OF. 16

SUMMARY SEDIMENT QUALITY MEASURES FOR THE RECOMMENDED OFFSHORE BORROW AREAS A1, A3, B1, C1 & D2		
PARAMETER	NATIVE BEACH SAMPLES (COMPOSITE)	BORROW AREA (COMPOSITES TO 8 FT)
MEAN GRAIN SIZE MM *	0.253 MM	0.408 MM
SORTING MM	0.523 MM	0.342 MM
PERCENT >2 MM	5	12.7
PERCENT SHELL >2 MM	~4.7	12.7
PERCENT SHELL <2 MM	~6.4	15.6
DOMINANT SHELL SPECIES	DONAX SP	DONAX SP
SEDIMENT DESCRIPTION	MEDIUM SAND	MEDIUM SAND

SOURCE: CSE. 2007. SHORELINE ASSESSMENT AND LONG-RANGE PLAN FOR BEACH RESTORATION ALONG THE NORTHEAST EROSION ZONE, ISLE OF PALMS, SOUTH CAROLINA. COASTAL SCIENCE & ENGINEERING, COLUMBIA, SC 74 PP. & CSE 2008, GEOTECHNICAL DATA REPORT, ISLE OF PALMS BEACH RESTORATION PROJECT, COASTAL SCIENCE & ENGINEERING, COLUMBIA, SC, IN PREPERATION.

* UNWEIGHTED

Proposed Dredging Sub-Areas (7 ft Dredge Depth)							
Sub-Area	Volume (cy)	Mz (mm)	% Mud	% Shell	% > 2 mm	% Shell < 2 mm	Core Density (acres/core)
A1	235,000	0.373	1.9	26.5	12.4	14.1	4.1
A3	260,000	0.464	2.7	34.6	14.4	20.2	5.7
B1	255,000	0.409	3	21.1	10.1	11	4.7
C1	105,000	0.419	1.2	33.8	15.4	18.4	4.6
D2	40,000	0.289	2.9	32.6	11.9	20.7	3.7
Total (weighted by volume)	**895,000**	**0.411**	**2.4**	**28.4**	**12.65**	**15.6**	**4.75**

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT: P/N 2007-02631-2IG-P (REVISED)
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
SEDIMENT CHARACTERISTICS

SCALE: AS SHOWN
DATE: JAN 2008
TMS# 634-11-00-211
PROJECT #: 2277
SHEET #: 13
OF: 16

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
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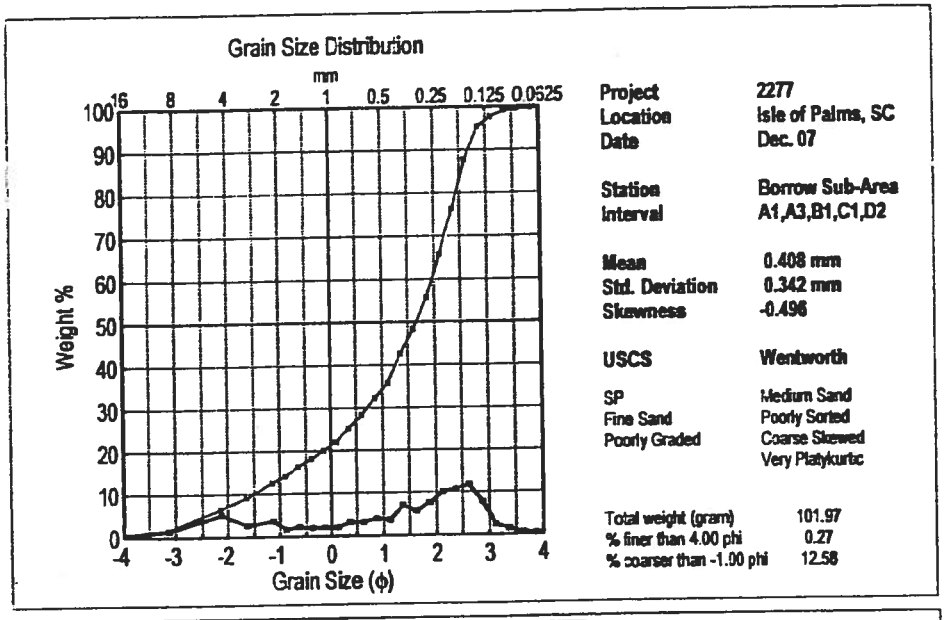
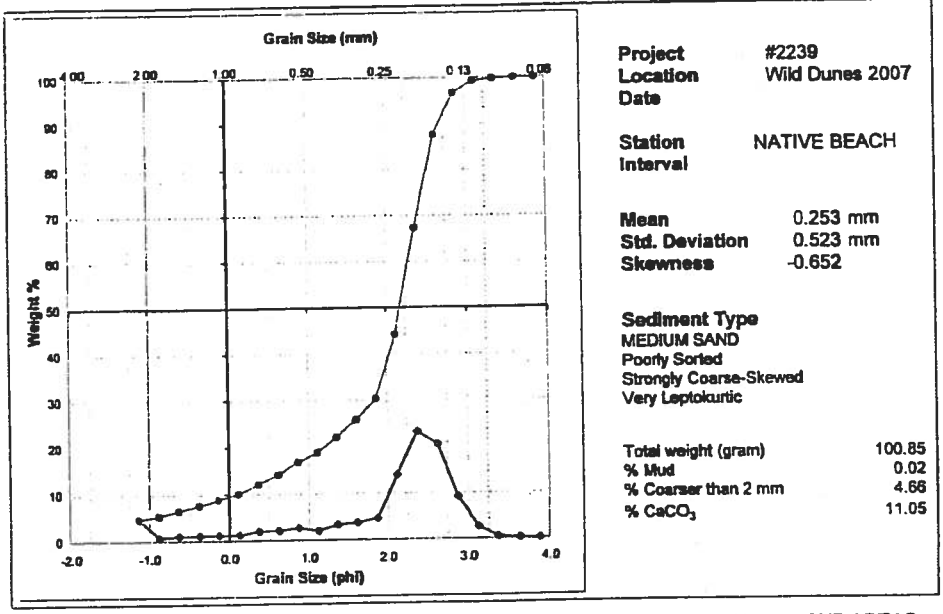
No. C01950

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORD JR
1/11/08





SEDIMENT GRAIN-SIZE DISTRIBUTION FOR THE PROPOSED OFFSHORE BORROW SUB AREAS BASED ON A COMPOSITE SIZE DISTRIBUTION FROM SIX CORES TO A TARGET EXCAVATION THICKNESS OF ~8 FT. LOWER GRAPH SHOWS A REPRESENTATIVE NATIVE BEACH COMPOSITE FOR REACHES 2 AND 3 AT WILD DUNES.

APPLICANT:
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT: *P/N 2007-02631-2IG-P (REVISED)*
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PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
SEDIMENT CHARACTERISTICS

SCALE: AS SHOWN
DATE: JAN 2008
TMS# 604-11-00-211
PROJECT #: 2277
SHEET #: 14 OF: 16

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
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No. 23707
JAMES W. MORMAN JR
1/11/08

15 of 20

Sediment Compatibility

Overfill ratios are Based on 2007 Beach Surface Samples and Proposed Borrow Area Cores.

				Mean Grain Size			Std.Dev			
	Native Beach			(mm)	(phi)		(mm)	(phi)		
	Beach Composite			0.253	1.984		0.523	0.935		

Offshore Borrow Area		Limits (feet)	Sediment	% Mud	Moment Measures		X	Y	Overfill Ratio	Overfill Ratio
2007 Borings	Sample ID		Description*		$M_{\phi b}$	$\sigma_{\phi b}$	$(M_{\phi b}-M_{\phi n})/\sigma_{\phi n}$	$\sigma_{\phi b}/\sigma_{\phi n}$	(RA)	RA + Mud
9	Comp 7'	0 - 7	FS,mws,c-s	1.23	2.153	0.694	0.18	0.74	1.77	1.78
12	Comp 7'	0 - 7	CS,ps,sym	1.00	0.729	1.920	-1.34	2.05	1.08	1.09
15	Comp 7'	0 - 7	MS,ps,sym	2.87	1.664	1.213	-0.34	1.30	1.04	1.07
18	Comp 7'	0 - 7	MS,ps,sym	1.00	1.070	1.678	-0.98	1.79	1.07	1.08
30	Comp 7'	0 - 7	CS,ps,sym	1.00	0.783	1.571	-1.28	1.68	1.03	1.04
31	Comp 7'	0 - 7	MS,ps,c-s	1.00	1.661	1.487	-0.34	1.59	1.13	1.14
32	Comp 7'	0 - 7	MS,ps,c-s	5.37	1.396	1.439	-0.63	1.54	1.06	1.12
33	Comp 7'	0 - 7	MS,ps,c-s	1.00	1.400	1.414	-0.62	1.51	1.06	1.07
42	Comp 7'	0 - 7	CS,ps,sym	1.38	0.696	1.742	-1.38	1.86	1.05	1.06
43	Comp 7'	0 - 7	MS,ps,c-s	0.96	1.473	1.455	-0.55	1.56	1.08	1.09
44	Comp 7'	0 - 7	MS,ps,c-s	1.14	1.212	1.621	-0.83	1.73	1.08	1.09
45	Comp 7'	0 - 7	MS,ps,c-s	1.19	1.370	1.509	-0.66	1.61	1.08	1.09
47	Comp 7'	0 - 7	MS,ps,c-s	1.84	1.254	1.642	-0.78	1.76	1.09	1.11
48	Comp 7'	0 - 7	MS,ps,sym	9.13	1.154	1.559	-0.89	1.67	1.06	1.15
57	Comp 7'	0 - 7	CS,ps,sym	2.03	0.667	1.781	-1.41	1.90	1.05	1.07
58	Comp 7'	0 - 7	MS,ps,sym	1.33	1.029	1.712	-1.02	1.83	1.07	1.09
59	Comp 7'	0 - 7	MS,ps,c-s	1.00	1.480	1.479	-0.54	1.58	1.09	1.09
60	Comp 7'	0 - 7	MS,ps,c-s	7.85	1.880	1.811	-0.11	1.94	1.28	1.36
62	Comp 7'	0 - 7	CS,ps,sym	3.38	0.751	1.510	-1.32	1.61	1.02	1.05
63	Comp 7'	0 - 7	CS,ps,sym	1.73	0.761	1.452	-1.31	1.55	1.01	1.03
65	Comp 7'	0 - 7	MS,ps,sym	3.20	1.053	1.826	-1.00	1.95	1.10	1.13
70	Comp 7'	0 - 7	MS,ps,sym	3.86	1.269	1.785	-0.77	1.91	1.12	1.16
73	Comp 7'	0 - 7	CS,ps,sym	1.18	0.952	1.580	-1.10	1.69	1.04	1.05
76	Comp 7'	0 - 7	MS,ps,c-s	5.21	1.287	1.721	-0.75	1.84	1.11	1.16
Composite	Borrow Area	0-7	MS,ps,c-s	2.5	1.220	1.594	-0 82	1.70	1.07	1.10
Composite	A1,A3,B1,C1,D2	0-7	MS,ps,c-s	2.4	1.294	1.517	-0.74	1.62	1.07	1.09

APPLICANT: P/N 2007-02631-2IG-P (REVISED)
CITY OF ISLE OF PALMS
PO DRAWER 508
ISLE OF PALMS SC 29451

AGENT:
COASTAL SCIENCE & ENGINEERING
PO BOX 8056
COLUMBIA, SC 29202

DRAWING TITLE:
SEDIMENT COMPATIBILITY

SCALE:	AS SHOWN
DATE:	JAN 2008
TMS#	604-11-00-211
PROJECT #.	2277
SHEET #:	15
	OF 16

SOUTH CAROLINA COASTAL SCIENCE & ENGINEERING No. C01950 CERTIFICATE OF AUTHORIZATION

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER No. 23707 JAMES W. FORMAN JR.

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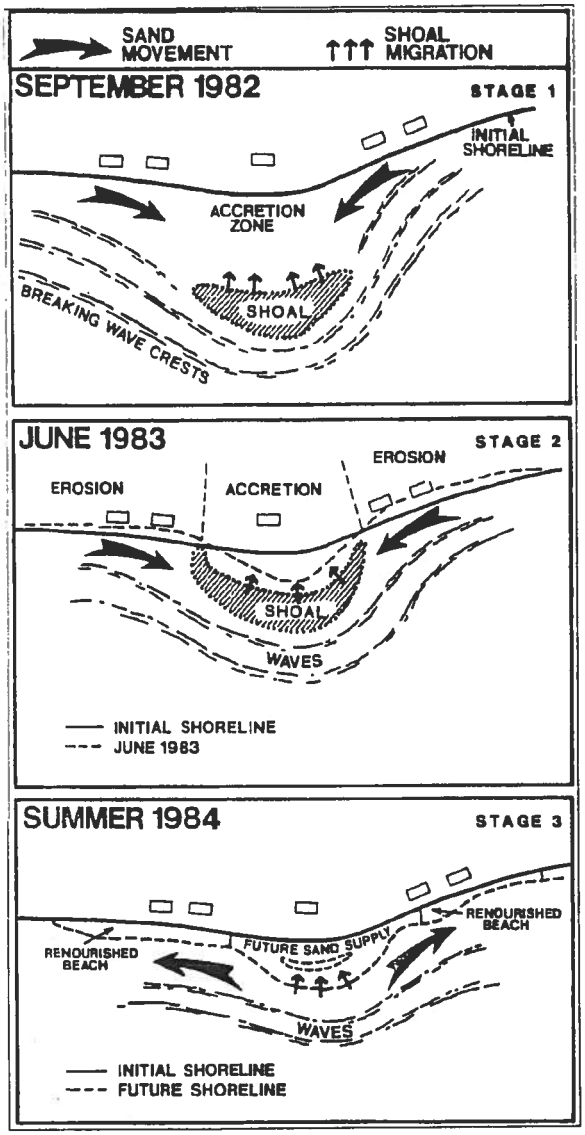
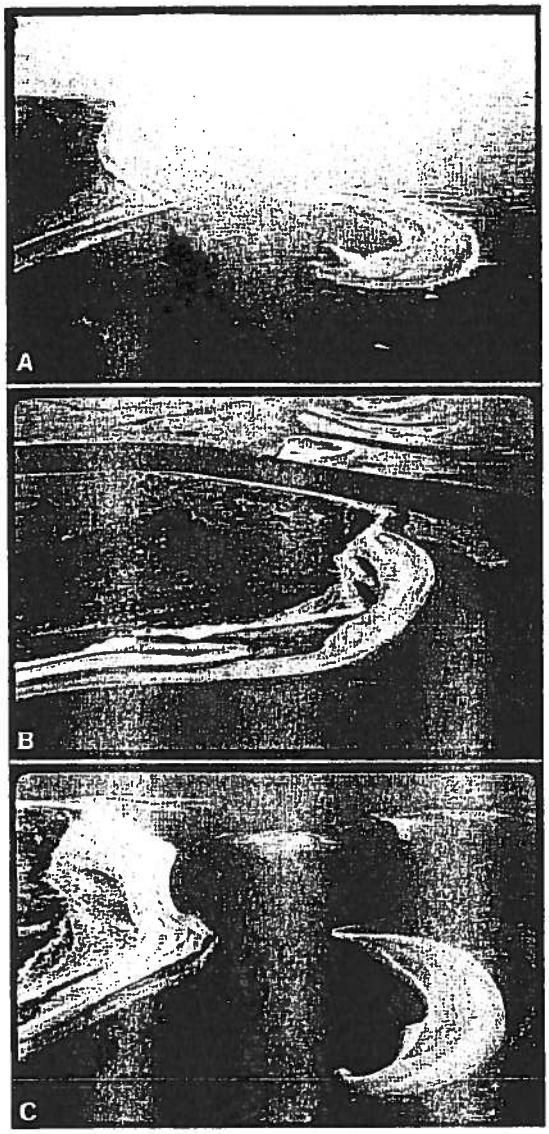
13 of 20





[LEFT] THE THREE STAGES OF SHOAL BYPASSING BASED ON A CASE STUDY AT DEWEES INLET/ISLE OF PALMS (AFTER KANA ET AL 1985). **[RIGHT]** SHOAL-BYPASS EVENT INVOLVING ~1 MILLION CUBIC YARDS OF SAND AT STONO INLET/KIAWAH ISLAND BETWEEN 1977(A) AND 1983 (B). A SUCCESSIVE EVENT BEGAN AROUND 1986 (C), CULMINATING IN ATTACHMENT AROUND 1990. VIEWS ARE LOOKING NORTH AT LOW TIDE. NOTE MAJOR CHANGES IN THE ADJACENT SHORELINE. SUCH LARGE SWINGS IN SHORELINE POSITION ARE COMMON AROUND ALL SOUTH CAROLINA INLETS. [FROM KANA ET AL 1999, FIG 6]

APPLICANT:
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ISLE OF PALMS SC 29451

AGENT:
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COLUMBIA, SC 29202

DRAWING TITLE:
SHOAL BYPASSING STAGES

SCALE: AS SHOWN	SHEET #: 16
DATE: JAN 2008	
TMS# 604-11-00-211	
PROJECT #: 2277	OF: 16

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
COASTAL SCIENCE & ENGINEERING
No. C01950

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
No. 23707
JAMES W. FORMAN JR

1/11/08

Protection of sea turtles

1. All fill material placed on beaches will be sand that is similar to that already existing at the beach site in both coloration and grain size distribution. All such fill material must be free of construction debris, rocks, organic materials, or other foreign matter and will generally not contain, on average, greater than ten percent fines (i.e., silt and clay; passing the # 200 sieve) and must not contain, on average, greater than five percent coarse gravel or cobble, exclusive of shell material (retained by the # 4 sieve). Based on the borrow site for the project, the dredge depth is not to exceed 7 feet below grade.

2. Daily early morning surveys for sea turtle nests will be required if any portion of the beach nourishment project occurs during the period from May 1 to September 30. Nesting surveys must be initiated 75 days prior to nourishment activities or by May 1, whichever is later. Nesting surveys must continue through the end of the project or through September 30, whichever is earlier. If nests are constructed in areas where they may be affected by construction activities, eggs must be relocated per the following requirements.

   2a. Nesting surveys and egg relocations will only be conducted by hired personnel with prior experience and training in nesting survey and egg relocation procedures. Surveyors must be trained by qualified personnel and have a valid SCDNR permit. Nesting surveys must be conducted daily between sunrise and 9 am (this is for all time zones). 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.

   2b. Only those nests that may be affected by construction activities will be relocated. 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. Nest relocations in association with construction activities must cease when construction activities no longer threaten nests. Nests deposited within areas where construction activities have ceased or will not occur for 75 days must be marked and left in place unless other factors threaten the success of the nest. Any nests left in the active construction zone must be clearly marked, and all mechanical equipment must avoid nests by at least 10 feet.

   2c. Nests deposited within areas where restoration activities have ceased or will not occur for 75 days must be marked and left *in situ* unless other factors threaten the success of the nest. The turtle permit holder must install an on-beach marker at the nest site and 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 an area of 10 feet radius surrounding the nest. No activity will occur within this area nor will any activity occur which 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 and all nest sites will continue to be monitored through the nest inventories.

2d. The applicant will hire nighttime monitors with sea turtle experience to patrol the length of the pipeline and the beach adjacent to operating construction equipment for sea turtles attempting to nest. Two monitors will work the beach nightly from 9 pm until 6 am and coordinate with the daytime monitors about any nests laid the previous night.

2e. The nighttime monitors will ensure that a 100 foot buffer remains around any sea turtle attempting to nest in the action area and all construction equipment excluding the dredge must be shut down until the turtle returns to the ocean.

3. Immediately after completion of the beach nourishment project and prior to May 1 for 3 subsequent years, sand compaction must be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the State regulatory agency, and the applicant. At a minimum, the protocol provided under 3a and 3b below must be followed. If required, the area must be tilled to a depth of 36 inches. All tilling activity must be completed prior to May 1. Each pass of the tilling equipment must be overlapped to allow more thorough and even tilling. If the project is completed during the nesting season, tilling will not be performed in areas where nests have been left in place or relocated. A report on the results of the compaction monitoring shall be submitted to the Service prior to any tilling actions being taken. (NOTE: The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.)

3a. Compaction sampling stations must be located at 500-foot intervals along the project area. One station must be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station must be midway between the dune line and the high water line (normal wrack line).

At each station, the cone penetrometer will 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 lay over less compact layers. Replicates will be located as close to each other as possible, without

interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth will be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final 6 averaged compaction values.

3b. If the average value for any depth exceeds 500 pounds per square inch (psi) for any two or more adjacent stations, then that area must be tilled immediately prior to May 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 Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

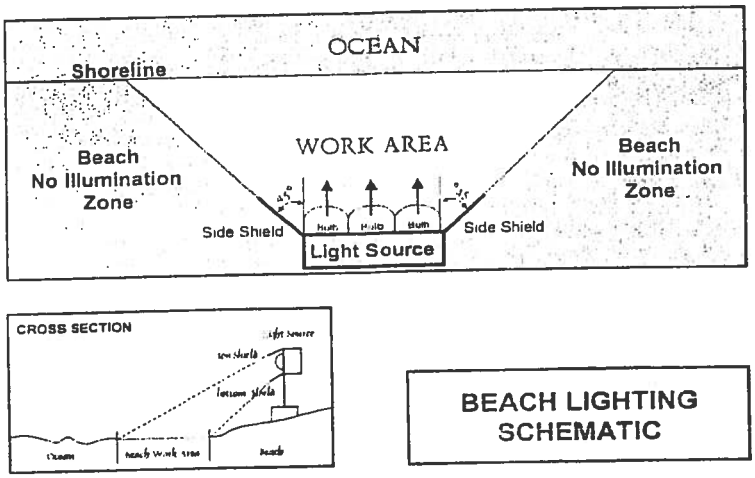
4. Visual surveys for escarpments along the project area must be made immediately after completion of the beach nourishment project and prior to May 1 for 3 subsequent years. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet must be leveled to the natural beach contour by May 1. If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. The Service must be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken must be submitted to the Service. To ensure compliance with this condition, turtle nesting surveys must be conducted for 3 years following beach restoration. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the beach.)

5. The applicant must arrange a meeting between representatives of the contractor, the Service, the SCDNR, the night monitors, and the permitted people responsible for egg relocation at least 30 days prior to the commencement of work on this project. At least 10 days advance notice must be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.

6. From May 1 to July 31, staging areas for construction equipment must be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach must be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes

must be off the beach to the maximum extent possible. Temporary storage of pipes on the beach must be in such a manner so as to impact the least amount of nesting habitat and must likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

7. From May 1 to July 31, direct lighting of the beach and near shore waters must be limited to the immediate construction area and must comply with safety requirements. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to misdirect sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being transmitted outside the construction area (see below schematic).



BEACH LIGHTING SCHEMATIC

8. All pipeline and heavy equipment will be removed from the beach prior to August 1, 2008. No tilling or escarpment removal needed will occur between August 1, 2008 and October 31, 2008. If the project is not completed prior to August 1, 2008, project construction cannot start again until November 1, 2008.

9. All sandbags will be removed during project construction. The length and width of the beach where sandbags were placed must be probed in order to locate any buried bags or remnants. If sandbags are to be cut open and the material is left in the project area, it must be beach compatible. Any incompatible material will be removed and disposed of offsite. The applicant will hire an inspector responsible for ensuring sandbag removal and disposal offsite.

10. All dune vegetation must be native to South Carolina. Sand fencing must be installed correctly and spaced ten feet apart outside of the nesting season.

11. Immediately after completion of the beach nourishment project and prior to May 1 for 3 subsequent years, beach slope must be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the State regulatory agency, and the applicant.

Reporting

1. A report describing the actions taken to implement the terms and conditions of this incidental take statement must be submitted to the Service within 60 days of completion of the proposed work for each year when the activity has occurred. This report will include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of self-release beach sites, nest survey and relocation results, and hatching success of nests.

2. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project must be notified so the eggs can be moved to a suitable relocation site.

3. Upon locating a sea turtle adult, hatchling, or egg harmed or destroyed as a direct or indirect result of the project, initial notification must be made to the Service Law Enforcement Office at (843) 727-4707 ext. 210 or 211 or (843) 514-3260 or (843) 297-9829. Additional notification must also be made to Melissa Bimbi of the Charleston Field Office at (843) 727-4707 ext. 217 and DuBose Griffin of the SCDNR at (843) 870-3667. Care should be taken in handling injured 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.